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ENGINEERING PAPERS AT C.E.R.A. MEETINGS

The meeting of the Central Electric Railway Association in Toledo last week was marked by the intensive interest shown by the managers of the various properties represented. In fact it was almost exclusively a managers' meeting, and the lack of engineering discussion on the technical papers was noticeable. There were only four master mechanics in attendance, so far as we can remember, and only two or three electrical engineers. Real progress was made by the managers, and we believe all went home with a much better perception of the need for giving the public first-hand information on the true conditions in the industry. But the value of the two technical papers was largely lost, due to the absence of men to discuss them from the engineering side of the industry. This suggests the advisability of special sessions or, possibly a separate section, of the association for the engineering side of the industry. True, the principal problems of to-day are managerial ones, but there are still many things puzzling the men who deal with the technical side. We already have the traffic and accounting subdivisions; why not an engineering subdivision of the C. E. R. A.?

RESTRICTING UTILITY STRIKES

Last week we devoted considerable space to the addresses and discussions on the subject of labor disputes before the Academy of Political Science in New York City. We did this not because we believed that the Academy had the power to make either an immediate or a profound impression upon public opinion, but because we thought that the various sessions would serve to assemble the views of government mediator, economist, employer and labor leader and make the public conscious of a possible drift of opinion in any direction. That there really was, in spite of the uncompromising attitude taken by the labor leaders, a basic principle underlying the opinions of the other representatives was quite evident. This principle involved the paramount right of the public to continuity of utility service. It was freely admitted that employees in general have a right to strike, but it was also averred that on public utilities this right should be subordinated to the public welfare and could constitutionally be made so subordinated when it created a public wrong. In such an event, however, it was felt that the public should guard employees by scientifically regulating wages, hours and working conditions, at the same time protecting utilities by seeing that increases in wages should be reflected in the rates. While, therefore, the sentiment at the conference was toward a realization of the need for governmental con-

trol over utility strikes, it included the idea that a restriction of the right to strike cannot fairly be demanded of labor without some provision for a more scientific method of adjusting labor questions. If the distrust of labor toward capital is to be removed, it would seem that this point should be considered.

RATES AND UTILITY INVESTMENTS

The hope of utility expansion in the future is the real investor and not the speculator. This statement, based on the remarks by Delos F. Wilcox, of which a short abstract is given in our financial department, ably sums up the fundamentals of utility financing, past, present and future. In the old days utilities were financed as speculative enterprises with more thought to a high rate of return than to security of either principal or return. At present, however, rate regulation tends to eliminate the speculative feature of utility securities, and to the extent that it provides security to make up for the lower rate of return, utility issues will increasingly appeal to another class of buyers, the investors. By sad experience, however, capital has learned that the bestowal of compensating security lags behind the removal of the chance for speculative profit. Capital, therefore, is inclined to hesitate in entering the utility field. If utility investments are to have the desired security, the public must fully give up some of its cherished illusions. For instance, as Mr. Wilcox says, the fancied protection of maximum or absolute rates fixed by franchise for a long term of years must be surrendered, and the public must frankly recognize that rate regulation involves the possibility of increases whenever justice so demands. Thus the public has a direct responsibility for the attitude of investors toward utility expansion. The public cannot well afford to bite off its nose simply to spite its face on account of past speculative returns.

A BIRD'S-EYE VIEW OF HEAVY TRACTION

It is often of help to see ourselves as others see us. This point of view is presented in the article on heavy traction affairs in this country, abstracted on another page from a recent contribution to *La Lumière Electrique*. The author, Joseph Carlier, professor of railways at the Belgian university at Liège, spent but a few weeks in this country last summer but seems to have made good use of his time. His views may be said to have been prepared from two angles, so to speak, a wide one including the heavy traction field as a whole, and a smaller one including only that portion operated by electricity. The broader view shows that there is a tremendous field for the electric locomotive and the

motor car, considered as a factor in increasing the ability of a road to handle traffic, the prime requisite. In electric traction itself the professor sees two big factors which are to settle the question of system. One is the economical contact line voltage which is determined by density of traffic and length of line. A light traffic on a long line calls logically, in his opinion, for a high-tension distribution and therefore involves the use of alternating current on the trolley wire, while, vice versa, heavy traffic calls for the use of direct current. The other point brought out is the natural inclination of the railroad man for the direct-current system, everything else being equal, in spite of his appreciation of the excellent qualities of the single phase. If we get Professor Carrier's idea correctly he thinks that the preference of the railroad man is for the third-rail contact system on account of its simplicity and freedom from overhead obstructions. Consequently there will be pressure to extend the range of third-rail operation by adapting it to higher voltages. In the professor's mind there is no question as to the complete technical success of the two great systems now in vogue. He says so, with the aid of numerous complimentary adjectives. At the same time he sees the larger future for direct current in the light of heavy electric traction economics.

TRUSS-SIDE CONSTRUCTION FOR RAILWAY CARS

That there should be a division of opinion as to the relative desirability of the truss-side and side-girder designs for steel cars is not surprising when one considers the novelty (comparatively speaking) of the whole question. Practice in an industry such as electric railway operation is notoriously conservative. Three years, for example, is hardly enough time for any suggested change to become of general knowledge, and yet it is only three years ago that this journal was combating a widespread opposition to the introduction of steel in place of wood as a material for car construction. Clearly enough the truss-side type of construction, which is a physical impossibility when steel is not available, could hardly arouse any great interest so long as an appreciably large section of the industry held a preference for wooden cars.

At the present time, of course, this situation has been wholly changed. So far as new orders are concerned the wooden car is no longer moribund—it is extinct. And with the passing of the wood-versus-steel controversy, more attention may well be, and undoubtedly will be, devoted to the new principles of design that are applicable with the new material of construction. These, as explained in L. B. Stillwell's Toledo paper, abstracted in our last issue, offer the alternatives of a side-girder construction and a truss-side construction, whose development of the whole car side to carry weight gives a beam height approximately 7 ft. The former was the first type of steel car upon the ground, and, excepting a few disastrous experiments with shallow steel underframe designs, it has until quite recently held the electric railway field exclusively.

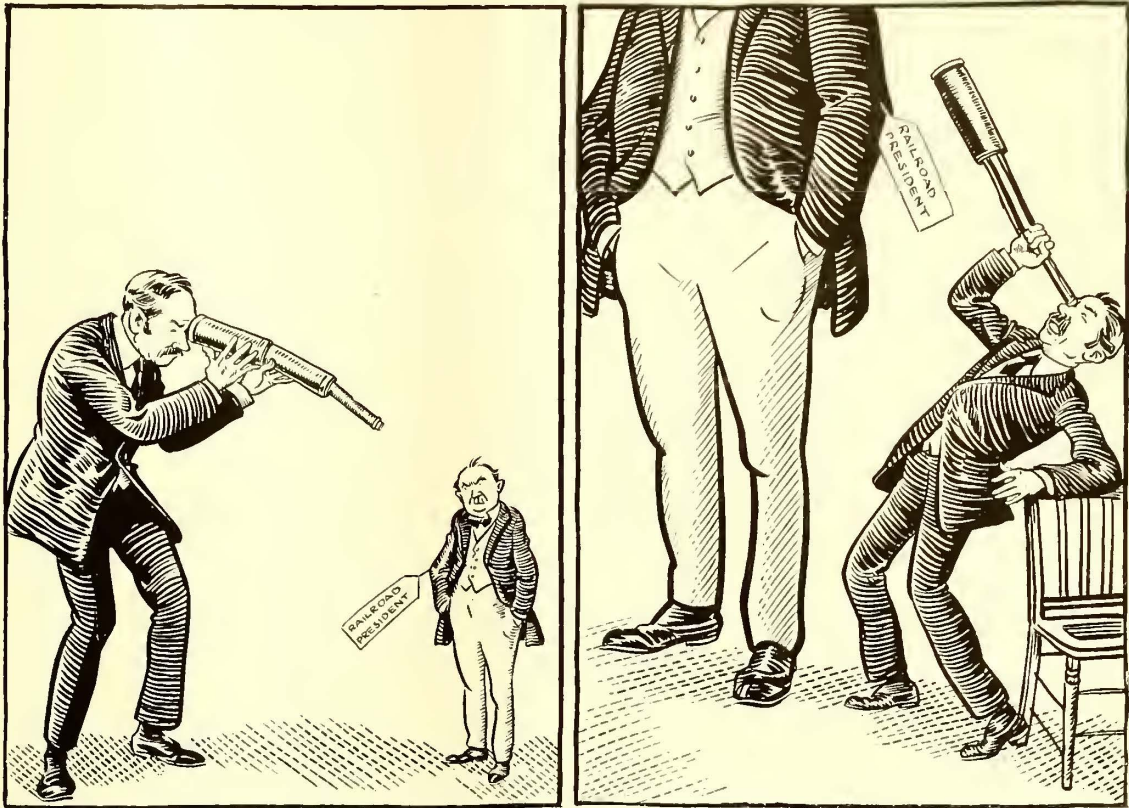
However, the truss-side type of construction offers

many points of superiority. Among them, as Mr. Stillwell points out, is a collision strength inherently greater than anything possible with side-girder designs, because with the latter there is always the tendency toward over-riding, thus crumpling up the light superstructure. This is, perhaps, of more importance on steam railroads than in electric railway operation, for the reason that one-car and two-car trains are the rule rather than the exception even on the high-speed inter-urban properties, and where trains are short and light the energy of collision impacts is quite easily dissipated. In fact, it is a long-standing axiom of steam locomotive engineers that in a collision where a light engine or engine and caboose are involved, the safest procedure is to stay in the cab rather than run the risks of jumping.

It would seem, therefore, that the feature of greater impact strength alone would hardly be a sufficient reason for the general desirability in electric service of the truss-side type of construction. Its dominating point of superiority seems rather to lie in its obvious ability to reduce weight and repairs, because the costs of the alternative types of construction are the same, and where one of the two offers the chance to effect a saving in weight, even though this be slight, there is an excellent reason for its adoption. In addition, there is a vastly increased rigidity with truss-side designs, and this prevents "weaving" of the body and working of the side posts at the window sills. Such relative movements in a composite structure like a car body are harmful enough with flexible wooden constructions, but with steel they permit the establishment of localized corrosion at the points where movements, however small, break the paint film or otherwise allow entrance of moisture between adjacent pieces of metal. When the motion is of sufficient amplitude, the great hardness of steel as compared with wood prevents any opportunity for "give" at the joints and may easily start rivets, which when once loose will certainly never tighten up again of their own accord.

Even with city cars, therefore, there is a clear-cut reason for preferring the truss-side to the side-girder design, though the latter may, with short car bodies, provide enough beam height for the required load without necessitating excessively thick plates. All that is required to establish the principle of truss-side construction and to utilize the potential compressive strength of the letterboard and roof—elements that have to be installed whether or not they are required to carry load—is to increase somewhat the longitudinal dimensions for the side posts over those now commonly used. When sufficient strength has been provided to take up the longitudinal shear existing between the top and bottom of the car side, there will have been eliminated the most obvious feature of weakness in steel car construction. This is the working of the posts. That it exists in practically every car with side-girder construction is not difficult to demonstrate, because merely by pressing a finger into the corner formed by the sash, post and window sill of a moving car when it rounds a curve one will find in nine cases out of ten that relative movement is taking place.

Putting the Railroad Man Right with the Public



Through Which End of the Telescope Do You Want the Public to Look at You?

DO the executives of electric railways loom as large and look as good as they really are? No; as a general rule, they do not.

They do not lay half enough cornerstones or address enough Fourth of July celebrations and June graduating classes or lead enough of the preparedness parades.

If they did, more people would know them and like them better.

Surely, there isn't anything about running a railroad that makes a man an unsocial individual.

Then why are there not more railway men among those who lead in the civic life of their communities?

One explanation is that more or less general distrust, not to say hostility, has kept railway men at arm's length from public affairs.

A few exceptions do not alter the truth of this general statement.

Railway executives will always be in this position until they take the trouble to show themselves **AS THEY ARE**—mainly big men who are making the most of a hard job.

Before the Civil War a lot of people in the South thought that Yankees had horns and a tail.

Afterwards it was found that this report was exaggerated, and now the people of North and South even hold each other in considerable esteem.

The same happy condition of affairs will obtain when it is discovered that railway presidents have no horns or caudal appendages.

But to effect this result it is necessary that they should show themselves.

If they are too busy frequently to pose in person, they can at least pose in print.

Where do most people get their impressions of people as well as things? From the newspapers.

Breaking into print, however, is no job for unassisted amateurs.

It is almost pathetic at times to see how small a big man looks in a newspaper statement.

No one would expect a lawyer to make a success as a master mechanic; then why expect a railroad man to be an expert in dealing with the public?

And even if he is, he is too close to his job to see it in its relations to the man in the street.

He overestimates the public knowledge for one thing. "Any idiot ought to know that," is a remark frequently heard when enlightenment of the public is under discussion.

Yet railway executives probably know as little about the packing industry, for example, as packers know about railroading.

Get a publicity man who knows how little the public knows and who thinks about what the public is thinking and feeling.

He can do as much toward **PUTTING YOU RIGHT WITH THE PUBLIC** as your best trial lawyer can do toward putting that accident case in the right light before the jury.

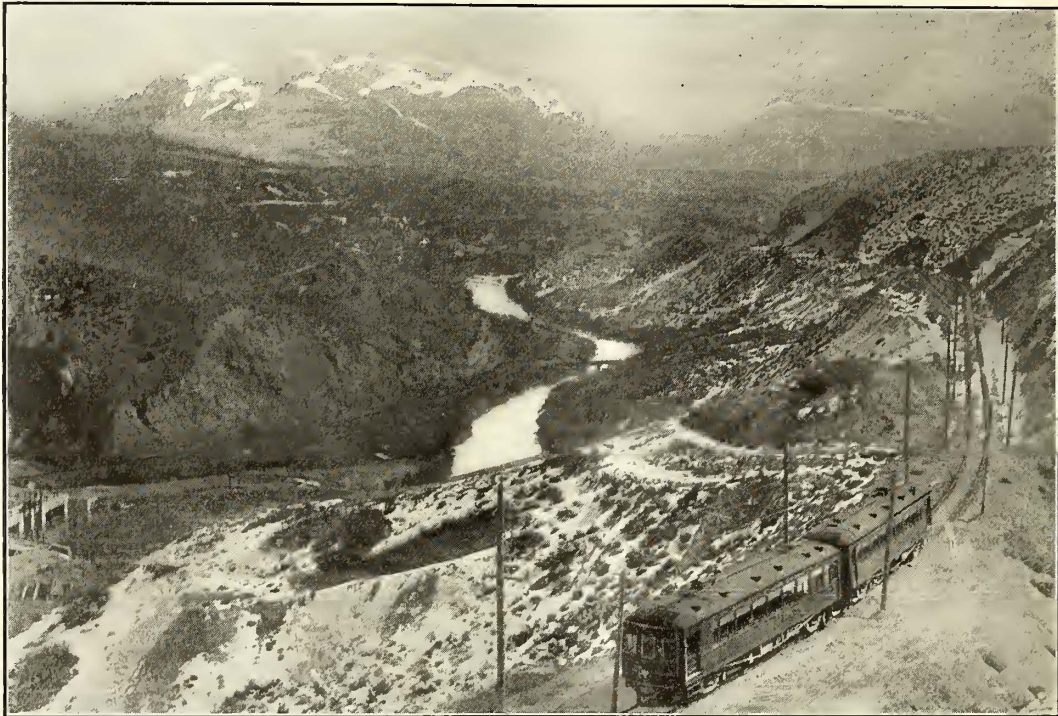
The two things are much the same; the main difference is in the size of the jury before which the publicity attorney argues his case.

1500-Volt Substation with Three 750-Volt Rotaries

New Substation of Salt Lake & Utah Railway Contains One Bank of Three Single-Phase Transformers and Three Rotaries—A Feature Is the Provision for Reliability with Reasonable Standby Equipment

BY M. R. LOTT

Electrical Engineer Salt Lake & Utah Railroad



UTAH SUBSTATION—ROUTE OF THE SALT LAKE & UTAH RAILROAD ALONG THE JORDAN CANYON AT THE NARROWS; WASATCH MOUNTAINS ARE IN THE DISTANCE

THE Salt Lake & Utah Railroad is a 1500-volt d.c. interurban line extending some 67 miles south from Salt Lake City, Utah, to Payson, the last section having been completed in June of the present year.* As the line has been extended and traffic increased it has been necessary to add to the number of substations. The Bringhurst substation, which the writer will describe, was the last one to be completed, and while the apparatus used is similar to that at the other substations a different arrangement has improved operating conditions over those existing at the original stations.

The service now consists of thirteen daily passenger trains each way, with considerable freight traffic. The passenger rolling stock comprises 44-ton all-steel cars, each equipped with four 115-hp., 750-volt motors. These are connected in two pairs, the motors of each pair being wired in series for operation on 1500 volts. A change-over switch mounted on the car allows all motors to be connected in parallel for full-speed operation on 750 volts. This connection is used when operating in Salt Lake City, or at times when it is desired to operate cars over the Salt Lake & Ogden Railroad, which is a 750-volt road connecting Salt Lake City with Ogden. They are geared for a free running speed of 55 m.p.h.

Frequently two-car and three-car trains are operated, and at times four-car trains are run to care for special conditions.

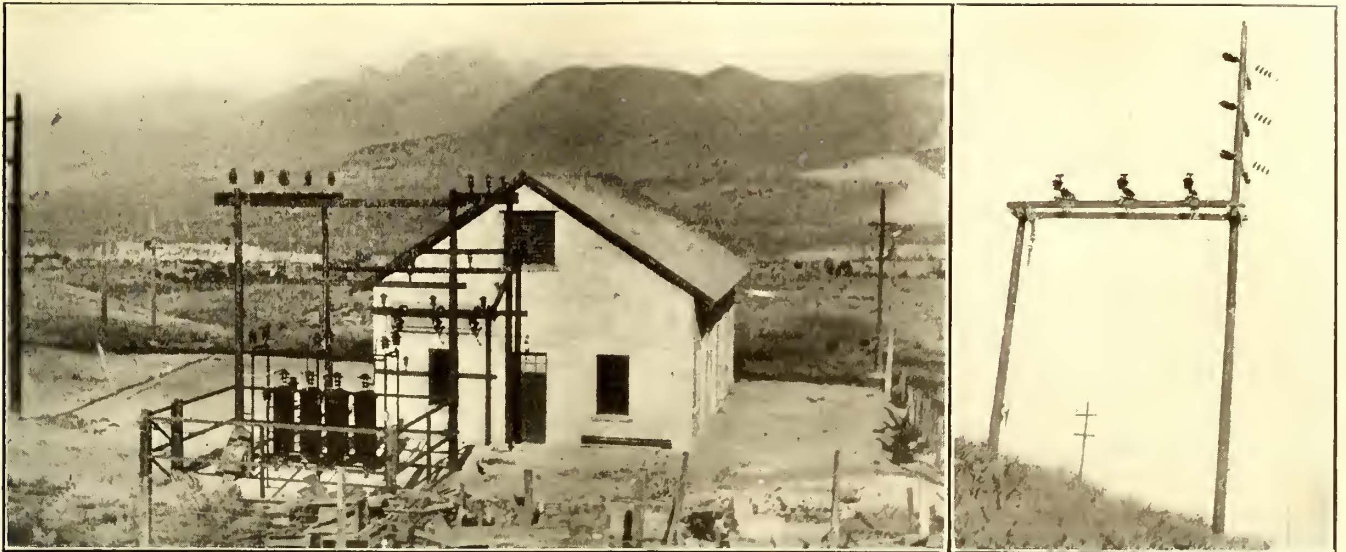
The other three substations are at Granger, Lindon and Springville, and are respectively 5.8 miles, 38.7 miles and 53.4 miles from Salt Lake City. A No. 0000 copper trolley wire is used and the feeders are of the same size. Under normal conditions of operation all of the substations feed into the trolley wire, which is maintained continuous throughout the entire length of the road. Provisions are made, however, for sectionalizing the line in times of trouble. The normal rating of each substation is 500 kw.

Load conditions were the deciding factor in locating the substation at Bringhurst, 23.4 miles from Salt Lake City, approximately midway between Granger and Lindon substations. This location was also readily accessible for connection with some of the existing 44,000-volt lines of the Utah Power & Light Company, from which company 60-cycle power is purchased for the operation of the entire road.

GENERAL FEATURES OF BRINGHURST SUBSTATION

The building is of brick, 52 ft. x 34 ft. in plan, with walls 18 ft. high. It is fireproof and has steel roof trusses and asbestos-covered corrugated iron roofing.

*See ELECTRIC RAILWAY JOURNAL, July 22, 1916, page 143.



UTAH SUBSTATION—BRINGHURST SUBSTATION OF SALT LAKE & UTAH RAILROAD, SHOWING INCOMING HIGH-TENSION LINES; ALSO THREE-PHASE AIR-BREAK SWITCHES AT POINT WHERE TAP LINE TO SUBSTATION CONNECTS WITH TRANSMISSION LINE

The energy is received from the Utah Power & Light Company's lines at 44,000 volts and delivered to the trolley line at 1500 volts d.c. through two 750-volt, 250-kw. rotaries connected in series. At present there are three rotaries installed with wiring so arranged that any two can be operated together. The station and switchboard will care for two additional rotary converters and the accompanying transformers, which will give the station an ultimate rated capacity of 1000 kw.

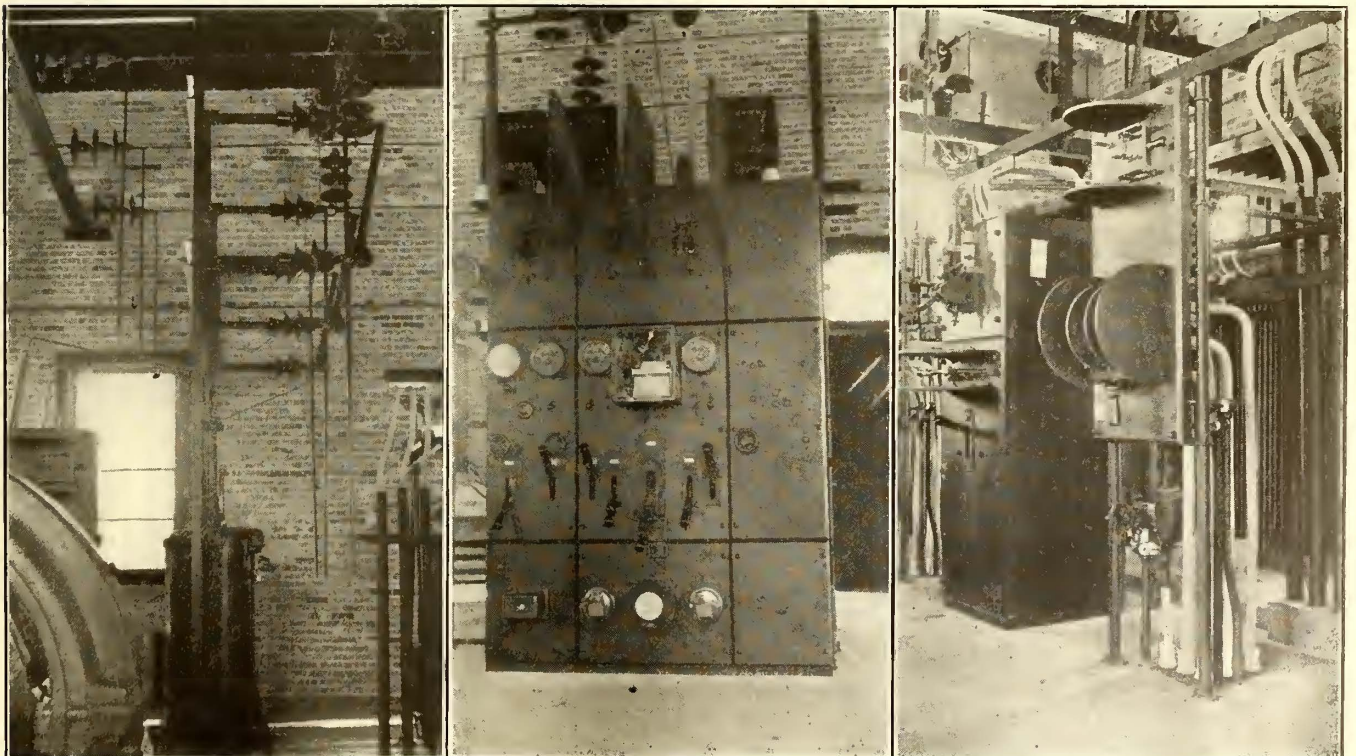
Conduits have been laid to care for the equalizing cables which will be necessary when the two sets of rotaries are operated in parallel. In the future installation, a three-pole breaker will be mounted on the negative panel to care for the three equalizer leads, and this breaker will be interlocked with either one of the

four circuit breakers, so that on the opening of any of the main breakers the three-pole breaker will open and disconnect the two sets of converters.

All of the apparatus is placed in the one room and on the same floor level, and the operator has a small portable office provided with desk, telephone and an electric heater. An I-beam equipped with a chain hoist extends the full length of the building.

OUTDOOR APPARATUS

The Utah Power & Light Company's transmission line is approximately 200 ft. from the substation building. At the point of connection there is a switch rack equipped with an air-break switch to cut off the south end of the company's transmission line should trouble



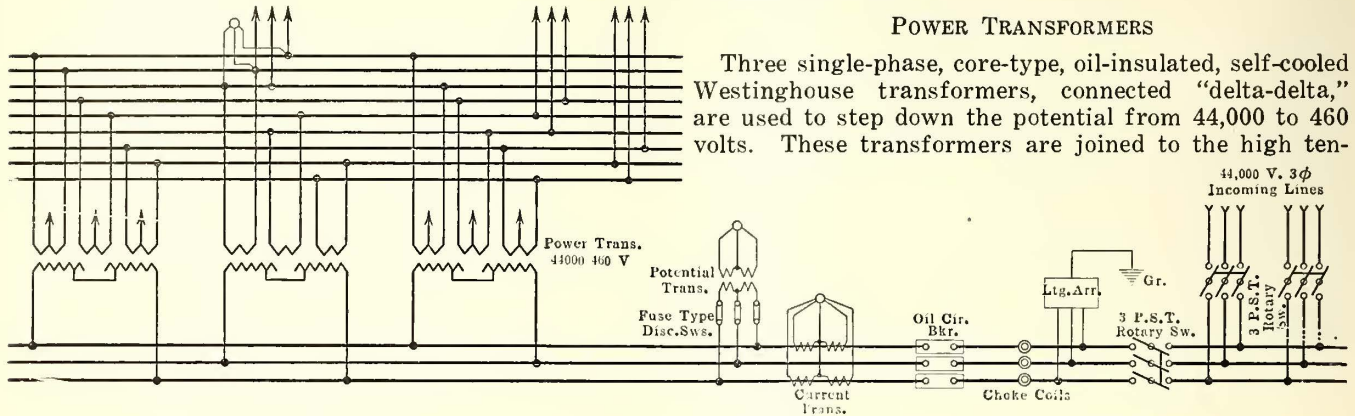
High-tension wiring, showing disconnecting switches and instrument transformers. Front view of switchboard, showing rheostats mounted above and at rear of panels. View of negative panel on the left and starting panel on the right.

UTAH SUBSTATION—THREE VIEWS OF INTERIOR SUBSTATION EQUIPMENT

arise on that section. As the Utah Power & Light Company has a sectionalizing station about a mile north of the Bringhurst substation, this arrangement practically insures the same continuity as a loop-line service.

At the substation is another rack fitted with a similar switch to disconnect the substation wiring and lightning

mounted on an elevated concrete base. Connection is thence made with the copper-tubing high-tension bus which extends the length of the building 15 ft. above the floor. The bus is supported at the ends by strings of three 10-in. strain insulators attached to structural steel supports, and from the roof trusses by means of suspension insulators.



POWER TRANSFORMERS

Three single-phase, core-type, oil-insulated, self-cooled Westinghouse transformers, connected "delta-delta," are used to step down the potential from 44,000 to 460 volts. These transformers are joined to the high ten-

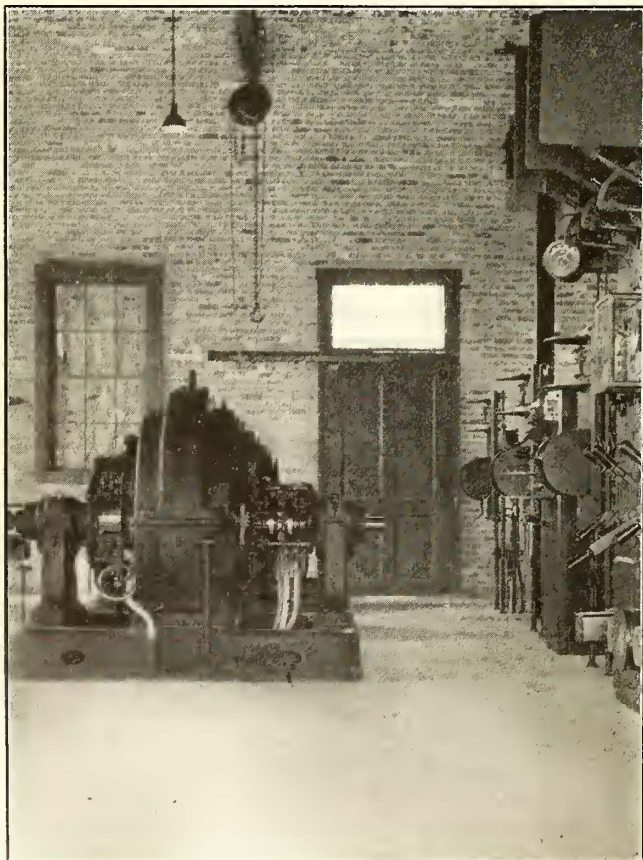
UTAH SUBSTATION—DIAGRAMMATIC LAYOUT OF HIGH-TENSION WIRING OF SUBSTATION

arresters from the tap line. Westinghouse electrolytic lightning arresters for the three-phase ungrounded neutral system are mounted on a concrete base and fenced in.

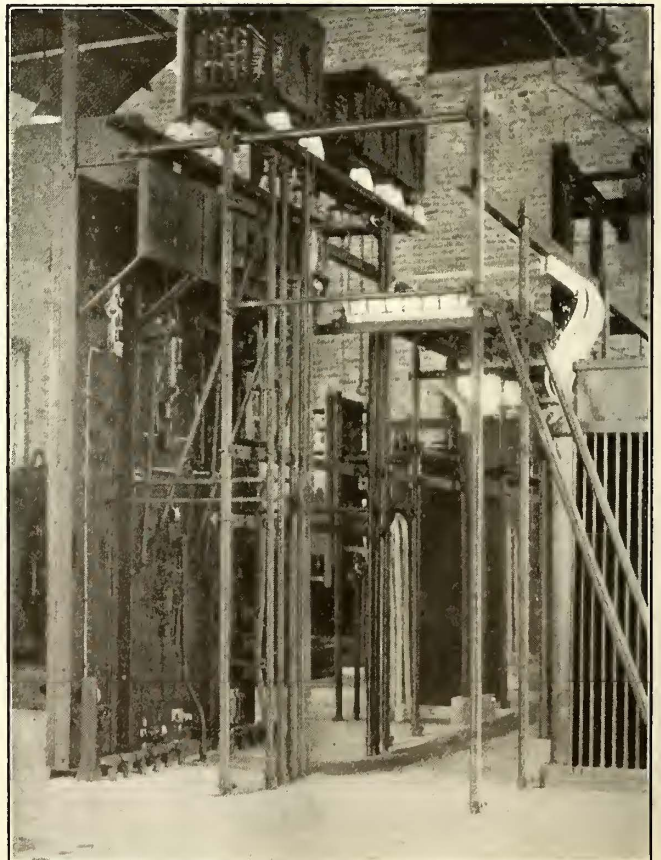
HIGH-TENSION STATION WIRING

Pin-type insulators, mounted on pipe work, support the incoming high-tension conductors which enter the building through porcelain bushings. Immediately inside are aluminum choke coils connected by 3/4-in. copper tubing to type GA hand-operated oil switches

mounted on an elevated concrete base. Connection is thence made with the copper-tubing high-tension bus through Dossert connectors so that a defective transformer may be readily disconnected to permit operation on "open delta." Each transformer has three separate secondary windings, having a capacity of 75 kva. each, one for each rotary. This arrangement provides for the operation of any two rotaries in series on the d.c. side. Adjusting taps are provided on the high-tension side so that full 460 volts low tension can always be secured. Taps are also provided on the low-tension side for starting the rotaries. Use is made of the 300-volt tap in starting the rotaries as induction



UTAH SUBSTATION—INTERIOR VIEW OF SUBSTATION, SHOWING ROTARY CONVERTERS, SWITCHBOARD AND STARTING PANELS



UTAH SUBSTATION—REAR OF SWITCHBOARD, SHOWING MOUNTING OF FIELD RHEOSTATS

motors. Starting taps are actually brought out from two end transformers only, though connections can readily be made with the middle one should it be desired to use this with open delta operation.

ALTERNATING-CURRENT BUS STRUCTURE—LOW TENSION

Flat bare copper busbars, 1/8 in. x 3 in. in section, used for the low-tension circuit, are supported on a pipe framework 6 ft. 6 in. above the floor level. To provide for the operation of any two of the three rotary converters in series nine copper bars are employed, three for each secondary. Connection is made with the low-tension 500,000 circ.-mil cables by means of clamps. These cables are inclosed in 2-in. fiber conduit. The conduits are reinforced and protected by small concrete blocks extending 6 in. above the floor level. The conduit thus supported at the floor and attached by U-clamps to the pipe structure gives a neat appearance to the low-tension wiring.

ROTARY CONVERTERS

Each rotary has a continuous rating of 250 kw. at unity power factor, and a 50 per cent overload capacity for two hours. The momentary capacity is 300 per cent of normal load. The compound winding is so arranged that the series field tends to hold up the power factor on heavy loads and produce a slight increase in voltage. Since the transformers have high internal reactance a slight control of voltage is obtained through the operation of the field rheostats. Each rotary is provided with the usual a.c. starting panel mounted on a pipe-work frame.

The connections which place any two of the three rotary converters in series on the d.c. side are made at the negative panel, which is placed between and in line with the starting panels for the second and third rotary converters. This panel is equipped with a triple-pole double-throw oil switch mounted on the back of the slate panel, and a single-pole knife switch mounted on the face. Any desired combination can be effected by means of these two switches. This panel also carries a carbon-break switch placed in the ground connection of the machines for additional protection.

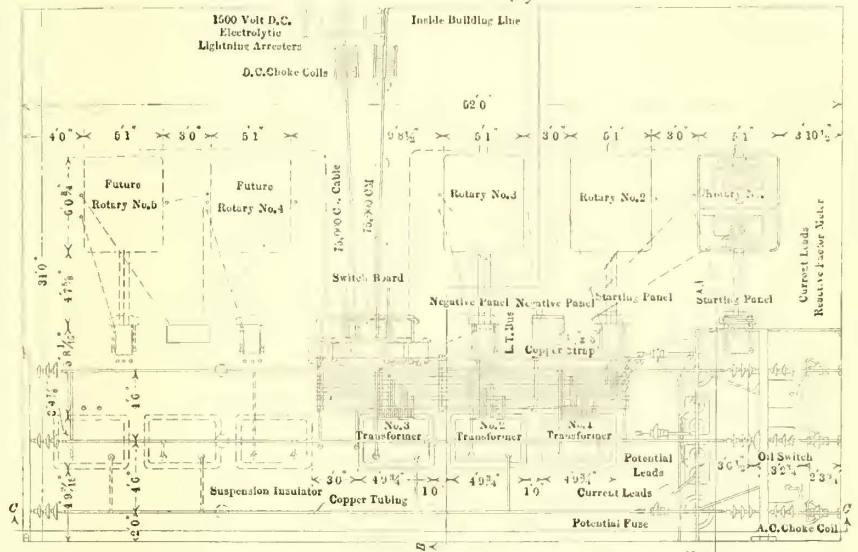
SWITCHBOARD

The main switchboard is made up of three marble panels. The middle one carries the control for the incoming alternating current and outgoing direct current, together with a.c. energy measuring equipment, while the left-hand panel controls the connection to the d.c. bus from the present converters. The panel to the right is reserved for the future converters.

Carbon circuit breakers with adjustable overload trips are provided for the machine circuit, and the two d.c. feeders. The machine breakers have low-voltage release coils, and all these breakers are separated by transite barriers. Each feeder circuit and the machine

circuit are provided with d.c. ammeters, and a reactive-factor meter is placed on the machine panel with plug connections. The current transformers for each converter are mounted on the starting panel for that machine, and the field rheostats are mounted on top of the pipe framework which supports the switchboard.

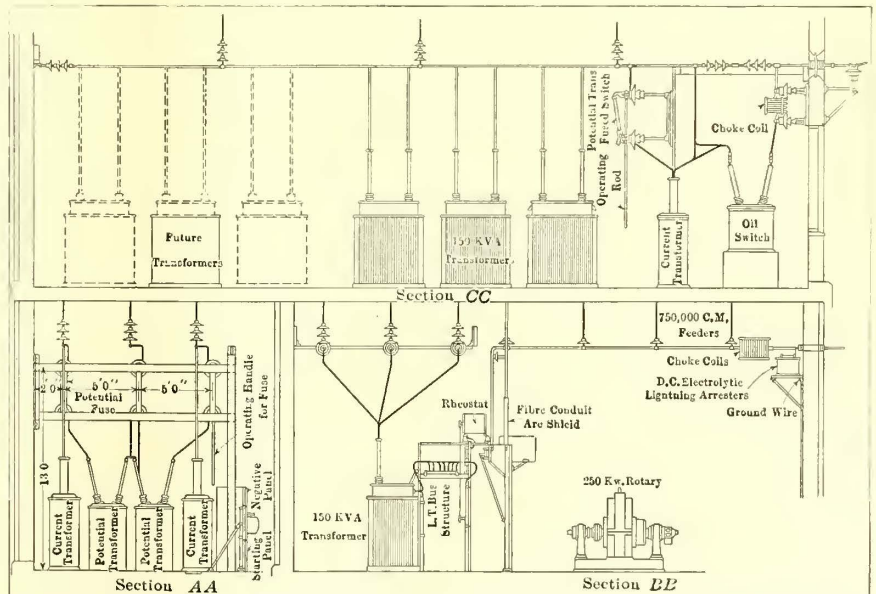
Under present conditions of operation it is aimed to set the rheostats so that the power factor will be unity



UTAH SUBSTATION—PLAN OF SUBSTATION SHOWING LAYOUT OF APPARATUS

at about 200-amp. load, as at this setting the power factor stays close to unity and the current is leading for greater loads. The normal rating of the machine is 333 amp. direct current.

A d.c. voltmeter with a 2000-volt scale is provided with connections which permit voltage readings to be taken on each machine as well as on the feeder circuits.



UTAH SUBSTATION—SECTION ELEVATIONS OF SUBSTATION, SHOWING PORTIONS OF THE A. C. WIRING

As the payment for power is based on maximum demand as well as energy consumption, both integrating and graphic wattmeters are provided. The instrument transformers are placed in the 44,000-volt bus between the oil switches and the power transformers. The current transformers have each two secondary windings, one for the integrating wattmeter and the other for

the graphic wattmeter and overload relay coils on the a.c. oil-switch circuits. All instrument wiring is of multi-colored cables placed in 1-in. iron conduits.

The d.c. feeders are 750,000 circ.-mil in cross-section and are suspended with Marlin hangers from a steel messenger wire. The d.c. circuit is protected by reverse current relays. Choke coils and electrolytic lightning arresters are installed on feeders at the entrances to the building. A summary of the a.c. protection apparatus is as follows: Lightning arresters with charging resistances and choke coils; condensers on low-tension busbars; overload relays acting on main oil switch, low-voltage on 44,000-volt oil switch; spark gaps on 44,000-volt current transformers, and fused disconnecting switches on 44,000-volt potential transformers.

LIGHTING

A 5-kw., 440-110-volt lighting transformer is installed to light the station, grounds and operator's cottage and to heat the operator's office. Four 200-watt units placed in deep-bowl reflectors are suspended 14 ft. above the floor over the rotary converters. The high-tension section of the building is lighted by five 60-watt bracket lights placed 12 ft. above the floor. Each lamp in this section is protected from static charges by means of a grounded wire lamp guard.

EQUIPMENT AND INSTALLATION

All of the equipment was supplied and erected by the Westinghouse Electric & Manufacturing Company according to plans prepared under the supervision of the writer. The total cost of substation building and equipment for the present installation was \$58 per kilowatt of normal rated capacity. When the future installation is completed the cost will be about \$39 per kilowatt.

Mayor Curley of Boston Issues Reasonable Orders Relating to Safeguarding at Drawbridges

Warning Devices Rather Than Foolproof Automatic Stops Are Specified for Immediate Installation—Study Is to Be Continued

FOLLOWING the preliminary conference on safeguarding at drawbridges held under Mayor Curley's auspices on Nov. 16, as described in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 25, 1916, page 1102, a second conference was held in the Mayor's office on Nov. 27. Representatives of the Boston Elevated Railway, Bay State Street Railway, Massachusetts Public Service Commission, Public Works Department and other bodies were present. Prof. Charles M. Spofford of the Massachusetts Institute of Technology, chairman of the engineering committee named to investigate safety methods, presented a preliminary report. As a result of its investigation the committee recommended the following immediate precautions, which Mayor Curley ordered placed in effect at once, following a unanimous vote in their favor:

1. That gates at all highway drawbridges be painted white with transverse black stripes maintained conspicuous at all times.

2. That on all highway drawbridges signs not less than 18 in. x 24 in., bearing the word "Stop" be installed, with black letters on a white background.

3. That at a proper distance from all highway drawbridge gates, lights be installed with reflectors so arranged that gates and signs shall be brightly illuminated when gates are closed.

4. That there be installed on all gates of highway

drawbridges over which electric cars operate, at a proper distance above ground, powerful red lens lanterns, so located that when the gates are closed lanterns will hang at a proper elevation above the ground, directly between the two rails on each track, and drawtenders are to be required to keep these lamps burning from sunset to sunrise. Displaying sufficient warning lights for all other vehicular traffic is to be continued.

5. That at all highway drawbridges large gongs at a distance of not less than 100 ft. from each end of the draw span be installed, so interlocked with the drawbridge operating mechanism as to make it compulsory on the part of the drawbridge tender to close the circuit which causes the gong to ring before he can open the drawbridge, the gong to be designed to ring continuously while the draw is open.

6. That existing gates at highway drawbridges be substantially braced, guyed and strengthened and provided with such fastenings in the form of chains, cables or other devices, that when closed they will offer their maximum of resistance to vehicles colliding with them.

7. That on all highway drawbridges traversed by electric cars signs be installed directly over the car tracks, at a distance of approximately 100 ft. from the draw opening on each side, reading, "Slow Across Draw," such signs to be not less than 12 in. x 36 in., with black letters on a white background.

8. That an illuminated sign, not less than 12 in. x 36 in., reading "Stop When Draw Is Open," be installed at a distance of approximately 200 ft. from each highway drawbridge and the illuminating mechanism interlocked with the drawbridge and gong-operating mechanism.

No recommendation was made relative to the relocation of gates, as the committee asked for and received further time in which to study the advisability of establishing at each highway draw span a positive barrier that will absolutely stop all vehicles which may disregard such warnings as may be provided.

The committee has given careful consideration to the wisdom of installing derailing devices, and has concluded that the danger from derailment of electric cars to other vehicles standing at the side of the tracks, to foot passengers on sidewalks, and to passengers in the car which might thus be forced off the side of the bridge, is so great as to make such devices dangerous and impracticable. It has also considered the wisdom of automatically cutting off the power from electric cars at a reasonable distance from the draw span before the latter is opened, but feels that this might prove dangerous in case of failure of the brakes, as the motorman would then have no opportunity of controlling the car with his reverse. Copies of the committee's report are to be sent to all state bodies having charge of maintenance and operation of highway bridges. The report was also signed by Matthew C. Brush, president Boston Elevated Railway; T. T. H. Harwood, assistant engineer United States Engineer's office, Boston; John R. Rablin, chief engineer Metropolitan Park Commission, Boston; James D. Andrew, superintendent of station construction Edison Electric Illuminating Company of Boston; David Curtin, engineer maintenance of way Bay State Street Railway, Boston; and John E. Carty, secretary to the division engineer of the bridge and ferry division, Public Works Department, Boston.

In the first-aid cabinet used by the Beaver Valley Traction Company, New Brighton, Pa., individual brushes inclosed in sealed envelopes are provided for use in applying iodine. W. H. Boyce introduced this feature as an extra sanitary precaution.

C. E. R. A. Meets at Toledo

At the November Meeting of the Central Electric Railway Association Papers Were Presented on Headlights, Relations of the Public and the Electric Railways, Safety Campaigns, Freight and Express and Steel Car Construction

THE fall meeting of the Central Electric Railway Association, with about ninety railway officials and thirty manufacturers' representatives in attendance, was held at the Secor Hotel, Toledo, Ohio, Nov. 23 and 24. One of the features of the opening session was the response made by Henry L. Doherty to the address of welcome delivered by C. T. Laughton, in the absence of Mayor Charles M. Milroy. Mr. Doherty said he had had the pleasure of receiving many kinds of welcome from the city of Toledo, and had found that the people of the city had never welcomed or appreciated their street railway service until they were forced to do without it. He thought it was to be regretted that the people could not be made to realize their interest in the railways without having first to suffer their loss or a depreciated service. He told Mr. Laughton he was facing a group of the gamest men that could be found, because in the face of enormous increases in the prices of all supplies and materials and labor, they were still able to attend the convention with smiling faces, the only thing they feared being a rise in the price of red ink.

The public seems generally to think, Mr. Doherty continued, that the railways, steam or electric, are entitled to no profit outside of a certain limited return on the investment, but he asked what provision has been made to take care of the losses. With the public taking all the profits and the companies standing all the losses, there appears a reason why there has been no independent building of railways the last several years. The losses have been great. The railways have not been financially able to open up new country as fast as the population has grown, and the result is that the farmer in the great new areas under cultivation is able to market his produce only at a high cost. The public pays for the forced low transportation rates in high prices for food. What the industry needs is big men to put these matters before the public in the right light and make them see that the problems of the railways are their problems. The railway men should talk more and write more to bring about this proper enlightenment. There must come a change in public sentiment, and the man who sees it and leads it will indeed be the great leader. This thought Mr. Doherty submitted for all the politicians. The big problems of the railways, he said, are not in the technical side, but in the public relations side, and there is great need for some comprehensive joint and individual effort to bring about better relations.

Mr. Doherty then remarked that once he had been unable to get even a hearing at public meetings in Toledo, but that the people had come to understand through their personal experiences that railway problems were of vital importance to them, and his statements were now heard with interest. These, he said, are times when the government should not only refrain from further regulation, but should come in with a helping hand.

After Mr. Doherty's remarks, upon call of President Benham, the minutes of the previous meeting were read by Secretary Neereamer, and they were approved as read. An amendment to the constitution was passed to

the effect that the president and two vice-presidents shall each be elected from different states.

DISCUSSION ON HEADLIGHTS

A paper on headlights by K. W. Mackall and discussion on the subject occupied the balance of the morning session. This paper is published in abstract on another page. The discussion was opened with an inquiry about the relative properties of the parabolic reflector and the semaphore lens, to which Mr. Mackall replied that the former should not be used at all with the luminous-arc type of headlight, because the fumes from the electrodes were kept almost wholly within the parabolic reflector, which extends almost completely around the arc. Semaphore lenses may be put in headlights formerly using reflectors by simply substituting the lens for the glass in the door in one type and in another type by putting on a new door to bring the lamp and lens in proper position for focus. While the lens utilizes only a sector of the light flux as compared with almost total utilization of all the light with the parabolic reflector, yet a lens placed 7 in. from the light source projects a narrower beam of greater intensity than given by a reflector. With equal amounts of light flux used for both types of headlights, the intensity of the beam down the track is two to one in favor of the lens, because the concentration of the rays is more perfect than with the reflector.

S. R. Dunbar, Anderson, Ind., said that the type of headlight which should be used by a road depended on whether one wanted concentration, spread or distant projection. He thought it essential to have more or less spread of light, particularly on curves, as a means for attracting attention of vehicles approaching from the side of the track. Few accidents occur from objects lying on the track; most of them are caused by people going across the track.

Mr. Mackall said that the optical semaphore lens illuminated the whole roadway at a distance of 1000 ft. This, he thought, constitutes sufficient spread, and the intensity is retained. It is impossible to have both spread and distant lighting. The choice is a matter largely to be settled by personal preference and by the character of the particular road.

The best location for the headlight, whether above or below the motorman's plane of vision, was then discussed at length, but the arguments and experiences expressed seemed to be as conclusive for one way as the other. C. L. Henry summed the matter up with the conclusion that at distances of 1200 ft. or 1500 ft. a headlight location 3 ft. above the motorman would be practically equivalent to one 3 ft. below him, because the rays would be practically parallel from the two positions. This matter was discussed also by Mr. Mackall, F. N. Norviel, F. W. Coen, H. A. Nicholl, G. H. Kelsay, S. R. Dunbar, President Benham and J. H. Drew.

The afternoon session was devoted to the presentation and discussion of papers entitled "The Electric Railway Industry," by F. R. Coates, president Toledo Railways & Light Company; "Safety," by Harold W. Clapp, general superintendent Columbus Railway, Light & Power Company, and "Electric Railway Freight and

Express," by Nathan Rumney, general freight and express agent Detroit United Railway. After giving a short history of the industry, Mr. Coates referred to the recent increase in the cost of materials used by railway companies. The three principal items in electric railway use, according to Mr. Coates, are labor, copper and coal, but, in the past twelve months, on an average, labor has increased in price 20 per cent, copper 100 per cent, and coal, when bought in the open market, 200 per cent. Mr. Coates then called attention to the dependence of the public upon the continued operation of the utilities and suggested that these utilities and the steam railroads should be preferred, for this reason, when shipments of coal are being considered. He then read a paper on public relations, which was the same as that presented by him at the Doherty Managers' Meeting in Toledo last October and contained the ten basic principles of public relations, as he understood them. These principles were published on page 867 of the issue of this journal for Oct. 21, 1916, in connection with a report of the Doherty meeting, but the full paper is given in this issue. An abstract of the paper by Mr. Rumney on freight and express traffic is also published.

The discussion was opened by Terence Scullin, Cleveland, Ohio, who said, in commenting on Mr. Coates' paper, that the citizens of Toledo are to be congratulated because their railway company is now putting into service a large number of cars of the best type in existence to-day. He referred to the new, front-entrance, center-exit cars just placed in service.

SAFETY CAMPAIGNS

E. R. Kelsey, Toledo, Ohio, then told how the safety work in Toledo is carried by two safety supervisors, of whom one is responsible for the safety of the employees and the other for the safety of the public. The company has been doing a great deal of work in the schools and started out last year to have a talk on safety given in every schoolroom. A film, named "The Price of Thoughtlessness," had been shown very widely also, and the result of this work in the schools has been that accidents to children have been almost eliminated. At present, however, the company is disturbed over the number of automobile accidents, having had an increase of almost 80 per cent in this kind of accidents during the last year. A campaign is being conducted by using the window space in the cars for a series of photographs showing actual accidents and indicating the losses due to them. The results of this particular work are not yet known.

In general, the work among the children has fostered a friendly spirit between the parents and the company and has greatly improved the sentiment of the whole community toward the railway. As evidence of this, as well as the value of taking the public into the confidence of the railways, Mr. Kelsey remarked that 67 per cent of the public of Toledo, after one city administration had passed a 3-cent fare ordinance to embarrass its successors, had chosen to pay a nickel rather than ride for nothing. This was after the company had put squarely up to the public through purchased newspaper space why it could not carry passengers for 3 cents and had offered to carry anyone free rather than accept less than a 5-cent fare. Mr. Kelsey also pointed out the importance of having the highest officers easily accessible to the public and said that, as soon as the public finds the doors open to complaints, there is no longer a desire to kick. He considered that car window advertising is the most valuable tool a company has.

H. A. Nicholl, Anderson, Ind., then described briefly the work of the Union Traction Company of Indiana in promoting safety. This had been confined very largely

to the employees, where a splendid showing had been made, the company having been awarded the Brady safety medal last year. Efforts are being directed especially toward keeping up the interest in the movement, and the enthusiasm of the employees in safety work, which was somewhat inclined to waver, was maintained by two safety banquets a year. At these banquets contest papers are read and speeches are made by the men and officers of the company. At the next banquet, for example, H. L. Brownell, safety engineer, is to give one of his safety lectures illustrated with motion pictures.

Following this, Mr. Clapp was asked how he had been able to bring about the 33-per cent reduction in insurance rates that was cited in his paper. In explanation he stated that the original rate had been 75 cents and the company was facing an increase to \$1.05. In consequence, a proposal for co-operative action was made to the Ohio Inspection Bureau with the aim of finding a way to cut the increased rate, which the company did not propose to pay. Two of the bureau's experts and two department heads of the company then went through the company's plant, and as a result, in a year's time the company spent \$9,500 in placing its property in shape to meet the recommendations and requirements of the bureau. Fire walls were built higher, fire doors installed, sand and water buckets provided wherever they were wanted, and all wiring strung in a way that inspectors would pass without penalizing. The head of one department was appointed to make a monthly inspection of the property to see that every nook and corner was kept absolutely free from rubbish. Also, four surprise inspections each year by the Ohio Inspection Bureau were requested. The result was a lowering of the rate to less than 50 cents per \$1,000. A company, Mr. Clapp continued, must first put its house in order and train its own employees and after that go out and talk to the public. The bonus system seemed to be the answer to keeping up the interest of employees in safety work. He had used \$1,000 for this purpose last year and intended to go in for bigger bonuses next year. The way to reap best results from the safety endeavor was to work from the inside out.

Regarding public relations, Mr. Clapp said that if a company treats the public right it will get suggestions rather than kicks. That is what the company is getting in Columbus. To make it easy for the public to receive attention and gain ready access to the office of the general superintendent, he has a push button in his outer office and a sign reading: "If you don't receive prompt attention, push this button." This rings a bell in his office, and as a result callers received prompt attention. No conference, he said, is too important for him to leave to meet any of the public.

ELECTRIC RAILWAY FREIGHT

Charles L. Henry, Indianapolis, Ind., was then called upon by the chair. He said there was no question but that electric railways must look to freight traffic rather than passenger traffic for any large increases in volume of business, and recalled that in the year 1893, when he had made a contract for carrying carload freight into Indianapolis, it was prophesied that the time would come when a large amount of the transportation of farm products into the cities would be by electric lines. The railways have had to face a prejudice against the bringing of freight over the city streets although they use clean, closed electric cars, whereas evil-smelling, littering wagons are permitted on the same streets at all hours of the day. The electric railways could save the communities they serve thousands of dollars if the people could be made to view the matter in the right

light and see the great economic value of permitting the movement of freight cars over the streets during the night. If produce could be brought into the Indianapolis markets by trolley it would not disturb traffic one-tenth as much as to bring in the same produce by wagon.

The papers of the afternoon were also discussed briefly by F. D. Carpenter and J. F. Starkey. Prior to the conclusion of the session the executive committee stated that it had been decided to hold the annual meeting in Indianapolis in February.

On Thursday evening the delegates attending the meeting were made the guests of F. R. Coates, president Toledo Railway & Light Company, at a theater party.

At the opening of the session on Friday morning Mr. Kelsey displayed the previously-mentioned film entitled "The Price of Thoughtlessness," which the Toledo Railways & Light Company had shown in conjunction with a lecture in every schoolroom in Toledo, and which had resulted in almost complete elimination of accidents to children. Mr. Kelsey gave part of his talk as ordinarily delivered to the children and said that while the company was showing this film in the schools, volumes of letters had been received from parents thanking the company for the lesson that was being conveyed to their children. One of these letters was from a man who had four children, each of whom without exception had come home and told him the complete story of what they had seen and warned him against the dangers of the street. At these lectures a safety button was given to each child, and added interest was created in the buttons by numbering them and having a few duplicate numbers. Then if any child found another button with the same number as his own, the company gave a reward of \$1 when the two buttons were presented by the two children.

After this F. W. Coen read a paper, saying when introducing it, that it was also on safety first, but from another viewpoint. This was published in abstract in last week's issue. At the conclusion, L. B. Stillwell's paper on car construction, which was abstracted in last week's issue, was read by F. M. Brinckerhoff of the firm of L. B. Stillwell, consulting engineers. A joint discussion of both the foregoing papers then took place.

F. D. Carpenter, president, Fostoria & Fremont Railway, discussing Mr. Coen's paper, pointed out the necessity for properly posting the lawmakers on matters which concern the railway properties. He thought that the passing of some of the laws which are injurious to the railway companies was due largely to the ignorance of the legislators and that the railway men ought to be very active in making sure that the proposed bills are read by the men affected as well as that the legislators understand the full significance of any proposed measure. There was need for work in this direction. Railway men in general had been lame in not undertaking to educate the public as to the actual operation of the railway properties. He entreated everyone to go home and create some more favorable sentiment.

Mr. Coates suggested that the executive committee of the association appoint a committee to consider the advisability of having a series of talks given to the public, and of distributing suitable posters and carrying car advertising for the education and information of the public, the plan being to have the same thoughts expressed simultaneously throughout the Central Electric Railway Association territory. President Benham thought this was a good suggestion and said he would put the matter before the executive committee.

In the discussion of Mr. Stillwell's paper, G. H. Kelsey, Anderson, Ind., asked about the relation of car weight to ease of riding, stating that it is common to

hear the expression that a heavy car is easy riding. Mr. Brinckerhoff answered by saying that it was to a certain extent true that the heavier car rode easier, due to the fact that the inertia of the great mass was, of course, harder to overcome and hence less susceptible to the quick motion of the trucks. These same easy-riding qualities can be obtained, however, with the lighter weight car by using long soft elliptic springs. He said that the all-steel, truss-side construction cars described in his paper weighed 10,000 lb. less than the old steel-underframe wooden cars of the same dimensions, and were lighter per seated passenger, per foot of length, or under any basis of comparison. Yet particularly good riding qualities had been obtained through the use of a special truck frame permitting of the mounting of 42-in. elliptic springs. In the ordinary truck only 34-in. springs can be installed. He said that great mass in a car did not necessarily signify strength, but that strength was obtained through the proper association of members rather than weight of members.

Clarence Renshaw, Westinghouse Electric & Manufacturing Company, asked Mr. Brinckerhoff if he had ever arrived at any particular relation between car weight and speed of operation. Mr. Brinckerhoff thought there was no reason why a car should leave the track because it was light, and said there was a more direct relation between the weight of a car to carry a certain weight of equipment. Mr. Renshaw said there seemed to be a general impression for ordinary track conditions that a car for operation at 50 m.p.h. or 60 m.p.h. should have a minimum weight between 35 tons and 40 tons.

Mr. Brinckerhoff said the light car could be run at high speed more safely than the heavy car, basing his opinion on the consideration that, once a moving, spring-supported mass is seriously disturbed, the resulting oscillation is more serious with a heavy car than with a light weight car. There is always a close relation between truck-center distance and riding qualities, the longer truck centers tending toward steadier riding. He cited an instance of some cars on one road which were 33 ft. long between truck centers, and although these had a very bad nosing characteristic at 30 m.p.h., they rode smoothly at 40 m.p.h. and nosed badly again at 54 m.p.h. These cars weighed 70,000 lb. The phenomenon was partly due to wrongly-hung swing links. When asked how much weight would be added to a steel car by increasing its length from 48 ft. to 60 ft., Mr. Brinckerhoff said that 10,000 lb. would probably cover the difference.

C. L. Henry, president, Indianapolis & Cincinnati Traction Company, was very firmly of the opinion that the greater mass would tend to keep the car on the track, the greater inertia holding the wheels more firmly to the rails over track inequalities. His cars, he said, are heavy—undoubtedly too heavy—but he had never had a car derailed, exclusive of collisions and derailments at switch points, in twelve years of operation. He did not believe it possible to derail a heavy car as easily as a light one.

Walter Evans, United States Metal & Manufacturing Company, pointed out that Mr. Stillwell's paper dealt very largely with car construction for train operation and that a car running individually had very different riding characteristics than when operating in a train. He said the electric railways had adopted a good many features from the steam roads which added materially to the weight without adding to the comfort. Referring to the all-steel truss-side construction cars shown by Mr. Brinckerhoff, he said they gave him the impression of being rather top heavy, or the bottom too light for the balance of the car body. He said they used to load the bottom of steam-road coaches with steel rails in order

to make the center of gravity lower. This tended toward easy riding and also resisted telescoping of the cars in collisions.

Mr. Evans, in commenting on Mr. Coen's paper, said that in his experience legislators were for the most part open-minded in receiving information regarding proposed legislation from the electric railway men. He thought it very advisable that individual effort be made to become acquainted with the members of the legislature, and that this personal effort would go a long way toward correcting unfavorable regulation.

Mr. Henry then asked about the durability of all-steel cars and the likelihood of rusting becoming a serious matter in the life of all-steel equipment. Mr. Brinckerhoff answered that this was a matter of maintenance; that the life of a car is the life of the joint which must be developed in excess of the strength of the members it connects. If motion is once started in a joint, the car will very rapidly deteriorate, since it is impossible to get at the rivets and tighten them up again. To prevent rusting in the joints they must be thoroughly painted when put together, and hence the matter is largely one of workmanship. Then the steel, and especially the joints, must be kept painted, or corrosion will take place. Some metals such as ingot iron are more resistant to rust than others, and if the metal is properly selected there need be no great difficulty in eliminating rust. The extra money spent in the material is more than compensated for by the added life.

Referring to Mr. Evans' comments on the top-heavy appearance of the cars, Mr. Brinckerhoff said that the center of gravity had been raised by this side girder construction only 2 in. The company for which these cars were built, figured a resultant saving of \$800 a year per car in coal bills, and found also that there was a saving of one new locomotive for every ten cars built, since the old locomotives which were in operation were large enough to haul a ten-car train of these cars, but would not have been for ten cars of wooden construction. Hence, with locomotives costing \$25,000 each, the use of wooden cars would have added an indirect charge of \$2,500 per car for locomotives alone. Keeping the weight of the car down, therefore, also kept down the first cost.

Some comment was then made on the relative cost of all-steel and steel-underframe wooden cars. Mr. Coen said that his company had some all-steel, 60-ft. interurban cars equipped with 100-hp. motors and train control, weighing 80,000 lb. and having a seating capacity for sixty-four people, and that when these cars were purchased one year ago the price was considered to be less than the cost of the same car in wood.

At the close of the meeting President Benham appointed the following nominating committee to nominate a president, vice-president and members of the executive committee, and to report at the annual meeting to be held in Indianapolis, Feb. 22 and 23: F. D. Carpenter, chairman, and C. L. Henry, C. E. Morgan, S. D. Hutchins and W. H. Bloss.

SPECIAL CAR FROM INDIANAPOLIS TO CONVENTION

A party of fifteen railway men, including C. L. Henry, E. B. Peck and A. L. Neereamer, made the trip to the meeting from Indianapolis through to Toledo on a special car. The group was augmented by other railway officials at various points along the route, so that some thirty-five members stepped from the car at its destination. The trip was made by way of the Terre Haute, Indianapolis & Eastern Traction Company to Richmond, the Ohio Electric Railway to Dayton, the Dayton & Troy Electric Railway to Piqua, the Western Ohio Railway to Lima, and the Ohio Electric Railway to

Toledo. Luncheon was served from Richmond on. At Toledo, one of the Toledo Railways & Light Company's new front-entrance, center-exit, low-floor cars served as the special car to take the delegation from the interurban station to the Secor Hotel. The 262-mile run from Indianapolis was made in 9 hours and 30 minutes, the car leaving Indianapolis at 9 a. m. and arriving at Toledo at 6.30 p. m. A special car from Toledo to Indianapolis made the return trip Saturday morning and Mr. Coates provided a special city car to convey the members from the hotel to the interurban depot.

Freight and Express Traffic*

Increased Freight and Express Service Will Make Electric Railways More Useful

BY NATHAN RUMNEY

General Freight and Express Agent Detroit (Mich.) United Railway

WITH most lines the development of the freight and express business was somewhat slow. The lean years following the efforts of those who undertook to build it up were most discouraging, but persistent efforts were finally rewarded. It can now safely be stated that this branch of electric railway service has proved to be a valuable asset to the community, if not an actual necessity in the development of present-day commerce.

While at first the attention of the railways was confined solely to the development of the local business along their own lines, the addition of connecting electric lines at various points brought about an interchange of freight between these lines, and through routes and rates were eventually established. In this the various associations of the electric lines played a prominent part, and to them the present free interchange of both passenger and freight business can be largely accredited.

On many of the lines, particularly those having access to a large city, the transportation of milk and cream has been extensively developed. For obvious reasons this should prove to be a particularly desirable class of business, although to make it successful it is absolutely necessary that a regular schedule be maintained. Experience has demonstrated the desirability of cultivating the dairy industry as far away from the large centers of population as possible. At the rate of present-day development the lapse of a few years may largely increase the area of a city, making the land immediately adjoining too valuable for dairy purposes. In some cases refrigerator cars are now being operated, and it is not improbable that this method of transporting milk will be more generally adopted in the future.

Different views have been, and still are, held as to whether the traffic was more profitably handled as a purely freight business, or on the old-line express basis. In general, the electric lines are committed to the freight business, and this field appears to hold out a greater opportunity for future development. Between large cities or industrial centers, however, there seems to be no good reason why an express business should not be a paying investment, but a freight business would undoubtedly also prove successful.

The freight business on electric lines has been looked upon largely as a package or less-than-carload business, and this is still true to a large extent. To take proper care of this class of business adequate warehouse facilities are essential. At the larger terminals a number of the lines have entirely outgrown

*Abstract of paper read at Toledo meeting of C. E. R. A., Nov. 23-24.

their facilities, and as a result are experiencing a continual congestion. Just what this means in additional cost for labor and claims for loss and damage, many know. In dealing with these congestions, electric lines are confronted with entirely different conditions than those encountered by their steam road contemporaries. The latter with their larger freight car equipment are in a position to keep their loaded merchandise cars outside until such time as room is available in the warehouse for unloading them. On the other hand, freight cars on most electric lines are usually at a premium, or at least they have been in the past. The cars which enter a station with inbound merchandise or less-than-carload freight must be immediately unloaded in order that they may be available for loading outbound freight.

The despatch afforded freight business on electric lines approaches more nearly the service of the old-line express companies. In fact, as far as the less-than-carload business is concerned, it may properly be classed as express service, minus the pick-up and delivery features. An example of this is furnished in two-carrier service between two cities separated by a distance of more than 200 miles. The merchandise run leaves one terminal about 2 p. m., and cars arrive at the other terminal in time to effect delivery of freight by 9 a. m. the following day. This may be exceptional, but points located on the same line are invariably served with over-night delivery.

By reason of the nature of the freight business conducted by electric lines and the conditions under which they operate, much discussion has been provoked among the lines themselves as to the proper basis of rates applicable to the traffic. Without venturing too far into a discussion of the merits of the question at this time, I desire to express the hope that in addition to the usual items of value, weight, bulk and risk, the service rendered by electric lines may be seriously considered as a factor in determining the rates.

Reference has been made from time to time to the competition afforded by electric lines to the steam roads. There may even have been some animosity existing between the two factions at first, but if such feeling did exist it has gradually been eliminated. The freight departments of the electric lines have a field distinctly their own, and the day is not far distant when they will serve as valuable feeders for the steam roads. At least the friendly relations which now for the most part obtain between the officials of the steam and electric lines augur well for the future.

With the express or less-than-carload freight business well under way, as it is at present on most lines, the tendency should be toward the development of traffic in car lots—not only that which is to be secured in local movement, but also that which moves in interchange with connecting electric and steam lines. Bulk commodities such as sand, gravel, stone, brick, ice, etc., also offer a means of increasing revenues. Even city lines under proper franchise conditions may participate in transportation of certain bulk commodities which could be moved at night, and thereby utilize equipment now called into use for the most part during the daytime only. In many cases refuse, garbage, etc., might be transported through arrangement with the civic authorities.

Even if the passenger business on most electric lines is of paramount importance, it is but fair to say that the freight and express business in some form or other can be made a valuable adjunct, the extent to which it can be developed depending largely upon the financial and operating conditions. With the attainment of

full development the usefulness of electric railways in the community will be manifestly increased, and to this development the express and freight department will contribute in no small measure.

Headlights*

A Comprehensive Survey of the Practice and Theory of Illumination as Applied to This Phase of the Subject

BY K. W. MACKALL

Electrical Engineer Ohio Brass Company, Mansfield, Ohio.

HEADLIGHT service is divided into three classes, each marked by different service requirements as follows: City service, slow speed; city and suburban service, moderate speed, and interurban service, high speed. Each class of service requires a different type of headlight.

In ordinary city service cars as a rule operate on well-lighted streets and a powerful headlight is not

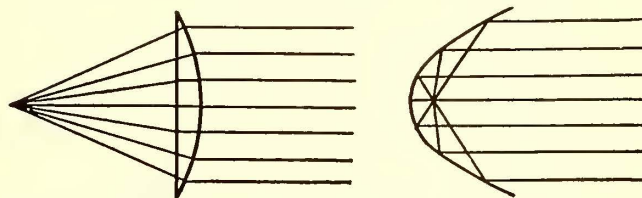


Fig. 1

Fig. 2

LIGHT RAYS UNDER IDEAL CONDITIONS—FIG. 1, WITH LENS; FIG. 2, WITH PARABOLIC REFLECTOR

required. The prime objects of the headlight for this service are to warn of the car's approach and to illuminate switch points. For these purposes the dash-type headlights are entirely satisfactory.

Cars which run from the main business centers to outlying suburban districts require more powerful headlights. For this service a small 2-amp. luminous arc headlight or an incandescent headlight with about a 9-in. reflector equipped with a focus-type Mazda lamp gives the desired results.

For interurban service it is desirable that the headlight illuminate the track a sufficient distance ahead of the car to enable the motorman to see an obstruction

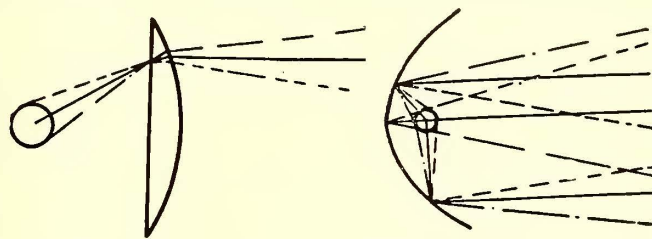


Fig. 3

Fig. 4

LIGHT RAYS UNDER PRACTICAL CONDITIONS—FIG. 3, WITH LENS; FIG. 4, WITH PARABOLIC REFLECTOR

and stop the car before striking it, and also to warn vehicle drivers and pedestrians approaching on intersecting highways. For this high-speed service the luminous-arc headlight is perhaps best suited owing to its high power, reliability and low maintenance cost. The carbon-arc headlight is also used extensively, and within the past year or two the incandescent headlight has gained some prominence in this field. The last-named is, however, subject to the limitation that it does not operate satisfactorily on widely fluctuating voltages. Storage-battery headlights have also been tried out, but

*Abstract of paper read at Toledo meeting of C. E. R. A., Nov. 23-24.

have been abandoned in all but a very few isolated cases owing to the high initial and maintenance cost of a satisfactory storage-battery equipment.

CHARACTERISTICS OF THE SEVERAL TYPES OF HEADLIGHTS

The luminous-arc headlight is the most efficient of all types available. Its maintenance cost is very low. By simply reversing its polarity, an inefficient light is produced which permits the use of this headlight on city streets. Sometimes it is provided with an auxiliary circuit of two incandescent lamps in series with resistance for operation on city streets. As the upper electrode is practically non-consuming, the arc is always maintained at the focal point of the lens or reflector.

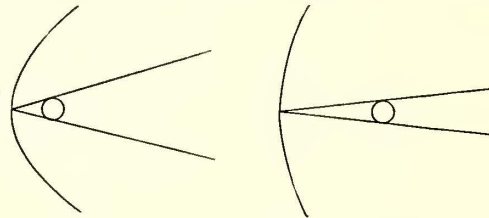


Fig. 5

Fig. 6

DIAGRAMS SHOWING EFFECT OF FOCAL LENGTH ON DIVERGENCE OF LIGHT BEAM—FIG. 5, SHORT FOCUS; FIG. 6, LONG FOCUS

The luminous-arc headlight has the disadvantages that fumes are given off from the arc; that it is not quite as simple as an incandescent headlight, and that the natural travel of the arc around the electrodes causes the beam to wander slightly from side to side. However, its many advantages more than offset these disadvantages. Poor illumination from luminous-arc headlights is caused by lack of proper care of the upper electrode, which should be adjusted every two or three months.

Carbon-arc headlights are of low initial cost and no fumes are given off by the arc to cloud the reflector or lens. Dimming for city service is accomplished by using an auxiliary circuit of incandescent lamps or a screen dimmer. They are reliable and require little attention to the operating mechanism. However, the efficiency is low and the maintenance cost high as compared with the luminous-arc headlights.

The incandescent headlight is simple and steady, and in the smaller sizes the maintenance cost is somewhat less than the arc headlights. An incandescent lamp, whether it is used in a headlight or not, is very sus-

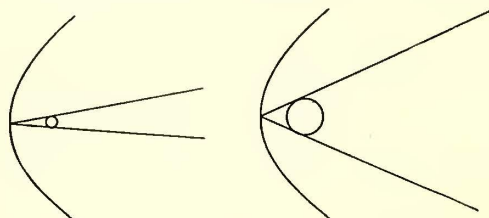


Fig. 7

Fig. 8

DIAGRAMS SHOWING EFFECT OF SIZE OF LIGHT SOURCE—FIG. 7, SMALL SOURCE; FIG. 8, LARGE SOURCE

ceptible to fluctuations in voltage since the illumination varies as about the cube of the voltage.

It is out of the question to use high-powered incandescent headlights in series with resistance on 1200-volt trolley circuits, because when a lamp fails an arc will be established between the leading-in wires of the lamp and burn down into the base and receptacle with a strong possibility of starting a fire. The incandescent headlight is considerably more fragile than an arc

headlight, and the constant vibration to which incandescent lamps are subjected in actual service makes their operation uncertain in interurban work.

THEORY OF HEADLIGHTS

A headlight consists of two principal parts, a primary light source and a reflecting or refracting medium. For redirecting the rays of light to form a beam, we may use either a parabolic reflector or a refracting lens. Under the ideal conditions of the light emanating from a point and the lens or reflector being perfect, the actions of a lens and a parabolic reflector are as shown in Figs. 1 and 2 respectively.

Figs. 3 and 4 show respectively the actions of a light source of appreciable size on a lens and a parabolic reflector. A cone of light strikes each small surface of the lens or reflector and is reflected or refracted as a cone of light, the angle of divergence of which is exactly equal to the angle subtended by the light source itself. The effect of focal length upon the angle of divergence of a beam is shown in Figs. 5 and 6, which represent two parabolic reflectors of equal diameters but different focal lengths.

The intensity of illumination given by any headlight depends upon the following: Concentration of the primary light sources at the focal point of the lens or reflector; shape and condition of the reflecting or refracting medium, and candle-power of the light source.

Figs. 7 and 8 illustrate the effect of concentration of the light source. These represent two reflectors of

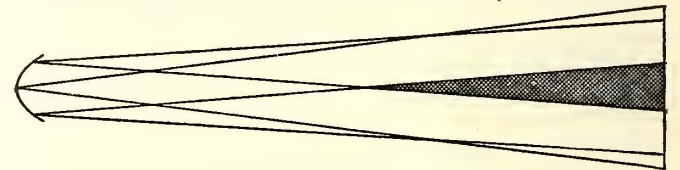


FIG. 9—DIAGRAM SHOWING CONCENTRATION AND DIFFUSION OF LIGHT RAYS BY REFLECTOR

equal diameter and focal length, but in one case a small light source is used, resulting in a narrow beam of light, while in the other the large light source produces a beam of considerable divergence.

If the reflector is tarnished or the lens is dirty light which would otherwise be transmitted is absorbed. If the reflector or lens is not true, the beam will be more divergent and of less intensity. It is also perfectly obvious that if the reflectors are equal in efficiency and have the same dimensions, the higher the intensity of the light source the higher will be the intensity of the projected beam.

Fig. 9 shows how the entire beam of a headlight is made up. The center of the reflector is the most inefficient part, while the main beam (the shaded section), which is useful for long-range illumination comes from the outer portions of the reflector. If it is desired to use a combination lens and reflector a spherical reflector should be used.

MERITS OF DIFFERENT REFLECTORS

From the standpoint of efficiency for light projection, reflectors can be arranged in the following order, that having the highest coefficient of reflection being placed at the top of the list: Silver-plated copper, clear plate-glass mirror, canary glass mirror, nickel-plated copper and polished aluminum.

The coefficient of reflection, however, is not the only element to be considered in selecting a reflector. The following order is that of relative permanency of reflecting surface: Clear glass and canary glass, nickel-plated copper, silver-plated copper and polished aluminum.

Arranged in order of initial cost the list appears thus: Polished aluminum, nickel-plated copper, silver-plated copper, clear glass and canary glass.

MERITS OF DIFFERENT TYPES OF LENSES

There are three types of semaphore lenses which are used in headlights, for the most part in connection with luminous-arc headlights. So far as I know no carbon-arc headlight is in use to-day with anything but a parabolic reflector. The three types are optical semaphore, or "bull's-eye," inverted semaphore, and "spreadlite."

When the optical semaphore lens is used with ordinary luminous-arc headlights, the horizontal spread of the beam is 2½ ft. per hundred. It produces a long, narrow beam of light ideally adapted for cars operating at very high speeds on straight rights-of-way, but the wandering of the beam, due to the travel in the arc, is more pronounced than with other types of lenses.

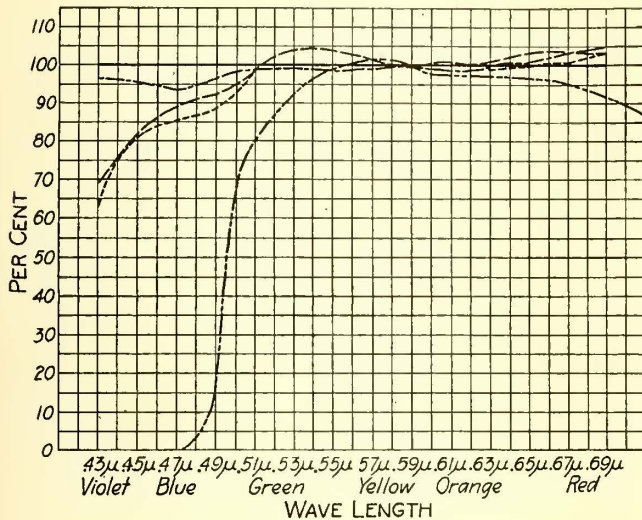


FIG. 10—CURVES SHOWING COLOR VALUES OF SEVERAL HEADLIGHTS

Since the facets of the lenses are on the side nearest the arc, a lens of this type is somewhat more difficult to clean than one of the inverted or the "spreadlite" type.

The inverted semaphore lens is very widely used, since it produces a beam of light slightly wider than the optical semaphore lens. The horizontal spread of the beam is about 6 ft. per hundred, and is adapted to high-speed roads where the right-of-way is somewhat crooked. It affords ample protection to the car and illuminates not only the track, but to a certain extent illuminates the entire right-of-way. Owing to the somewhat greater spread, the inverted lens will not project the light as far down the track as will the optical semaphore lens. Since the facets of the lens are on the outside and a smooth surface is next to the arc, the lens is more easily cleaned.

Where there is a demand for a semaphore lens to throw a very wide beam of light, the "spreadlite" lens is available. The horizontal spread of the beam is made 26 ft. per hundred, but that in the vertical direction is not changed. A lens of this type is particularly adapted to cars that operate at moderate rates of speed on very crooked rights-of-way with numerous intersecting highways. It is also easily cleaned.

FOCUSING

In all headlights it is of the utmost importance that the primary light source shall be located as near the

focal point of the reflector as possible. To illustrate this a test was made by L. C. Porter (see *Proceedings I. E. S.*, 1915), using a 6-volt, 36-watt, focus-type Mazda lamp in a reflector of 16-in. diameter and 3-in. focus. With the lamp 1/16 in. ahead of the focal point, the intensity of the beam was reduced to 54 per cent of the original intensity, while with the lamp 1/8 in. ahead the intensity was reduced to 34 per cent and at 1/4 in. ahead it was only 6 per cent of what it would have been if the filament had been located at the exact focal point. In ordinary railway work it is impracticable to use light sources of the small dimensions of that used in the test, so that the case above cited is somewhat exaggerated, but it serves to bring out the general principle clearly.

Another example will serve to illustrate the effect of filament concentration on the apparent beam candle-power of the headlight. Five incandescent lamps were manufactured, each having the same candle-power, but with the filament wound in different sizes. Using the same reflector with the five lamps in turn the results tabulated below were obtained.

	Relative intensity in center of the beam
240-volt carbon, regular filament	1
240-volt carbon, stereopticon.....	2
120-volt carbon, stereopticon.....	5
40-volt Mazda, focus type.....	12
6-volt Mazda, focus type.....	60

YELLOW LIGHT

There is much discussion at present as to the value of yellow light. The sum and substance of all of the papers so far presented has been a conglomerate mass of conflicting and personal opinions. At this time there is no absolutely authoritative information on the subject. It must be borne in mind that the subject of yellow light for headlight work is not the same as yellow light for general illumination.

Fig. 10 shows a set of spectrophotometric curves made by the Electrical Testing Laboratories, New York, which represents the color value of several headlights. These are all compared with the same 100 per cent standard, a 56-watt focus-type Mazda vacuum lamp. The dot-and-dash curve is for an ordinary crystal glass mirror reflector. The short-dash curve and the long-dash curve are for samples of uranium or canary glass reflectors of different manufacture. These curves are practically coincident. The other curve is an analysis of a piece of "Noglare" glass. Evidently if a real yellow light is wanted this glass will produce it.

I have made many tests of various headlights which produce yellow light, but find no reduction in glare except that directly traceable to the lesser intensity of the headlight, due to the absorption of the glass. So far as my tests are concerned I cannot find that there is any basis for the claim that a light of this characteristic will penetrate fog, dust, smoke or mist to any greater degree than will a white light of equal intensity. There is this about yellow light which appears to be advantageous, and that is, when driving a car through a rainstorm or a heavy fog, the diffractive halation or back glare is somewhat reduced. There are, however, no scientific data on this point.

On this subject the manufacturers of headlights must look to the operating men for definite data. Several manufacturers are putting out headlights with uranium glass reflectors or a combination clear reflector and yellow front glass in response to a demand of the railways. In a matter of this kind any elaborate theory which may be evolved may or may not hold good under actual operating conditions, and the question can only be settled by the co-operation of the railways and headlight manufacturers.

How to Improve Public Relations*

The Matter Is in the Hands of the Company Management and Employees—The Ten Basic Principles Enunciated

BY F. R. COATES

President Toledo Railways & Light Company

SERVING the public is a problem that is always supermost in the mind of the public utility operator. It is a complex study that requires the deepest thought. The average patron of the street railway system knows the company by the men with whom he comes in contact, namely, the motormen and conductors. They are makers of public sentiment toward the company. If the employees are honest, courteous, neat in appearance and always on the alert to look after the safety of the patrons, it is an axiomatic fact that that company will be in high standing in the its community.

The critic might say: "How about the public policy of the company affecting the employees?" The reply is, those organizations, if there are any, which have an antagonistic policy toward the public, do not have such a class of men as those just described. The reason is that the tendency will be that this ill-feeling will permeate through the different members of any organization with the consequent abuses that will go with it.

Public sentiment should be molded in the board of directors' room of each and every company.

It is immaterial whether one is selling newspapers on the streets or selling street railway transportation, the thought always to be borne in mind is—serve your customers in the best possible manner.

There has been in the recent past a decidedly unfriendly feeling by the public toward public utilities in general. "Isms" of all kinds have been advocated, but these explosions of the dreamers are getting less frequent, sentiment in this direction is returning to normal and in a great many cases to actual boosting for the utility.

There must have been a reasonable cause for this. This condition of the public mind was created originally by the feeling generated by certain kinds of people who can see no good in anything or anybody and are destroyers of things tangible and intangible. The tendency of human nature is to fight back, and in a number of instances in the past, policies have been put into effect by corporations that were to a great extent interpreted by the public as indicating a rupture of the friendly feeling that had previously existed.

Some companies fought this "ismatic" enemy with consideration and forethought. They plodded along, always serving the community to the best of their ability, and others, seeing confidence being restored, adopted the same tactics. To-day we see the pendulum swinging the other way. The corporation is being treated more nearly as it should be and both sides are the gainers.

Suspicion has been the undoing of a great many beings and corporations. The root of all antagonism to the utility is suspicion. Remove this, and we have more idealistic fields of labor. To accomplish the desired result, the public must be taken into our confidence. Keep them advised in advance of all contemplated improvements, methods of operation, etc. If objections are raised, hold conferences with your public and listen to their opinions pro and con, always remembering in your final decision to do the greatest good for the greatest number.

Service is an essential element in making friends.

Make certain that your schedules are adequate to care for your patrons. Constancy is a virtue. A well-maintained and regular schedule, one that is dependable, is a pleasing factor to the public.

Clean cars, up-to-date equipment are always appreciated. It may not always be possible to have equipment that is the latest model, but what you have should be neat, kept clean and well painted and always maintained at the highest degree of efficiency.

The employees should be neat in appearance, polite and courteous. A smile at the front end of the car and one at the rear end, as the conductor collects the fares, are well worth while. Pause a moment to think how a "Thank you" is appreciated as one pays his or her fare.

If the employee notices a passenger acting contrary to the rules of the company, have him explain the situation in an agreeable manner instead of gruffly advising the patron of the fact. In order to secure these results, courtesy and politeness must be practised by the officers in dealing with their subordinates. In personal talks, in telephonic communications, in written correspondence, the same politeness should prevail, and it should be of the highest order. Many a friend is lost to the company by an officer or other representative answering curtly and gruffly on a telephone. Always take the time, in a pleasant voice, to explain in detail any misunderstanding.

Volumes could be written on this subject, but it all simmers down to a few basic principles, which are herewith enumerated:

1. A kind word quietly spoken will make friends.
2. Take the public into your confidence and lay all your cards on the table face up.
3. Give service that is everything that the word implies.
4. Treat your employees and the public as you would want to be treated yourself.
5. Remember we are all human and likely to err. Be patient in your dealings with everyone.
6. Keep your property maintained as nearly as possible to 100 per cent standard.
7. Corporation officers should become connected with all bodies in their community that tend toward civic uplift. Be an active member. Do your share of the work. Do not hesitate to let the public know you. Be one of them.
8. The corporation office should be devoid of red tape. The company representative should always keep his door open to the public.
9. Do not keep callers at your office waiting too long before attending to them.
10. Keep your promises. Do not make any that cannot be kept.

Always remember that you will do more toward furthering the public relations of your corporation if at all times you carry out, in its strictest sense, the motto, "He profits most who serves best."

Experiments conducted at the Engineering Experiment Station of the University of Illinois have established a relationship between the ash content of bituminous coal and its specific gravity which makes possible rapid estimation of the ash and moisture content. These tests have also shown that a knowledge of the specific gravity of coal simplifies the problems of estimating tonnages underground and in storage, and of determining the adaptability of coal to treatment by the washing process. The experiments were made by M. L. Nebel and the results are published as Bulletin No. 89 of the Engineering Experiment Station.

*Abstract of paper read at Toledo meeting of C. E. R. A., Nov. 23-24, 1916.

A Belgian Engineer's Ideas of Heavy Electric Traction in America

Recently Returned from an Inspection of Important Electrifications in the United States, Prof. J. Carlier, of the Faculty of the University of Liège, States That High-Tension Direct Current Is Now Leading and Compares It with Single Phase

JOSEPH CARLIER, assistant professor of railways at the University of Liège, Belgium, recently returned to England from a trip through the United States, where he studied particularly the progress of steam railroad electrification. He has contributed his impressions to *La Lumière Electrique*, Paris, in the form of an article under the caption "Single-Phase Traction and High-Tension Continuous-Current Traction." This contains the results of conferences with a number of railway engineers and observation of several steam railroad electrifications. His comments upon the tendencies in this country are, therefore, based upon first-hand information.

"MONOPHASISTES ET CONTINUISTES"

Referring to the difficulties which American engineers have had to meet in applying electric traction on steam roads, Professor Carlier says that the American engineer knows perfectly well that each time he embarks on a new enterprise uncertainties must be expected, but he is not discouraged by difficulties and solves his problems one by one. As examples the professor cites some of the difficulties which have been met in developing the single-phase system. He refers humorously to the division of opinion among American engineers as to the best system, denominating the extremists on one hand as "monophasistes" and on the other "continuistes." He says that we must admit with the former that excellent progress has been made in reducing the weight of single-phase equipment and in making it flexible. For example, it has been possible to operate three-phase and d.c. motors from a single phase line. This, however, results in greater complication, and the sole advantages which a combined system yields as compared with the high-tension d.c. system are that a line voltage higher than 5000 can be used and dynamic substations are unnecessary. On the other hand in most cases there is no economic advantage in having a very high line voltage and the mercury vapor converter promises simplification of substations to the advantage of the d.c. system.

ELECTRIFICATION SYSTEM ECONOMICS

Taking up the general situation, Professor Carlier says that while the two systems of traction are in use and developing in this country the high-tension d.c. system is making most rapid progress for two reasons. The first is the preference of engineers connected with the companies, and the second is the matter of relative total expense. The last-named item, however, has less weight than in Europe. The American railway man is primarily concerned in developing traffic and he is not so much concerned with the cost of the motive power. In his mind the essentials are to secure simplicity and low capital cost. The consumption of coal or electrical energy in the locomotives is secondary. An example of this is seen in the lack of compound steam locomotives, the powerful ones of the Pacific type of the Pennsylvania Railroad having but two cylinders. While it is true that coal is cheap in the United States, on

the other hand labor is expensive, and it is the latter which particularly concerns the engineer. The result of this state of things, which may change later with increase in the price of coal, is that the greater consumption of electric energy in the single-phase system as compared with the d.c. system does not interest the American engineer to the same extent as it does those in European countries. On the other hand he appreciates the greater simplicity of the equipment as a whole and the non-existence of dynamic substations which require constant attendance. His attitude toward the single-phase system for long-distance lines is sympathetic because its principal advantages lie in the net cost factors which interest him most.

Summarizing the qualities of single phase as compared with direct current, Professor Carlier gives the following: the energy consumption is greater; there is less labor required (in substations); it is simpler, and the required investment is less. But when the traffic is considerable the extra expense of electrical energy exceeds the reduction in capital and labor cost, to the extent that the advantage rests with the direct current. Since high-tension direct current (3000 to 5000 volts) has become practicable the single phase has less interest. It is significant that the Westinghouse Company, which has virtually monopolized the single phase, has for more than a year been experimenting with 5000 volts direct current, from substations equipped with mercury vapor rectifiers.

SINGLE PHASE STILL ACTIVE

The two systems operate very well in the United States and in spite of special difficulties which the New Haven Railroad, the first important single-phase electrification, encountered in the early years, there appear now to be no special operating difficulties. The Philadelphia-Paoli line has shown very regular operation. That the single phase still enjoys great favor is evident from the fact that the Pennsylvania Railroad is planning to electrify a section of its main line between Altoona and Pittsburgh at 11,000 volts single phase, with an overhead contact line similar to that between Paoli and Philadelphia. This part of the line is quite broken and it carries an important freight and passenger traffic. Increase in capacity of the line rather than economy in cost is sought in this case. This railroad is also considering the electrification of the New York-Philadelphia line at 11,000 volts. The New York terminal of this has been electrified since 1900 at 600 volts direct current, with third-rail, and has operated admirably.

ADAPTABILITY OF ELECTRIFICATION

Professor Carlier considers that the Pennsylvania Railroad, which is considered as in the forefront of progress, has taken up the electrification problem resolutely. He quotes J. T. Wallis, general superintendent of motive power, to the effect that while electric traction on heavy lines is still in the experimental stage, the systems available are in such a state that there is

no risk in adopting them for a period of twenty years at least. The Pennsylvania does not consider its selections final, but expects to apply the latest developments in electric traction. Professor Carlier points out further that progress is to be expected, but it would be ridiculous to delay electrification until the realization of this progress, for the same situation exists and has existed with respect to the steam locomotive.

The selection of contact system, overhead line or third-rail, and form of current (he evidently eliminates consideration of three phase) is a perfectly simple problem and there are numerous solutions. It is possible to pass from one form of current to another and from one kind of contact system to another, as in the case of the New Haven operation into the New York Central terminal in New York. In the future it will be necessary to remodel an existing steam road electrification from time to time, introducing new types of rolling stock and contact system and changing the form of current. Electrical equipment is well adapted to this process.

MERITS OF HIGH-TENSION DIRECT CURRENT

Summing up the situation the professor admits that the reliability of the systems of electric traction in present use is such that the future holds great possibilities. In the light of the experience with the traction systems in use in the United States and in Europe, for railroad lines now operated by steam and approaching the limits of capacity and which are not of considerable length, the direct-current system at high tension (3000 volts or even 5000 volts) with aerial equipment is most economical. The General Electric Company has equipped in the United States a number of lines with direct current at high tension, including an important road which has been operating regularly at 3000 volts for many months.

While it is true that the high voltage has its place, it is also true that the more intense the traffic the lower can the voltage be. Thus for underground roads in cities, with close headways, the use of third-rail with the moderate voltage of 600 is quite economical. But to the extent that the distance increases and at the same time the traffic diminishes, the contact line voltage must be raised. If the traffic becomes comparatively light, the advantage of very high tension, and therefore of single phase, appears.

Between the two limits of contact line voltage, 600 and 11,000, there is an economically mean tension corresponding to a traffic sufficiently intense on relatively short lines, namely, 3000 volts to 5000 volts, permitting the use of direct current with all of its inherent advantages.

THIRD RAIL AND AERIAL LINE

Third rail electrification of the New York Central Railroad (32.3 miles) and of the Pennsylvania Railroad at New York (9 miles), as well as of the subways, the Hudson & Manhattan Railroad and the elevated railroads in New York has been successful for many years. We must look also to the electrification over long distances with third-rail at higher tension, 2400 volts. Up to the present this line of development has not progressed very far, but such progress is desirable, and great improvement must be made in the future in this direction.

Unfortunately the economical voltage is not always compatible with the use of third-rail. Under these conditions, in spite of the sentiment of the railroad engineer for a system in which there is no clumsy and complicated superstructure, he must accept the aerial equipment. In time the third-rail with 2400 volts and

even 3000 volts will become practical, but to use third-rail at this tension economically, a certain density of traffic will be necessary. It should be added also that in certain installations, such, for example, as that of the Philadelphia-Paoli line, the overhead construction has been made more sightly than that of previous installations through the use of cross supports and posts which are comparatively light while still sufficiently strong. The railroad engineer is thus partially satisfied.

It should be emphasized, however, that both high-tension direct current and 11,000 volts single phase are entirely practical and operate with entire reliability. While the former seems to be in more favor, the single-phase system is still developing, although, as explained, the trend of progress tends to render competition with the direct current more difficult.

MECHANICAL FEATURES OF ROLLING STOCK

In the United States the locomotives most favored are those with jackshafts geared to the motors or connected with them by rods and cranks. The Pennsylvania Railroad has combined these drives in a locomotive for heavy freight train service from Altoona toward East Pittsburgh. This locomotive consists of two similar units each with three driving axles connected to a jackshaft, which in turn is driven by two motors through connecting rods. Between the electric motors and the jackshaft is an elastic coupling containing powerful springs which absorb in part the variations in the driving force.

The locomotives used at the Pennsylvania Railroad terminal in New York, from Manhattan Transfer to New York, contain jackshafts driven by the motors through connecting rods and cranks. They are very stable at high speeds, and Professor Carlier was able to state from personal recent observation that the stability and other operating characteristics were absolutely perfect at a mean speed, including starting and stopping, of 45 m.p.h. and a maximum speed of nearly 70 m.p.h. The railroad management is justly proud of these locomotives, which, it appears, are also able to operate on long runs satisfactorily. However, there is as yet little experience along the latter line and further information as to the durability of electric locomotives on long runs at high speed is desirable.

The New York Central locomotive with motors mounted directly on the axles, and the New Haven locomotive with motors driving the wheels through elastic couplings are giving regular service with important trains. It seems, however, that the New York Central plan with armatures mounted directly on the axles requires a track perfectly constructed and maintained, a condition which appears to exist on the electrified section between New York and Harmon. Nevertheless this installation furnishes valuable data for reference, and it must be admitted from an inspection of the motors after long use that they have surprising mechanical as well as electrical qualities. This example, however, has not been followed by other companies. In this arrangement the center of gravity of the locomotive is low with a corresponding tendency to strain the track, and the gyroscopic effort developed on sharp curves at high speed is apt to produce a reaction inimical to the stability of the railway.

In the United States the tendency on the whole is to use multiple-unit cars when possible, wherein the motor equipments are arranged under the cars to provide the maximum passenger space. Locomotives are only employed for through trains and freight trains. There is as yet little experience with these cars at high speeds, say 75 m.p.h., or more on long runs. The use of steel passenger cars is extending very rapidly. In the case

of motor cars this has been brought about to secure absolute insurance against fire.

SUMMARY AND CONCLUSIONS

In Professor Carlier's opinion we shall see in the United States before many years the electrification of a truly high-speed line with heavy traffic on which the electric locomotive and also possibly the multiple-unit car will be subjected to speeds of 75 m.p.h. or more for an hour or two. The Pennsylvania Railroad, always in the forefront of progress, seems to desire to undertake an electrification of this kind on the New York-Philadelphia Line.

Summing up in résumé the results of his observations in the United States, Professor Carlier says that this country affords abundant and instructive examples of the electrification of railroad lines in which complete success has been achieved. It is important for European countries to investigate these, although to copy directly the practice in this country is not advisable. It is necessary intelligently to adapt American systems and methods to European conditions. The choice of system with all of its possible variety must depend upon the numerous and complicated characteristics of the railroad to be electrified.

The Future of the Street Railway

New England Street Railway Club Hears Address on Regulation, Valuation, Fares, Public Relations and Other Future Factors

AT a meeting of the New England Street Railway Club in Boston, Mass., on Nov. 23, with President C. V. Wood in the chair, Edwin F. Jones, counsel Manchester Traction, Light & Power Company and allied electric railways recently concerned in fare increase proceedings before the New Hampshire Public Service Commission, delivered an address on "The Future of the Street Railway," which was received with unusual enthusiasm. After a comprehensive survey of street railway development, the penalties of early over-construction and financial mistakes, the influence of electrification upon traction expansion and the increasing demands of the public, Mr. Jones took up the points of regulation, valuation, fare units, tax abatements and jitney competition.

THE FUTURE OF REGULATION

Regulation, in Mr. Jones' opinion, is probably more essential to the future welfare of public utilities than to the public itself, for it includes governmental protection to the properties and to the securities issued under public authority. Provided good judgment has been used in selecting the locality in which to operate and the community has need of the company's service, the security holder of the future under regulation may rely upon the fact that in the end such charge for the service rendered as will make his investment reasonably profitable will be sanctioned by the authorities. A commission cannot under the law authorize a stock issue by a street railway for money actually invested in the plant and then afterward refuse the company the right to charge such a fare as will assure a reasonable dividend upon that stock. The necessary increases in fare may come step by step, one at a time, but in the end the desired result is bound to be attained. Utilities, Mr. Jones said, must realize that the public service commissioners generally represent the average public opinion, and that they desire to be fair to the companies as well as the public. If they make mistakes in the law, the courts will afford a remedy.

Mr. Jones stated that the determination of the value of the property devoted to the service of the public is the first and fundamental requirement for future business. Every street railway ought immediately to welcome and prepare for the official determination of the value of its property devoted to the use of the public. Fares cannot be raised on any road until the supervising commission is satisfied that the increase is necessary to afford a reasonable return upon the value of the property after the payment of all allowed charges against revenues. A certain value is better for the security holder than a higher estimated one. When once fixed by a commission, the valuation is not likely to be reduced, as under official regulation provision for renewals will be required and all future additions will perforce be accurately recorded. In future rate hearings or in refinancing, therefore, the difficulties of the present situation will be avoided. To Mr. Jones' view it would be better for the business to start over with a clean balance sheet approved by the public authorities to be used as a basis for all future operations. It would be better to have securities scaled and be able to charge rates which would give at least a 6 per cent dividend, whose permanence might be relied upon, than to go on with existing uncertainties as to value and income. A small certainty is a better basis for business than a doubtful proposition of estimated but undetermined larger value.

SEVEN AND EIGHT-CENT FARES ARE PRACTICABLE

The public, Mr. Jones averred, ought constantly to be reminded of the advantages that American street railways afford as compared with those in foreign countries. The length of ride for a single fare, the system of free transfers, the speed of the cars and the higher wages paid should all be kept constantly in the public mind by judicious advertising or otherwise. More important than almost anything else, the public must be taught that there is nothing sacred about a 5-cent fare. A 6-cent fare is just as pure, just as holy, if the investment needs of the railway warrant the increase. Since the recent increases from 5 cents to 7 cents and 8 cents were granted on lines outlying the Manchester and Nashua districts, the public has seemed to ride as freely as before and no great complaint has been registered. With the great rises in wages and in operating and construction costs generally, street railways are justified in raising the selling price of their product. Every increase thus authorized will help in every other application for the approval of fare increases. The public, Mr. Jones believes, will be reasonable when all the facts are before it.

BETTER PUBLIC RELATIONS SUPREMELY IMPORTANT

Continuing, Mr. Jones stated that every effort ought to be made by street railway managers to mold public opinion so that some of the undue burdens and restrictions now imposed by law may be eliminated. There is no fairness, for example, in requiring an electric railway to maintain street paving between its tracks and for a distance of 18 in. on either side. The reason for the requirement vanished with horse cars. Besides, a street railway pays its proper proportion of the cost of building and maintaining highways when it pays its taxes.

Moreover, the unjust and damaging competition of jitneys must be curtailed if street railways are to have a cheerful future. Here again only a change of public opinion can bring due relief. The public must be made to realize that within the last twenty-five years street railways have been one of the greatest factors

in the growth and improvement of American cities, and that future growth is in large measure dependent upon street railway extensions. Jitneys should be made common carriers and subjected to the same public regulation as other agencies of local or inter-community transportation. Bonding against accidents is equally essential. Unless properly regulated, jitneys are a very serious menace to the street railways, and public opinion should be turned toward the inevitable results which will follow to both the railway and the community welfare if regulation is not imposed.

Regardless of protective laws, however, the greatest and most important thing for the present and for the future, in Mr. Jones' estimation, is to increase the number of passengers carried on street railways. If this cannot be done by bringing the service to the highest state of efficiency and keeping it there, it cannot be done at all. Each successful company must have a pleased clientele, a satisfied lot of regular patrons who will recognize the needs of the railway and the advantages which the railway affords to the community.

The co-operation of organized employees in securing jitney legislation may be a great help in meeting

that particular problem. Employees must be so treated that they will be satisfied and loyal and that by their conduct and manners they will attract and not repel the public. Wages and general conditions must be such as to attract and retain a superior class of employees. The necessary increase in operating cost due to such conditions will be recognized when fares are regulated.

Fair treatment of claimants, also—prompt adjustment of cases where the liability of the railway is clear and generous compromise where it is doubtful—will bring better results than the policy of the old-fashioned claim agent who always denied liability and took every advantage in making settlements. Companies should always be ready to fight to the finish, however, claims which are known to be unfair or faked. Nearly everyone in a town knows about the verdicts which juries award against street railways, for the newspapers publish them prominently. Such involuntary advertising ought to be reduced to a minimum and few cases should actually be sent to a jury unless a defendant's verdict may confidently be expected. The less notoriety there is about the handling of the claims department the better.

Safety Cars and Accident Claims Occupy Attention of I. E. R. A.

Higher Wages and Better Service Result from a Complete One-Man Car Installation on One Fort Worth Line—Waterloo Installation Also Successful—Harmony and Co-operation Keynote of Addresses on Claims

ONE of the principal features of the Nov. 28 meeting of the Illinois Electric Railway Association, held at the Hotel Sherman, Chicago, was the address by Samuel Insull on the subject of "Economies in Power Supply" which was made at the noon luncheon. This appears on another page in this issue. Aside from this address, the association devoted the one-day meeting to the subject of the operation of one-man cars at the forenoon session and to a discussion of personal injury and damage claims at the afternoon session. Two valuable papers, by Carl Beck, Westinghouse Traction Brake Company, St. Louis, Mo., and C. D. Cass, general manager Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, respectively, were read on the first subject and the latter was presented by address. Abstracts of these papers will appear in a later issue. The meeting was presided over by President J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, and there were about 100 in attendance at the luncheon to hear Mr. Insull, and about fifty at the other sessions.

At the end of his paper, Mr. Beck gave some figures to show the results of operating one-man cars on one line in Fort Worth. During the first twenty days in November, 1916, the total number of passengers hauled was 90,600; while for the first twenty days in October, 1916, with two-man cars the number was 78,000, and for the first twenty days in November, 1915, 75,000. In the first comparison the increase was 13.2 per cent and in the latter 20.6 per cent. The car-miles operated with the one-man cars was an increase of 54.3 per cent over that with the two-man cars. The receipts per car-mile showed a decrease of 23.4 per cent but the cash received, exclusive of tickets, showed an increase of 22.2 per cent for the twenty days in November over the similar period

in October, and 22.3 per cent over the first twenty days of November last year. The figures covered a period long enough to show that the increased riding was not due to curiosity seekers, but rather to the fact that automobile owners were induced by the frequent service to use the street cars instead of their own automobiles or the jitneys to go down town.

The papers by Messrs. Cass and Beck were both read and then discussed jointly. President Blackhall was interested to know if much trouble had been experienced in placing the one-man cars in operation and whether or not the car men were organized in Waterloo. The question was also asked as to whether or not more money was paid to the men.

Mr. Cass answered that the men on his property were not organized and that some trouble was experienced in placing the cars in operation, due principally to the fact that a municipal election was in progress at the time and the new cars gave the politicians a good talking point. The company had considered paying the men more money, but finally had decided not to do so, and as a larger number of cars were placed in operation, none of the men were displaced. He said the men preferred the two-man car because it was natural for men to get out of as much work as possible. Mr. Cass also pointed out that at the present time the American Federation of Labor is actively at work in Iowa in an attempt to get a State law against the use of one-man cars and that this may be one of the serious problems in connection with their use.

F. E. Fisher, general superintendent Chicago, Ottawa & Peoria Railway, noted that the two papers differed as regards the schedule speed, this having been improved in Fort Worth and made slower in Waterloo. This was explained by Mr. Cass as being due to the fact that the

Fort Worth cars were of the very latest type, while those in Waterloo were equipped with manually operated brakes and doors. This had made it necessary to add a few minutes to the schedule to give the men time to make out their reports.

Mr. Beck said that the higher schedule speed with the one-man cars in Fort Worth was partly due to the high rate of acceleration and braking of the new cars, but that the principal advantage had been realized through the more frequent service which had made necessary the handling of fewer people at each stop.

The matter of wages, he said, had not been settled in Fort Worth and thought that some companies might feel that the Fort Worth company had too broad a view on the subject. Upon putting the one-man cars in operation they had increased the wages 2 cents an hour, but now felt, after having seen the possibilities for operating economies, through the use of these cars, that they could afford to go still further. They analyzed the question by noting that the seniority men were always anxious for the longer runs, because of the greater compensation from them and had concluded to put the men on a ten-hour-a-day basis as beginners, and arrange enough increase in wages to give the men the same wages they now receive for twelve to fourteen hours' work. Future laws may force them to go to eight hours a day labor schedule, but they feel that the economy of the one-man car will still take care of this. They are willing to divide the increased net returns in three ways; giving the men their share, thus making them glad to operate the one-man cars, and giving the people better service and the company better returns.

In regard to the acceptance of the one-man cars by the public, Mr. Beck said that after they had been operated on the one line for a few days, rumors were circulated that the company was planning to extend the system to other lines and the officials began to get suggestions from individuals to put these cars on their particular lines. Later these suggestions became direct requests and came in by letter and personal visits to such an extent that the officials made the remark that they wished they had fifty cars to put in operation. Mr. Beck said that the officials of the Houston (Tex.) property had made a visit to see the Fort Worth cars in operation, and although they had previously been skeptical, after seeing them in operation and how the people accepted them, that they were now planning to place an order for fifteen.

Mr. Fisher also called attention to the disagreement of the two papers, one advocating small platforms and the other large. Mr. Cass answered that in his own case, the narrow platform had been the cause of greatest complaint on the part of the public, but said that they were really trying to find something to complain about, as this was just at the time of a municipal election. They made no objection to the two-man cars with similar platforms which necessitated that passengers wait for others to get off before they could get on. It had also been his observation in other places, where the one-man cars are used, that the large platform facilitating loading and unloading simultaneously had been one of the features which had appealed to the public and about which they had expressed commendation.

Mr. Beck defended the narrow platform on the ground that few passengers get on at each stop owing to the frequent headway. He said he had been impressed by the tendency of the narrow passage to cause the passengers to line up and enter the car in an orderly manner and with less confusion than results with the large platform where all get on at once and cause a momentary congestion while paying fares and making

change. He said with a single line of passenger movement he had noticed many times that the passenger who presented a bill or did not have exact change, would be pushed one side while the others paid the exact fare and passed on into the car; and that this had the advantage of discouraging the practice of not having the exact fare ready. On the Fort Worth cars the door opening is 30 in. with no separation or stanchion rails. He said it had been remarkable how the people had showed to a great degree a desire to promote the rapid transit which the company had inaugurated. He said he had seen a car loaded up with thirty-five passengers, every one of whom had presented the exact fare. They had also shown a tendency to be ready to get off as soon as the car came to a stop.

ADDRESS BY GEORGE WHITMORE

At the afternoon session George Whitmore, claims attorney Illinois Traction System, addressed the association on the organization and operation of the claim department of his company. The keynote of this talk was to point out the great value of harmony and co-operation between the claims department and the operating officials. The claim department of the Illinois Traction System is a separate organization known as the Western Illinois Accident Association, which is operated in the nature of a mutual benefit association for all the companies of the Illinois Traction System. The system of financing, which is claimed to be satisfactory and economical, is very unique and provides that each company contribute a certain per cent of its gross income to the association. This percentage varies according to the nature of business and hazards under which the various companies operate. The work of the association is directed by an executive committee and administered by a board of trustees. Payments for claims are made by draft or voucher and each claim agent carries a draft book with him for prompt settlement wherever possible. The operating officials of the company have no direct authority over the activities of the claim department, but their recommendations receive careful consideration. In this connection, Mr. Whitmore said that there was no conflict of interest, and that closest co-operation and harmony existed between the operating and claims officials.

The local general superintendents are made personally responsible for the handling of accidents and settling of claims. They generally have some man who makes out the reports and secures the details through investigation. These superintendents are authorized to pay small claims out of their operating funds and then request payment from the Western Illinois Accident Association. If large amounts are involved, they are taken out of the association direct and the case handled very largely by the general attorneys. As a result of this close working between the superintendents and the claims department, a general feeling of confidence and co-operation is fostered and a most harmonious co-working of the two departments follows.

The Western Illinois Accident Association is headed by the general claim agent who has under him four district claim agents located at Peoria, Decatur, Springfield and St. Louis. These district agents are responsible for the handling of all claims in their respective districts and keep in close touch with the operating department. For all except very important cases, they use their own best judgment in making settlement and the draft and release are forwarded to the general claim agent's office, who maintains a complete file on every accident. By this means the latter can check over the judgment of the various district agents and also guard against fraud by having the broader information available.

It is the policy of the department to dispose of all accidents in which the company is responsible as soon as possible, for it has been its experience that the longer a case drags out the more expensive it becomes. They aim to be absolutely fair and just and to impress on the people the fact that the company wants to be fair and just as liberal as possible.

Mr. Whitmore described the method of handling an accident. The motorman or conductor or other employee telephones the dispatcher all the details. The dispatcher telephones these to the superintendent of transportation and he telephones them on to the claim department. The train dispatcher also gives the details to the district claim agent and he makes out the written form for the general office. Finally the personal statement of the crew is taken, but in serious accidents the claim department makes this record in order to bring out all possible details.

The operating department holds schools of instruction for the trainmen at which various phases of the company's business are discussed, and every endeavor made to promote careful operation, and it is believed that great good is accomplished from this source.

ADDRESS BY CHARLES H. PEGLER

Charles H. Pegler, general attorney Aurora, Elgin & Chicago Railroad, following Mr. Whitmore, addressed the association along much the same lines, bringing out some of the details of how claim work is handled on the Aurora, Elgin & Chicago. The company is striving through safety-first work to avoid accidents as far as possible by working with both the employees and the public. One feature of the settlement of claims which Mr. Pegler had found valuable was the manner of calling train crews in after claims had been paid and letting them know just how much they cost the company. Some of these accidents which appeared very trivial to the men, in many instances surprised them greatly by the large amount required to settle, and impressed upon them the great importance of avoiding even minor accidents. They are made to feel how serious these matters are and even if they are not at fault, the case may at least serve as an important lesson.

The principal problem of the claim department is how to gain the co-operation of the public. As business grows, the dangers are increasing constantly due to the good roads which make vehicle travel faster and more dense. More than one-half of all accidents are due to collisions with vehicles and to boarding and alighting. To avoid either class requires the co-operation of the public. To this end, the company is making addresses to automobile clubs, to the school children, to the civic clubs, etc., but is somewhat limited in the extent to which it can carry on this work by the cost of flooding the country with signs and newspaper advertisements, etc., which would be very valuable.

In payment of claims, Mr. Pegler said that he always took particular pains to see to it that persons to whom claims were paid were thoroughly satisfied, as he is very anxious that they do not go away and "knock" the road and tell how the company robbed them, etc. He always informs them that unless they are perfectly satisfied with the amount, that he would much prefer to litigate the whole matter rather than to pay them any amount and have them go away dissatisfied. He always maintains a frank and truthful attitude toward these people, as the company has nothing to conceal from the public, and finds it is always best to be open and above board.

President Blackhall read a communication to the members relative to the advocacy of a law requiring automobiles to come to a full stop at railroad crossings,

applying more especially to unprotected country crossings. It was voted to refer this to the executive committee with instructions to mail copies of the communication to all the member companies.

President Blackhall said that in answer to the A. E. R. A. circular letter sent out regarding crossing protection and asking for suggestions, that he had suggested that a series of bumps or waves in the road surface should be placed on either side of railway crossings for about 250 ft. or more, beginning with small bumps and increasing in size near the track. He said that while this seemed like a joke in one way, that he believed it would be effective in bringing about the desired results.

H. B. Adams, safety supervisor of the Aurora, Elgin & Chicago, suggested that it would be a good thing to put a card in every garage with the following two safety admonitions: "Equip Your Automobile with Brains," and "The Best Safety Device for an Automobile is Common Sense."

Samuel Insull on Interconnecting Power Supply Systems

In I.E.R.A. Address He Recommends That Interested Associations Gather Data to Show Possible Operating Economies to Be Secured Through Co-operation

SPEAKING before the Illinois Electric Railways Association at Chicago on Nov. 28, Samuel Insull, president Commonwealth Edison Company, Chicago, said electrical people had spent energy, time and money in perfecting economical apparatus, but had neglected to some extent to study the conditions of supply through which great economies could be effected. At one time, said Mr. Insull, less energy per capita was sold in Chicago than in any other large community. But since a study has been made of methods for taking advantage of the different demands and the diversity factors of all classes of business, and since steps have been taken for the massing of production, the Commonwealth Edison Company now supplies more energy per capita than any other company in the world operating on steam power. But even with this record the company supplies only about one-third of the possible energy consumption in Chicago. Down-State companies, according to the best information available, are supplying only about one-fifth or one-fourth of the possible energy production.

The most neglected point in economic power supply is the study of conditions governing the use of electricity. Too few are taking advantage of everything to prevent duplication of investment. Too little attention has been given by most people to the seasonal diversity that exists, and there has been not enough marshalling into one vast system of distribution with the idea of preventing duplicate investment to reduce the average over-all cost per kilowatt-hour of supply.

As an example of this, two great companies, recently at swords' points, were much surprised to learn that both could make a great saving by combining their loads. They were doing approximately a \$15,000,000 business, one being largely occupied with urban and the other with interurban transportation and power supply. It was learned that the peak load for one came in the forenoon while the peak of the other occurred in the afternoon. There was a duplication of equipment to the extent of 8000 to 10,000 kw. capacity, and each was striving to get business to enable it to pay interest on this investment, when, by combining the loads, the investment which served one in the forenoon could easily serve the other in the afternoon.

In seeking to obtain data on such conditions the use

of instruments of precision is very necessary. A few years ago these were not available and men in the industry had only a hazy idea of the maximum requirements of any business and the time in which the maximum occurred. Instruments now record not only the maximum requirements, but the exact time at which the maximum occurs.

As an instance of what may be learned through studying diversity, Mr. Insull told of a community around Wilson Avenue, Chicago, in which the inhabitants were all in about the same class, with approximately the same habits, and same buying power. In one block, with 200 possible customers, the separate demand of each showed an average load factor of about 5 per cent. As a group, however, the load factor, as the result of diversity, was about 20 per cent. Adding the other blocks in the neighborhood containing stores, picture shows, etc., the result showed a neighborhood load factor of about 30 per cent. Going still further into the situation it was shown that the maximum demand of the neighborhood as a whole occurred at about 8 o'clock in the evening, while the company's peak occurred at about 4.35 p. m.

Considering supplying energy on the basis of the individual 5 per cent load factor, the condition would spell bankruptcy for a company. The business at a 20 per cent load factor would put the company in the class struggling for existence, just as most companies were doing twenty-five years ago. With this business at a 30 per cent load factor the return is such as was considered ample before the wholesaling of energy became the order of the day. Under present conditions, however, this class of business grouped with industrial power, heating, railway and various industrial demands in Chicago produces a load factor of between 40 and 50 per cent. Some may think, Mr. Insull said, that these conditions apply only in Chicago, but in reality they apply just as truly to the densely settled agricultural and manufacturing territory throughout the State of Illinois, and he was confident that studies of these methods applied by one or a dozen organizations in the production and distribution of energy throughout this State, or any State east of the Mississippi River, would greatly reduce the average energy cost.

Engineers of the Insull companies are now engaged in working out a map of the transmission lines of the State of Illinois and securing as far as possible the maximum demands of the different systems and the times at which these maximums occur in order to determine the diversity between the various systems. It is not the idea that energy produced in the Illinois coal fields can be used on the northern border of the State. But if all electrical properties of the State were feeding into one vast network of transmission lines, the electricity supply companies would have contributed more to the conservation of the resources of the State than even the high-sounding promises of politicians in this direction. There would be an enormous saving in investment and in operating expenses; and if the interconnections were extended to include steam railroad supply, it would be possible to effect an economy in energy distribution that cannot be hoped for through increasing the efficiency of generating and distributing apparatus. Just now the world is being taught great lessons in marshalling the forces of men, and the producers and distributors of electrical energy should see to it that they get the greatest possible return from every dollar of investment.

Mr. Insull said he was very much interested in the production of power at Keokuk, Iowa, and in discussing the project with Messrs. Stone and Webster had ventured the statement that energy-producing enterprises

of Iowa and Illinois, owing to lack of co-operation, are throwing away more energy annually than can be produced at Keokuk. He also expressed himself as anxious to secure the co-operation of the Illinois Electric Railways Association and other similar bodies in getting records for the benefit of all to show what it is possible to do by interconnecting systems.

Taking such steps means greater economy of capital, lower cost, and lower selling price. The regulatory bodies at present are most interested in low selling price. Mr. Insull said he, too, was interested in a low selling price, but believed that the time would come when regulatory commissions would be interested in a company's method of distribution as much as in its methods of financing.

In closing, Mr. Insull called attention to the possibilities, through interconnected systems, for the small-town manufacturer to purchase power at prices as good as he would be able to obtain in the large cities. This would tend to develop the small community far more rapidly than is now possible and would also arrest the concentration of population and industry in the great centers. The men of the electrical industry, co-operating to conserve the resources of the State, will be able to feel that they are doing a large share in uplifting their fellowmen and contributing to the security and prosperity of the State.

COMMUNICATION

More About the Automatic Stop

VIRGINIA RAILWAY & POWER COMPANY

RICHMOND, VA., Nov. 28, 1916.

To the Editors:

In the issue of the *ELECTRIC RAILWAY JOURNAL* for Nov. 25, page 1121, you published an article describing the automatic car stop which we have been using for the past two years on the lines of the Virginia Railway & Power Company. I think that your readers would be interested in another fact regarding this system which probably occurred to them in reading the article, namely, that the automatic stop can also be operated very nicely in conjunction with a block signal system, in which case the switches which are used to de-energize the overhead channels would be operated by the signal semaphores.

I have also just been granted a patent covering the application of the general plan described in your article to single-truck cars or to double-truck cars not equipped with air brakes. In such cases a small reverser takes the place of the electropneumatic valve. The reverser is in circuit with the contacts on the top of the car and, when these engage the energized stationary contact, the motor connections are reversed and the motors tend to operate as short-circuited generators, bringing the car to rest. While this device has not been developed as fully as the others it has been tried out on our lines and has proved absolutely practical.

A. TAURMAN,

Superintendent of Rolling Stock.

Statistics compiled by one of the large Eastern Railway companies recently developed the fact that in the renewal of 369 miles of trolley wire of all gages from No. 0 to No. 0000, but mostly 00, the average return for the old copper was 74 per cent of the original weight of the wire.

MID-YEAR MEETING
BOSTON
FEBRUARY 16, 1917

ASSOCIATION NEWS

MID-YEAR MEETING
BOSTON
FEBRUARY 16, 1917

President Boylan of the Accountants' Association Announces Committee Appointments—At the Connecticut Company Section Meeting on Nov. 14 Addresses on Timely Topics Were Made by Speakers Prominent in the Industry—Reports of Chicago and Washington Section Meetings

Accountants' Association Committee Appointments

President M. R. Boylan of the Accountants' Association has made the following appointments to date. There still remain to be completed the following: The committee to represent the Accountants' Association at the 1917 convention of the National Association of Railway Commissioners, the committee on education, the committee on passenger, express and freight accounting, and the joint committee on life of railway physical property.

Accounting Definitions—John J. Landers, York, Pa., chairman; George A. Harris, Gloversville, N. Y.; S. C. Stivers, New York, N. Y.; J. Gerry Dobbins, New York, N. Y.

Standard Classification of Accounts (standing committee)—H. L. Wilson, Boston, Mass., chairman; W. F. Ham, Washington, D. C.; W. H. Forse, Jr., Anderson, Ind.; R. N. Wallis, Fitchburg, Mass.; P. S. Young, Newark, N. J.

JOINT COMMITTEES

Claims-Accounting-Accountants' Association—H. J. Davies, Cleveland, Ohio, chairman; George B. Cade, Asbury Park, N. J.; H. S. Swift, Pittsburgh, Pa. (Claims' Association members not yet announced.)

Engineering-Accounting-Accountants' Association—F. H. Sillick, New York, N. Y., vice-chairman; B. E. Bramble, Champaign, Ill.; Charles H. Lahr, Akron, Ohio; J. C. Collins, Rochester, N. Y.; H. A. Gidney, Boston, Mass. (Engineering Association members not yet announced.)

Transportation-Accounting-Accountants' Association—A. D. Dedrick, Youngstown, Ohio, chairman; George E. Kalweit, Milwaukee, Wis.; W. O. Ingle, Rochester, N. Y. (For T. & T. Association members see ELECTRIC RAILWAY JOURNAL, issue of Nov. 25, page 1115.)

Annual Meeting of Connecticut Company Section

On Nov. 14 Section No. 7 held its annual meeting in New Haven with an attendance of 147 members and guests. The meeting was preceded by the usual dinner, both being held at the Hotel Garde. The company section orchestra played during the evening and other entertainment features were provided. The serious part of the program included the presidential address of W. J. Flickinger; an address on "County Bureaus to Encourage Agricultural Development as They Relate to the Street Railway Industry," by R. W. Perkins, president Shore Line Electric Railway; an illustrated talk on "Railway Traffic Problems," by Edward Dana, superintendent of traffic Boston Elevated Railway; a talk on "The Cost of Maintenance and Operation of Electric Railway Properties To-day Compared with a Year Ago," by L. S. Storrs, president The Connecticut Company; and remarks by C. V. Woods, president Springfield Street Railway, in the course of which he said that he hoped to install a company section on the Springfield properties some time in the future.

The result of the election of officers was as follows: W. J. Flickinger, chairman efficiency committee, presi-

dent; I. A. May, comptroller; W. E. Jones, statistician, and G. H. Cresson, chief clerk treasurer's office, all re-elected, and H. L. Wales, superintendent, Waterbury, director for three years.

President Flickinger reviewed briefly the short history of the section, which was organized on Dec. 7, 1915, stating that the present membership is 240, that there have been nine meetings with an average attendance of 75 per cent of the membership, that nine papers have been presented by members and eight talks on live subjects given by men of high standing in their professions. He expressed satisfaction that the American Association committee on award of the medal for the best paper read before a company section had made honorable mention of papers prepared by H. Bates and H. N. Balfour, and said that the section hoped to give this committee a great deal more work next year in its effort to select the medal winner.

Chicago Section Hears Travelog by Claim Adjuster Scholz

The regular meeting of the Chicago Elevated Railway Company Section was held on Nov. 21 with about 100 members and visitors present. President E. J. Blair announced the appointments to the program and membership committees. An important amendment to the constitution was passed providing for the membership of the outgoing president in the executive council, to provide continuity of administration.

The speaker of the evening was A. F. Scholz, chief claim adjuster, who described a trip around the world, and illustrated his lecture by more than 200 slides from pictures mostly taken by himself.

Clarence P. King Addresses Section No. 4

At a meeting of the Washington Railway & Electric Company Section, held in Washington on Nov 25, the Electrical Week Appliance Show which begins to-day was the feature of interest. The section is to be represented in the automobile parade next Tuesday evening by a decorated car driven by William L. Clark, vice-president of the section.

The feature of the meeting was an informal address by President Clarence P. King of the Washington Railway & Electric Company, who showed how electricity is the twin brother of prosperity. Addressing the railway men he said, "Whether you occupy the position of conductor, motorman or director of the company you will play your part in the city's prosperity through your 'electrical connection,' so to speak." President J. T. Moffett of the section announced that at the regular meeting to be held on Dec. 11, Warden J. H. McKenty of the Eastern Penitentiary, Pennsylvania, would speak on "Recent Activities in Prison Reform."

In the abstract of the address delivered on Nov. 16 by ex-Senator Edmund W. Wakelee before the Public Service Railway company section, which was published in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 25, page 1095, Mr. Wakelee's name was incorrectly printed. It should have appeared as in this note.

Some Recent Advances in EQUIPMENT AND ITS MAINTENANCE

Superintendent Montreal Tramways Traces History of Prepayment Cars in That City—Way Engineer Finds Gasoline Roller to Compare Favorably with Steam—Equipment Engineer Discusses Some Elements of the Gear Case Situation—Two Articles Treat of Recent Track Practice in Kansas City

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

Rolling Subgrade with Gasoline Motor-Road Roller

**The Cost of Rolling Has Proved to Be About 2 Cents
Per Foot of Track**

BY R. C. CRAM

Assistant Engineer Way and Structure Department
Brooklyn Rapid Transit System

While subsoil conditions in Brooklyn are generally such that the rolling of subgrade has not been considered necessary, the conditions created by various sewer failures and the many cuts made under old track structures during their life made it seem advisable to adopt the practice of rolling the subgrade in many cases. Before deciding upon the type of roller to be purchased, an investigation was made of both the small steam and

TABLE II—COST OF ROLLING SUBGRADE FOR 1322 FT. OF
SINGLE TRACK

Operator's labor		\$19.25
Fuel and lubricants		6.94
Total		\$26.19
Cost per Foot of Track		
	Unit, Cents	Total, Dollars
Labor:		
Moving roller to and from work	0.911	\$0.55
Rolling subgrade	0.707	9.35
Detentions	0.707	9.35
Material:		
Gasoline	0.508	6.72
Lubricants	0.916	.22
Total	1.979	\$26.19

chased from the Austin-Western Road Machinery Company of Chicago. The accompanying illustration shows the roller in operation. Its use has proved satisfactory and another one has been ordered for next season.

The actual operating costs per day averaged for one year for a gasoline and a steam roller are given in Table I.

The cost per foot of single track for rolling subgrade is found to be about 2 cents, with no allowance for interest and depreciation of the machine, as it is indicated in the statement of rolling costs for one job, which are given in Table II. The cost included in this table covers the use of the roller under heavy operating conditions and the actual rolling time available was from 9 a. m. to 3.30 p. m. daily. This accounts for the item of detentions shown in the table which indicates time in which the machine could not be used.

Rolling Stock Progress in Montreal

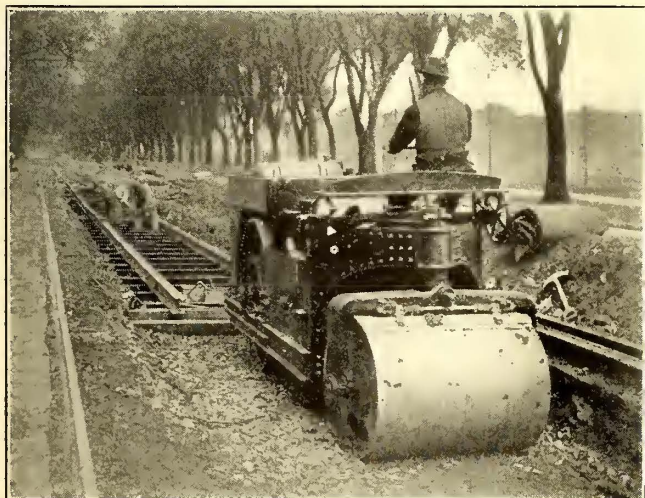
Author Traces Steps in the Development of the
P.A.Y.E. Car in That City from Its
Origin to Date

BY A. GABOURY

Superintendent Montreal (P. Q.) Tramways

That the prepayment system has revolutionized the methods of fare collection is beyond question, and that the Montreal Tramways Company, with which the car originated, is to-day proud of its achievement is also beyond any doubt. It feels that every operating man should have some kind thoughts for the company that through this discovery has helped him out of some of his troubles and the fact that this car is now almost universally used is some recognition of the service it has rendered.

This type of car saw the light of day in 1905 and one made its trial trip on one of our main thoroughfares, St. Catherine Street, on March 30. The first car was of the class shown on the accompanying plate, as Fig. 5. After some opposition the public was soon clamoring for cars of this type, so that they could not be built fast enough to meet the requirements. Some fifty center-entrance cars, ordinarily known here as Scotch cars, were, therefore, immediately remodeled, as shown in Fig. 4. The center entrances were closed and P.A.Y.E. devices were installed on rear and front ends.



ROLLING SUBGRADE WITH GASOLINE ROLLER IN BROOKLYN

gasoline rollers with particular reference to operating and maintenance costs.

It appeared from estimates based on actual cost of operation of several similar rollers of the steam type, taken from the records of one railway company, that the gasoline machine would be the more economical. An eight-ton tandem gasoline machine was accordingly pur-

TABLE I—OPERATING COSTS PER DAY OF ROAD
ROLLERS

	Gasoline Roller	Steam Roller
Engineer's wages	\$2.75	\$3.60
Coal		1.10
Oil and gasoline99	.25
Oil and grease25
Watchman's wages	1.50*	1.65
Water10
Totals	\$5.24	\$6.70

Repair cost for steam roller was stated to be about \$100 per year. There has been no repair cost in 1915 on the gasoline roller except for batteries.

*Time of watchman was included in total, although only a small part of the time of one man was required, and this is charged against the job.

Evolution of Pay-as-You-Enter Cars in Montreal

(SEE ARTICLE ON PAGES 1163 AND 1165.)

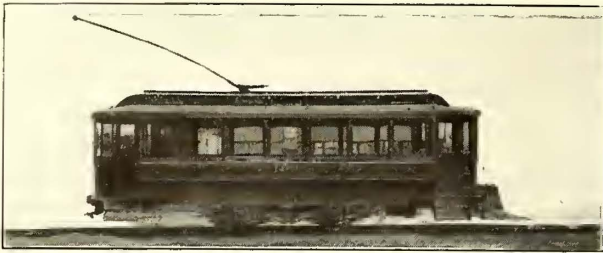


Fig. 1—Old Type Remodeled to P. A. Y. E. Type in 1905, Withdrawn from Service in 1912

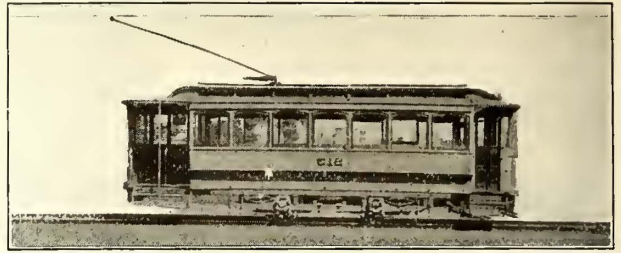


Fig. 2—In Operation from 1896 to 1900, Remodeled in 1905, Withdrawn from Service in 1912

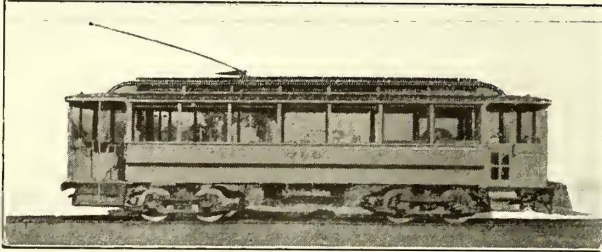


Fig. 3—Built in 1902, Remodeled in 1904

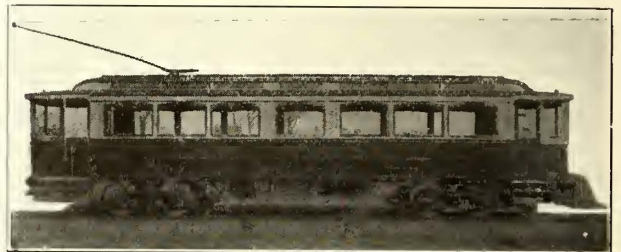


Fig. 4—Built in 1900, Remodeled in 1904

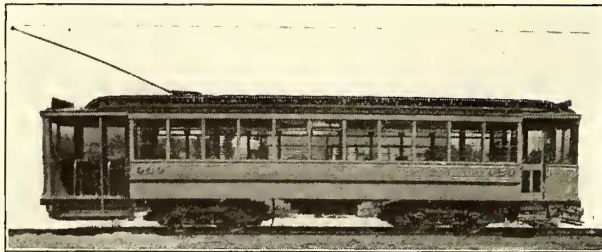


Fig. 5—Built in 1904

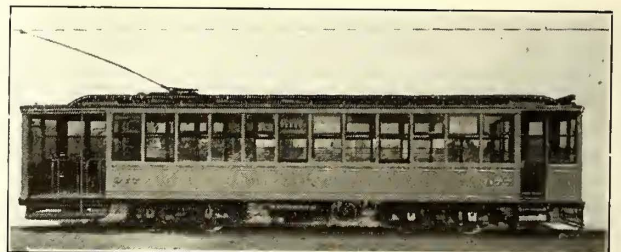


Fig. 6—Built in 1910



Fig. 7—Suburban Car Built in 1911

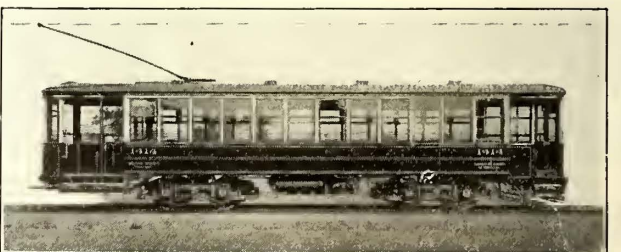


Fig. 8—Built in 1913-1914



Fig. 9—Built in 1914

Immediately after this, fifty more cars of the type shown in Fig. 3 were also remodeled, and the following year all of our single-truck cars of latest type "went through the mill." Since then they have been replaced by double-truck cars. In a very short period after the first car had made its appearance there were none but P.A.Y.E. cars to be seen in Montreal. But Montreal was expanding rapidly and the demand for cars was increasing in proportion, so that the 701-801-901 classes of cars were built and purchased, the latter two types being of steel construction. A car of the 901 class is shown as Fig. 6.

The large platform of the P.A.Y.E. car, as compared with that of the small cars, was conducive to congestion. The smokers among our patrons preferred to stand on the platform and smoke rather than be seated in comfort inside. We were confronted with a serious problem for this reason, but the city authorities came to our assistance and passed an ordinance in 1913 forbidding smoking on street cars. From that date congestion at the rear ends of our cars disappeared.

Next came the question of adopting the P.A.Y.E. system on suburban cars, where a smoking compartment was a necessity. Cars of the 1100 class, Fig. 7, were designed for this service.

Our summer-service suburban cars of the double-truck 13, 14 and 15-seat open type were also remodeled by closing up the open side, cutting an aisle through the center, closing the vestibules and adding the P.A.Y.E. devices on front and rear platforms. This removed the danger of accidents which existed on account of the running board of open cars. The cars were rendered suitable for summer service as suburban or city cars, while in the winter window sash and heaters were added.

The demand for city service continued to increase and cars of the 1300 and 1400 classes, Fig. 8, were purchased. Then came the last but not the least of our cars, those for operation in two-car trains, Fig. 9. Fifty of this type were purchased. The trains are made up of two different types of car, the motor car being of a pay-within type and the trailer of the near-side type. This gives a double-width loading platform at the point of embarkation.

Folding steps and folding doors are part of the car's equipment. These cars have been in operation for the past two years on our St. Catherine Street, a 16-mile round-trip run, and have proved decidedly popular. This is a trunk line running east and west, fed by all our cross-town lines, running through residential districts in the west end, the main shopping district in the center and residential and manufacturing districts in the east and far east.

All our cars have four-motor equipments, with 50-hp. motors. This is necessary owing to the hilly topography of the city and to the severity of our winter climate.

Rearrangement of Current Collectors for Maintenance Saving

K. L. Wilcoxon, late master mechanic of the Chicago, Lake Shore & South Bend Railway Company, recently began the rearrangement of the current collecting equipment on his passenger cars to minimize the trouble and maintenance on these parts. The passenger cars were formerly equipped with a trolley stand over each truck and a pantograph trolley in the middle of the car. One trolley stand is taken off in the rearrangement and the pantograph moved to the better position over the truck. This has a tendency to make the pantograph follow the

wire in better shape. The jumper cable between trolley stands is cut out altogether, thus eliminating 65 ft. of 6600-volt cable and conduit on the roof of the car. With the position of the pantograph over the truck a much shorter air line to operate it is required, and hence it responds more readily to the air lifting and lowering, and the maintenance on one trolley stand is eliminated.

Protecting Rail Bonds from Theft

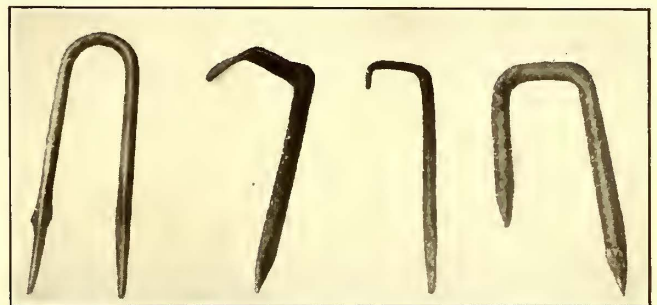
The Author Discusses the Difficulty of Preventing Theft of Long Bonds and Recommends a Certain Form of Staple for Fastening Them to Ties

BY G. H. MCKELWAY

Line Engineer Brooklyn Rapid Transit System

The problem of preventing theft of unprotected cable bonds is emphasized by the present high price of copper. There are some types of bond protectors so made as to cover bonds of the shorter types but the writer has never seen any made for long bonds, and even the ones for the short bonds are not wholly satisfactory as they are bolted on with the same bolts that hold the joint plates. If they are removed to permit of repairs to the bonds the plates are loosened and cannot be made to fit as tightly to the rails as before.

The most satisfactory form of protection would appear to be the placing of the entire bond under the splice plate far enough away from the ends of the rail or the bolt holes to avoid weakening the rails, and with



No. 1 No. 2 No. 3 No. 4
TYPES OF STAPLE FOR USE IN ATTACHING LONG BONDS
TO TRACK TIES

the bond long and flexible enough to prevent the breaking of the strands and the loosening of the terminals. While this type of construction may be slightly more expensive than others, the bonds so installed should last as long as the joint.

Long bonds may be installed under the joint plate, the plate being made with sufficient clearance to prevent the crushing of the bond even after long service when the plate has been drawn closer to the web of the rail than when first installed. Although few rail and joint sections will give this clearance, yet it will be found in some, including the present American Electric Railway Association standard.

Sometimes to avoid the drilling of the bond holes between the holes for the bolt holding the joints, or to render easier the renewal of defective bonds without disturbing the plates, long bonds are installed under joint plates with the terminals outside. This affords very little protection because, as soon as the terminals are cut off, the bonds can be withdrawn from under the plate. The bonds should be installed with the terminals as well as the strands protected.

Where long exposed bonds are used, many companies have adopted the plan of stapling the bonds down to

the ties. The accompanying illustration shows four types of staple which have been tried out carefully by one company. Although no staple was found to be perfectly satisfactory, the best results were obtained from the type marked No. 4. All the staples were $3\frac{1}{2}$ -in. long and their price varied from 40 to 95 cents per gross when prices were normal.

Type No. 1 made a satisfactory job but did not drive well into the tie. Type 2 was easily driven but not strong enough to hold the bond when the latter was pulled vigorously. The only fault to be found with type 3 was in the short leg which was not long enough to enter the wood to a sufficient distance, and the bond was apt to be damaged in the endeavor to bury the short leg in the wood.

The trouble with a staple is that unless it is driven down far enough to bind the bond to the tie, the bond can be stolen by cutting off or knocking out the terminals from the rail and then pulling the bond through the staple. If the staple is driven down so far as to prevent the movement of the bond it is liable to cut into or through some of the strands. Even if this does not happen it will be necessary to hold the bond so tightly that it will be affected by vibration and the strain will be broken off in the neck of the terminal in the course of time. Of course this will not happen if the bond is fastened to the tie by only one staple at the center, but then it is not greatly protected. It is evident then that the practice of stapling long bonds may reduce danger from theft but is apt to shorten the life of the bond. As mentioned earlier, the best plan is to protect the bond completely by means of the splice plates.

Sheet-Steel Gear Cases

The Author Discusses the Points Raised in Article Published by "Vulcan" Last Week

BY C. W. SQUIER

I have read with much interest the article by "Vulcan" on "Gear Case Maintenance" which appeared in the ELECTRIC RAILWAY JOURNAL of Nov. 25, page 1116. From this I infer that the sheet-steel gear case has not proved entirely successful when installed on surface roads in England, due to rivets working loose and seams opening up with excessive vibration and other damage caused by small clearance from the roadbed. I have found track conditions in England to be much better than those on the average surface lines in this country. It is a striking fact that a great many English roads operate electric track brakes with but a clearance of $\frac{1}{4}$ in. above the track rails.

Operation with any such clearance as that indicated would be impossible on most roads in this country. It is not to be wondered at then, that the experience of operating engineers here was much the same as outlined by "Vulcan," with the first types of sheet-steel gear cases brought out. Cases with rivets and welded seams soon fell apart and many of the dissatisfied operating officials who tried out the built-up riveted and welded cases returned to the use of the malleable iron types. Manufacturers of motors were anxious to comply with their customers' demands for lighter equipments and they realized that gear cases offered a fruitful field for reducing weight. As a result seamless drawn-steel gear cases became popular and are now supplied with the late types of both Westinghouse and General Electric motors. Large numbers of these cases have now been in service for upward of three years and a number of the roads using them report that satisfactory results have been obtained.

The obtaining of satisfactory service from gear cases depends on several factors besides their construction, so that the results obtained on different roads show a wide variation. As already stated the condition of the track plays a very important part in the life obtained, and another important factor is the securing of proper clearance from the roadbed. With the advent of the low-platform and low-step cars, the use of small diameter wheels has been necessary. This has unduly reduced the clearance between gear cases and roadbed in some cases.

In comparing results obtained with sheet-steel gear cases I find without exception that subway, elevated and other roads operating on T-rails are obtaining satisfactory service, and another road operating new cars

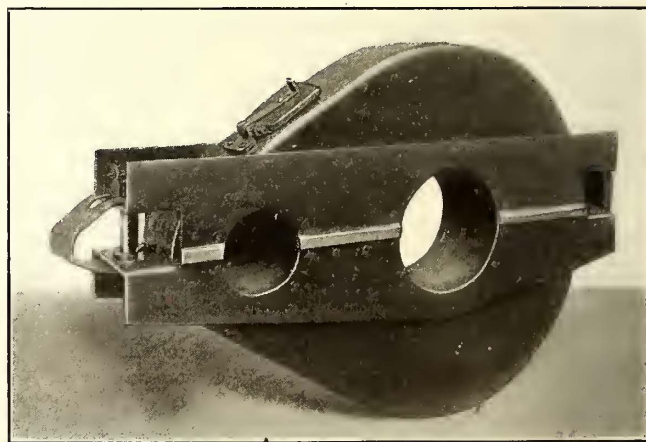


TONGUE-AND-GROOVE JOINT IN SHEET STEEL GEAR CASE

with new equipment on the surface reports very little gear case trouble. This may be due partly to the fact that the wheels are still near their maximum diameter and the clearance has not been reduced to the allowable minimum.

The method of suspension also has an important bearing on the life of the gear case. The two-point end suspension throws less strain on the gear case and its supports than the older type of side suspension. As pointed out in the article by "Vulcan," vibration causes a crystallization of the iron used for hangers and suspension brackets, and these then break when a severe strain is thrown on them. The two-point suspension prevents excessive lateral vibration and strains and provides an increased flexibility for the case should it strike an obstruction. This type of suspension has been used by the Westinghouse Company on its motors for many years.

An accompanying illustration shows the latest type of pressed-steel gear case now being supplied with the motors provided with this suspension. The channel shaped supports at either end of the case are



SEAMLESS DRAWN-STEEL GEAR CASE WITH TWO-POINT END SUSPENSION AND SAFETY STRAPS

in turn supported by large sheet steel plates running the entire length of the gear case and spot welded to the sides of it. Safety straps are provided, which support the lower half of the gear case should the nut come off the connecting bolt. This feature will prevent many cases from being damaged.

The pavement over which surface cars operate is another factor in the damage done to gear cases. Paving

stones are loosened by thawing and freezing conditions and forced above their normal surface. Ice and snow also forms an obstruction for damaging the case and throws additional strains on the gear case supports.

A source of annoyance in connection with the maintenance of gear cases is the working out of gear grease at the openings provided where the case clamps the wheel hub, the axle bearing and the armature bearing, and also where the halves of the case join. The usual method of providing felt rings to close the openings aids to some degree, but these are sometimes torn off or become damaged or worn so as to lose their value. The sketch on page 1166 illustrates the tongue and groove method of closing the joint along the split of the two halves of the case which forms an effective barrier to dust, moisture and grease. Some engineers are advocating the manufacture of an oil-tight gear case so that the gears can be flooded with oil instead of using a grease which is usually found in the bottom of the gear case instead of on the gears. The clearances provided with the present design of motors for the gear case are so small that an oil-tight case appears impossible. On new designs of motors, however, some method of combining the bearings on the gear case end with the gear case might be advantageously worked out.

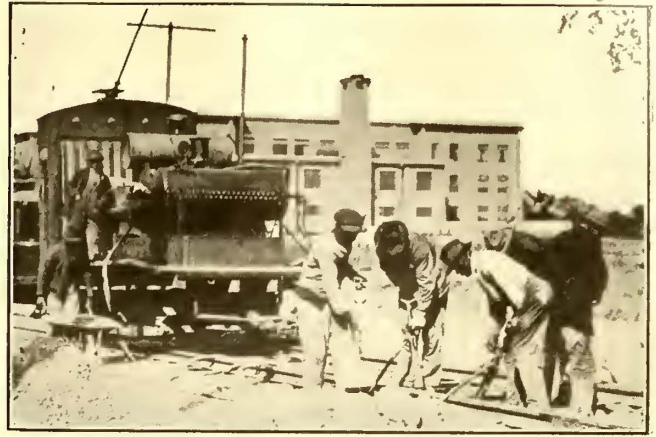
The principal advantage of sheet-steel gear cases is their lightness. This saving in weight is not so great with small motors as with large ones. The pressed-steel gear case supplied with the Westinghouse No. 333 motor of 150-hp. capacity weighs 115 lb. as against 195 lb. for the wrought-iron type, saving in weight of 80 lb. The pressed-steel case for the Westinghouse No. 306 motor of 60-hp. capacity weighs 95 lb. against 130 lb. for the wrought-iron type, or a saving in weight of 35 lb.

Gear cases should be of sufficiently rugged construction so that they will not shake apart due to vibration, but we must expect a certain amount of damage to light cases by striking obstructions. Of the types of sheet-steel gear cases now being supplied the seamless pressed steel type has proved the most satisfactory.

Tamping a Tie a Minute with Air Tampers

With labor particularly scarce and the need to push the extension of a line to completion, the Kansas City (Mo.) Railways resorted to a scheme for speeding up the work with machinery. An Ingersoll-Rand pneumatic tie-tamping outfit was brought into use and has proved to be very successful. The equipment complete consists of a 100-cu. ft. capacity, triple cylinder, upright air compressor, producing 90 lb. pressure, electrically driven by a 550-volt, 18-hp. motor. The compressor, the air-storage reservoir and a tank for cooling water for the compressor are mounted on a single-truck car to facilitate moving from place to place. The outfit includes four pneumatic tamping hammers which in reality are the ordinary riveting handles used in structural steel work with the rivet head replaced by special tamping heads. These in appearance and construction, are much like the old-fashioned heads in use on tamping bars and tamping picks.

The compressed air is carried from the storage reservoir to each tamper by a 1/2-in. rubber hose and is controlled by the usual valve located near the hand grip of the tamper. Using these machines on the new Marlborough line during the last four months, four track workers made a record for a day's work of 600 ties tamped



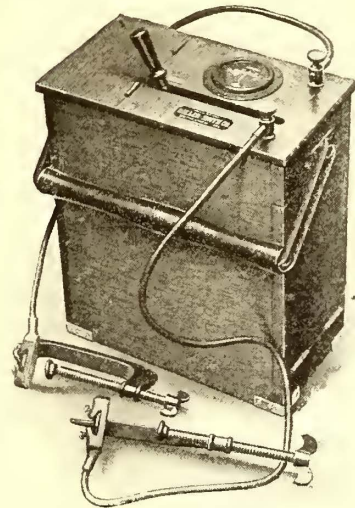
TIE TAMPING EQUIPMENT IN USE ON THE KANSAS CITY (MO.) RAILWAYS

in ten hours, equivalent to one tie a minute. The average day's work with this same force was 500 ties every ten hours. The ballast used on this track work was crushed limestone. A. E. Harvey, superintendent of way and structures, states that he had experimented with no other kind of ballast, but felt positive that the air tampers would work satisfactorily with any kind of ballast.

Portable Battery Equipment for Bond Tester

The Roller-Smith Company, New York, N. Y., has just placed on the market a portable storage-battery equipment for use with its bond tester. The containing case, as shown in the illustration herewith, is 12 in. wide by 7 in. deep by 15 in. high and weighs approximately 45 lb.

This equipment comprises an Edison A-5 storage battery of 187.5 amp.-hr. capacity, as the source of cur-



PORTABLE BOND TESTING STORAGE BATTERY

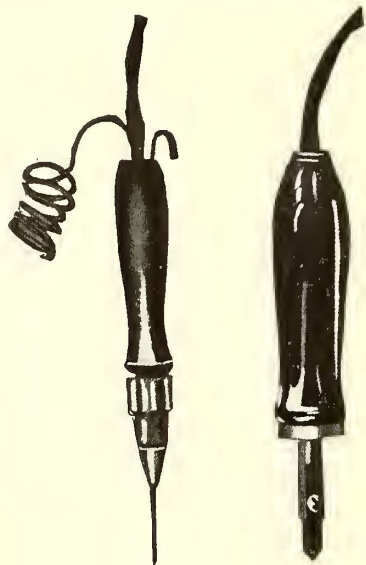
rent; an ammeter, range 60-0-60 amp., to show the rate of battery charge or discharge; a rheostat the first step of which is an open-circuit step, the succeeding steps being used for establishing and bringing to correct value the rail current; and a knife-blade switch for interruption of the circuit while moving the tester from joint to joint. A compartment for carrying the cables and clamps is also provided.

Impregnated Switchboard Stone

Lin-Stun, which is a natural stone, impregnated with an insulating compound to render it entirely moisture-proof and increase the insulating resistance, is now being manufactured by the Lin-Stun Company, 5010 Glosster Street, Pittsburgh, Pa. The maker states that tests have been made with 125,000 volts on pieces 1 in. thick without puncturing the stone. This material is especially adapted for switchboards, panelboards, barriers, insulated walks and such other uses as require a board to resist moisture, high voltage and large currents. It is being made in all commercial sizes and thicknesses and in several colors.

A Recent Type of Soldering Iron

The generation of heat at the point of contact and at the spot where the heat is needed for soldering, brazing or annealing purposes, is the basis for the design of an electric soldering iron now made by the Clemens Electrical Corporation of Buffalo, N. Y. Another feature claimed for this iron is that the operator need not wait for the iron to get hot, since the instant the object to be soldered or brazed touches the two high-resistance heating points, these points glow with a white heat directly at the tips where the heat is needed. The moment the tool is taken from the work, after the object is soldered, the current ceases to flow, as the circuit between the high-resistance points is opened. The high-resistance points when they become used can be readily renewed at a small cost. The prongs are made of solid bar brass with nickel-plated finish and accurately machined. In the two-prong iron, the bushing that holds



LOW VOLTAGE SOLDERING IRON WITH HIGH RESISTANCE TIPS

and separates the prongs is made of molded asbestos. The handle is made of bakelite, compressed under 600 deg. Fahr.

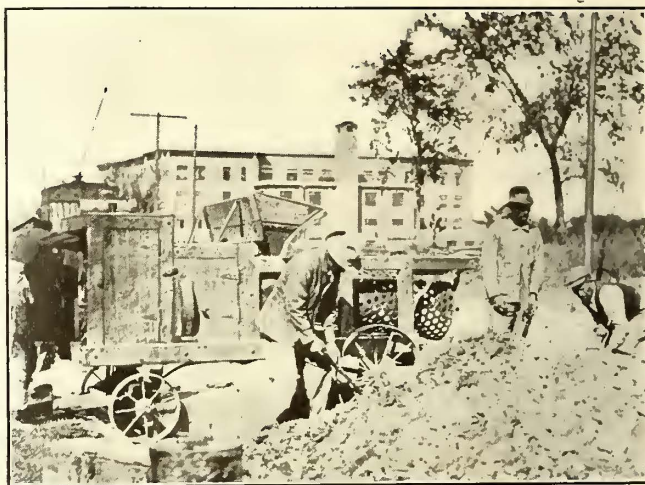
This soldering iron operates on low voltage, the range being from 6 to 15 volts. The high-resistance points are made to carry current according to a rating of 150 watts, 250 watts and 500 watts.

A two-handle portable outfit is made which consists of a single-prong soldering tool attached to one wire of the secondary side of a transformer, and a soldering feed tool attached to the other secondary wire of the transformer. The single-prong point is brought to bear upon the object to be soldered and solder-feeding tool is placed on the spot when needed. This outfit is

especially adapted for special jobs of soldering, such as big wires behind switchboards as well as for general repair work.

Rebuilt Concrete Mixer Makes Good Device for Cleaning Old Ballast

With the prevailing high cost of ballast rock a neat saving is to be had through the cleaning of old ballast and reusing it. For this purpose, the Kansas City Railways have devised a portable rotary screen from a made-over obsolete continuous concrete mixer, with a revolving screen substituted for the mixing trough and blades. This old rotary grout mixer was dismantled and the ends of the circular screen attached to the mechanism which formerly rotated the blades and mixer. This screen is about 6 ft. in length, and tapers



OLD CONCRETE MIXER BUILT OVER INTO SCREEN FOR CLEANING BALLAST

from 18 in. in diameter at the motor end to about 3 ft. at the discharge end. The same gasoline engine which formerly drove the mixer now serves as motive power for the circular screen. The ballast, salvage from track under reconstruction, or other material to be screened, is thrown into a wooden hopper built in at the small end of the screen, and carried by gravity, as the screen turns, down toward the discharging end. In passing over the meshes of the screen, the dirt and foreign matter is loosened from the rock and sifts through to the ground below where it is taken up by workmen and carried away. The rock discharged at the end of the screen is clean and of good quality for concrete grout purposes.

The whole machine is mounted on a portable steel-wheeled truck, making it possible to transport it easily from one job to another. The company has used this home-made device on various parts of the system, and has found it to be very satisfactory and to have saved its cost many times.

Chicago Elevated Steel Cars Show No Deterioration After 100,000 Miles

The all-steel cars of the Chicago Elevated Railways, which were ordered in December, 1913, and received beginning in July, 1914, are now being put through the shops for the first general overhauling after having been run 100,000 miles. In speaking of this, H. A. Johnson, master mechanic, said that the cars were being taken down and carefully inspected, but that the men were finding practically nothing to do on the body, trucks, or any of the equipment.

LONDON LETTER

Efficiency Meetings in London—Belfast Earnings for Six Months Reviewed—Edinburgh Experts Report

(From Our Regular Correspondent)

The first of the London Underground and the London General Omnibus Company's operating department efficiency meetings for the season 1916-1917 was held on Oct. 30, in the London General Omnibus Company's training school at Chelsea, with H. E. Blain, the operating manager, presiding over an audience of about 200 officials. An address on "The Camera and the Cinema in the Operation of Transit Companies" was delivered by Capt. A. Rozier, superintendent of training and employment of the London General Omnibus Company, who contrasted the haphazard and inefficient training in operation in the horse vehicle days with the scientific and practical instruction received now by all those who deal with passenger transit. The effect of this training was clearly shown by the reductions constantly taking place in the number of accidents, notwithstanding the present abnormal difficulties in connection with street lighting, etc. The use of the camera and the cinema in this instruction is very prominent in the company's school, and many slides and films were exhibited.

The working of the Belfast city tramways for the first half of the present financial year, namely, from April to Sept. 30, has resulted in a surplus profit of £3,883. For the same six months of last year the surplus was £8,380. The revenue for the six months was £151,980, as compared with £141,580 for the corresponding period of last year. This is an increase of £10,400 earned without any appreciable increase in the car mileage. The car-mile unit of receipts for September, 11.93d., was the highest in the history of the undertaking. On the other hand, the working expenses, 7.03d., reached the highest point also. For the six months ended Sept. 30 the receipts per car-mile were 11.58d., as against 11.01d. for the same six months of 1915. Working expenses during the six months increased from £78,189 to £89,723, or more than £11,000. This more than wiped out the increase in revenue. There was an increase of more than £1,800 in net revenue charges and of nearly £2,000 in sinking-fund charges. These increases, which are due partly to additional capital expenditure and partly to additional income-tax charge, reduced the surplus profit to £2,880. The heaviest item of increase in the working expenses was in power, for which the charge was £20,824, as against £14,649, an advance of more than £6,000 in the six months. Traffic wages increased £2,000, war pay increased from £3,700 to £4,400, the car works cost £1,800 more, and the permanent way and electrical equipment £1,300 more. Mr. Moffet, the new general manager, has now taken charge of the undertaking. He assumes control at a period when financially the concern is anything but flourishing, although the traffic is steadily expanding.

The full report by the experts selected to advise the tramway committee of the Corporation of Edinburgh, namely, J. A. Brodie, city engineer of Liverpool; J. B. Hamilton, general manager of the Leeds Corporation Tramways, and A. H. Campbell, city engineer of Edinburgh, has now been submitted to the Edinburgh Town Council, and differs very little from the curtailed statement published a month or two ago. The report shows that there was possible of adoption electric traction by overhead, the conduit, the surface system, the self-propelled petrol or petrol-electric cars, the electric storage battery car, and the motor bus. It is pointed out that overhead wires are not an innovation in Edinburgh, and that cities like York and Chester, and pleasure resorts such as Bournemouth and Southport, have adopted the system with good results. As applied to Edinburgh the experts estimated that the cost of installation of the overhead system, restricted to the existing tramway routes, would be £400,000 for permanent way and electrical equipment of the tramway. The cost of installation of the conduit system, restricted to the existing cable routes, would be £850,000 for street work only. In regard to the self-propelled car, it is thought that it would not provide a satisfactory or economic service for the entire city. The motor bus might become a serviceable and suitable auxiliary to the tramway system. The experts

do not think it advisable or necessary to retain the cable for any route in the city. In recommending the overhead electric system it is suggested that the conduit system should be applied to Princess Street from the Register House to the West End. In the event of that system being adopted, it is further suggested that an alternative line be provided in Queen Street. In a summary the report states that, independent of the existing tramway conditions of the city, the overhead system offers the best, most reliable, convenient and economical solution of the transit requirements of the city and suburbs.

In a recent interview, Mr. Blain, the operating manager of the London General Omnibus Company, stated that several hundred more girl bus-conductors were wanted by the company. The company had to contradict several reports that the girls were unable to stand the strain of the work and were leaving the employ of the company. The actual position was that every week the company put on about eighty new conductresses, and would increase the number if it could. In the service at the present time there are more than 1150 girl conductors. Each pupil receives not only free tuition for a period of two or three weeks, but is paid 2s. a day for her time. After the girls have qualified the average earnings run to about £2 a week. There is no abnormal sickness among the girls. They like the work and benefit in physique and complexion by the open-air life. They are all under the care of a woman physician. Since March the company has interviewed 16,000 applicants. Among the ranks of the women seeking employment almost every class is represented. Owing to the careful training of the men drivers and the company's safety first campaign, there were 25 per cent fewer accidents in the streets than before the war. Nearly half the drivers were trained during the war, so that their record is a splendid one, considering the condition of the streets at night.

The proposal that Glasgow should proceed with the erection of a new electric generating station gives further proof of the enormous and growing demand all over the country for power purposes. While no local authority in England has been allowed since the early days of the war to raise fresh loans or incur large capital expenditure without the consent of the Local Government Board, the necessity for additional electric power has become so urgent and widespread that for some time the department has been granting to many English municipalities authority to borrow money with which to extend their electricity undertakings.

The British Electrical & Allied Manufacturers' Association announces that the department of import restrictions (Board of Trade) has granted to the association a special license to import insulating materials in certain classes which are included in the list of prohibited imports. Electrical manufacturers, whether or not they are members of the association, can avail themselves of this license by making application to the secretary of the Manufacturers' Association.

The numerous stoppages on the Birmingham tramways received special consideration at a recent meeting of the electric supply committee of the City Council. The inconvenience to the public of stopping the cars suddenly and for prolonged periods was fully recognized, and the matter had been discussed at an interview between Mr. Chattock, the engineer to the electricity department, and Mr. Baker, the manager of the tramways. The conclusion arrived at by these gentlemen was that it would be better not to issue any definite notice as suggested. The reason for this was that it was certain there would be a sufficient supply of current to enable the cars to run until 9.30 a. m., and again from 6 p. m. onward, as well as during the dinner period from 12.30 p. m. or thereabouts until after 2 p. m. Another matter which occupied the attention of the committee was the general question of the supply of current throughout the city. Deliveries of plant have been delayed, and this, with a depleted staff, is largely the cause of the inability of the department to cope with the demands made upon it. Steps are being taken to secure additional equipment before Dec. 15. When that has been accomplished it is hoped that the difficulties of the committee will come to an end.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

Traffic and Transportation

Financial and Corporate

Personal Mention

Construction News

COMPROMISE OFFER TO ST. LOUIS

Company Acknowledges Its Liability for the Mill Tax, But Asks City to Withdraw Its Franchise Contention

The United Railways, St. Louis, Mo., through its committee appointed to confer with an official city committee to discuss a settlement of the mill tax and franchise problems, at a meeting in Mayor Kiel's office on Nov. 22, made a definite proposition of compromise to the city. The proposal was offered by Richard McCulloch, president and general manager of the United Railways, and contained the following plan of settlement:

1. The United Railways, in settlement of its differences with the city, will acknowledge liability for the accrued mill tax up to and including Dec. 31, 1916, aggregating about \$1,500,000.

2. The city to accept payment of the accrued mill tax in annual payments. The amount of the yearly payments to be decided on by the joint conference committee. The first payment to be made Dec. 31, 1916.

3. The city to reduce the present mill tax to an equitable amount, taking into account present operating conditions, to become effective Jan. 1, 1917.

4. The city to withdraw its attack on the validity of the franchises of the United Railways lines, and to confirm the terms of the franchises to extend to April 12, 1948.

5. The joint conference committee, when the details of the compromise are agreed upon, to recommend to the Board of Aldermen the enactment of the necessary legislation to accomplish these results.

The United Railways was represented at the conference by President McCulloch, Murray Carleton and A. L. Shapleigh. The city was represented by Mayor Kiel, President-elect Aloe of the Board of Aldermen, Acting President Nat Hall and the public utilities committee of the Board of Aldermen.

A subcommittee composed of Messrs. Aloe, McCulloch, Carleton and the seven members of the public utilities committee of the Board of Aldermen was appointed to verify the statistics presented by Mr. McCulloch as to the company's financial condition and report back to the joint committee.

No date for the next meeting was set. Mayor Kiel suggested that the subcommittee should report in about two weeks. Alderman Gregory, chairman of the public utilities committee, which dominates in numbers the subcommittee, indicated it would take much longer than two weeks for a report.

Mr. Gregory said after the meeting that the subcommittee would not make a report until after it has held a series of public hearings to determine the sentiment of the public and that these hearings will not begin until after Jan. 1.

The company published in the St. Louis papers of Nov. 23, in the form of a full-page advertisement, the complete plea for a settlement as presented to the city. In explaining its purpose the company said:

"We are not coming to you with a legal argument; we are not pleading for this settlement as a matter of legal rights, but we are pleading for it as a matter of good business policy, both for the city of St. Louis and for the United Railways. There is nothing technical in the arguments which will be submitted and there is nothing at issue which may not be passed upon by business men without the aid of technical experts."

The company said that the differences between it and the city were two in number. These it stated as follows:

"1. The mill tax matter. The city is attempting to collect a 2 per cent tax on each cash passenger originating in the city limits in addition to all other taxes now paid. Judge-

ment was obtained and affirmed by the Missouri Supreme Court and the United States Supreme Court for the taxes up to 1910, amounting, with interest, to \$1,839,205. This sum was paid the city on June 16, 1916. The city has brought suit for the accrued taxes since 1910, amounting, with interest, to date to about \$1,500,000. The annual tax on present earnings is about \$240,000.

"2. The duration of the franchises. The city contends that the franchises expire as specified in the original ordinances. The company contends that all these franchises were extended to 1939 by the St. Louis Transit franchise and to 1948 by the Central Traction franchise. The railroads company has won its contention in the Circuit Court and the matter is now pending on appeal in the Missouri Supreme Court."

In its plea the company said that "it is our earnest desire to reach a settlement with the city by which both of these differences may be adjusted in a manner fair and equitable to both parties."

Among the subjects other than those mentioned upon which the company touched in its advertisement were taxes, service, rate of fare, duration of franchises, necessity for new capital, bond issues maturing, necessity for refinancing maturing bonds, possibility of receivership, value of transfer system, and service. These were followed by the five proposals mentioned at the outset of this article. In conclusion the company said of its proposal:

"We consider this proposition fair and reasonable.

"We ask the city to withdraw its contention as to the expiration of our franchises because this contention casts a cloud upon the franchises and prevents the financing which is necessary for our continued existence and progress. It is becoming more and more difficult to get capital to invest in street railway enterprises, and it would be greatly to the advantage of the city of St. Louis if capital would be attracted to this city.

"We propose to acknowledge our liability for a tax which we have heretofore fought as unjust and unreasonable.

"We are not asking to be relieved from the payment of 1 per cent of the accrued taxes, but we do ask for time in which to make this payment.

"We ask relief from the payment of a portion of the future tax, because the payment of the full tax will affect our service, and we consider the maintenance of this service our first duty to our patrons. Furthermore, the payment of the full tax is not justified in comparing our taxes with those paid in other cities."

DALLAS VOTE IN FAVOR OF FRANCHISE

The straw vote on the indeterminate franchises to be granted J. F. Strickland and C. W. Hobson, who are to take over the electric traction and electric lighting properties of Dallas, Tex., is reported to be going overwhelmingly in favor of the franchises. The vote so far tabulated when this account was mailed by the correspondent of the ELECTRIC RAILWAY JOURNAL in Dallas amounted to more than 60 per cent of the number of postcards sent out, and probably more than 90 per cent of the total vote to be cast. It showed about 97 per cent in favor of the franchises. Of the other 3 per cent, fully one-third are not counted because of defective ballots, leaving but a very small percentage of negative votes.

While the franchises will undoubtedly be approved in the straw vote, Mayor Henry D. Lindsley and members of the Board of City Commissioners have indicated that they will not formally pass the franchises until there has been a referendum vote on the franchises, as provided in the City Charter. It will perhaps take several months for this referendum vote.

CITY ENGINEER ON SAN FRANCISCO SITUATION

In the annual report just issued by the city engineer of San Francisco, Cal., considerable space is devoted to the municipal railway. After reviewing briefly the history of the municipal railway project and recent earnings, the report mentions the several extensions that have been constructed and others that are contemplated. The most important of the latter is referred to as follows:

"Upon the recommendation of this office, the supervisors have appropriated \$275,000 from the surplus earnings of the municipal railway system for the purpose of constructing the track and overhead work through Twin Peaks tunnel from Seventeenth and Market Streets to the junction of Sloat and Junipero Serra Boulevards."

In conclusion the report states:

"The street railway situation in San Francisco presents a number of serious problems. The track mileage in the city is more than five years behind the needs of the present population. It is difficult to extend the street railway facilities logically or economically because of the fact that all of the railway lines are not under a unified control. The city cannot force the United Railroads to make any extensions, nor will the United Railroads make any extensions of its own volition under existing charter conditions. Many extensions are at present desirable, but without suitable connections or transfer arrangement with both the Municipal Railway and the United Railroads system would be of little real benefit. The more carefully the situation is studied the more urgent appears the necessity for the unification of control of all the existing lines, and until this has been accomplished San Francisco will have to put up with a more or less inadequate transportation system.

"This office at the present time is studying the problem and expects to make a report shortly outlining a logical program for future extensions of the existing Municipal Railway System, but at best the construction of these extensions will fall short of solving the transportation question in San Francisco, for the solution of this problem requires consideration on broader lines. The time is fast approaching when a rapid-transit system must be considered. This would be either of subway or elevated type, preferably the latter at this stage of our development, the comparative costs being about \$800,000 a mile for the elevated as against \$3,500,000 a mile for the subway construction. The first link in a rapid-transit system naturally should parallel Market Street, connecting with the Twin Peaks tunnel and with a branch extending south through the Mission in the vicinity of Capp Street."

HEARINGS PROPOSED ON STRIKE PREVENTION PLAN

Chairman Oscar S. Straus of the Public Service Commission for the First District of New York, will preside at a series of public hearings to develop a plan to eliminate strikes of employees of public service corporations and to formulate a plan of pensions. Mr. Straus says that in order to perfect certain details that would have to be known before a proper bill could be drafted for submission to the Legislature the views of all of the persons concerned ought to be heard in as public a fashion as possible. The main feature of the idea is to have enacted a law for the appointment of a wage commission that should have absolutely the last say in all disputes between employers and employees. The rate of pay fixed by the commission should be the rate each corporation would have to pay to its employees, and the employees would also have to accept the decision of the commission. Some plan of penalizing both sides in a controversy that resulted in the violation of the commission's order would have to be worked out later. If a corporation should protest against the rate on the plea that it could not afford to pay it, then the Public Service Commission in the district where the corporation was located would have to find out whether the rate fixed was too high for the earnings of the company to pay and still provide the stockholders with reasonable dividends. In case the corporation was an interstate concern then the Interstate Commerce Commission would be called upon to make this investigation. If the investigation resulted in proving that the corporation could not afford to pay the wages set

by the wage commission, then the Public Service Commission or the Interstate Commerce Commission, having control over the corporation, should permit it to increase its charges to a point where it could pay the wages set.

REPLIES TO ITS TRADUCERS

The Public Service Corporation of New Jersey, in Unusually Direct and Forceful Manner, Spreads Its Cards on the Table

The election over, the Public Service Corporation of New Jersey has addressed a statement signed by Thomas N. McCarter, president of the company, to the people of New Jersey. This statement, as it appeared in the form of a four-column, page-deep advertisement in the Newark *Evening News* of Nov. 23, follows in full:

"During the recent campaign a number of the candidates for office, including one of the candidates for Governor, one of the candidates for Mayor of Newark, and one of the candidates for the State Senate in Essex County, went up and down their respective constituencies seeking political capital for themselves by attacking this corporation.

"They did not confine their malicious attacks to their public speeches, but the newspapers of the State were filled with paid advertisements of the same general character, either inserted or promoted by them. One of the chief bases of their attack was the allegation that this corporation maintains at Trenton during the legislative season a pernicious and corrupt lobby for the purpose of improperly influencing legislation. This corporation does no such thing.

"As long as conditions remain as they have existed in the past, and as they are at present, the corporation will, if I can control it, send its officers to Trenton to represent it in a legitimate, straightforward way, in the light of day.

"The corporation is seldom interested in any affirmative legislation. When it is so interested it goes about the matter in precisely the same manner that any other company or individual would do under similar conditions, but every year more than 10 per cent of the bills introduced in both houses of the Legislature are bills which, intentionally or otherwise, directly affect the property and rights of Public Service. There are tax bills, there are rate bills, there are confiscation bills, and there are strike bills, in all more than 100 every year.

"Those of us chargeable with the responsibility for the management of the affairs of this corporation would, indeed, be recreant to our trust if we did not exercise the American right of free speech in reference thereto. It is a matter of every-day experience for delegations of the public, of all kinds, to go to Trenton to exercise their influence in favor of or in opposition to this or that measure pending before the Legislature. It is frequently an act of patriotic service for one thus to participate in legislative councils. According to our traducers, when we seek in the same manner to protect ourselves from the character of legislation above referred to it is not an exercise of right but an act of scandalous lobbying.

"When the theorists, the demagogues and the fakers cease attacking the corporation in the manner above indicated we shall be only too glad to be relieved of the vexatious burden of self-protection.

"This corporation is honestly trying to carry on a great work of upbuilding development throughout this State. From which it is only seeking a reasonable return commensurate with the risks and effort involved. This, I believe, the people of the State are rapidly realizing to be the truth. At all events, it would not seem as if the making of Public Service the feature of their campaigns had been particularly successful, as two of the three gentlemen above referred to were overwhelmingly defeated for the offices they sought, and the third, while elected, ran many thousand votes behind his ticket. Throughout the campaign this corporation remained altogether silent on the subject.

"In all fairness, is it not about time that this kind of thing stopped, and that politicians who seek to ride into office through attacks on this corporation should at least make statements of fact, and not reiterate false insinuations?"

REASSURANCES ON CLEVELAND RAPID TRANSIT PROJECT

W. R. Hopkins, president of the Cleveland (Ohio) Rapid Transit Company, has written to the City Council of that city in regard to the prospects for building the proposed road, construction rights for which were granted some time ago. The substance of the letter of Mr. Hopkins follows:

"At the time the matter was last brought to your attention, we requested and you granted modifications of the ordinance to meet the requirements of parties to whom we had committed the financing of our project and who had assured us that these modifications of the ordinance would remove the last obstacle in the way of the financing of the first two lines. We had previously met all other requirements and, with your co-operation, the last requirement was met fully and promptly, but the assurances then given us and the others subsequently given were not made good. We have therefore terminated all previous arrangements and negotiations, adopted a new plan of financing and are proceeding upon new lines, with excellent prospects of success. At this moment the most serious obstacle in the way of proceeding with construction work at an early day lies in the great increase of construction costs. Our latest estimates of cost for the first line exceed by upwards of \$3,000,000 the price at which responsible parties were prepared to do the work at the time the ordinance was last amended. Such an increased cost, although due in large part to temporary conditions, involves a large permanent increase in the fixed charges which would have to be carried by a line constructed at such cost.

"However, Cleveland's need of real rapid transit is now so evident and the city's growth so assured, we are convinced that the project can, if necessary, carry even these increased burdens and so justify the increased investment. Acting upon this faith, the company is more determined than ever to proceed with its efforts to provide a system of subways for the city of Cleveland, in accordance with the plans embodied in the legislation hitherto passed by your honorable body, and we beg to assure you that we shall continue our efforts in this direction until we have accomplished the result or you shall determine that the city can secure it more quickly by other means."

TOLEDO CONFERENCES ADJOURNED TO DEC. 5

The street railway commission of Toledo, Ohio, adjourned on Nov. 22 to Dec. 5, after failing to agree on the amount that should be paid down in case the city decides to take over the street railway property of the Toledo Railways & Light Company at the expiration of five years. The tentative franchise provides for an initial payment of 15 per cent. Henry L. Doherty, however, refused to consider so small a payment. He said 25 per cent was the smallest amount to which he could agree, and, for the safety of the city in an undertaking of this kind, it should be more. John Thurston, president of the commission, contended for 15 per cent, but finally offered to compromise at 20 per cent. Mr. Doherty refused.

N. D. Cochran, of the commission, said that 25 per cent was a much smaller sum than he ever dreamed Mr. Doherty would be willing to accept. He thought the city was fortunate in receiving an opportunity to participate on so liberal a basis. Commissioner Wright agreed with him but Commissioner Usher objected.

Mr. Doherty explained that a profit of 1 cent a passenger would in five years yield \$3,600,000 for making an initial payment, while only \$2,500,000 would be required for such payment. Judge Emery expressed the belief that the city charter could be so amended as to allow the issue of bonds for this purpose, but the matter had not yet been tested in the courts.

An agreement was reached on Nov. 21 to the effect that the city may relieve the company from the cost of paving streets between the tracks, but the money must be used as part of the purchase fund.

Commissioner N. C. Wright proposed that the sliding fare clause be changed so that the fare would drop automatically to the next lower figure when the equalizing fund reached the maximum without action of Council, since it advanced automatically when the fund reached the minimum. John Thurston, president of the commission, con-

tended that municipal ownership was of more consequence than low fares. Low fares might prevent the accumulation of a fund for the purchase of the property. Mr. Wright held that the people expect both low fares and municipal ownership. Mr. Wright's final suggestion was to make the fare low and then let the people decide by vote whether it shall be increased to provide a fund for the purchase of the property.

Henry L. Doherty presented a clause which provides for a sliding scale, with fares from the present fare down to five tickets for 15 cents. The commission asked that the minimum fare be made 2 cents and that 5 cents be made the maximum.

HOLYOKE ARBITRATION FINDING MADE PUBLIC

Brief reference was made in the ELECTRIC RAILWAY JOURNAL of Oct. 21, page 906, to the finding of the arbitration board sitting in the wages and working conditions case of the Holyoke (Mass.) Street Railway. The conclusions of the board were made public during the week ended Nov. 25, following the signing of the award by all three members. The union endeavored to obtain a day basis of payment for its members, but the board ordered compensation upon the basis of platform time, as desired by the company. Under the award the maximum pay of the platform men becomes 33 cents an hour. The finding extends from June 1, 1915, to Oct. 1, 1918, the wage scale in cents an hour being changed as of June 1, 1916, as tabulated below:

	June 1, 1915- June 1, 1916	June 1, 1916- Sept. 30, 1918
First six months.....	26	27
Second six months.....	28	28
Second year.....	29	29
Third year.....	30	31
Fourth year, etc.....	32	33

In connection with the 1915-1916 scale above listed, each man of thirty crews who worked more than nine hours on schedule runs is to receive one-half hour's extra pay for each day so working, at the rates as determined above, allowing the men a cent in each case instead of a fractional part thereof.

The award allows each conductor, after June 1, 1916, five minutes at the close of his platform work each day for making up and turning in his cash returns, with compensation at his platform rate. Schedule runs are defined as those that provide daily not less than eight hours nor more than nine and one-half hours platform work inside of twelve consecutive hours. The company is to arrange its schedule runs so that not more than 20 per cent are to exceed nine hours' platform work performed within eleven consecutive hours; not more than 20 per cent are to exceed nine hours' platform work within twelve consecutive hours; not more than 30 per cent are to exceed nine and one-half hours' work in eleven and one-half hours, and not more than 30 per cent nine and one-half hours' work in twelve. Extra platform work may be performed daily within fourteen consecutive hours. Any scheduled run taking from eight hours to nine hours is to be paid as nine hours, but crews so paid are to hold themselves in readiness at the expiration of the day's schedule runs to perform reasonable service until the close of the nine hours. Such men are to be notified by the manager or superintendent at the close of their respective schedule runs of the day whether the company has further occupation for them.

Spare men are to have the preference for extra platform work, followed by employees operating schedule runs, and then by men not otherwise employed by the company whom the manager shall consider qualified to perform extra or other platform work. Spare men ordered to report, and who do report to cover sleepovers, are each to receive two hours' pay, provided they remain on the company's premises during that period. Carhouse men, shop employees and track greasers are to receive ten hours' pay for nine hours' work. Employees of carhouses and shops are to be allowed ten minutes' time before the noon hour for washing purposes. Intervening time is to be paid to all motormen and conductors operating scheduled runs who report on order for extra service within one hour after the completion of their scheduled run, such payment to be from the time of such completion until they take their cars into the house or are relieved; but in no case are such platform men to receive less than two hours' pay.

PLEA MADE FOR HYDRO-RADIALS

The central executive of the Ontario Hydro-Radial Railway Union interviewed the Cabinet of the Ontario government at the Parliament Buildings, Toronto, on Nov. 7, and made the following requests:

1. That the government provide money so that the Hydro-Commission may from time to time purchase radial rights-of-way for the municipalities of the province. That such sums be in the nature of loans to the municipalities until after the war, when the municipalities can raise the required sums on debentures and repay their obligations to the government.

2. That legislation be passed at the next session of the House placing the Chippawa Creek power development scheme in the hands of the Hydroelectric Power Commission, as representing the municipalities, and that the municipalities receive authority to vote on Jan. 1, 1917, on the question of guaranteeing the bonds of the commission jointly with the government's guarantee.

3. That the "ambiguous and uncalled for and unwarranted" sections of bill 167, which prevents municipalities building radials during the war, be eliminated and only the clause allowed to remain which gives the government power to authorize the purchase of rights-of-way.

4. That legislation be passed at the next session divorcing the hydro and its commission from any government department so as to make it absolutely independent and not liable to be referred to as being under the attorney-general's department.

After a very attentive hearing by the government to the deputation, careful consideration of the proposals was promised. The government also promised that the necessary orders-in-council providing money for the purchase of the rights-of-way would be passed as they were asked for by the votes of the municipalities. With regard to the Chippawa Creek development, it was pointed out that it would have to stand pending the determinations of the respective rights of the Province and the United States.

Voters along the route of the proposed electric railway between Toronto and St. Catharines, Ont., have been asked to express approval at the January municipal elections of various bond issues assessed against localities for the construction of the line. The Ontario Hydro-Electric Commission has agreed that no construction work shall start until after the war, but it is the purpose of the commission to have all financial details and construction surveys completed before that time. It is said that the commission desires to buy the Niagara, St. Catharines & Toronto Railway, between Niagara Falls, Ont., and St. Catharines, and use the line as the connecting link between Toronto, St. Catharines and the Niagara frontier. If these negotiations are unsuccessful the commission has completed a survey of a route 4 miles shorter which extends from Niagara Falls, Ont., to Port Colborne, along the Canadian shore of Lake Erie and through to Welland and St. Catharines. Cities and towns along the route are asked to meet any deficit that may result from the operation of the road. If the railway should prove a success the bonds will be paid from the earnings. The bonds are to run for fifty years.

NEW OFFICERS FOR NORTHERN OHIO TRACTION & LIGHT COMPANY

New officers have been elected for the Northern Ohio Traction & Light Company, Akron, Ohio, as follows: President, B. C. Cobb; vice-president, T. A. Kenney; vice-president, treasurer and general manager, A. C. Blinn; secretary, F. C. Potvin; assistant secretary and assistant treasurer, S. E. Wolff. The board of directors consists of B. C. Cobb, J. C. Weadock and T. A. Kenney, New York; Frank Silliman, Jr., Philadelphia; A. C. Blinn and Charles Currie, Akron; E. W. Moore, J. R. Nutt, T. H. Hogsett, J. P. Witt and J. P. Becker, Cleveland. Messrs. Cobb, Weadock, Kenney and Wolff are connected with Hodenpyl, Hardy & Company, New York, N. Y., while Mr. Blinn was formerly vice-president, treasurer and general manager of the Public Utilities Company, Evansville, Ind. Control of the Northern Ohio Traction & Light Company passed recently to Hodenpyl, Hardy & Company and E. W. Clark & Company.

CLEVELAND HAS A PAVING QUESTION

The Cleveland (Ohio) Railway has notified Fielder Sanders, street railway commissioner, that the cost of repaving between the tracks, where street improvements are being made, must be borne by the city. Mr. Sanders found that the ordinance making this requirement had been repealed during the administration of Peter Witt, and the same is true of the ordinance requiring the company to pay for the relocation of tracks, where public improvements are being made. Mr. Sanders contends, however, that the company did not attempt to place the charge for such work upon the city during Mr. Witt's time.

The Cleveland Railway was granted a franchise on Oct. 30 for an extension of its track to the new city hall on Lakeside Avenue, but it will probably not accept it, because of the fact that it requires the company to pay for paving between the tracks.

J. J. Stanley, president of the Cleveland Railway, recently notified the board of directors that the present car equipment was not sufficient to take care of the increased number of passengers without unpleasant crowding.

FRANCHISE DISCUSSED IN MONTREAL

The Montreal (Que.) Tramways is desirous of obtaining a further franchise from the city, and the president, counsel, and manager have recently met the comptrollers and publicly discussed the terms of the franchise with a view of finding a basis of agreement. The proposed clauses include those relating to poles, rails, repairs, maintenance, seating accommodation, etc. It was suggested that the wooden poles should be replaced by iron poles laid in cement, the cost of the wooden poles being \$1,000 per mile while the iron poles would cost \$6,000. The question of appointing experts to advise the city as to the physical valuation of the company's property and on other points before a further franchise was granted was debated. The names of E. L. Cousins, Toronto, and P. St. George, Montreal, were mentioned. The representatives of the company strongly opposed certain suggestions involving large expenditures, the president pointing out that if the comptrollers insisted on very onerous conditions the public would have to pay for them in the end. The question of fixing standards of service was also considered.

Service Abandoned in Cleburne.—The Cleburne (Tex.) Street Railway has discontinued service. Announcement is made that lack of patronage made it impossible to operate the lines at a profit. The company has been in receivership and the property has once been sold at public sale by order of the court. It is said that the rolling stock will be sold and the rails probably torn up.

Park Commissioner Opposes Central Electrification Plan.—The proposed contract between the City of New York and the New York Central Railroad involving changes in Riverside Park is discussed at length by Park Commissioner Ward in his annual report. Mr. Ward is dissatisfied with the proposed plan. He seems to fear that the Board of Estimate, at an early meeting, will adopt the plan, and it will then be too late for the modifications which he deems should be made.

Wilbur Sadler's Memory Honored.—The Board of Freeholders of Mercer County, N. J., will place a memorial lamp on the new Willow Street bridge at Trenton in honor of Adj. Gen. Wilbur Fisk Sadler, electric railway promoter, who died recently at Carlisle, Pa. as noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 18. General Sadler took much interest in having a bridge erected and rendered valuable assistance to the freeholders. The State of New Jersey will also have a bronze tablet erected in memory of General Sadler because of his efforts in behalf of the State in the building of General Stacy Park in the rear of the State House at Trenton.

Railroad Club Elects Officers.—At the annual meeting of the New York Railroad Club on Nov. 17 these officers were elected: President, James Milliken, superintendent of motive power for the Philadelphia, Baltimore & Washington Railroad; First Vice-President, Sidney Chambers, superintendent of motive power of the Central Railroad of New

Jersey; Second Vice-President, C. L. Bardo, general manager of the New York, New Haven & Hartford Railroad; Third Vice-President, Miles Bronson, manager of the Grand Central Terminal; Treasurer, R. M. Dixon, president of the Safety Car Heating & Lighting Company, and Secretary, Harry D. Vought.

Cities Service Orders Power Equipment.—The Cities Service Company, New York, N. Y., has placed with the General Electric Company an order which calls for generating units for various electric generating and distributing subsidiaries of the Cities Service totaling 86,000 kw., or approximately 115,000 h.p. of generating capacity. The contract price is close to \$1,000,000. In addition to this order the Cities Service Company also has placed with the Westinghouse Electric & Manufacturing Company orders for generating equipment totaling 41,000 kw., or approximately 58,000 h.p., at a contract price of about \$500,000.

Final Hearing on Proposed Removal of Elevated Tracks.—The Public Service Commission for the First District of New York, on motion of Commissioner Travis H. Whitney, has fixed Dec. 4, 1916, as the date for a final hearing upon the question of the disposition to be made of the elevated tracks upon lower Fulton Street, Brooklyn. Upon the facts presented at the hearing, taken in connection with those brought out at previous hearings, together with studies made by Commissioner Whitney and other officials of the Public Service Commission, will be predicated the action of the commission in its final settlement of the much discussed Fulton Street situation.

Electric Railway Labor Leaders See President Wilson.—Four labor leaders affiliated with organizations of electric railway employees called at the White House on Nov. 27 by appointment and had an interview with President Wilson. None of them would make known the object of his visit, and from the White House no statement was forthcoming. It was reported from Washington that the purpose of the visit might be to ask President Wilson to use his influence to have employees of electric railways engaged in interstate commerce included in the provisions of the Adamson eight-hour law. Another theory was that the visit was in connection with the New York City local situation.

Two New Trustees for the Connecticut Company.—Morgan B. Brainard, vice-president and treasurer of the Aetna Life Insurance Company, and Charles C. Sanford, president of the First National Bank, Bridgeport, have been appointed by Federal Judge Mayer as members of the board of trustees of the Connecticut Company provided for in the decree entered against the New York, New Haven & Hartford Railroad in the Sherman act law suit. The appointments were made to fill vacancies caused by the deaths of George E. Hill and Lyman B. Brainard. Of the original board of trustees, named in April, 1914, only two members are living, Judge Walter C. Noyes, New London, and Charles Cheney, South Manchester. Those who died were William Waldo Hyde, George E. Hill and Lyman B. Brainard. In December, 1915, Leonard M. Daggett, New Haven, was appointed to the board to fill the vacancy caused by the death of Mr. Hyde and, with the appointment of Mr. Brainard and Mr. Sanford, the board is complete.

Cleveland's First Franchise Granted Fifty Years Ago.—On Oct. 25, 1859, fifty-seven years ago, the City Council of Cleveland, Ohio, granted its first street railway franchise to the Kinsman Street Railway. There were objections to the innovation from people who felt that a railway would interfere with other forms of traffic and transportation and others thought that a city of 40,000 people could not afford a luxury of that kind. Troubles and delays of one kind or another interfered with construction and the East Cleveland Street Railway had its line in operation first. Ground was broken for the latter in the summer of 1860, and in the fall of the same year cars were running between Bank Street, now West Ninth Street, and Wilson Street, now East Fifty-fifth Street. Fifteen years later the city had nine car-lines, owned by a number of companies. The East Cleveland Street Railway, however, kept ahead of others and at that time was operating thirty-seven cars with 246 horses, while the Kinsman Street Railway had three cars, six horses and 2 miles of track.

Financial and Corporate

THE FUTURE OF UTILITY INVESTMENTS

Non-Speculative Capital Will Flow Freely if Rate Regulation Provides for Security of Investment to Go With Lower Rate of Return

The expansion of public utilities and the enormous increase in public utility investments during the last twenty-five years have been among the most remarkable developments of this age. The important question to-day, however, is—how will the future affect this utility development and utility investments? To Delos F. Wilcox, writing in the November issue of *The Annals* of the American Academy of Political and Social Science, it seems reasonable to anticipate that the need of additional capital to be invested in the expansion of utility plants in this country will go on in the future much as it has in the past, say at the rate of \$1,000,000,000 a year. In spite of this need, however, capital will for some time to come hesitate about going into public utilities in those communities where the chance of speculative profit is removed and no compensating security given. Ultimately, through the full triumph of the theory of public service, there will be a free flow of non-speculative capital into utilities to the extent that the consuming public is able and willing to pay for the expansion of the service.

Mr. Wilcox bases his prediction upon certain conclusions deduced from utility experience. In a growing community, he says, utility investments tend to lag behind the demand, and therefore when city growth slackens or stops, the demand for utility expansion continues until the community has spread out. Transfers of population, moreover, will not release existing utility investments but will necessitate large additional ones in new districts. In general, the relative importance of transportation and communication necessarily increases with the growing complexity of social organization. Furthermore, although utilities are primarily urban phenomena, they are the promoters or sales agents, to rural districts, of the economic and social advantages hitherto characteristic of urban life, and the territorial expansion of utility service means generally an even greater investment in proportion to the population served than the investment required for strictly urban service.

In the early days, Mr. Wilcox states, utilities were involved in a riot of speculation, but this was attacked first through taxation and then more directly through rate regulation. At present the public pressure for a reduction of rates is a continuing force tending toward the elimination of the speculative element in utility investments. At the same time this force, if not supplemented by measures calculated to give security to the investment, will drive capital into other fields. If security follows rate regulation, utility stocks and bonds will merely appeal to another class, the investors, who are willing to accept a lower return with security.

In Mr. Wilcox's opinion, there are some facts which the public must recognize, for security of utility investments and the assurance of a fair return thereon will necessitate the giving up of many long-cherished illusions on the part of the public. The fancied protection of maximum or absolute rates fixed by franchise contract for a long term of years must be surrendered. It must be frankly admitted that rate regulation involves the possibility of increase as well as decrease of rates, whenever justice demands it. Utilities must not be harassed by demands financially impossible, and if the standards of service are to be raised year by year, the people who receive the improved service will have to pay for it. Moreover, the public will have to reconcile itself to an allowance of adequate depreciation funds, and it must give up once for all its lingering fancy for competition in utility service. It will also have to forego the short-term franchise that imposes no obligation upon the city to protect the investment at the end of the franchise period. In short, Mr. Wilcox states, the "let-them-take-a-chance" policy must be definitely discarded.

ANNUAL REPORT

Virginia Railway & Power Company

The comparative statement of income, profit and loss of the Virginia Railway & Power Company, Richmond, Va., for the years ended June 30, 1915 and 1916, follows:

	1916		1915	
	Amount	Per Cent	Amount	Per Cent
Revenue from railway operations	\$3,172,862	56.20	\$2,838,370	55.55
Light, power and gas revenues	2,472,296	43.80	2,271,252	44.45
Total operating revenues	\$5,645,158	100.00	\$5,109,622	100.00
Railway operating expenses:				
Maintenance of way and structures	\$251,424	7.92	\$286,560	9.46
Maintenance of equipment	180,611	5.70	173,137	6.10
Traffic expenses	8,725	0.27	6,742	0.24
Transportation expenses	1,006,422	31.71	901,005	31.74
General expenses	342,205	10.79	293,157	10.33
Total	\$1,789,387	56.39	\$1,642,601	57.87
Light, power and gas expenses	886,792	35.87	826,473	36.39
Total operating expenses	\$2,676,179	47.41	\$2,469,074	48.32
Operating income	\$2,968,979	52.59	\$2,640,548	51.68
Other income	96,610	1.71	80,919	1.58
Gross income	\$3,065,589	54.30	\$2,721,467	53.26
Taxes and licenses	327,631	5.80	298,551	5.84
Income applicable to fixed charges and rentals	\$2,737,958	48.50	\$2,422,916	47.42
Fixed charges and rentals	1,415,036	25.05	1,337,867	26.19
Surplus over fixed charges and rentals	\$1,322,922	23.44	\$1,085,049	21.23
Depreciation	\$100,000	1.77	\$100,000	1.96
Proportion of discount on securities	30,316	0.54	29,261	0.57
Net miscellaneous charges not operating	38,488	0.68	33,284	0.65
Total direct charges	\$168,804	2.99	\$162,546	3.18
Surplus over fixed and other charges	\$1,154,118	20.45	\$922,503	18.05

The operations of the Richmond Railway & Viaduct Company for the last fiscal year are included in the above statement, but not for 1915. The gross income from all sources, after operating expenses, showed an increase of \$344,122, or 12.65 per cent, and established the highest record of earnings in the history of the company. Railway operations secured increased revenue of \$334,492, or 11.8 per cent, and the total light, power and gas revenues rose \$201,044, or 8.8 per cent, so that the total operating revenue increased \$535,536, or 10.4 per cent. The total operating expenses, however, increased \$207,104, or 8.4 per cent, so that the operating income gained \$328,431, or 12.4 per cent. This, combined with an increase of \$15,691 or about 19 per cent in other income, gave the unprecedented gain in gross income before noted. The gain in surplus over fixed and other charges was \$231,615, or about 25 per cent.

The stated increase in total operating expenses arose from an increase of \$60,318, or 7.3 per cent, in light, power and gas expenses, and \$146,786, or 8.9 per cent, in railway expenses. In the railway group, maintenance of way and structures alone showed a decrease. The total expenditures for railway maintenance amounted to \$432,035, or 13.62 per cent of the railway revenues in 1916, as compared to \$441,697, or 15.56 per cent, the previous year. In addition to the regular charge for maintenance of way and equipment, \$100,000 was carried to the depreciation reserve, and an additional sum of \$335,973 was credited thereto as of June 30, 1916. The balance in the reserve on this date was \$1,157,866, as compared to \$960,572 the preceding year.

The company expended \$371,597 for additions, extensions and betterments in 1916. Various statistics follow:

	1916	1915	Change
Revenue passengers carried	67,226,456	62,271,603	+4,954,853
Transfer and free passengers	16,980,726	14,706,115	+2,274,611
Total passengers carried	84,207,182	76,977,718	+7,229,464
Percentage of passengers using transfers	19.33	18.10	+1.23
Average fare per passenger, including transfers	\$0.037	\$0.037	—
Car mileage	13,750,325	12,439,758	+1,310,567
Car hours	1,645,521	1,513,612	+131,909
Total revenue per car mile	\$0.231	\$0.228	+0.003
Total revenue per car hour	\$1.928	\$1.87	+0.058
Operating expenses per car mile	\$0.131	\$0.132	-\$0.001
Operating expenses per car hour	\$1.088	\$1.09	-\$0.002

ELECTRIC RAILWAY STATISTICS

Returns for Year Ended June 30, 1916, Are Encouraging for East and South, with Depression in West

A comparison of electric railway statistics for the twelve months ended June 30, 1916, with figures for the corresponding period of 1915, made by the information bureau of the American Electric Railway Association, indicate an encouraging improvement in the electric railway business of the Eastern and Southern districts of the United States, together with a continued depression in the Western district. This latter is probably due both to the economic effects of the European war and to unregulated jitney competition. Increasing expenses and taxes accompany the advance in net earnings and net income. Data for twelve months representing 8721 miles of line* of companies scattered throughout the country indicate an increase in operating revenues of 3.47 per cent, in operating expenses of 2.40 per cent and in net earnings of 5.15 per cent, while data representing 7718 miles of line indicate an increase in taxes of 3.04 per cent, and in net income of 25.72 per cent. The operating ratio of the United States as a whole decreased from 61.19 per cent in 1915 to 60.56 per cent in 1916, though that of the Western district increased from 63.01 per cent in 1915 to 64.18 per cent in 1916. Moreover, the operating ratio of this district was higher than that of the other two groups.

The number of revenue passengers carried by companies representing 6667 miles of line increased 4.13 per cent, while the number of transfer passengers increased 2.90 per cent, the revenue car mileage 2.42 per cent and revenue car hours 0.43 per cent. Indications point to almost no increase in traffic in the Western district while its earnings decreased. The average fare per revenue passenger decreased 0.39 per cent while the average fare per passenger, including transfers, decreased 0.25 per cent. It must be borne in mind in this connection that both of these figures are based upon the combined returns of both city and interurban electric railways. The average number of revenue passengers per passenger car-mile increased 1.64 per cent.

The returns from the city and interurban electric railway companies, as shown in the tables on the following page, were classified according to the following geographical grouping: *Eastern District*—East of the Mississippi River and north of the Ohio River. *Southern District*—South of the Ohio River and east of the Mississippi River. *Western District*—West of the Mississippi River.

Table I shows the revenues, expenses and net earnings of 185 electric railways in the United States as well as the net income of 150 companies reporting taxes and fixed charges. Of the three groups in this table, the Western represented by 2262 miles of line showed a decrease in operating revenues of 1.04 per cent and a slight increase in operating expenses, while net earnings decreased 4.19 per cent. The net income of companies in this group represented by 1966 miles of line decreased 14.91 per cent. The Southern and Eastern groups secured increases in operating revenues, expenses and net earnings. The net income of the Southern group increased about 25 per cent, while that of the Eastern apparently increased over 50 per cent. All groups had an increase in the amount of taxes paid, the percentage increase for the United States as a whole being 3.04.

Table II shows the details of the operating revenues of companies represented by 6926 miles of line. This table shows a considerable decrease in the mail revenue together with increases in freight, express and milk revenue. As a whole passenger revenue increased, though that of the Western group decreased. The largest increase in passenger revenue, one of 5.71 per cent, occurred in the Eastern group.

Table III gives the traffic statistics of companies represented by 6667 miles of line. All groups secured increases in the number of passengers carried and car-miles run. The Eastern and Southern showed increases in the number of car-hours run, while the Western suffered a very slight

*The 1912 report of the Bureau of the Census on street and electric railways gives the total miles of line in the United States as 30,437 miles.

†The returns for this group include the First and Second Districts of New York, exclusive of the Interborough Rapid Transit Company of New York City.

decrease of 0.07 per cent. The Southern district showed the greatest increase in the number of transfer passengers carried; the Western, the least. The per cent of increase in the number of revenue passengers carried was almost the same in the Eastern and Southern groups, while the Western district showed almost no increase. A large number of companies keep no record of free passengers, and the records of free passengers as shown in the table are therefore somewhat smaller than the actual figures. The average fare per revenue passenger decreased in all but the Southern district, where there was apparently a slight increase. A similar decrease occurred in the average fare

per passenger including transfers, though the Southern district showed no change in this respect. The average number of revenue passengers per passenger car-mile increased in the East and decreased in the South and West, particularly in the latter district. The increase for the United States as a whole was one of 1.64 per cent.

In Table IV are shown the revenues, expenses and net earnings per revenue car-mile and per revenue car-hour, together with the per cent increase or decrease over the corresponding figures for 1915. There are also given the number of revenue car-miles and revenue car-hours involved with the last three figures omitted. The table indi-

TABLE I

REVENUE AND EXPENSES OF ELECTRIC RAILWAYS FOR TWELVE MONTHS ENDING JUNE 30, 1916
COMPILED FROM MONTHLY RETURNS OF ELECTRIC RAILWAYS TO THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

Table with 8 columns: ACCOUNT, United States (Amount, Increase), Eastern District (Amount, Increase), Southern District (Amount, Increase), Western District (Amount, Increase). Rows include Operating revenues, Transportation revenues, Other railway operating revenues, Operating expenses, Way and structures, Equipment, Traffic, Conducting transportation, Power, Car operation, General and miscellaneous, Net earnings, Operating ratio, Average number of miles of line represented.

TABLE III

TRAFFIC STATISTICS OF ELECTRIC RAILWAYS FOR THE YEAR ENDING JUNE 30, 1916

Table with 8 columns: ACCOUNT, United States (Amount, Increase), Eastern District (Amount, Increase), Southern District (Amount, Increase), Western District (Amount, Increase). Rows include Car miles, Passenger car miles, Non-revenue car miles, Car hours, Passenger car hours, Other revenue car hours, Non-revenue car hours, Passengers, Revenue passengers, Transfer passengers, Free passengers, Average fare per passenger, Average number of revenue passenger per passenger car mile, Average number of miles of line represented.

COMPANIES REPORTING TAXES AND FIXED CHARGES

Table with 8 columns: ACCOUNT, United States (Amount, Increase), Eastern District (Amount, Increase), Southern District (Amount, Increase), Western District (Amount, Increase). Rows include Operating revenues, Operating expenses, Net earnings, Taxes, Operating income, Miscellaneous income, Gross income, Income deductions, Interest, Rentals and other, Net income, Operating ratio, Average number of miles of line represented.

TABLE II

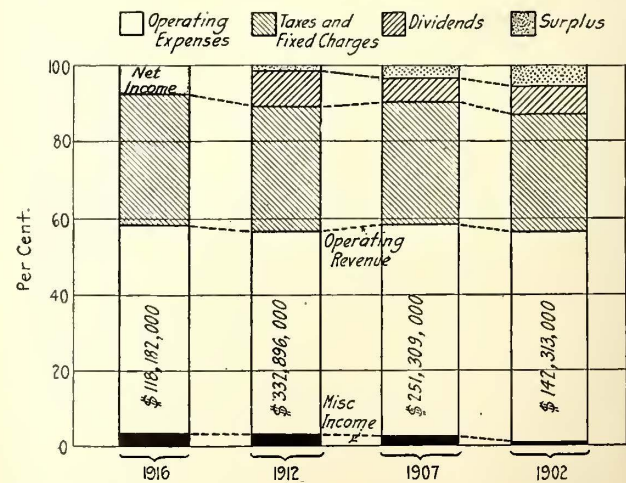
DETAILS OF OPERATING REVENUES OF ELECTRIC RAILWAYS FOR THE YEAR ENDING JUNE 30, 1916

Table with 8 columns: ACCOUNT, United States (Amount, Increase), Eastern District (Amount, Increase), Southern District (Amount, Increase), Western District (Amount, Increase). Rows include Operating revenues, Transportation revenues, Passenger, Special car, Mail, Express, Milk, Freight, Switching, Miscellaneous, Other railway operating revenues, Station and car privileges, Parcel room, Storage, Car service, Rents, tracks and terminals, Rents, equipment, Rents, buildings, etc., Power, Miscellaneous, Average number of miles of line represented.

TABLE IV

OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR MILE AND CAR HOUR YEAR ENDING JUNE 30, 1916

Table with 8 columns: ACCOUNT, United States (Amount, Increase), Eastern District (Amount, Increase), Southern District (Amount, Increase), Western District (Amount, Increase). Rows include Per revenue car mile: Operating revenues, Operating expenses, Net earnings, Revenue car miles, Average number of miles of line represented; Per revenue car hour: Operating revenues, Operating expenses, Net earnings, Revenue car hours, Average number of miles of line represented.



Note—Figures in italics denote decreases. *Last three figures are omitted.

cates that the net earnings per revenue car-mile increased 3.09 per cent, while the net earnings per revenue car-hour increased 5.94 per cent. The largest increase occurred in the Eastern group, while the Western suffered decreases of 5.26 and 6.61 per cent respectively.

The chart on page 1176 is a graphical representation of the income account of the electric railways of the United States for the four years 1902, 1907, 1912, 1916. The first three are based on the returns from the 1912 census of street electric railways and are taken from a diagram in F. W. Doolittle's "Studies in the Cost of Urban Transportation Service" (page 25). The figures for 1916 are based upon the returns of 150 electric railways represented by 7700 miles of line. Though of course not strictly comparable owing to the difference in the number of companies represented, they furnish some indication as to the trend of operating expenses and net income.

Cincinnati & Columbus Traction Company, Cincinnati, Ohio.—The property of the Cincinnati & Columbus Traction Company is advertised to be sold at Cincinnati on Dec. 19, under foreclosure of the first mortgage of \$600,000 and the second mortgage securing \$148,000 of notes outstanding. The upset price of the property free and clear of all liens has been set at \$850,000.

Illinois Traction Company, Peoria, Ill.—Bodell & Company, Providence, R. I., are offering at 99½ and accrued dividend a block of 6 per cent cumulative guaranteed preferred stock of the Danville, Champaign & Decatur Railway & Light Company, which is under the management of the Illinois Traction Company. The present offering is a small additional amount to that previously outstanding and brings the amount of this issue outstanding up to \$500,000.

Keystone Utilities Company, Hanover, Pa.—The Keystone Utilities Company was incorporated under the laws of Delaware on Nov. 27, with an authorized capital stock of \$5,000,000, to take over a number of public utilities in Pennsylvania, among them the Hanover & McSherrystown Street Railway, the Hanover Light, Heat & Power Company, the Gettysburg Electric Company, the Du Bois Electric & Traction Company, and the Susquehanna County Light & Power Company. Among the directors are F. J. Platt, E. J. Lynett, James A. Linen, Jr., Griffith T. Davis and W. W. Inglis, Scranton; Irving A. Stearns and Guy W. Moore, Wilkes-Barre.

Pensacola (Fla.) Electric Company.—The Pensacola Electric Company has declared a dividend of 1½ per cent on the \$300,000 of preferred stock of the company on account of accumulation, along with the semi-annual 3 per cent dividend, both payable on Dec. 1 to holders of record of Nov. 23. This leaves about 7½ per cent still in arrears.

Public Service Corporation of New Jersey, Newark, N. J.—The financial statement of the Public Service Commission of New Jersey for October shows a gross increase in total business over October, 1915, of \$466,189, or 13.9 per cent. The balance available—after payment of operating expenses, fixed charges, sinking fund requirement, etc.—for amortization, dividends and surplus, was \$641,066, and the increase in surplus available for dividends over the corresponding month in 1915 was \$130,234. The gross increase in total business for the ten months ended Oct. 31, 1916, amounted to \$4,096,443, or 13.4 per cent. The balance available for amortization, dividends and surplus totaled \$4,568,381, and the increase in surplus was \$1,018,738.

Springfield, Troy & Piqua Railway, Springfield, Ohio.—The Springfield, Troy & Piqua Railway has applied to the Ohio Public Utilities Commission for authority to issue \$280,000 of common stock and \$250,000 of bonds to reimburse the estate of Asa F. Bushnell on account of \$670,844 of advances made to the company.

Toronto (Ont.) Railway.—William A. Read & Company, New York, N. Y., have sold \$1,250,000 of 6 per cent gold notes of the Toronto Railway due \$500,000 on Dec. 1, 1917, and \$750,000 on Dec. 1, 1918. The notes are in coupon form of \$1,000 each. They are redeemable at 102½ and interest on any interest date on thirty days' notice. The railway agrees not to issue any bonds or other funded debt while any of these notes remain unpaid, without applying the proceeds to their redemption. The present \$1,250,000 of

notes are part of an authorized issue limited to \$2,000,000, of which \$1,500,000 will eventually be issued to refund a like amount of a previous issue. Of this old issue, \$1,250,000 was to mature on Dec. 1, 1916, and \$250,000 on Dec. 1, 1917. The notes represent extensions and improvements of the Toronto Power Company, Ltd., which endorses them.

Third Avenue Railway, New York, N. Y.—The Third Avenue Railway, on Nov. 28, passed the quarterly dividend. Dividends were renewed last January for the first time since 1911, at the rate of 1 per cent a quarter, and 3 per cent has been disbursed this year. F. W. Whitridge, president of the company, said: "The statement for four months shows that there was a decrease of \$1,433,921 in the operating revenue and a decrease of \$1,282,154 in the net income. This latter sum may be estimated to be the net cost of the strike on the Third Avenue Railway during the last four months. That performance is practically over. The service on all the lines under the jurisdiction of the Third Avenue Railway is now normal except in the town of Yonkers, where it is between 50 and 60 per cent normal." The October statement of the company showed that total revenue of \$390,022 was \$578,626 less than in the same month last year. There was a deficit of \$505,508 after all deductions had been made.

United Light & Railways Company, Grand Rapids, Mich.—The United Light & Railways Company has executed an agreement with the New York Trust Company to secure an issue of convertible debenture bonds, due Nov. 1, 1956. One and a half million dollars will be issued presently.

DIVIDENDS DECLARED

- Baton Rouge (La.) Electric Company, 3 per cent, preferred.
- Eastern Power & Light Corporation, New York, N. Y., quarterly, 1¾ per cent, preferred.
- Louisville (Ky.) Traction Company, quarterly, 1 per cent, common.
- Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.
- Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.
- Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¼ per cent, common.
- Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

CITIES SERVICE COMPANY, NEW YORK, N. Y.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '16	\$1,122,910	\$20,041	\$1,102,869	\$393	\$1,102,476
1 " " '15	411,504	14,323	397,181	40,833	356,348
12 " " '16	8,233,952	232,384	8,001,568	340,069	7,661,499
12 " " '15	4,232,914	163,503	4,069,411	490,000	3,579,411

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Oct., '16	\$513,465	*\$230,840	\$282,625	\$215,691	\$66,934
1 " " '15	477,723	*192,605	285,118	212,502	72,616
4 " " '16	1,884,103	*860,077	1,024,026	859,430	164,596
4 " " '15	1,768,622	*759,418	1,009,204	847,035	162,169

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH KY.

1m., Sept., '16	\$26,019	*\$17,033	\$8,986	\$7,128	\$1,858
1 " " '15	23,864	*14,131	9,733	7,475	2,258
12 " " '16	309,432	201,118	108,314	87,345	20,969
12 " " '15	290,264	*181,222	109,042	91,654	17,388

PENSACOLA (FLA.) ELECTRIC COMPANY

1m., Sept., '16	\$23,920	*\$12,997	\$10,923	\$7,712	\$3,211
1 " " '15	22,012	*12,186	9,826	7,062	2,764
12 " " '16	280,503	*155,104	125,399	90,585	34,814
12 " " '15	246,988	*146,777	100,211	86,639	13,572

PHILADELPHIA & WESTERN RAILWAY, UPPER DARBY, PA.

1m., Oct., '16	\$47,433	\$20,865	\$26,568	\$12,570	\$13,998
1 " " '15	44,922	21,302	23,620	12,485	11,135
12 " " '16	508,235	242,346	265,889	150,501	115,388
12 " " '15	449,346	217,636	231,710	147,448	84,262

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Oct., '16	\$846,915	\$512,896	\$334,019	\$141,883	\$192,136
1 " " '15	807,582	488,731	318,851	144,173	174,678
10 " " '16	8,441,904	5,205,673	3,236,231	1,434,878	1,801,353
10 " " '15	7,822,440	5,020,124	2,802,316	1,416,420	1,385,896

*Includes taxes.

Traffic and Transportation

BATHING BEACH A REVENUE BUILDER

Sunday Beach Travel in Summer Averages 30,000 on Portland Interurban Line that Carried Less than 5000 Before Resort Opened

About the middle of the summer season in 1915 it became apparent to the Portland Railway, Light & Power Company, Portland, Ore., that as a whole the people of Portland preferred above all other places of resort and recreation during the summer season those which afforded bathing facilities. It did not seem to matter particularly whether there were additional amusements. This led to a study of the possibility of developing some resort on the traction company's system which would offer bathing attractions.

On the Columbia River about 7 miles north of the heart of the city the railway, in conjunction with a number of other owners, held title to property on Sand Island, known as Columbia Beach. The Vancouver interurban line of the railway passes within a few hundred yards of the beach at a point which is an even thirty-minute run from the city. The island has a frontage of 5800 ft. on the river, the water is clean, the average current is from 2 to 3 m.p.h. in the summer, and the beach is of fine white sand with a gradual slope, making it an ideal beach for children and beginners.

Although there is a fine grove of trees on the island and attractive places for picnicking and camping, the place was practically unknown as a resort, and had never brought the owners any revenue.

In the middle of August, 1915, in its company publication which is distributed on the street cars, the railway company printed a paragraph about the possibilities of Columbia Beach. This was followed with an expenditure of \$80 for display advertising in the daily papers in which the beach was mentioned as "an ideal romping place for the kiddies." The results of this publicity was a flood of applications for leasing the beach for the 1916 season, leases being requested on short and long terms and for almost every conceivable amusement and concession privilege. As a result, a concessionaire's agreement was drawn up whereby the lessee agreed to expend several thousand dollars for improvements, such as bath-houses, water supply and sewerage systems, athletic field, etc. This agreement netted a considerable revenue to the owners and the only expenditure on the part of the railway was the cost of the display advertising and construction of a station and loading platform.

When these arrangements were completed it was too late to accomplish much in 1915, but the lessees undertook an active advertising campaign in which the company assisted, and the beach came to be generally known.

The Vancouver line which serves the beach handles the regular through business to Vancouver, Wash., and there were no elements tending to increase the revenues on the line except the development of Columbia Beach. In 1916, the receipts on this line were about 230 per cent more than in 1915, and 550 per cent more than prior to the development of the bathing beach idea. The passenger totals for four Sundays in August, 1914, were 18,383, while the totals for four Sundays in August, 1915, were 35,769, and similar totals for four Sundays in August, 1916, were 119,314.

In the summer of 1916, the unprecedented high waters in the river and the late rains made it impossible to open the season at the beach until the first Sunday in August. Another condition which worked against the greatest returns to the railway was the construction of a 700-ft. causeway which enabled automobiles to reach the beach. In 1915, the only access to the beach was by electric car or boat, but with the completion of a highway bridge in 1916 the number of automobiles entering the grounds on Sundays ranged from 500 to 2000 and checks made by the railway showed the average number of passengers per automobile to be 4.8. The remarkable gain in receipts despite the auto competition indicates the efficacy of the advertising campaign and the popular approval which met the beach idea.

STATISTICS OF ACCIDENTS IN PENNSYLVANIA

John P. Doheny, chief of the bureau of accidents of the Pennsylvania Public Service Commission, on Nov. 25 submitted to William D. B. Ainey, chairman of the commission at Harrisburg, Pa., statistics relating to accidents that have occurred on steam railroads and street railways in Pennsylvania during the year ended June 30, 1916.

The total number of accidents during this period was 13,278, an increase of 9 per cent over the previous year so far as steam roads are concerned, and of 10 per cent with respect to the operation of electric railways. As a result of these accidents 1138 persons were killed on the railroads and 10,419 injured, while 174 were killed on the street railways and 2858 injured. There is an increase of 14 per cent with regard to railroad fatalities and of 16 per cent with regard to the number injured. The increase in the number of killed on the street railways was 7 per cent, and in the number of injured 3 per cent.

The report shows that the trespasser is the chief sufferer from railway accidents, for although there is a decrease in the number of trespassers killed this class represents 50 per cent of the total number of railroad fatalities and only 1 per cent involves passengers.

Grade-crossing accidents on street railways other than city street crossings resulted in the death of eighteen people, fifteen of them automobilists, two pedestrians, and one by collisions with trains.

Thirty-nine people were injured in grade-crossing accidents, one an employee, twenty-three passengers, and fifteen others. The total number of killed and injured was fifty-seven.

CLEVELAND SERVICE TO BE INCREASED

Yielding to persistent demands from the public and the newspapers, Fielder Sanders, street railway commissioner of Cleveland, Ohio, has arranged a schedule for Superior Avenue that will add fourteen cars during the rush hours, and has promised to increase the number on Euclid and Detroit Avenues as soon as his checkers have finished their work.

The demand for additional cars has been earnest and vehement for some weeks past. It has been stated that as many as 200 and 250 cars have been found in the car storage yards during the rush in the morning and evening, while people were fighting for standing room in order to get back and forth.

Under the Cleveland settlement grant the operation of cars is in the hands of the company, but it must be conducted according to instructions from the city. J. J. Stanley, president of the Cleveland Railway, insists that the base tables should be raised, so that more cars may be run all through the day. Aside from the need of additional cars through the day, he says it will be impossible to secure men for the short hours morning and evening. All men receive pay for five hours any way, and he believes that the service should be better all around. The officers of the local branch of the Amalgamated Association agree with him in this.

Mr. Sanders said that it was very difficult to secure men and he did not know whether a sufficient number to operate the additional cars he has put on Superior Avenue can be obtained. The demand for men in other work is so great and the wages so high that men will not take places on the cars at the wages the company can afford to pay.

FARE INCREASE IN PENNSYLVANIA

The Titusville (Pa.) Traction Company has succeeded in securing an increase in fares from 5 cents to 6 cents in the city of Titusville, in the boroughs of Pleasantville and Hydetown and in the township of Oil Creek. Some few weeks ago the company in its campaign for permission to charge an adequate fare addressed the Mayor and the Commissioners of the city of Titusville summarizing the facts in connection with the affairs of the company that made an advance in rates imperative. In its statement to the Mayor and the Commissioners the company, through William J. Smith, its general manager, said that the road had not earned sufficient to pay interest at 5 per cent on its first

mortgage bonds, to say nothing of the interest on the second mortgage bonds. Mr. Smith stated that this condition had been brought about in the last seven years by the great number of automobiles publicly and privately owned, together with the high cost of labor and materials which entered into the financial operation of the road. He offered to submit the records and books of the company to the Commissioners for verification of the facts set forth by him. Mr. Smith said that the day had passed when the company could secure capital to meet its obligations year by year if it was unable to do so through its own resources.

The statement by Mr. Smith to the Mayor and the Commissioners was published in the papers in the territory through which the company operates. In a subsequent notice to the public published in the papers the company quoted in full the editorial, "Encouraging Fare Increases," which appeared in the *ELECTRIC RAILWAY JOURNAL* of Oct. 28. It also referred to other articles in the same issue of this paper relating to fare matters, notably the application of the Bucks County Interurban Railway, Trenton, for permission to increase its fares, the decision of the New Hampshire Commission in the Manchester & Derry Street Railway fare case and the allowance of the 6-cent fare rate for the major portion of the lines of the Massachusetts Northeastern Street Railway.

PITTSBURGH NIGHT FARE CASE ARGUED

The question of 10-cent fares at night on the lines of the Pittsburgh (Pa.) Railways was argued before the Superior Court at Philadelphia, Pa., recently. David A. Reed, attorney for the company, asserted that the Public Service Commission had wilfully ignored its own tariff statement in ruling that the railway had violated the publicity provision of the law when it restored the 10-cent night fare last summer. Mr. Reed explained that in 1907 the Pittsburgh Railways reduced its night fare to 5 cents in obedience to an act of the Legislature. Subsequently the act was declared unconstitutional. The railway, however, continued the 5-cent rate until the recent strike. With the aid of the Mayor the strike was settled, but the company was called upon to meet an additional expense of \$500,000 a year. This made it necessary to find additional revenue, and it was decided to restore the 10-cent owl fare. The proposed new tariff was published and posted and notice was served on the Public Service Commission. In referring to the complainants' grounds of attack, Mr. Reed said the tariff was properly posted. C. Elmer Bown, representing William Jacoby, city complainant, contended that the company did not do what the law required in making the rate nor did it do anything that would give the public adequate notice that it proposed to put the increase into effect.

The decision of the commission in the case was referred to at length in the *ELECTRIC RAILWAY JOURNAL* of Oct. 14, page 856. The commission held that the company acted in violation of both the spirit and the letter of the Public Service Company Law of Pennsylvania in the way in which it proceeded to give notice of the doubling of the fare. No opinion was expressed of the commission with regard to the authorization of an increase in rates. It said that "when that matter comes before us in the regular way, and after full hearing shall be had, this commission will decide."

One-Man Cars in Fort Worth.—The Northern Texas Traction Company has put ten front-entrance one-man cars in service on the Summit Avenue line in Fort Worth. According to G. H. Clifford, general manager, the one-man cars are being tried as an experiment.

Accident on New York Elevated.—Eleven persons were injured on the morning of Nov. 24 by the derailment of the rear car of a southbound Third Avenue elevated train of the Interborough Rapid Transit Company at 129th Street, New York. After the car had left the rails it was dragged about 20 ft.

Withdrawal of Reduced Rate Tickets Suspended.—The Public Service Commission of Massachusetts has issued an order requiring the Bay State Street Railway to suspend until Jan. 1, 1917, unless otherwise directed, its proposed withdrawal from sale of strips of six tickets for 25 cents in the city of Fall River.

Near-Side Stops in Jeffersonville and New Albany.—The city cars of the Louisville & Southern Indiana Traction Company are being stopped on the near side in Jeffersonville and New Albany, Ind. The commercial organizations of the two cities requested the change, as the cars in Louisville and in other cities stop on the near side.

Journal Cartoon Reproduced in Birmingham.—The *Buzzer*, published in the interest of the employees of the Birmingham Railway, Light & Power Company, Birmingham, Ala., reproduced in its issue of Nov. 25 the editorial "Every Employee a Publicity Representative" and the accompanying cartoon, from the *ELECTRIC RAILWAY JOURNAL* of Nov. 4.

Prizes Offered for Car Names.—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., will offer cash prizes for the best name submitted and adopted for two new limited cars which have lately been installed. The new cars will operate between Fort Wayne, Ind., and Lafayette, Ind., the running time being four hours for the 110 miles.

New Destination Ordinance in St. Louis.—A bill has been passed by the Board of Aldermen of St. Louis, Mo., which provides that extra cars used at times when traffic is heavy, must display placards informing passengers just how far the car is going. By the provisions of the bill the United Railways is prohibited from running cars over any other than their regular routes except when emergencies arise.

Louisville Semaphores Successful.—In the annual report of the Board of Public Safety of Louisville, Ky., special attention is paid to the success which has attended the use of the semaphores installed as a part of the police department's traffic regulation at the principal corners. It is observed that pedestrians are coming more and more to be governed in their crossing at these intersections by the semaphore signals of the traffic officer.

Additional Time to Rebuild Running Boards.—A supplemental order has been issued by the Public Utilities Commission of Connecticut which makes it compulsory on the Shore Line Electric Railway to equip on or before June 1, 1917, all its double truck open cars with double running boards. The order permits the company to reconstruct cars that are not now so equipped, but on the understanding that the plans of reconstruction are first approved by the commission.

Portland Company to Test Rebuilt One-Man Car.—The Portland Railway, Light & Power Company, Portland, Ore., is rebuilding one of its three-compartment cars so that it can be operated by one man. The company has a number of these cars, weighing 13 tons, and equipped with two 27-hp. motors. The one being rebuilt will be operated as an experiment to see whether it will afford quicker service and whether it would be desirable to remodel other cars of this type in a similar manner.

Near Side Stops for Houston.—By agreement between the Public Service Commissioner of Houston, Tex., and the officials of the Houston Electric Company, near-side stops have been put into force on all street railway and interurban lines operating in the city. The near-side stop has been the order for down-town streets for several months and has proved satisfactory. It now has been extended to all residential streets. Certain leniency will be extended on unpaved streets, especially in wet weather, when the motor-man may be permitted to use his own discretion.

Statement of Accidents Posted Monthly.—Every month hereafter there will be posted in each division of the United Railroads, San Francisco, Cal., a classified statement of all accidents. During the month of July last the number of car-miles per accident was 3955, and the number of passengers carried per accident was 32,546. In both August and September these figures each decreased, showing that, relatively, the number of accidents was greater in these months. The actual comparison of September with July showed that there was a decrease of 995 car-miles per accident and 5987 passengers per accident.

Conference on Louisville-Indianapolis Rates.—Action in regard to division of the rates for freight traffic north from Louisville over the Louisville & Southern Indiana and connecting lines to Indianapolis and beyond is understood

to have been considered at a conference in Louisville between representatives of the Louisville Board of Trade and the railway managements. Chester P. Wilson, president, and Frank Smith, vice-president, of the Interstate Public Service Corporation, represented the railways, and John Telford, secretary of the transportation committee, represented the Board of Trade. Through routes and through rates were ordered by the Interstate Commerce Commission nearly three years ago, but no agreement has been reached as to division of the rates.

Service Abandoned in Lincoln.—The Lincoln Railway & Heating Company, Lincoln, Ill., has suspended business after a long period of unsettled relations with the city. About three months ago, the Public Utilities Commission of Illinois decided that the company could quit business if the city of Lincoln would concur therein. This permission was not received by the company, but after a number of weeks of uncertainty J. R. Patton, president of the company, issued an order discontinuing railway service. The Lincoln Railway & Heating Company was organized in 1891 and the first cars were run Christmas Day of that year. Mr. Patton bid in the property two years ago at foreclosure. It is expected that the lines will now be dismantled. The road is 5.5 miles long and equipped with seven motor cars. The decision to abandon the road is said to have been hastened by the prohibitive prices for coal and by the need which existed for immediate repair to the plant and equipment.

Thirty Extra Cars in Portland After Enforcement of Jitney Ordinance.—In the *ELECTRIC RAILWAY JOURNAL* for Nov. 25, page 1130, mention was made of the arrest of drivers of jitneys in Portland, Ore., charged with failing to secure franchises to operate as prescribed in an ordinance which went into effect on Nov. 15. In rendering decision in the case of one of the drivers arrested Judge Langguth sustained the right of the city to enforce the franchise requirement and sentenced the driver to pay a fine of \$25. Attorney for the defense immediately gave notice of appeal. Meantime the jitneys, equipped with the speed and time recording devices required by the city ordinance for taxicabs, continued operating on the usual routes. On Nov. 20 A. J. Lee was arrested and made the defendant in a test case which will determine whether the jitney-taxicabs are infringements of the franchise ordinance. On Nov. 16 the Portland Railway, Light & Power Company added thirty cars to its regular service to handle the traffic which was not provided by the jitneys. Although no definite check of the additional traffic has been made, Fred Cooper, superintendent of transportation, estimated that the daily average jitney patronage was about 20,000. The railway company, it was announced, would put on such additional cars as were required to accommodate increases in the traffic.

Kansas City Suburban Fares to Be Considered.—The Kansas City (Mo.) Railways has asked the Public Service Commission of Missouri to inquire into the question of suburban rates on its lines extending beyond the city limits of Kansas City, Mo. The request of the company was a result of many complaints as to suburban rates, and specifically of the complaint filed with the commission on the rate to Maywood, a suburb about 15 miles from the center of Kansas City, Mo. At one hearing, Judge Kennish, chairman of the commission, intimated that without passing on the merits of the Maywood rate, the commission would be inclined to grant a reduction to a 5-cent fare, because the company already allowed a fare of only 5 cents to Fairmount Park; about equally distant from the city. The final hearing on the Maywood case was to have been held in Kansas City on Oct. 27. At that time the company intimated its purpose of filing the request for a general review. Temporarily, the Kansas City Railways is not charging the 10-cent fare heretofore charged for Maywood. It is, however, preserving its position, by not charging anything for the ride between Maywood and Kansas City, on business on which a city fare is collected. The fare from Kansas City to the city limits is 5 cents, and no additional fare is collected until after Maywood is passed. Inbound, conductors do not collect from passengers boarding cars at Maywood until after the city limits are reached, when the city fare is collected.

Personal Mention

R. W. Harris has been retained to make a survey of the Kansas City (Mo.) Railways with reference to the relation of schedules and cost of service on the various divisions.

A. C. Blinn, vice-president, treasurer and general manager of the Public Utilities Company, Evansville, Ind., has been elected vice-president, treasurer and general manager of the Northern Ohio Traction & Light Company, Akron, Ohio.

Charles Currie has been succeeded as vice-president and general manager of the Northern Ohio Traction & Light Company, Akron, Ohio, by A. C. Blinn, as noted elsewhere in this column. Mr. Currie has been general manager of the property for sixteen years, and has been active in electric and street railway work for thirty-four years. Some time ago he indicated his wish to be relieved of the active management of the Northern Ohio properties. He will continue with the company actively until Jan. 1, while Mr. Blinn is becoming familiar with the property. Mr. Currie has been re-elected a director, and, in addition, will serve the company hereafter in an advisory capacity.

Luke C. Bradley has been appointed district manager of the Stone & Webster properties in Texas. Mr. Bradley succeeds M. M. Phinney, who has been elected vice-president of the Stone & Webster interests with headquarters in Boston. Mr. Bradley has been in Texas for the last six years. His services with Stone & Webster cover a period of about fifteen years. For the last twenty years he has been engaged in public utility work, having occupied responsible positions of an engineering and operative character with various public utility corporations throughout the United States. Mr. Bradley went to the gulf coast section of Texas nearly six years ago as vice-president of the Houston Electric Company, Galveston-Houston Electric Railway and Galveston Electric Company, and manager of the latter two companies. In these capacities he was a constructive factor in the development of the Galveston-Houston territory. Early in 1913 he was appointed assistant district manager of the Stone & Webster properties in Texas, relieving Mr. Phinney of a large part of his duties as district manager. For a while the office was maintained in Dallas, but on account of its more centralized location with respect to the Stone & Webster properties was moved to Houston. Mr. Bradley is president of the American Electric Railway Transportation & Traffic Association, to which office he was elected at the recent convention in Atlantic City.

OBITUARY

Karl L. Wilcoxon, for the last five months master mechanic of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., in charge of the shops and motive power, died recently from injuries received when one of the locomotives of his own company ran him down while switching in the Michigan City yards. Karl Wilcoxon was a son of C. N. Wilcoxon, president and general manager of the company. He was born in Muncie, Ind., in 1879. After completing his education he entered railway work at the age of nineteen, in the shops of the Citizens Street Railway, Muncie, Ind. Later on he was employed in the shops of the Decatur Railway & Light Company, Decatur, Ill., as general electrician. In 1901 Mr. Wilcoxon took employment with the Western Ohio Railway, Lima, Ohio, his first work in the interurban field being as train dispatcher. He was subsequently made chief train dispatcher of the Western Ohio Railway, and later was promoted to the office of superintendent of the company. He left the Western Ohio Railway in 1907 to become superintendent of the Pittsburgh & Butler Railway, a single-phase road operating between Pittsburgh and Butler, Pa. He afterward engaged in general construction work, and spent about three years on the Pacific coast in railway work. For the last three years he had been connected with the Chicago, Lake Shore & South Bend Railway, first as signal inspector and for the last five months as master mechanic.

Construction News

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

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

RECENT INCORPORATIONS

Denver & Ephrata Street Railway, Denver, Pa.—Governor Martin G. Brumbaugh has approved a charter for the Denver & Ephrata Street Railway, which proposes to construct a line between Denver and Ephrata, 4.7 miles. Capital stock, \$130,000. H. S. Dissler, Denver, president. Incorporators: H. W. Marburger, R. S. Dornbach, J. Guy Eshelman, G. R. Zimmerman and H. S. Dissler.

***Keystone Utilities Company, Scranton, Pa.**—Incorporated under the laws of Delaware to take over a number of public utilities in Pennsylvania, among them the Hanover & McSherrystown Street Railway, the Hanover Light, Heat & Power Company, the Gettysburg Electric Company, the Du Bois Electric & Traction Company, and the Susquehanna County Light & Power Company. Authorized capital stock, \$5,000,000. Among the directors are F. J. Platt, E. J. Lynett, James A. Linen, Jr., Griffith T. Davis and W. W. Inglis of Scranton; Irving A. Stearns and Guy W. Moore of Wilkes-Barre.

FRANCHISES

Peoria Heights, Ill.—The village of Peoria Heights, a suburb of Peoria, has revoked the franchise of the Peoria Railway, which operates a car on Galena Road through the village. The trustees said the company had failed to provide a fifteen-minute schedule as stipulated in the franchise. The company was ordered to discontinue the operation of its cars on the night of Nov. 22 and to have its tracks removed by Dec. 1.

Paterson, N. J.—An ordinance has been passed by the Board of Public Works permitting the Public Service Railway to relocate its tracks on lower Broadway opposite Mulberry Street and also on Van Houten Street west of Furman Street.

Bowling Green, Ohio.—The Toledo, Fostoria & Findlay Railway has received a twenty-five year franchise from the Council to operate cars over Wooster and Meeker Streets, Bowling Green.

TRACK AND ROADWAY

Edmonton Radial Railway, Edmonton, Alta.—It is reported that acting city engineer A. W. Haddow and J. H. Moir, traffic manager of the Edmonton Radial Railway, are investigating the suggestion of forming a belt line in the center of the city. The matter will come before next year's city council. The estimated cost of the line is \$40,000.

Visalia Electric Railroad, Exeter, Cal.—Freight service has been begun by this company on its El Mirador extension.

Municipal Railways of San Francisco, San Francisco, Cal.—It is reported that the Municipal Railways of San Francisco plans the construction of 20 miles of new tracks into residence districts not touched by city lines.

Tidewater Southern Company, Stockton, Cal.—This company has withdrawn its application filed with the Railroad Commission of California for authority to extend its line from Hatch to Irwin City. The commission has issued an order granting the request and dismissing the company's application for authority to build the extension.

Ferrocarril Electrico De Matanzas S. A., Matanzas, Cuba.—A report from this company states that operation will be begun this month on its line between the city of Matanzas and suburbs, about 12½ miles. Storage battery cars of the Electric Storage Battery Company will be used. Luis Amezaga, Matanzas, president.

Miami, Fla.—Bids will be received by the Board of County Commissioners of Dade County, Fla., at the office of the Clerk of the Board of County Commissioners, Miami,

up to Dec. 14, for the construction of the Miami Causeway across Biscayne Bay, connecting the city of Miami and the town of Miami Beach. The structure will consist of approximately 4000 lin. ft. of viaduct and 13,000 lin. ft. of embankment. The embankment portion will be composed of sand and will be protected and retained by either a creosoted timber bulkhead or a concrete wall on each side. Bids will be received on both types of construction, and the type to be constructed will be selected after the bids are opened. This portion of the structure will be 105 ft. wide. The viaduct portion will consist of a series of reinforced concrete girder spans, providing for a roadway 20 ft. wide, a sidewalk 5 ft. wide, and an electric railway track outside of the roadway.

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—This company reports that construction is now under way on its proposed Coffee Pot Loop, 1½ miles.

Chicago, Fox Lake & Northern Electric Railway, Chicago, Ill.—The Illinois Public Utilities Commission has granted a certificate of convenience and necessity to the Chicago, Fox Lake & Northern Electric Railway for the construction of an electric railway from Evanston to Palatine. It is reported that work on the proposed railway will be begun early next year. L. K. Sherman, Chicago, chief engineer. [Nov. 25, '16.]

East St. Louis & Suburban Railway, East St. Louis, Ill.—This company is now at work repairing and otherwise placing its lines in East St. Louis in first-class condition at a cost of more than \$200,000.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—Work will be begun at once on this company's proposed line to connect Harrisburg, Marion, Johnston City, Herrin, West Frankford, Benton and St. Louis. The first work will begin at Marion and the road will be built north toward Johnston City. An office will be opened in Marion immediately and placed in charge of L. F. Kiple, who will be cashier and general auditor. Frank Payne will continue in charge of the engineering department. It is reported that negotiations are under way for the purchase of the Eldorado, Marion & Southwestern Railroad. [Oct. 21, '16.]

Waukegan, Ill.—It is reported that a movement is now on foot among local capitalists for the organization of a gigantic stock company in Waukegan which plans to secure rights to operate a street railway in Waukegan and to take over the holdings of the Chicago, North Shore & Milwaukee Railroad in case the latter company does not obtain a franchise from the city in the immediate future. The franchise matter is now at a standstill. The Chicago, North Shore & Milwaukee Railroad is not inclined to tender any further proposition other than the offer of \$40,000 and building of extensions while the City Council is holding out for the payment of \$60,000 claimed as due the city from the company in payment for special assessments.

Wichita Railroad & Light Company, Wichita, Kan.—This company is considering the construction of a street car trestle across the Arkansas River at Douglas Avenue.

Alexandria (La.) Municipal Railway.—Work will be begun at once by the Alexandria Municipal Railway on the construction of an extension beginning at the corner of Second and Casson Streets, thence in a southerly direction along the railroad to Third Street, down Third Street to a point to be determined. It is possible that the extension will eventually go down Third Street to the old Watkins tracks and out through the hardwood mill district across to Lee Street near Vance Avenue.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—It is reported that this company plans to construct an extension to Rumford.

Winnipeg (Man.) Electric Railway.—Negotiations are under way with the Winnipeg Electric Railway to construct a line between Transcona and Winnipeg, and it is expected that this line will be built next year.

Worcester (Mass.) Consolidated Street Railway.—It is reported that this company proposes to construct an extension to Rochdale.

Detroit (Mich.) United Railway.—Operation has begun by the Detroit United Railway on the new extension of the Grand Belt line. The route determined upon connects the

line on Forest Avenue east with the Grand Belt line on Junction Avenue. Combined it will be called the Grand Belt line.

United Light & Railways Company, Grand Rapids, Mich.—This company has sold \$1,500,000 of convertible debentures, of which the proceeds of \$400,000 will be used to retire underlying bond issues, for payment of a small amount of floating debt, and the balance for construction requirements of subsidiary companies during 1917.

Michigan Railway, Kalamazoo, Mich.—Right-of-way is being secured by the Michigan Railway for its proposed extension from Flint to Owosso.

***Jefferson City, Mo.**—It is reported that preliminary surveys have been made by interests connected with the Illinois Traction System for the construction of an interurban electric railway from Jefferson City to Mexico, via Fulton, about 45 miles.

Kansas City (Mo.) Railways.—The engineers of the Kansas City Railways recently condemned the Seventh Street Bridge in Kansas City, Kan., and arrangements are now being made for the erection of a new bridge, at a cost of \$260,000, to be paid for by the company and two steam roads over the tracks of which the viaduct passes. Cars will be stopped at each end and passengers will walk across the old structure pending construction of the new one.

***Woodbury, N. J.**—Plans are being made to construct a line from Woodbury to Paulsboro and possibly to Gibbstown and Pennsgrove. Thomas F. Deegan, Philadelphia, is reported interested.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has approved the award of a contract by the New York Municipal Railway Corporation to the G. E. Engineering Company, Inc., New York City, the lowest bidder, at \$116,702.75 for the furnishing of tunnel lighting, station lighting, heating and ventilating systems in the Broadway and Canal Street subways. The work of installation must be completed by April 15, 1917.

Carolina & Yadkin River Railway, High Point, N. C.—This company has discontinued operation of the storage battery car placed in service on its line between High Point and Thomasville last July.

Northern Ohio Traction & Light Company, Akron, Ohio.—*The Traction Bulletin*, published by the Northern Ohio Traction & Light Company, in its issue of Nov. 25 states that among other things contemplated by the retiring directors for the immediate future, the Akron terminal project is to be carried forward to completion without delay by the new owners. In general, this paper ventures the prediction that although the retiring executives have authorized liberal expenditures for additions to the property, keeping pace with the growth of the territory served, those to whom the control now passes will be even more ready to build for the future.

Dover, Millersburg & Western Railway, Dover, Ohio.—Plans are under way by this company for the construction of a new bridge over Sugar Creek. The bridge will be about 200 ft. long and will have concrete foundations with steel spans. No contracts have as yet been awarded. D. F. A. Wheelock, Woodward Building, Warren, Pa., engineer. [Oct. 21, '16.]

Ardmore (Okla.) Railway.—This company reports that plans are being made for some new city and interurban extensions.

Sand Springs Railway, Tulsa, Okla.—This company will construct an extension from Crib Siding to Lake, 3½ miles.

Oregon Electric Railway, Portland, Ore.—It is rumored that the Oregon Electric Railway, a subsidiary of the Spokane, Portland & Seattle Railway, will build an extension to the Hill timber tracts, above Cascadia, branching off the main line at Salem, passing through Stayton and east of Scio, following the South Fork of the Santiam River, opposite Lebanon, thence through Waterloo into Sweet Home and Foster. This route will open a well developed district that now has no railroad facilities. It is reported that location surveys have been made.

***Dover-Rossville Transit Company, Dover, Pa.**—The Public Service Commission of Pennsylvania has announced its

approval of a plan to operate trackless trolley cars on the public highways submitted by the Dover-Rossville Transit Company. This company proposes to operate a trackless line between Dover and Rossville.

Johnstown (Pa.) Traction Company.—The construction of an extension from Johnstown to New Florence is being contemplated by the Johnstown Traction Company. It is estimated that the cost of such a line would be about \$300,000.

Hull (Que.) Electric Company.—Work will be begun next spring by the Hull Electric Company double-tracking its lines on Montcalm Street and Chelsea Road from Graham's Corners to Montclair Street, also constructing a loop at the Mountain Road.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—This company will double-track its line from Five-Mile House to the Navy Yard, 1½ miles.

Memphis & Rugby Railroad, Memphis, Tenn.—This company, which is constructing an electric railway between Memphis and Rugby, reports that the line will be in operation about Jan. 1. The line will be 2 miles long and will reach Rugby Park. The company will also do a general lighting business in Rugby.

Morgantown & Wheeling Railway, Morgantown, W. Va.—W. E. Glascock, receiver of the Morgantown & Wheeling Railway, has let a contract to H. D. Eichelberger, Richmond, Va., to construct an extension from Price Station to Blacksville, W. Va.

SHOPS AND BUILDINGS

Illinois Traction System, Peoria, Ill.—This company has made changes in its Urbana station, the business of the traction company requiring the entire station. The Urbana Light, Heat & Power Company has been removed into the first building west of the station.

Detroit (Mich.) Railway.—It is reported that this company has purchased a site at Lake Orion Junction on which it will erect a new carhouse and power house next year.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company is negotiating for the purchase of the warehouse of the Canton Feed & Milling Company on Cherry Avenue, Canton, as a site for a new freight station. A substantial building is to be erected as soon as the site is secured.

Philadelphia & Garretford Street Railway, Upper Darby, Pa.—It is reported that this company contemplates the construction of a passenger and freight station on the West Chester Pike, in Media, a few feet west of the present terminal at Sixty-ninth Street.

POWER HOUSES AND SUBSTATIONS

Tri-City Railway & Light Company, Davenport, Iowa.—This company has purchased a 20,000-kva. Westinghouse turbine together with condensing equipment for installation in its plant at Moline, Ill. Plans are now being prepared for the installation as well as an addition to the power plant building, which will be required to accommodate the new unit. All the equipment has been ordered and will be delivered next summer. The total estimated cost of equipment and improvement is \$300,000.

Piedmont Railway & Electric Company, Burlington, N. C.—This company proposes to erect a transmission line to Elon College and Gibsonville, about 8 miles.

Memphis & Rugby Railroad, Memphis, Tenn.—This company, which is constructing a line between Memphis and Rugby, reports that it is purchasing machinery and erecting a power plant at Rugby Park.

Monongahela Valley Traction & Light Company, Fairmont, W. Va.—Arrangements are being made by the Monongahela Valley Traction Company for increasing the output of its power plant at Hutchinson. Contract, it is understood, has been placed for an additional 1150-kw. generating unit. The addition to the power station will provide space for the installation of two additional units when needed.

Waupaca Electric Service & Railway Company, Waupaca, Wis.—This company expects to make a number of improvements in its power plant.

INDUSTRIAL NEWS

Review of Trade and Market Conditions

Rolling Stock Purchases

Business Changes

Trade Literature

WHO SHOULD CARRY THE REPAIR PARTS IN STOCK?

Manufacturers Continue to Discuss This Important Question
—One of Them Considers It a "Fifty-Fifty" Proposition

Opinions on this subject from a number of manufacturers were presented in the article beginning on page 1135 of last week's issue. They may be briefly summarized into the statement that the manufacturer of a standard product should be prepared to furnish repair parts promptly, that the railway should be notified when standard designs are to be changed and patterns destroyed, but that the railway should see to it that enough local stock is carried to avoid the necessity of making rush demands on the manufacturers for repair parts subject to periodic renewal because of wear. Twelve representative manufacturers discussed this question in last week's issue. Communications have been received from other manufacturers and abstracts of these are given below:

FIFTY-FIFTY PROPOSITION

E. G. Marble, American Engineering Company, the manufacturer of the Taylor stoker, writes as follows:

"We have always felt that good business policy made it advisable for any manufacturer to carry in stock, so far as possible, all parts normally subject to call for repairs for all the product which he manufactures. Existing conditions many times make it impossible to carry in stock a sufficient quantity to provide for shipment immediately upon receipt of order. But we are satisfied that from an economic standpoint in the long run the best results will be obtained if the manufacturer carries a stock of these parts, rather than each user should carry an individual stock in sufficient quantity to protect himself against normal breakdowns.

"So far as tying up capital in repair parts is concerned, this is a 'fifty-fifty' proposition, because when the manufacturer does it he necessarily has to add interest charges to the price he asks for the parts, and on the other hand, if the individual customer carries parts, his money is tied up, with consequent carrying charges, even though he may not so figure it."

ELECTRIC TOOLS ARE STANDARDIZED

G. P. Blackiston, of the Van Dorn Electric Tool Company, is of the opinion that if the repair parts needed will tie up the earning capacity of a car, then certainly it would seem that the railway would consider it very important that its supply department keep such parts in stock. A manufacturer should, of course, carry a sufficient quantity to meet normal demands. "Consider, for example," says Mr. Blackiston, "the portable electric tool which we manufacture. This particular field has been one that has shown rapid development. A great many changes have been necessary. Also, these tools are used in 'hard service,' and it is expected that a user will keep all parts of a tool of this character in stock, unless he can delay his work pending receipt of repair parts from the manufacturer."

THE ROAD SHOULD CARRY NON-STANDARDIZED PARTS

R. G. Clapp, of the Brown Hoisting Machinery Company, writes as follows:

"It is our plan and intention to carry stock parts for our regular standard product, but where anything special is ordered we feel that we should not be obliged to carry the spare parts for the customer on this class of material. The chances of his making the material himself, or at least of not wanting to purchase from us, are such that it looks and always has looked unwise for us to attempt to anticipate his possible repair parts. We cannot agree with the position you state the railroads are taking with reference to repairs. That would mean that the manufacturer would have to bear

all the expense of financing repair parts for all of his product without knowing the condition of service of all the apparatus involved—a position which this company would creditably decline to assume."

OIL PUMPS REQUIRE FEW REPAIRS

B. F. Geyer, of the Wayne Oil Tank & Pump Company, says:

"Our pumps require very few repairs as compared with the total number sold. As nearly as we can tell, less than 10 per cent of the outfits sold ever require any repairs.

"I know from experience that some manufacturers do not give the attention to repair parts that they should. I feel that every manufacturer who is called upon to furnish repairs for any device he is marketing should make a special effort to have these repair parts in stock and ready for shipment instantly. There are some extenuating circumstances in connection with this. If it is an exceptionally old model the purchaser should have some patience with the manufacturer.

"I do not believe that the purchaser should be expected to carry regular repair parts in the majority of instances. I further believe that there is a point of compromise on this subject. In my opinion, if the purchaser has equipment the parts of which are subject to breakage under service, it would be advisable for the purchaser to carry such repair parts in his own stock. If he has a device or equipment that is not particularly subject to breakage at any particular point, then he may depend entirely on the manufacturer for such repair parts as he might need."

STOCKS FOR OLD MODELS ARE CARRIED

F. W. Buchanan, Independent Pneumatic Tool Company, discussing this question from the standpoint of the manufacturer of a highly standardized tool, says that the purchaser of a machine "is entitled to prompt service when repairs are required and while it would be absolutely impossible with a great many manufacturers to supply any pieces that might be ordered from stock, the customer's interests should be considered sufficiently to protect him against delays by giving the most prompt service possible. When you consider that we manufacture approximately 100 different sizes and types of tools which contain anywhere from 25 to probably 125 various small parts from small screws up to pieces requiring the very best and most accurate finish, it is difficult to guarantee immediate shipment of any part at all times. However, with a tool such as we make, which is generally in continuous service and considered a big labor-saver, the manufacturer is not only under obligations to see that the user does not suffer loss on account of unnecessary delays by having tools out of commission but should figure a reasonable interest on the investment, the expense of storage space and insurance, the loss occasioned by parts being left over as obsolete when new models are brought out and the expense of handling small shipments. He should then plan to keep a sufficient stock on hand to make as nearly immediate shipment as possible.

"We might add that it has always been our policy, when bringing out new models, to provide a stock of parts for the old models sufficient to maintain the tools of that type which were out until such time as the customer received sufficient service to warrant the replacement of his old machines with the newer models."

CAR BUILDERS KEEP TRIMMINGS IN STOCK

A. H. Sisson of the Southern Car Company says that as far as the car-building business is concerned, it has possibly a few of the minor trimmings, etc. As a rule, however, where the articles manufactured are standard, and

are made up in large quantities, he believes that it would be good business for the manufacturer to keep repair parts on hand at all times.

MANUFACTURER HAS POOR EXPERIENCE IN ATTEMPTING TO GAGE THE MARKET

Roads Report No Orders in Sight and Then Ask for Quotations

The sales manager of a large manufacturing company selling to the electric railways has some comments to make on the remarks of Nic Le Grand of the St. Louis Car Company, which appeared on page 1135 of last week's issue of this paper in *Industrial News*.

Mr. Le Grand cited as a "fault peculiar to railway buying" that a salesman had interrogated the department heads of a road and got a uniform reply that there was no business in sight for his company, but within ten days in came a telegram pleading for parts to be shipped immediately. This experience was similar to that of the sales manager first mentioned. The observation made by him is that unless the roads know what they will need for future use how can the manufacturers afford to purchase in advance large supplies of raw materials and thus be able to lower costs? Continuing, he said:

"In order to get some tangible idea of what the larger roads would be apt to purchase during the next six months or a year, the writer recently sent a letter to his district salesman explaining the raw material situation and requesting them to get in touch with the large buyers. The salesman were requested to obtain an idea of what the next year's requirements were likely to be.

"The replies indicated that the market was practically dead, yet in a dozen or two instances, after we had received advice that there would be nothing doing for six months, these very companies came into the market for large orders. The reason advanced for misleading the manufacturer's representatives was that they did not want to be pestered by having a swarm of supply men calling on them and taking up their time several weeks or months before they were ready to buy.

"We cannot whine about this practice, but it certainly is not co-operation, or perhaps we did not reach the right people. Of course, there are some good reasons for railway companies not desiring to announce probable purchases, yet how else can a manufacturer gage the market? Perhaps some one can make a suggestion."

BUYING REPAIR PARTS ON AN ANNUAL BASIS

Roads Are Urged to Order for Monthly Delivery—Instances of Such Orders Are Cited

BY WARREN L. BOYER
Of the Bemis Car Truck Company

Referring to the discussion in your issue of Nov. 25, "How far should a manufacturer go in keeping in stock renewal parts for service repairs to his product?" I believe that the manufacturer should keep a certain amount of repairs on hand at all times to meet at least the average demand of customers for a period of six months. As a rule, a manufacturer can tell from past orders approximately the amount of stock to carry.

Under conditions such as these it sometimes happens that the demand for a certain article is unusual, exhausting the supply before the manufacturer has a chance to replace it. This condition applies especially to those things that the manufacturer does not make himself but for which he depends on either the open market or other manufacturers to supply. I do not think, however, that it is fair for the railroad to expect the manufacturer to assume the entire burden in carrying repair parts for his particular non-standardized equipment subject to immediate call. The manufacturer should have due notice from the railroad to prepare himself for an unusual demand. The manufacturer has no control over the plan of work followed by the various roads, such as the spasmodic overhauling of equipment in periods of two or three years, when such a practice is not standard on a particular road. This general overhauling naturally takes more repair parts than has been the custom of that railroad to buy for several years previous.

We think it is up to the railroad company to arrange for stock in advance of the time that it is actually required.

Our company is willing at all times to meet its customers more than half way. We endeavor to have them state what their yearly requirements will be and to tell us approximately the periods of the year at which they will call on us for certain quantities of the yearly requirements. In this way we are usually able to have the material on hand thirty to sixty days before it is actually needed. We can then make prompt shipments to them. To make up enough material for a year's requirements means larger orders to run through the shop. This would reduce our shop costs, and the saving would pay the interest charge for carrying the material from the time it is made to the time it is called for.

The Springfield (Mass.) Street Railway and the Worcester, Consolidated Street Railway are working with us on such a yearly basis. For instance, they will give us an order on the first of the year for 1000 pieces of a certain kind, specifying shipments in equal monthly installments, starting March 1 and continuing until the order is completed. In this way we can handle our work in the shop to advantage, giving them material at the time wanted, saving them money, and making a better percentage ourselves.

It would be a good thing if more railways realized what an advantage it would be to have such a working agreement with a reliable manufacturer instead of waiting until the last minute and then shopping around for hurried competition on a certain product.

CROSSING SIGNAL MAKERS REPORT ACTIVITY

Large Steam Road Sales Reported—Electric Railway Prospects Bright

Comments on the highway crossing signal article appearing on page 1085 of the *Industrial News* department of this paper for Nov. 18 have been received from two manufacturers. The article pointed out that there have been very few purchases of highway crossing signals during 1916, although according to one informant inquiries have been quite numerous. The question was whether reliability of action was not the greatest desideratum.

A. M. Adams, secretary, the Protective Signal Manufacturing Company, Denver, Col., writes as follows:

PROSPECTS FOR INCREASED SALES IN 1917-1918

"We have enjoyed an exceedingly good business in crossing signals embodying our wig-wags, bells, and other devices sold the steam roads during the last six months. We have also received some orders from two or three of our regular customers in the electric railway field. However, our orders from steam roads far exceed the orders from the electric roads, and the only explanation which we can give for this fact is that the electric railway companies throughout the country are loath to enter what is considered by many a new field in signaling.

"From conversations which the writer recently had with a number of electric railway men throughout the East he was impressed with the fact that they were not quite sure that any crossing signal now on the market was really efficient and effective. The wig-wag and bell signal seem to be favored more than lights and bells, and in a majority of cases the electric railways are holding back awaiting action of the various State railroad commissions on this question.

"We have not noticed any considerable increase in inquiries from electric railways this last year, and we have felt that this was due to the fact that they were not quite sure as to what their future plans would be in connection with crossing protection. In other words, they were not yet ready to go definitely into the matter. We believe, however, that the prospects are very good for a considerable market among the electric roads during the next two or three years.

"While the question of reliability is a very important one, still we do not believe that it is the chief one to be met in furthering advance in sales to electric roads. In our opinion, the greatest question is what action the various utilities commissions and State railroad commissions are going to take in this matter, and whether, by installing

crossing signals, the railway companies will be exonerated of any blame for crossing accidents providing they can prove that a signal operated at the time of accident. If the courts will take this stand, we believe the electric roads will not hesitate to put in more highway crossing signals."

ELECTRIC RAILWAYS SHY AT EXPENSIVE SIGNALS

E. W. Vogel, president Chicago Railway Signal & Supply Company, Chicago, says:

"It is a fact that on electric railways, so far as we know, very few purchases of crossing signals have been made.

"On steam railways, our business in crossing signals has been better than ever before. For example, only recently we sold over 100 for one installation on the Chicago Great Western Railroad, and it is a satisfaction to note that these signals were all of the very best and highest price types that we manufacture, with large locomotive bells, relay boxes, and the very best material throughout.

"The difficulty on electric railways, as we see it from our past experience, is that these roads want to put in crossing signals, but usually wish to purchase the materials required for about half of the price that it costs steam railroads. This, of course, cannot be done when reliable signals are furnished. The result is that some of the electric railways have experimented with cheap contrivances that, in the end, do not give satisfaction, and the trouble experienced with these cheaper contrivances, we believe, is the real cause for the lack of a more general installation of crossing signals."

POLE PRODUCER OFFERS NEW COMPLETE SERVICE

Utility Poles to Be Shaved, Gained, Bored and Creosoted by Producer

The Paducah Pole & Timber Company, Paducah, Ky., is about to offer to its customers special pole service at a comparative cost that will make it economically attractive for the railway company to have the pole producer finish the poles ready for immediate setting on delivery. The company's sales manager, John L. Fay, has had experience in operating distribution and transmission lines for electric railways and other utilities, and is familiar with the difficulty of obtaining and retaining suitable labor in public utility pole yards. Therefore, he proposes to finish poles at his yards, meeting railway specifications, and deliver them ready for setting.

The plan is to shave the pole for its entire length, remove the outer bark, fiber, and foreign material, and dress the knots down smooth. The poles are then to be taken to the treating vats and receive an open-tank treatment.

The course of treatment is to be as follows: The poles will be seasoned for at least six seasoning months before treatment; all fiber, inner bark and foreign substance will be removed from that portion of the pole, from the butt end to a point 1 ft. 6 in. above the ground line. Then the pole will be placed in an upright tank, with the butt fully and continuously submerged in the preservative not less than fifteen minutes, when the atmospheric temperature is 70 deg. F., or higher, and a proportionately longer time when the temperature is lower, or until such time as will be required to cause the wood to become as thoroughly treated as it would be in fifteen minutes at atmospheric temperature of 70 deg. F. After the foregoing treatment has been carried out the poles will be brush treated with the same preservative for the entire length above the butt where the preservative used in the open-tank process reached.

The principal purpose of this method of preservation is to secure an increased life for the pole not only below but above the ground, so that the upper portion can be re-treated by the brush method while it is standing in its old position. After this treatment the pole can be sawed off at the surface of the ground and reset, or else moved to some other location on the system where a shorter length of pole is sufficient. The usable life of the pole can thus be increased sufficiently to justify the expense of the treatment above the ground line. This scheme, it is believed, will aid the utility companies materially in that they can

arrange, at a nominal cost, to have the work done for them by an efficient organization. It will also relieve the utility superintendents from maintaining temporary organization for this class of work.

COPPER WIRE BASE PASSES FORTY-CENT MARK

It was reported early in the week that copper wire base could be obtained in limited quantities for 1916 delivery at 40 to 41 cents. The price, however, was nominal, each sale having its own quotation. For January shipments, quotations of 39.75 cents are being made and 37 cents for March, all quotations f.o.b. factory.

Practically all mills are sold out to Feb. 1, and some as far in advance as July 1, 1917. For this reason it is very difficult to obtain prompt deliveries, and even if possible to get them they command a premium of 1 cent to 1.5 cents.

On Monday, copper was quoted at 34 cents for 1916 delivery in a very strong market. Prices for 1917 delivery sloped off from this mark, but did not go below 30 cents, the quotation for last quarter delivery.

Buyers will therefore enter the December market with the metal around 35 cents and with practically none to be had except that held for better prices by speculators.

ROLLING STOCK

Richmond Light & Railroad Company, New York, N. Y., is said to be in the market for one steel dump car.

Trenton & Mercer County Traction Corporation, Trenton, N. J., is reported to be in the market for a number of cars.

Tri-City Railway & Light Company, Davenport, Iowa, is reported to be considering the purchase of ten or twenty city cars.

North Carolina Public Service Company, Greensboro, N. C., is reported to be considering the purchase of fifteen single-truck cars.

Northern Ohio Traction & Light Company, Akron, Ohio, has ordered ninety-five car bodies, fifty-seven motor trucks and ten trailer trucks from the St. Louis Car Company.

International Railway Company, Buffalo, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Aug. 5, 1916, as losing sixteen cars in a fire, is reported to have ordered sixteen cars from the G. C. Kuhlman Car Company.

East St. Louis & Suburban Railway Company, East St. Louis, Ill., has ordered forty-five new steel bodies for the cars now in use, which, when rebuilt, will be of the pay-as-you-enter type.

Memphis & Rugby Railroad, Rugby, Tenn., has purchased a new Edison storage-battery car from J. B. N. Cardoza, Inc., Norfolk, Va. This car, which will be used between Memphis and Rugby, will be put into service about Jan. 1, 1917, when the road will be finished.

TRADE NOTES

William J. Hammer, consulting electrical engineer, announces the removal of his office to 55 Liberty Street, New York City.

Arthur V. Farr, who for the last three years has been advertising manager of the SKF Ball Bearing Company, Hartford, Conn., has accepted the position of sales manager of the Hess Steel Corporation, Baltimore, Md.

Electric Cable Company, New York, N. Y., announces the opening of a Chicago warehouse with a complete stock of "Ecco" insulated wires and cables, and is now prepared to make prompt shipments of all sizes of its stock from this point.

Electric Porcelain & Manufacturing Company, Trenton, N. J., has acquired the plant of the Climax Pottery Company on New York Avenue, as a new factory for the manufacture of its electric porcelain specialties. A new addition, about 130 ft. x 150 ft., will be erected at an estimated cost of \$70,000. H. T. Paiste, Philadelphia, is president.

Holden & White, Chicago, Ill., report that the Anderson Brake Adjuster Company has recently received an order

for equipping twenty-five new cars being built by the Omaha & Council Bluffs Street Railway. This will complete the entire equipment of this property with these brake-slack adjusters.

Consolidated Car Heating Company, Albany, N. Y., announces an order for 180 geared-type pneumatic door engines with cut-off at the end of stroke to go on the Pressed Steel Car Company's forty-five cars ordered for the Long Island suburban service of the Long Island Railroad. These engines will be fitted with electro-pneumatic control. The engines are similar to the Consolidated types used at Rochester and at Brooklyn.

J. A. & W. Bird & Company of Boston, Mass., distributors of Ripolin enamel paint, announce that George Price, formerly manager of the New York office, 120 Broadway, will hereafter handle the sales department covering the entire territory south of New York as far west as the Mississippi, and also including the states of Louisiana and Texas. Mr. Price has been in charge of the Metropolitan district for the last eight years and recently completed an extensive trip covering this territory.

Page & Hill Company, Minneapolis, Minn., announces the addition to its sales force of Buford Adams of Kansas City, who will act in the capacity of sales engineer. Mr. Adams is well known, particularly throughout the Southwest, as a practical engineer and manager of public utility properties. At one time Mr. Adams was manager of the Missouri & Kansas Telephone Company at Carrollton, Mo., Joplin and St. Joseph. He then went to Denver, and was employed by the Colorado Telephone Company as assistant engineer. Mr. Adams later traveled for a telephone manufacturing company in the capacity of sales engineer, and for a period of time was general manager of the Independent Company's plant at Waco, Tex.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces an extension of its present bonus system to include salaried and office employees on hourly rates by which they will receive a bonus of 8 per cent of their salary each month providing their total excusable time absent and late during the month does not exceed six hours incurred on not more than three occasions. An additional 4 per cent will be given each month to the employee who has not lost any time from work during the month through absence or tardiness, thus enabling those to obtain an increase in earnings of twelve per cent for a 100 per cent attendance. Several thousand employees in the Pittsburgh district are benefited by the granting of the bonus.

Westinghouse Electric Export Company, East Pittsburgh, Pa., has recently sold twenty-seven new forced-draft, high-reserve capacity stokers of the underfeed type for service in Japan, twenty of them being sold to the Osaka Electric Light Company, two to the Nagoia Electric Light Company, and five to the Imperial Steel Company. They are all for use with 600-hp. boilers. The orders also included engines for operating the stokers, turbine and motor-driven forced-draft fan units, controllers, and other auxiliaries. No better illustration of the progressiveness of Japanese concerns in changing over their power plants to the most up-to-date, high-capacity equipment could be found than what these orders indicate. By the use of these stokers the plants are able to obtain from two to three times the capacity of the boilers.

Consolidated Car Heating Company, Albany, N. Y., announce that, effective Dec. 1, 1916, the following changes and promotions have been made in the sales organization of this company: C. A. Eggert, formerly assistant in the Chicago sales office, will be in charge of that office, and H. L. Hawley, formerly assistant in the New York office, will be responsible for the New York office. Thomas Farmer, Jr., heretofore vice-president in charge of the Eastern sales office at New York, has resigned in order to devote his time to his large interest in automobile garages in New York City. Mr. Farmer has been associated with the company for the past eleven years, and the company regrets the necessity of his resignation; it is pleased to state, however, that it will have the benefit of his services in an advisory capacity. W. S. Hammond, Jr., formerly vice-president in charge of the Western sales office, will be vice-president in charge of all sales of the company.

ADVERTISING LITERATURE

Johnson & Johnson, New Brunswick, N. J., are distributing catalog 110 on "First Aid to the Injured."

Hanlon & Wilson Company, Wilkensburg, Pa., is distributing a pamphlet on its "Vak Klean" portable vacuum cleaning machine.

Roller-Smith Company, New York, N. Y., is distributing bulletin 201 on its portable storage-battery equipment for use with the Roller-Smith bond tester.

Imperial Car Cleaner Company, Newark, N. J., renovator of electric, steam or trolley cars, has issued a bulletin of directions for handling work on cane and plush cushions.

Stow Manufacturing Company, Binghamton, N. Y., has issued a miniature of its bulletin 102, on the Stow flexible shaft portable tools. It is not only a novelty but is most complete in detail.

Electric Railway Equipment Company, Cincinnati, Ohio, has just issued a well illustrated 12-page bulletin on Elreco tubular steel poles and combination railway and lighting poles.

Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, is distributing bulletins on its automatic reclosing circuit-breaker system, the theory and operation of these circuit breakers, the different types used and the important considerations necessary to perfect individual motor circuits.

International Motor Company, New York, N. Y., is distributing a pamphlet showing auto-buses in use by a number of railways and motor truck lines. Among these is shown a unique adaptation of the Mack truck as a railroad bus used by the Utah Railway Company, Utah, Col., and also a Mack 2-ton pay-as-you-enter bus used by the New York State Railways, Rochester lines.

M. W. Kellogg & Company, 50 Church Street, New York, N. Y., manufacturers of piping material, has issued a ninety-page bulletin on lap-welded steel pipe, welded steel tanks, vanstone joints, welded nozzles and welded flanges. In addition, a number of the pages are devoted to the Bulkeley barometric injector condenser, giving illustrations, drawings and performance curves of the different types of this injector.

Bound Brook (N. J.) Oil-Less Bearing Company has just issued a well-illustrated booklet of forty-eight pages on its type of bearings, washers and clutch releases. Several pages of the booklet are devoted to the story of the trolley wheel bushings used by the Colorado Springs & Interurban Railway Company. In addition there are a number of full-page illustrations of battleships and of aeroplanes on which the bearings of this company are used.

General Railway Signal Company, Rochester, N. Y., has just issued Vol. I of its direct-current electric signal appliances. This volume, which is handsomely bound, contains sections E to L inclusive, each section covering the following items respectively: Relays, indicators, cable posts, battery chutes, bond wires, etc.; power generating and distributing equipment, generators, motor generators, switchboards, etc.; electric interlocking machines and appliances; electrically operated signals, mechanisms, poles, bearings, ladders, etc.; electrically operated switch machines, derail, layouts and fittings; circuit-controlling appliances, switch-circuit controllers, bridge circuit closers, locks, etc., and electro-mechanical interlocking machines and appliances.

NEW PUBLICATIONS

Some Graphical Solution of Electric Railway Problems.

By A. M. Buck, Engineering Experiment Station, University of Illinois, Bulletin No. 90. Copies can be secured gratis from W. F. M. Goss, Director, Urbana, Ill.

This bulletin, of which an advance notice appeared in the issue of the *ELECTRIC RAILWAY JOURNAL* for Aug. 12, 1916, page 281, is now ready for distribution.

Comparative Railway Statistics—United States and Foreign Countries—1913. Bureau of Railway Economics, Washington, D. C. Seventy-eight pages. Paper.

This pamphlet, just released, gives the latest available comparative data regarding the railway situation in the United States and in the principal foreign countries.