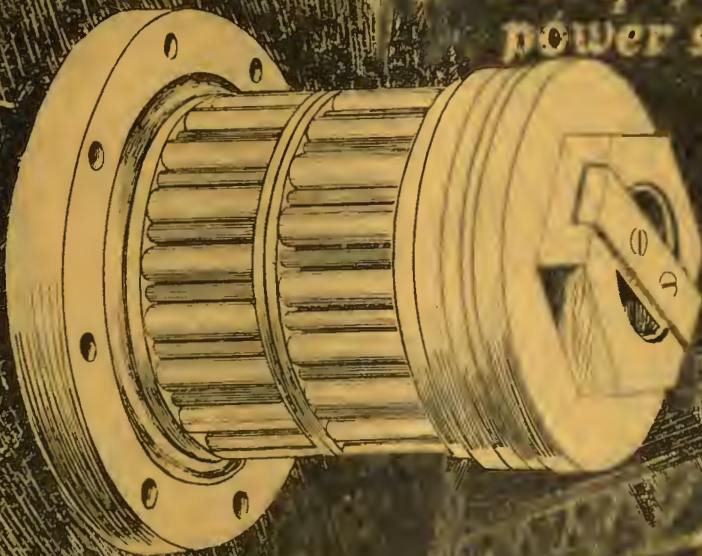


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ELECTRIC RAILWAY JOURNAL

STAFFORD ROLLER BEARINGS for CAR TRUCKS

Reduce starting and running resistance tremendously. The colder the weather the greater the power saving.



STAFFORD ROLLER BEARING
CAR TRUCK CORPORATION
LAWTON MICHIGAN



"IT ROLLS THE FRICTION AWAY"



No Resistor is Better Than Its Grids

The underneath view of this car shows a very efficient manner of attaching Westinghouse Resistors to the car sills on the side opposite the Westinghouse HL Control equipment, so as to equalize the load.

The two resistors each contain thirty grids, having the following qualities:

Design: Laid out by engineering specialists to provide for proper ohmic values, capacities and mechanical strength.

Castings: Moulded from accurate patterns, carefully cleaned, and the casting then dipped in rust- and heat-resisting paint.

Contact Surfaces: Accurately ground, assuring full area electrical contact and perfect mechanical fit.

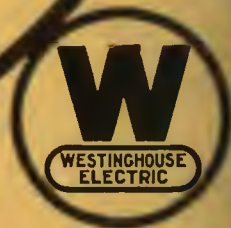
Material: Uniform and free from hard spots.

Suspension: Three-point suspension results in maximum rigidity with maximum flexibility, preventing the mechanical strains which otherwise may result from a non-uniformity in thickness of the insulation between the grids in resistors which are repaired and restored to service.

Economize by Making Westinghouse Grids Your Standard

Rough and jerky acceleration, resulting from the use of inferior grids, increases the maintenance cost on the other parts of the car equipment, both electrical and mechanical.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.



Westinghouse

ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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[The following statement is the eighth of a series of advertisements of the McGraw-Hill Company picturing the influence of the engineer in the affairs of the world. It appeared in the issue of the *New York Times* for Nov. 10.]

The Sway of Influence

THE institutions of the earth, like a set of ninepins, have been striking at each other in efforts to save themselves. This has come about through the balance of influence being on the destructive side, leading men into a succession of perils.

Less than a decade ago the industries of our country had assumed the rôle of victors before circumstance had put them to the test. There followed an upheaval of our triumphant routine, when our gods of achievement were thrown down.

We then became aware of the tragic fact that we had developed the mechanics of production, but not the science of economic production. We are now learning, at the cost of billions of wealth and years of hardship, that we have never known statistical accuracy and proved control.

So the sway of influence has at last been directed toward constructive service. The swirl of thought and action, of effort without direction, has been given a check.

This has come about through the increasing power of the engineer. By right of ability he has grasped the banner of influence from the clutch of chaos and has placed it above the stronghold of unified service. In so doing he has accepted the gigantic task of giving us service based on economics, prosperity secured by progress.

From the designing of a labor-saving machine to the drafting of a sane law of international intercourse; from problems of education to the laying down of principles of ethics; from questions of transportation to questions of industrial management—in all these the voice of the engineer is acquiring the influence of authority.

It is the practical, the demonstrated ability of the engineer that has brought him this power of influence. His training in analysis, in creating the means and methods for elevating the activities of men, and his ability to detail, in exact and tangible manner, the complex answers to the problems of industrial life—these have fitted him for leadership.

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The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, the Philippines, Porto Rico, Canal Zone, Cuba, Honduras, Nicaragua, Dominican Republic, Salvador, Peru, Colombia, Bolivia, Ecuador, Argentina, Spain and Shanghai, China. Extra foreign postage to other countries \$3 (total \$7, or 28 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid, to any part of the world, 20 cents.

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The Cost Sheet Tells

USERS of Westinghouse-National air compressors have only to refer to the monthly production cost chart to find evidence of a substantial saving in power.

Insofar as the compressor is concerned, there is no vexatious upward curve to indicate expensive waste.

Westinghouse - National motor - driven compressors are the most satisfactory units built for all classes of industrial service, and are particularly adapted for the railway shop, car barn or power station—or for portable track construction outfits.

Furnished in all types and sizes, always with the famous *automatic control* feature, which is responsible for the *positive saving of power* that is distinctive of Westinghouse - National machines.

Pictured below, Westinghouse-National 3VS Air Compressor, furnished in low pressure sizes of 250 to 520 cu. ft. displacement, and in high pressure sizes from 150 to 335 cu. ft. An ideal unit for railway shops and power stations.

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

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Boston, Mass.
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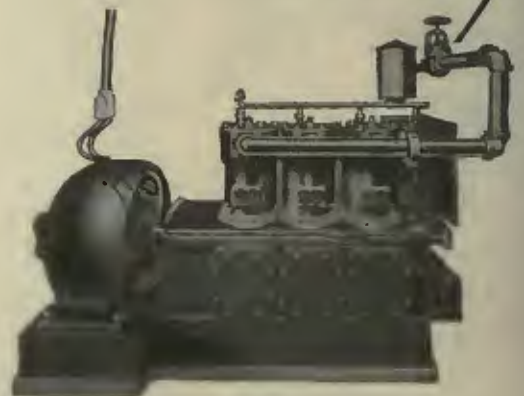
New York
Pittsburgh
Washington
Seattle
San Francisco



Write for literature giving full details of Westinghouse-National Compressors and the power-saving Automatic Control with which they are equipped.

SAVES POWER

Westinghouse- National 3VS Compressor





**You can replace the car—
But what about the riders?**

When the conductor signals "Come Ahead!" the tracks may be clear but, if the wheel jumps the wire, it is easy enough for a train to come in sight and run down the car before the conductor can realize what's up, race to the rear end and place wheel on wire. If he fumbles, if he loses the race—

But you don't need to take the chance of that kind of an accident. Put National Trolley Guard over your trolley wire at grade crossings.

National Trolley Guard is open wire mesh, formed into a trough which is inverted over the trolley wire. When the wheel jumps it runs on the Guard which furnishes power to carry the car and its passengers into the clear.

When National Guard prevents just one accident it pays for itself a thousand times over. It is the best kind of insurance because it prevents instead of repaying.

May we tell you more about it?



The Ohio  Brass Co.
Mansfield, Ohio, U.S.A.



New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus Marsh & McLennan Service

OTHER THINGS BEING EQUAL—Marsh and McLennan would not be carrying the insurance for a great number of the largest public utilities in America.

The public is no more interested in where you buy your insurance than they are interested in where you buy your rails or cars or other equipment.

Marsh & McLennan solicit your insurance solely because they can render you a service that will decrease your insurance costs.

On one large Eastern Corporation, for example, we were able to reduce the insurance rate from \$17.50 per thousand to \$4.30 per thousand. Why not buy your insurance where you can buy the most for your money?

We will be glad to outline this service to business executives who are interested in reducing insurance costs.

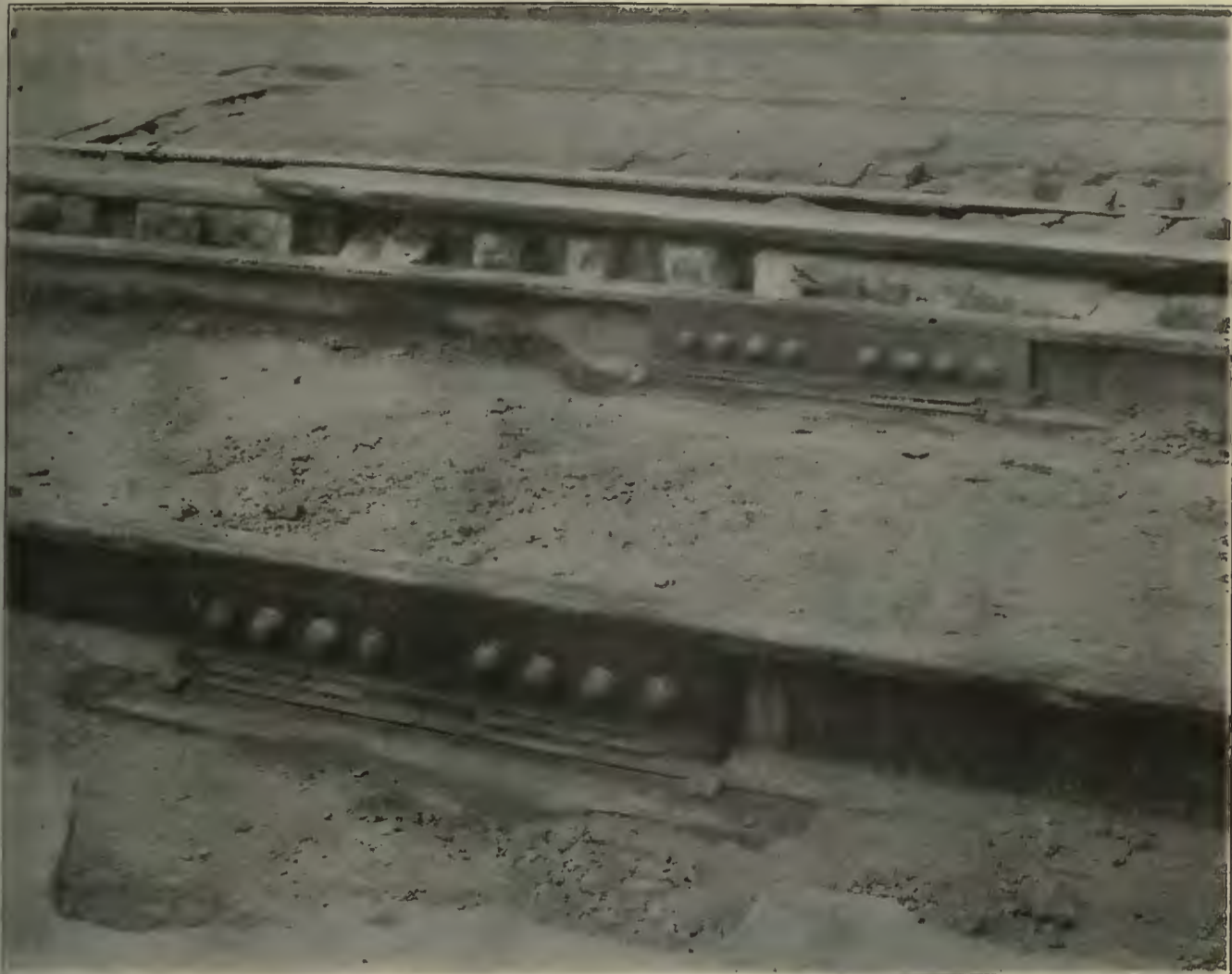
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There are 468 square inches of bearing in each plate of a steel twin tie.

THE TIE-PLATE IS PART OF THE TIE

To help increase the life of wood ties by preventing rail cutting, many Engineers favor tie-plates.

The principle involved has been extended and developed in STEEL TWIN TIES in which the tie-plate is part of the tie.

The plates provide a larger bearing

than is possible with wood ties on two-foot centers. They distribute the wheel loads on top of the concrete of the track foundation instead of at some point six to eight inches below the base of the rail. Hence there is more concrete in bearing with less total concrete required. The ultimate result is better track at a lower first cost.

THE INTERNATIONAL STEEL TIE COMPANY
Cleveland, O.

Steel Twin Tie Track

What International Service Means to You



IT is a fact that we are in the center of the largest timber producing area in the Southwest; that we have 120 acres in excellently drained yards for seasoning ties; a reliable corps of inspectors, expert supervision of treatment, efficient plant facilities to treat 300,000 ties per month, and an entire tie producing organization capable of meeting the most exacting tie requirements.

Important as these advantages are, there is yet another and far more important reason why International Service compels recognition.

It seems opportune and pertinent to say that the one commending thought, purpose, and ambition of the International Company is to produce sound, durable ties of uniform size in strict accordance with A. R. E. A. grades.

Not to be egotistical, we believe that our purpose and ambition have been successful. Executives and engineers have expressed their faith in our integrity, our ability to serve and our knowledge of the timber business by their implicit confidence in our production and inspection. Such faith can only be justified by works, and no greater tribute can be paid to, or desired by any organization.

International Creosoting and Construction Co.

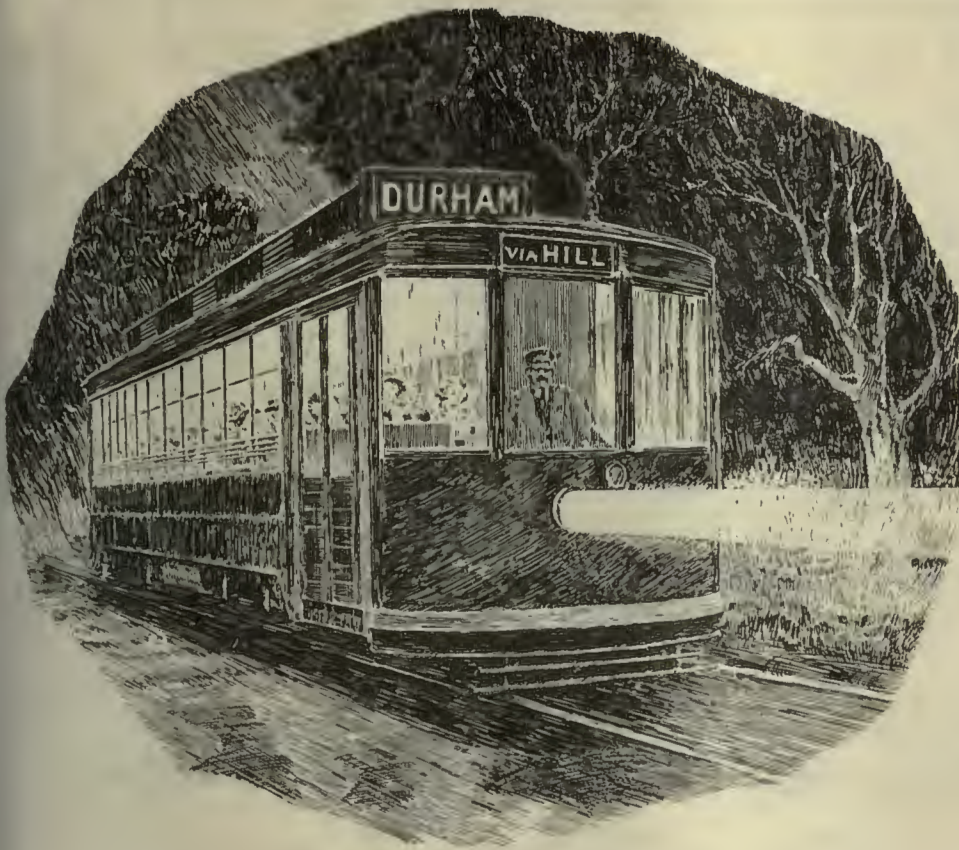
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Plants: Texarkana, Texas

Beaumont, Texas

Galveston, Texas

**Order
Now
For
The
Long,
Cold
Nights
Ahead**



**Keystone-Hunter
Destination Signs**

**Golden Glow
HEADLIGHTS**

These Signs and Headlights, with the assistance of Safety Car Lighting Fixtures on the inside, radiate to the people shivering in the street, an atmosphere of warmth about your cars. There's nothing attractive about poorly illuminated, signless cars—especially on zero nights. Golden Glow Headlights identify your cars in general and make it easier for the motorman and opposing traffic. Keystone-Hunter Illuminated Signs identify your cars in particular and make it easy for the night rider to pick the right car. Safety Car Lighting Fixtures enhance the interior attractiveness of your cars and afford your riders greater eye comfort.



Keystone-Hunter Illuminated Signs (They're white by day).



Golden Glow Headlights for either portable or permanent installation on the dash.

Write for data sheets.

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

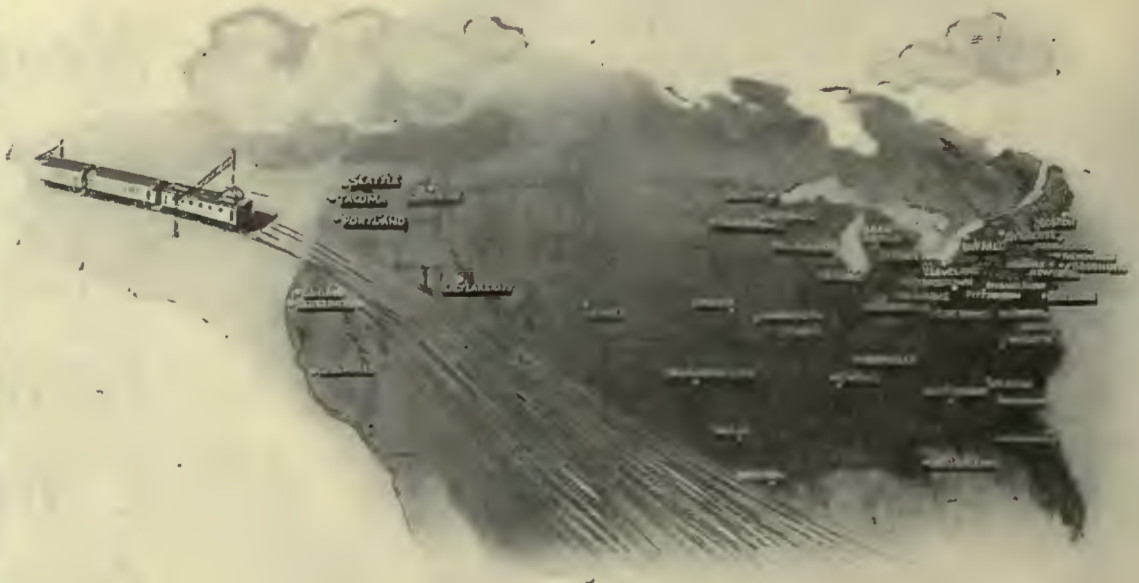
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17th and Cambria Streets

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50 Church St.

CHICAGO
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Branch Offices: Boston, Scranton, Pittsburgh

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Where Everything Electrical Is Brought To You

The service you render by bringing close together the suburbs and the trading districts is much like that we can render you.

Our nearest Distributing House brings to you standard electrical products of a long list of manufacturers.

It enables you to get for your outside plant everything from the tops of the poles to the bottoms of the holes—Power Apparatus for your shop—Lighting Equipment for cars, stations, yards, shops and offices—Intercommunicating Systems for controlling car movements and communicating in the shops, offices, yards and barns—and standard Electrical Supplies of every kind.

The House nearest you offers this time and money saving.

Address it.

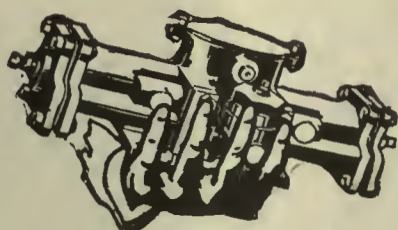
A
NATIONAL
ELECTRICAL
SERVICE

Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

Modernize!

Pneumatize!



If Crowds Would Stand in Line—

If passengers would take their time, *if* people would be cautious and deliberate and reasonable, *if*—

But—we all know that they won't do any such thing! Give them the slightest opening and they will leap off and on moving cars, hang on steps and running boards, and do almost everything else they shouldn't do.

So—to save them from themselves, it is necessary to make cars proof against the recklessness of the American public. Many roads have already accomplished this by equipping cars, both old and new, with—

The Complete National Pneumatic "Rushour" Line

Door and Step Operating Mechanisms

Safety Interlocking Door Control

Multiple Unit Door Control

Door and Step Control

Motorman's Signal Lights

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.

50 Church St., New York

McCormick Bldg., Chicago

Works: Rahway, N. J.



What Determines the Choice of Poles?

Every buyer of poles is concerned primarily with securing the most obvious value for the investment which is to be made in the whole line.

Value consists of pole strength to guarantee safety to the line and the service, fair assurances of long life, suitability for the particular construction contemplated, moderate cost of maintenance, and the original cost of poles and erection.

Bates Expanded Steel Poles have unusual strength, ample for safety in any present types of overhead construction. They have demonstrated their value in this particular in hundreds of instances.

Bates Poles have a life of at least fifty years, far beyond the safe life of other types. The uniformity of Bates Poles is assurance that the whole line is good for this life. Maintenance charges are quite moderate, for periodic painting is easy and cheap, and thoroughly protects the pole.

Any type of overhead construction can be erected on Bates Steel Poles, taking full advantage of their superior strength and life.

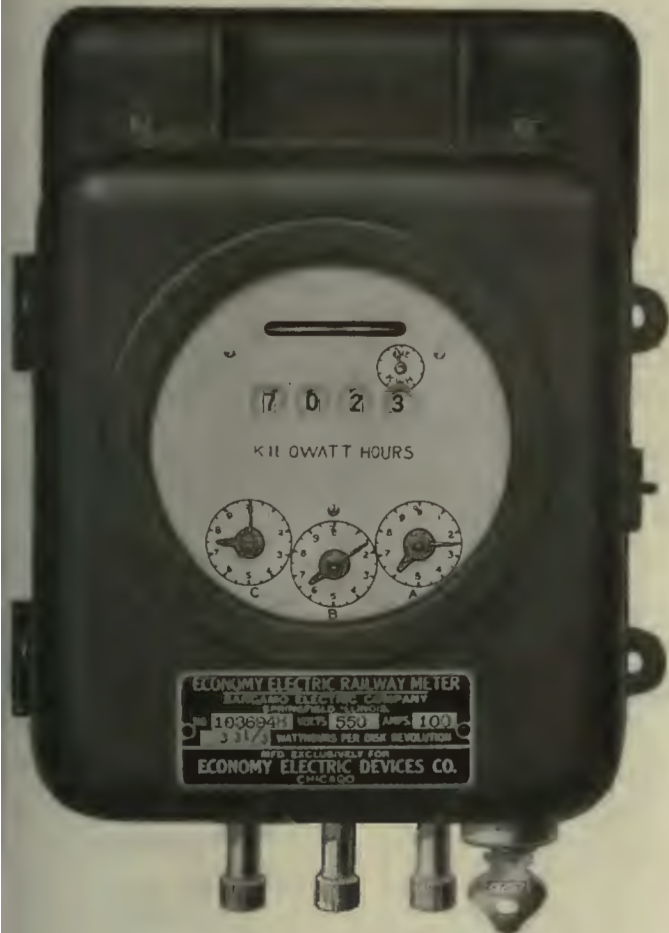
With the extra strength and life of Bates Poles, their present low price becomes an advantage that cannot be overlooked. Bates Poles give more in service, and cost less than any comparable type of pole.

Our engineering department is at your service with data gathered from years of experience in pole line construction

BATES EXPANDED STEEL TRUSS CO.
208 South LaSalle St., Chicago

BATES *ONE PIECE* **POLES**
EXPANDED
STEEL **POLES**

SAN DIEGO



Economy Meter with Power Saving and Car Inspection Dials

Buys Economy Meter Car-Inspection Dials

To Completely Equip Entire System

This well-known city system first installed 100 Economy Power-Saving Railway meters in 1917. Then, as new cars were placed in service, it purchased additional meters; ten in 1918, ten in 1921 and ten more in 1922.

The last two orders were for meters of the car Inspection Dial Type; and now material has been ordered to convert the 110 old type meters into the car inspection type, so that all cars may be inspected on the basis of actual work done (kw. hrs.).

The Watchdog of Your Power and Equipment

This is a rugged watt-hour meter. Top dials for motormen's power-saving records. Lower dials for car inspection use.

When the meter-driven hand on Dial A reaches the marker set for this car at 6, the barnman knows that the brakes and controllers have done their work and are due for an inspection equivalent to that otherwise made daily.

Likewise Dial B shows when the car has done sufficient work to require oiling. This supplants the usual time or mileage period for oiling.

Dial C shows when the car has done sufficient work to require general inspection.

After any inspection the meter-driven hand is set back to zero by means of its reset rod at the bottom of the case. A lock prevents unauthorized resetting of inspection dials.

The Economy meter with car inspection dials is readily adaptable to any electric car or locomotive operating condition.

It is a "power-saving device" with a double value.

Let us quote you prices and answer detailed questions

Economy Electric Devices Company

General Sales Agents

Sangamo Economy Railway Meter

Lind Aluminum Field Coils

L. E. Gould, *President*

1592 Old Colony Building, Chicago

STERLING



INSULATING VARNISHES & COMPOUNDS

THE STERLING VARNISH CO.
PITTSBURGH, PENNA.
WESTER, ENGLAND



WHAT DO YOU GET?

Users of STERLING VARNISH not only obtain materials well adapted to their needs but also sound, practical information as to how to employ them.

The new Catalog of The Sterling Varnish Company, which should be on the desk of every "live" executive or engineer interested in such products, will be mailed free to those requesting it. It not only contains much *real* information on the varnishes themselves but also facts as to their care and use. Moreover the engineers of the company are able to help customers upon such points as cannot be taken up in this small booklet.

Those who "shop" for varnishes on the price per gallon basis, besides getting only what they pay for, miss this service which has already effected much saving to even the largest varnish consumers. So write for your copy of the Catalog using your company letter head. Look into your insulating varnish problem after you have carefully read it over and see how many hazy points are cleared up and then to obtain the *best varnish and intelligent engineering service, USE*

STERLING VARNISH

THE STERLING VARNISH COMPANY, PITTSBURGH, PA.



“UNIVERSAL”
 “ATLAS” “RECIPROCATING”
Rail Grinding Machines

Repeat Orders Come of Themselves

Even without solicitation, numerous orders are coming in from satisfied railway customers for more and still more track grinding equipment. About half the operating companies in this country are now using one or more of these machines.

Two things account for this:—First, a growing appreciation of the real ultimate economy of rail grinding as a means of retarding depreciation; Second, the eminently satisfactory and efficient work done by our machine wherever they have been used.

Is your equipment as complete as it should be?

Diamond Brand Grinding Wheels

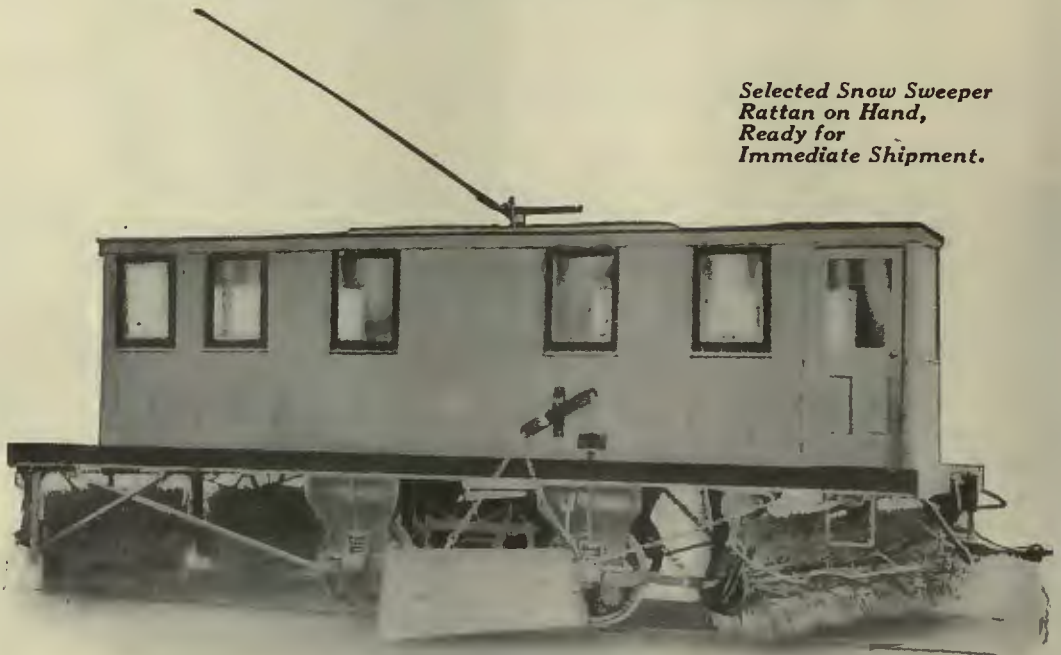
Our Atlas and Universal Grinders give best results when supplied with Diamond Brand Grinding Wheels. They are properly made, using only the highest quality cutting abrasive. Many of the leading manufacturers of special work buy them in large quantities.

See if you have them in stock.

Railway Trackwork Company
 3132-48 East Thompson Street, Philadelphia, Pa.

Snow Fighting Equipment

*Selected Snow Sweeper
Rattan on Hand,
Ready for
Immediate Shipment.*



Standard Single Truck, Steel Underframe Long Broom Sweeper

Approximately ninety-five per cent of all the electric snow sweeping equipment, which is used in the United States and Canada, is of McGuire-Cummings make.

The car illustrated here is one example. The brooms are so arranged that they will clean both rails ahead of the car; the side plows will clear 4 ft. 0 in. outside of rails.

It requires two 25-hp. motors to propel the car, and one 25 to 40-hp. motor geared to drive brooms at 300 to 350 r.p.m.

Blueprints and specifications will be submitted on request.

*End view of Standard Single Truck
Sweeper.*



McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES

111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars,
Snow Sweepers, Electric Locomotives.



Lubrication — a subject worthy of discussion

Realization of the fact that lubrication is a regulating factor in operating expenses that may run into many thousands of dollars, makes the selection of proper lubricants a much more important matter than the mere purchase of oils.

The opinions and judgment of practical mechanical and operating heads are invaluable in arriving at a decision that will return

your road the best service value.

Galena Oils have been specified on hundreds of electric properties because they have given conclusive proof of their ability to deliver exceptional service, keep equipment in perfect running order and reduce to a minimum the expenses of repairs and time losses, that, with inferior lubrication, run into high figures.

*"When Galena Service Goes In—
Lubrication Troubles Go Out!"*



Galena-Signal Oil Company

New York

Franklin, Pa.

Chicago

and offices in principal cities



Our New Railway Catalog is ready



An equipment catalog with textbook information on practically everything electrical used in the operation of electric railways in any service.

It has been compiled for you. It is now being distributed. The G-E Sales office nearest you will deliver your copy soon.



General Electric Company

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Schenectady, N.Y.

Sales Offices in
all large cities

ELECTRIC RAILWAY JOURNAL

Consolidation of *Street Railway Journal* and *Electric Railway Review*

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Volume 60

New York, November 18, 1922

Number 21

Europeans Thinking of Radical Revision of Car Design

ON PAGE 825 is reported the belief of E. S. Raynor, a British tramway manager and engineer, that radical revision of electric railway car design should be considered. His thinking is in the direction of greatly reducing the unsprung weight and the total car weight and eliminating the solid axle. He also criticized as crude and inefficient the present braking mechanism. The conviction of some European engineers along this line seems to be strong, for recently the operating company in Paris has placed in operation a single-truck car with a body-mounted motor connected by drive shaft to each axle, the latter being split and provided with differential and the brakes being of the transmission band type. Discussion of such car design has come out now and then in conversation in this country, but it has been considered so radical that the authors have felt compelled to keep their thoughts out of public print. To date, all discussion of the subject is purely speculative, but there is certainly food for thought. The advantages of placing the heavy electric motors in position to have their weight entirely sprung are very important in their relation to track and car maintenance and car-riding qualities. But so radical a departure from well-established designs has very serious drawbacks and would therefore have to have very positive merits in order to receive serious consideration.

Improve the Morale of Your Shop

IN A RECENT discussion between two mechanical men, the rolling stock of an electric railway was referred to as being kept in almost perfect condition. "How does the master mechanic do it with the poor shop facilities which he has?" was asked. A visit to the shops disclosed two essentials which were incorporated in the organization that are most vital to the success of any undertaking. They are: Co-operation, and pride in the work accomplished. A thoughtful master mechanic recognizes that proper credit for the work completed must be given to all, as the conscientious and skillful working out of each detail is necessary for producing a high-class completed unit. A mechanic will take pride in producing good work if allowed to do so. Sufficient time is also required for honest work. No first-class job is completed in a hurry except by accident. A satisfied mechanic will measure a right time necessary for doing a good job. It is true that without adequate tools and proper routing methods shop output is limited greatly, but without men proud of their work and earnestly striving for results the possibilities of economy will never be realized.

Proper recognition of satisfactory work is one of the essentials of increased effort. Advancement in position with increased remuneration is an important step toward increasing shop morale. A man's pride and interest in his work will decrease when they fail to secure

advancement over another who goes about his duties with a "don't care" attitude. Hope puts us in a working mood, and a 5-cent increase in a shop man's rate of pay shows that his efforts are appreciated.

The Square Deal in Regard to Track Paving

ON ACCOUNT of the wealth of information which was brought out in the papers and discussions at the Philadelphia Engineers' Club conference on track paving, this paper has in three successive issues devoted liberal space to a report of the conference. Way engineers throughout the country, and managers as well, will find much to think about in the discussions which took place. The conference, of course, did not settle the mooted questions which are involved in this complicated subject, but the joint consideration of the paving problem by railway and municipal engineers marks a step in the right direction. The discussion brought out in sharp relief the radical differences in points of view, the differences in part being due to different assumptions of fact and in part to the respective affiliations of the engineers. What is needed first would seem to be a formulation of those fundamentals upon which all can agree. Questions of fact ought to be demonstrable, and a sufficient volume of agreed-upon data ought to be possible of assembling. Once the facts are agreed upon, an equitable allocation of maintenance charges is possible.

City engineers may ultimately develop data to show that streets with tracks cost more to maintain than those without tracks. Just how much the difference in maintenance cost is, if any, and how it varies with the different types of track and pavement construction await determination. But whatever the result, it must be remembered that some streets must contain tracks, for without them adequate transportation for a city of any size cannot be furnished. If there were no tracks, the present cars or their transportation equivalent would be obliged to run on the paving, causing greater wear as well as frightful traffic congestion—wear that, under present laws, would be paid for almost entirely by the city. The track structure transfers the railway load to a separate, independent foundation, thus relieving the paved surface of a large transportation load. Obviously this is good economics. It does bring in the complication of paving around the track, but that complication can be simplified with good engineering.

The fair solution to the whole problem seems to involve the paving and maintenance of the paving of the entire street by the municipality, with types of paving selected with due regard to the presence of the track. The railway should build track of such types as will deteriorate the paving as little as possible. Relieved of the present paving obligation the railway might equitably be required to pay for actual damage done to the paving, as was suggested by Mr. Davison at the Philadelphia conference, where damage is done by movement of track and vibration at joints and special trackwork.

Efficient Lubrication Requires Clean Oil

ONE of the most trying problems in electric railway maintenance is that of keeping dirt and water out of bearings. Electric railway car equipment operates under extremely trying conditions, and the oil used for lubrication soon becomes filled with impurities that greatly reduce its efficiency as a lubricant. In order to prevent serious damage to the bearings, the waste and oil must be replaced at regular intervals. The master mechanic is then confronted with another problem, that of salvaging as much of the oil and waste as possible. If the impurities are removed, the oil can be returned to service, and if waste is carefully cleaned and sorted much of it can be saved for future use. Every electric railway, therefore, has need for simple and effective oil and waste purifying equipment.

Many railway officials look upon an oil purifying device as being primarily a means of conserving oil. While operation of the oil reclaiming plant of the Milwaukee company described in this issue returns the old oil for reuse in 98 per cent original condition at a cost per gallon just one-quarter that of new oil, the more important economy effected by such apparatus is the protection it affords against damage to the operating equipment. An armature wrecked because of faulty lubrication will require more money to put it back into service than can be saved by much oil economy. Lubrication affects the service and reliability of the equipment and ultimately public sentiment. In addition, it is a fundamental element in maintenance costs, but not through the quantity of oil saved. When compared with other items of operating expense, the item of lubrication appears infinitesimal.

The big point then when oil and waste reclamation is considered is to be sure that when reused and returned to service, the oil and waste are free from all of the contaminating elements that will damage the bearings.

Real Shop Improvements Are the Order of the Day for 1923

THIS is the time of year when the wide-awake electric railway master mechanics and the superintendents of equipment, are planning how they can reduce maintenance costs for the coming year. Most of them are well aware that parts of their shop layout are not what they ought to be, but shortage of funds, or perhaps lack of sufficient determination, or both, have interfered with the carrying out of choice projects. The shops suffered possibly more than other parts of electric railway properties, due to war and post-war conditions. Managers knew that the equipment department would "worry through" somehow, and regretfully but firmly tied another knot in the purse string. It is high time now, however, that the shops be brought back to first-class condition, for good maintenance work can be done only with good maintenance facilities. Investment in such facilities is a perpetually paying one, because the results continue indefinitely.

In looking toward 1923, equipment men will naturally have in mind the work which has been done on their behalf by Engineering Association committees. Years of hard work have been put in by these committees with a view to improvement in shop layout and procedure. During the past two years the efforts have crystallized in definite recommendations. While the suggestions as to shop layout may seem primarily applicable to new

shops, they have an important function to perform with respect to existing shops. They furnish a gage by which the merits of a particular layout can be estimated. The recommendations might well be studied with local conditions in mind. Such study would naturally lead to the laying out of a general program of desired improvements. If all of these improvements cannot be made at once, the alternative is to pick out for the present those things which promise the greatest immediate and prospective saving. Reinforced with the results of this analysis, the equipment superintendent might well go to the manager with some tangible recommendations backed up by figures as to the saving to be effected by a given investment. Thus reinforced, he ought to be able to get a reasonable appropriation for improvement for his department in the 1923 budget.

Too Slow Speed and Too Safe Operation Are Imposed Upon in Traffic

ON THE surface cars of a certain metropolis the habitual rider becomes impressed if not exasperated with the extremely slow speed of operation. The car is almost the slowest vehicle on the street. The excuse is the heavy traffic, but close observation in various cities where traffic congestion is comparable does not convince one that the excuse is controlling. In this particular case the reason lies in two causes: First, because the cars are equipped with but two old motors with low gear ratio and have very slow acceleration. Second, because of their slow movements, the cars are constantly imposed upon by the truck and taxi drivers, teamsters and most all the "professional" drivers, thus pyramiding the factors causing slowness.

One almost feels that the cars are operated too safely, for the drivers seem to depend confidently on the motorman giving way to them—and he does, in a way, variably. In cities where the street cars operate at high rates of speed, the truck and taxi drivers and teamsters have a wholesome respect for the right of way of the rail-bound unit. They do not impose on it because of the danger of collision. But there is no such danger, virtually, in the city in question because of the sluggish movement and the ultra-cautious operation. So the vehicle of the multitude is continually held back while the competitive taxi of the individual cuts in or swings around in front of the car if this offers an advantage in making speed.

The taxi drivers know the sales value of speed, but this railway management does not, for the speed of the cars is barely faster than walking.

This local situation could be changed materially with the installation of some modern equipment—on the part of aggressive motormen. And one wonders if a few bumps wouldn't be well worth while in overcoming the blasé ignoring of cars by the drivers of vehicles, thus making for speed and giving better service to the greatest number.

The street car does not need to be the poky, antiquated vehicle of days gone by. There are available modern street cars capable of even more "get up and go" in their movements than can be mustered by the newer form of mass transportation—the bus. The street car is not an antiquated vehicle, as a type, but there are antiquated street cars and antiquated operation in existence here and there, to the discredit of the industry, and also to the financial ill-being of the particular company.

Oil and Waste Reclaimed with Profit in Milwaukee

A Large Reduction in Lubrication Costs Has Been Brought About Through the Use of a Very Comprehensive System of Oil and Waste Reclamation—Apparatus Installed to Do This Work and the Process Are Described in Detail

THE waste and oil used in the motor, axle and journal housings of electric railway cars soon become contaminated with dirt, water and other impurities which impair the efficiency. By removing these impurities, the oil and waste can be restored to nearly their original condition and thus an increased service can be obtained. The Milwaukee Electric Railway & Light Company in its Cold Spring shops undoubtedly has the most complete oil and waste reclamation plant of any electric railway, and a study of its methods and equipment will be of value to other electric railways.

After the car body has been raised, the trucks run out and the motors lifted off in the truck overhauling shop, the waste and oil are removed from the various bearing housings. A galvanized-iron pail is used to receive the waste, and as soon as the pail is full it is emptied into rectangular containers approximately 3 ft.

x 3 ft. x 4 ft. high, three of which are provided in a convenient location. Two of these are used for the oil-soaked waste removed from axles and journal bearings, and one is used for armature bearing waste. The waste removed from the armature bearings is thus kept separate, but no attempt is made to keep the axle and journal bearing waste separate. The waste accumulated in the truck overhauling shop containers is sent in to the reclaiming room. Galvanized iron cans 2 ft. in diameter by 3 ft. 6 in. high are used for transporting the waste from outside shops. In the Cold Spring truck overhauling shop, which is adjacent to the oil reclaiming room, the waste is handled and taken to the oil and waste reclaiming room in a wheelbarrow with a special galvanized iron basket.

The waste received in the reclaiming shop is first sorted and any which is badly discolored or which has an excessive amount of foreign substance in it is thrown

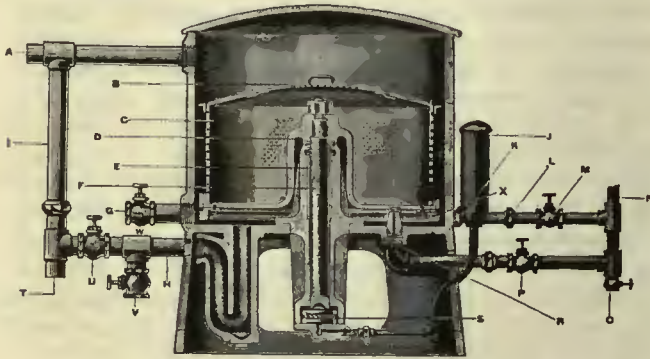


INTERIOR OF OIL HOUSE, SHOWING ARRANGEMENT OF EQUIPMENT USED IN OIL EXTRACTION AND IN WASTE RECLAMATION

A. Extractor of oil from waste. B. Liquid receiving tank. C. Gravity tank. D. Oil purifier. E. Storage tank. F. Barrel for oil supplied on requisitions.

out and scrapped. The remainder goes into a centrifugal oil extractor made by the Oil & Waste Saving Machine Company, Philadelphia, Pa. The size used by the Milwaukee company has a capacity of about 200 lb. of waste, and under average conditions this amount of waste yields about 20 gal. of liquid. An accompanying illustration shows the construction of this separator.

The waste is placed in the basket of the extractor, care being taken to have it evenly distributed and only loosely packed. No material is allowed to remain above



SECTION OF MACHINE FOR EXTRACTING OIL FROM WASTE

A. Steam exhaust. B. Removable cover to basket. C. Basket. D. Felt washer. E. Bushing. F. Shaft. G. Water Inlet. H. Fat discharge. I. Overflow. J. Oil reservoir for oiling machine. K. Turbine nozzle for revolving machine. L. Union. M. Steam supply valve for turbine. N. Steam supply pipe. O. Blow-off valve. P. Steam supply valve for boiling or washing nozzle. R. Boiling nozzle or washing nozzle. S. Step bearing. T. Drain to sewer. U. Valve for drawing off wash water. V. Valve for reclaimed oil extracted by machine. W. Valve for controlling wash water inlet. X. Turbine blades.

the rim of the basket. The cover of the machine is then closed, this being provided with a gasket so as to make it steam-tight. A steam turbine is used to rotate the basket, and after the lid of the machine has been closed the valve to the turbine nozzle is opened. The steam exhausted from the turbine passes up through the waste in the basket and thus heats it. An average steam pressure of 130 lb. is used in the Milwaukee installation. After the steam has been turned on it takes about ten minutes to bring the machine up to speed, and an additional fifteen minutes to complete the extraction. The basket is revolved at a speed of between 700 and 800 r.p.m. The centrifugal action throws the waste to the outside wall of the basket and the pressure exerted removes the oil. The action of the steam heats the waste and oil to about 200 deg. F., and at this temperature the oil becomes quite fluid and flows out at the bottom of the basket. The walls of the basket have holes, and inside the basket is a screen to keep the waste from clogging these openings. The heated oil flows freely from the extractor to an adjacent receiving tank. Some very fine fibers and ends of the waste follow in with the oil, and in order to prevent clogging the oil first passes through a screen at the opening to the receiving tank. This receiving tank is of rectangular shape and has a capacity of approximately 45 gal. As soon as the oil has been removed, the machine is stopped by closing the steam supply valve and by applying the brake. In the Milwaukee installation an average of 3,500 lb. (dry weight) of waste is reclaimed per month. The time required to charge the machine with waste and empty it is 0.25 man-hour. No attention is required after the machine is placed in operation. The extractor is entirely a self-contained unit and the installation and piping are fully illustrated in the accompanying photograph. In the Milwaukee in-

stallation the cover of the extractor is handled by a chain which runs over a sheave mounted on the wall. A counterweight is fastened to the lower end of this chain, which balances the weight of the cover.

The waste is removed from the basket of the extractor by means of a pitchfork and is placed on a sorting table, and the liquid removed from the waste is held in readiness for the purifying process. The liquid from the receiving tank is pumped by a centrifugal pump through a pipe which leads upward and across the top of the room to a gravity tank in the corner of the room. This tank has a capacity of about 70 gal. and is provided with a float with a gage to indicate amount of oil in tank.

From the gravity tank the oil is led through a 1-in. diameter pipe to the purifier. This pipe has a steam connection for the purpose of heating the oil as it is being conducted to the purifying machine. The distance from the settling tank to the steam connection is about two-thirds the total length of the pipe. The proper location for this connection was found by trial. If the steam enters the pipe too near the settling tank it retards the flow of oil, and instead of mixing with it as it flows toward the purifier the steam passes back through the oil and escapes through the settling tank. The valve which governs the flow of oil through the pipe is located just underneath the tank and has a long handle so that it can be operated from a position adjacent to the purifier. The steam connection is opened so as to heat the pipe before the oil is allowed to flow. The temperature of the oil as it enters the purifier is usually about 195 deg. F. The water used in the purifier is also heated to about 210 deg. F. in a similar manner.

The oil purifier is a most important part of the reclaiming equipment. The machine used was made by the De Laval Separator Company, New York, N. Y., and in outward appearance is very similar to the large centrifugal separators employed in creameries throughout the country. It is motor driven through a belt, and in starting the machine the motor is started first and the machine is then brought up to speed by tightening the belt on the driving pul-



TABLES FOR SORTING WASTE AND CLEANING OIL PURIFIER

ley. The starting of the machine takes approximately five minutes. The purification of the oil is accomplished by means of centrifugal force. Liquids of different specific gravities are thus instantaneously separated and any solid impurities are removed. As the pressure exerted by centrifugal force is several thousand times greater than that of gravity, the process is

much more rapid and the purification much more positive and complete than by the gravity method. In the De Laval bowl the effect of this centrifugal pressure is multiplied by a series of disks, which are placed so as to divide the liquid into thin sheets or layers. This is of particular advantage as it brings about a finer purification with less centrifugal force than if the entire contents were treated in a mass.

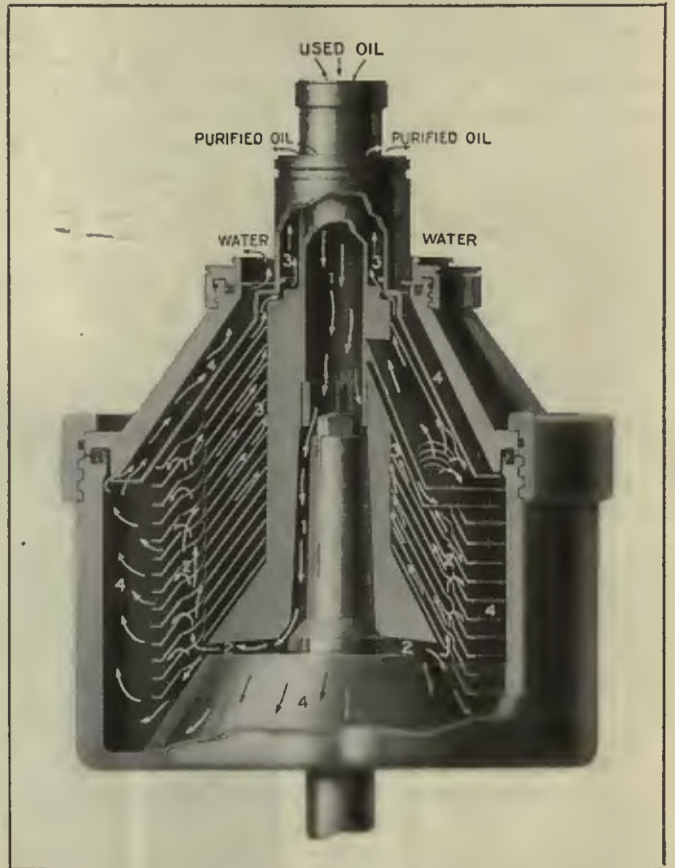
The principal part of the purifier and one with which the user should become very familiar is the revolving member known as the bowl in which purification takes place. An accompanying illustration shows a cross-section of the bowl of the No. 600 purifier used in Milwaukee. The bowl is revolved at a speed of approximately 6,000 r.p.m., and while revolving the liquid to be separated enters the bowl at the top opening marked "Used Oil" in the accompanying diagram. It then passes down through the center tubular shaft to the bottom of the inner chamber where the heavier and more easily removed substances are thrown out and held in the sediment pocket. After passing down through the tubular shaft and out through the slots in the bottom of the inside shell, the liquid is carried up between the disks where it becomes separated and is distributed in thin layers between the disks. Here, due to the centrifugal action, separation takes place. The water and sludge, being heavier than the oil, are thrown outward to the periphery of the bowl and pass upward along the outer edge of the disks to the discharge outlet.

The oil, being lighter, passes inward between the disks, where the thin layers are subjected to tremendous centrifugal force, which throws out the remaining traces of impurities and water. These impurities are forced along the lower surface of each disk toward the center shaft, thence upward to the oil discharge outlet.

The bowl of the purifier is surmounted by three covers, each provided with a spout. The top one serves as an overflow outlet. The purified oil is collected in the second cover and discharged through the attached spout, where it runs by gravity to a storage tank.

The sludge comes out at the bottom spout of the ma-

itate the cleaning of the disks and bowl of the purifier. One and a quarter man-hours are ordinarily required to purify 50 gal. of oil and to clean and assemble the machine. An average of 1,200 gal. of oil is purified per month. A conception of the amount of oil re-



CROSS-SECTION OF OIL PURIFIER BOWL.

claimed by the Milwaukee property may be gained from the fact that approximately 15,000 gal. of pure oil is produced per year. The base of the oil purifier covers a floor space of 17 in. x 21½ in., and it is bolted down by four bolts.

In passing from the purifier to the storage tank the oil runs through an open trough. Pure oil is almost transparent and the use of the open trough enables the operator to observe the oil as it comes from the machine. Whenever observation shows that the oil is becoming slightly discolored, the extreme end of the trough is lifted up so that no more oil can pass through it and the machine is then closed down and cleaned.

The pure oil storage tank is rectangular in section and is located just to the right of the oil purifier. This tank is equipped with a hand pump for use in delivering the oil to the saturating tank or to barrels as desired. For convenience in keeping a record of the amount of oil supplied on requisitions for use in the overhauling shops, a barrel has been installed just to the right of the purified oil tank. This barrel is filled and then any oil requisitioned is taken from the barrel. A record is thus readily obtained of the number of barrels of oil which have been furnished.

A row of saturating tanks is installed along the wall opposite to that which contains the oil purifying equipment. These waste saturating tanks were manufactured by the Milwaukee Oil Pump & Tank Company, Milwaukee, Wis. Four tanks are used for waste saturation,



WASTE SATURATING TANKS WITH PUMPING EQUIPMENT AND CONTROLS TO THE VARIOUS COMPARTMENTS OF EACH TANK

chine with the water and is run directly into the sewer. The extremely heavy sediment which cannot be carried out by the sludge remains inside the bowl to be cleaned out after such a quantity has accumulated as will clog the passages. This method permits of from 40 to 90 gal. of oil to be handled before sludging occurs at the purifier. A bench and small tank are provided to facil-

and each of the tanks is provided with three compartments. This separating of the tanks into compartments is convenient, as waste can be saturated in one compartment while waste in the second compartment is draining, and the third compartment can be used for supplying waste at the same time. Vertically the tanks are separated into three sections; the top is for the reception of the waste, the middle section is a drainage space and the bottom of each tank is used for receiving oil from the waste in the process of draining in the top compartment. Steam coils located underneath the tank maintain a waste and oil temperature of approximately 120 deg. F. during the saturating and draining process. Each tank is provided with a centrifugal pump in the piping, which enables the operator conveniently to use any accumulation of oil in the bottom for saturation. Signs installed on the wall above the tanks indicate the use to which the waste is intended to be put. There are two containers for waste used in armature bearings, one for journal bearings and one for axle bearings.

The waste removed from the oil extractor is placed on a sorting table. This has a pipe framework and galvanized iron top. The top is about 40 in. from the floor, which is a convenient height for sorting the waste. Two sides of the top have guards about 4 in. high. These guards prevent the waste from falling to the floor as it is removed from the oil extractor by a pitchfork. The under part of the sorting table is used for storage of various materials. In sorting, the waste is graded and is then placed on a drying-rack. In the process of oil extraction the waste has accumulated some moisture, so that it is necessary to dry it before it is again used. The drying rack has a pipe framework and a large mesh wire top. When thoroughly dry, the waste is placed in the saturation tanks, where it is immersed for twelve hours in the heated oil and is then drained for an additional twelve hours. Experience has shown that proper treatment of the waste enables it to absorb about 2 lb. of oil per pound of dry waste. Reclaimed waste is used for repacking axle and journal bearings only, while new waste is used for armature bearings. Whenever new oil is put in the saturating tanks, this is accomplished by raising a barrel above the tank by an air hoist and letting the oil flow by gravity as desired.

The electric car oil used on this property is furnished by the Texas Company and is a straight mineral oil of two grades, viz., summer and winter electric car oil. While the viscosity of the summer grade is considerably higher than that of the winter grade, the effect as regards reclaiming and purifying is identical with that of the winter grade.

The reclaimed oil is tested frequently by means of a glass test, a method now used on a large number of electric roads. In this test two pieces of thick glass $3\frac{1}{2}$ in. wide by 12 in. long are used. The oil is placed on the glass and its color is observed. This can be com-



GLASS TEST OF OIL
At left—Glass dipped in oil just taken from dirty waste.
At right—Glass dipped in oil which had been run through the purifier.

pared with new oil or with oil before reclaiming as desired. Accompanying illustrations show a comparison of two samples of oil, one of the oils before it has been subjected to the reclaiming treatment and another of the same oil after treatment. The difference is quite apparent. The lubricating value of reclaimed oil is equal to that of unused oil and is used for same purposes.

Increasing the Weld Section in the Seam-Weld Joint

A Development in Rail Joints Designed Primarily to Give Large Area of Weld Section Under the Outside of the Head

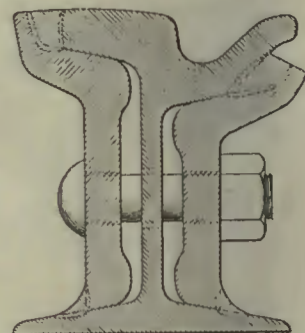
THE Third Avenue Railway System, in New York City, is trying out a modified form of seam-weld joint which was devised by E. M. T. Ryder, way engineer of that system. The fundamental purpose in the new design is to give a cross-section of weld much greater than that in the usual form of seam-weld joint.

The extra section of weld is provided by means of extensions of the joint plates. As applied by the Third Avenue System, the extension on the outside plate projects upward to the rail-head surface and at such a distance from the side of the rail head as to provide a trough which is filled with the welding metal. A similar extension may be made if desired on the inside plate projecting under the surface of the tram of the rail in such away as also to provide a trough. The welds between the bottom of the plates and the base of the rail are made in the usual fashion.

This design aims to give the maximum cross-section of welding material at the head seam, which is the point where it is most needed as most fractures of the seam start under the head on the receiving side and failure occurs progressively. Theoretically the most desirable place for the seam weld is under the rail head as the point of heaviest load would ordinarily be at about the inside edge of the fish plate, which place is of course impracticable to reach.

In the new design the welding material is at the outside of the rail head, but it is not felt that this will make a serious difference in the result, especially as it permits the fish plates to have full bearing across the fishing area, which is not possible with the designs now in general use. The provision of the troughs for the welding metal is a great convenience in welding and insures the best possible job in applying the welding metal whether by metallic or carbon electrode method.

One objection to the extension of the joint plate outside of the rail head is interference with paving. In practice, however, this proves not to be serious. Again, when the joint plate is brought up level with the rail surface, as shown in the illustration, there will be a small ridge of metal left as the rail head wears down. This can easily be ground off or, as has been suggested, the upper surface of the joint plate can be chamfered off so as to lower its edge a half inch or so without reducing the area of weld in contact with the rail head. Mr. Ryder has been granted a patent on this invention.



CROSS-SECTION OF RAIL JOINT DESIGNED TO PROVIDE LARGE CROSS-SECTION OF WELDING METAL

New Akron Viaduct Eliminates Bad Hills and Saves Railway \$14,500 Annually

WITHIN the next sixty days interurban and city cars and electric freight trains of the Northern Ohio Traction & Light Company, Akron, Ohio, will be crossing the Cuyahoga Valley on the new \$2,000,000 viaduct recently completed at Akron, establishing new time records and eliminating one ¼-mile hill having an average grade of 10.5 per cent and another of almost equal length having an 8 per cent grade. The viaduct extends northward from Main and Furnace Streets, close to the main business center across the valley to North Hill, a distance of 3,000 ft. It is a concrete structure with thirty-four major piers measuring from 27 to 36 ft. in width at the base and sunk to an average depth of 38 ft. The percentage of grade is 1.48. The structure is built to allow for 5 ft. 8 in. of contraction and expansion.

Work began on the viaduct June 1, 1919. Approximately 280 men worked on the job steadily. The height at the lowest point in the valley is 135 ft. and the longest arch span is 191 ft. There are twenty-nine arches. The roadway width is 52 ft. with a 10-ft. walk on each side.

In the track construction the company used 100 lb. Carnegie rail in 60-ft. lengths, with special track-work at the south approach to provide for turning freight and express cars down Furnace Street to the company's big warehouse a few blocks away, thereby keeping these cars off the city streets as much as possible. The company's terminal building for passenger traffic, built two years ago, was located with this viaduct project in mind and it is less than two blocks from the south approach.

With the operation of cars across the viaduct, the Northern Ohio Traction & Light Company begins payment to Summit County of an annual rental of \$15,000. This rental is in lieu of the company's estimated share in the cost of construction—6 per cent on \$250,000. Its use means a reduction of six to ten minutes in the running time of trains to Cleveland, Kent, Ravenna and

3,000-ft. grade eliminated is 9.5 per cent. Without the viaduct, the average time required to climb the 2,200-ft. north hill alone is ninety seconds, and the energy consumption on the hill is at the rate of 13.09 kw.-hr. per car-mile as against a probable 2 kw.-hr. per car-mile on the viaduct. The actual energy now used in going up the north hill by the standard interurban is .5 kw.-hr. The maximum current demand for the hill is 1,010 amp. There is also the improvement in safety to be considered. The hill on the north is one of the most dangerous in the country, while the south hill is almost equally bad, although much shorter. These hills have been the cause of numerous accidents and many



CONCRETE STRUCTURE ELIMINATES TWO BAD HILLS

special operating rules which will practically be eliminated by the use of the viaduct.

The cost of the track on the viaduct and the connections was \$224,381. The daily saving in operating expenses resulting from this investment and the \$15,000 annual rental is as follows:

Saving in equipment released.....	\$3.60 per day
Saving in brake shoes, wheel wear and armature repairs	5.00 per day
Saving in energy	61.40 per day
Saving in platform time	20.50 per day
	<hr/>
	\$90.50 per day
Annual operating saving	\$33,032.50
Six per cent interest on investment and rental.....	18,462.80
Net saving	<hr/> \$14,569.70

Burning Anthracite Mine Waste in Pulverized Form

ACCORDING to a report recently received from the Quigley Fuel Systems, Inc., an important series of tests on burning mine wastes was recently completed by La Société des Mines de Houille de Blanzy, at Montceau-les-Mines, France.

The fuel that was used averaged the following analysis after drying: Ash, 29.2 per cent; volatile matter, 11.2 per cent; fixed carbon, 59.1 per cent, and moisture, 0.5 per cent. The coal ran about 10,728 B.t.u. per pound and the fusing temperature of the ash was from 2,120 deg. F. to 2,228 deg. F.

The test consisted of an uninterrupted thirty-day run of 704 hours, employing a B. & W. boiler having 2,368 sq.ft. of heating surface and having neither a superheater nor economizer. During this period the hourly evaporation for each 10 sq.ft. of heating surface was 30.19 lb. of water per hour, the guarantee being 29 lb. Evaporation of from 36 to 45 lb. was easily attained for periods of several hours at a time.

The average evaporation per pound of coal was 6½ lb. of water, the guarantee being 5.5 lb. During periods of more than forty-eight hours, the evaporation per



NEW VIADUCT WHICH HAS BEEN BUILT OVER THE CUYAHOGA VALLEY, AKRON, OHIO

city cars to Cuyahoga Falls and the North Hill section of Akron. A total of 140 interurban and suburban trains will go over the structure daily in addition to the Cuyahoga Falls and North Hill city cars.

In addition to the saving in time, there will be a big saving in power, equipment and maintenance to the company. Accurate figures as to this saving are not available at this time, but some idea of the saving may be obtained from the following: The weight of the company's standard interurban cars is 72,000 lb. The

pound of fuel was maintained between 7.61 lb. and 7.65 lb., equivalent to an efficiency of 85 per cent.

The smoke leaving the stack was light and of a clear color and caused no deposit of dust in the neighborhood.

Coal preparing and burning equipment consisted of one five-roller pulverizer, one dryer, two powdered-coal feed controllers and two low-pressure burners at the combustion chamber, with the necessary blowers for supplying air for carrying the coal from the powdered-coal feeders into the burners. The equipment for the powdered coal installation was manufactured in France by the French-Quigley Company, with the assistance of the American company mentioned earlier.

Vocational Education in the Electric Railway Business

Northern Texas Traction Company Conducted Successful Class in Foreman Training in Co-operation With State Board

BY H. M. ROBINSON

Mechanical Engineer, Northern Texas Traction Company, Fort Worth, Tex.

IN 1917, to encourage vocational education, the federal government passed what is known as the Smith-Hughes act, the provisions of which are not as widely known as they should be. Under this act the government appropriated during 1921-1922 more than \$4,000,000 for vocational education. The money is apportioned among the states, which add equal or larger sums from state funds. Thus last year \$10,000,000 was spent by the states in addition to the above-mentioned appropriation, making a total of \$15,000,000.

The vocational work comprises three divisions: trades and industries, agriculture, and home economics and teacher training. Each division is directed in each state by a director or supervisor who works under the direction of a state board for vocational education. The state board in turn functions through local school boards and school superintendents.

Teachers for the vocational work are recruited from the trades, and by aid of a course in trade analysis and methods of teaching, and a few lessons in practical teaching, they are able to teach their particular trades in a practical manner.

An example of the application of this vocational training in co-operation with the state board is the foremanship class conducted by the writer for the Northern Texas Traction Company. This was the first foremanship class to be held in Texas and, as far as I know, the first class of its kind to be held in the street railway industry. The company provided the classroom and light, and cigars for the men at each meeting. As the class was held outside of working hours there were no wages involved, attendance being voluntary. The class cost the company but a small sum.

Twenty-two men were enrolled in the class, the foremen representing all departments except transportation. The transportation men will be cared for in a class for inspectors which is planned to be held beginning this fall.

The foremen's class ran from Oct. 4, 1921, to April 25, 1922, classes being held Tuesday and Thursday evenings from 7 to 9. There were fifty-five meetings of two hours duration each, a total of 110 hours.

The course was divided into three main parts, covering respectively materials, equipment, processes and

operation, and the "man factor." Each topic was subdivided so that supervision, cost elements and managerial problems of each of the three main parts could be taken up separately.

NO FORMAL TEXT USED IN THE COURSE

Before each class I prepared a schedule of topics to be covered during the lesson, but it was my policy to do as little talking as possible. During the meeting I would suggest a topic for discussion and ask the men to express their ideas freely. Frequently arguments would develop and these were of great benefit to the class because eventually some definite idea would come out of the argument. Frequently I would supplement the men's ideas with remarks of my own and also quote from any source from which I could draw information pertaining to the subject at hand. The members of the class expressed their ideas freely, and if others disagreed with them the correct solution was brought out sooner or later to the satisfaction of all.

During each meeting I kept notes on the subjects discussed and the agreements reached, supplemented by any other information I could get, and had these mimeographed and distributed at the next meeting. They served as a review of the previous meeting.

The benefits derived from the class were noticeable, both in the way the foremen handled the men under them and in the way they went about their work. During the course the class analyzed the foreman's job, and at its completion all members expressed surprise at the vast amount of detail that a foreman should take care of if he is onto his job.

Officials of the company attended several of the meetings and joined in the discussions, and their ideas were well taken or criticised by the members of the class. When the course was complete the company gave a dinner at a local hotel to all members of the class. This served to end the course fittingly and let the men know that the company appreciated their efforts at self-improvement. At the dinner all members of the class who had attended 60 per cent or more of the meetings were presented with state certificates recording the fact that the recipients had completed a course of 110 hours in foreman training.

What If the Nickel Fluctuated Thus?

The Berlin Municipal Railway System, which includes the elevated, the subway and the surface lines, has stopped printing the fare on its tickets, as formerly, because the exchange value of the mark changes so rapidly and the fare has to be changed. At the end of September the single fare rate was 10 marks, with transfer for 5 marks more, but an increase in both rates was expected shortly.

Pulverized Fuel for St. Louis Utility

PULVERIZED coal will be used in the new Cahokia station of the Union Electric Light & Power Company, St. Louis, Mo. The Lopulco system of the Combustion Engineering Corporation has been adopted for the preparation and burning of the fuel, and the Quigley transport system of the Quigley Fuel System, Inc., for the transporting of the fuel in its pulverized form. This system provides an interesting plan for weighing the fuel. Below the floor level of the pulverizing room will be placed a series of five blowing tanks, which serve an equal number of twin pulverizing units.

These blowing tanks will rest on platform scales, the dial of which will indicate to the operator in the pulverizing room the amount of fuel in the tank.

The fuel will feed into these tanks by gravity from fuel bins in the pulverizing room. Each charge will be weighed and then elevated by compressed air to a height of about 75 ft. through 4-in. pipes. By means of a simple system of switching valves and parallel distributing mains, cross-connected, any blowing unit can discharge into any of the eight inclosed storage hoppers in the boiler house. These hoppers serve the four pairs of boilers of 1,800 hp. each, comprising the first group of boiler units to be installed.

The fuel requirements for the first section of the plant, 60,000 kw., which is now under construction, is estimated as 1,000 tons per day, which will be prepared and transported in sixteen hours. The ultimate capacity of the plant will be about 240,000 kw.

The firms of McClellan & Junkersfeld, New York City, are engineers and constructors for this plant.

Mexican Railway to Be Electrified

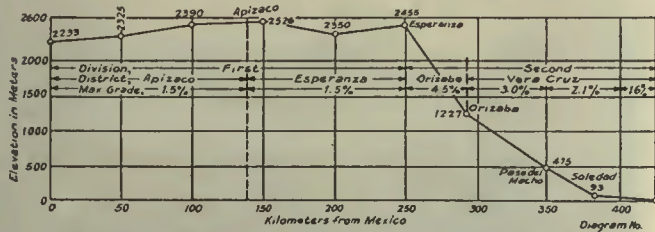
Thirty Miles of Single Track Between Orizaba and Esperanza to Be Equipped for Electric Operation at Once—Beginning of Main-Line Electrification

THE International General Electric Company has received an order from the Mexican Railway Company, Ltd., Mexico City, for the electrification of 30 miles of single track between Orizaba and Esperanza, which is on the main line between Mexico City and Vera Cruz. The approximate cost of the electrification project will be between \$2,000,000 and \$2,500,000.

This is the first main-line steam road electrification to be undertaken in Mexico. It will be carried out on the oldest and largest railway in the country. Electrification was decided upon on account of the heavy grades and increasing traffic. Indefinite postponement of the necessity for double tracking the road and a saving which will pay for the entire cost of electrification in five or six years are indicated. The system will be operated at 3,000 volts, direct current, power to be supplied by the Pueblo Tramway, Light & Power Company from its hydro-electric plant 5 miles from Orizaba.

The contract calls for ten 150-ton locomotives interchangeable for freight and passenger service, equipment for an automatic substation, the trolley overhead and feeder lines and fittings complete, as well as the supervision of the complete installation.

The electrification of this portion of the Mexican Rail-



SOME STEEP GRADES ARE SHOWN ON THIS PROFILE OF THE RAILROAD CONNECTING MEXICO CITY AND VERA CRUZ.

way is the beginning of the main-line conversion, and extensions will follow as it becomes necessary to increase the capacity of the single track or the number of electric locomotives. The total route mileage of the system is 403 miles. It rises from sea level at Vera Cruz to a maximum altitude of between 2,500 and 2,800 meters. Grades as steep as 5½ per cent are encountered,

while the ruling grade on the electrified portion will be about 4.7 per cent.

The locomotive will be similar in general to the standard articulated truck design furnished for the Detroit tunnel, the Baltimore & Ohio, the Butte, Anaconda & Pacific, the Chicago, Milwaukee & St. Paul, and other railroads. In order to provide the necessary tractive



Lines of the Mexican Railway which will be partly electrified at this time

effort without exceeding 50,000 lb. weight per axle, each unit will consist of three articulated trucks instead of two as in former designs. These will, however, be placed under a single cab.

All six axles will be driving axles, each twin-g geared to a 1,500-3,000-volt motor. The contract provides for three running speeds with an additional arrangement for shunting the fields on light grades or with light trains. Full regenerative control will be provided and the equipment will be suitable for either independent or multiple-unit operation. The maximum rigid wheelbase will be about 9 ft. 2 in.; and the length over all, about 52 ft.

Mammoth Steam Turbine for Brooklyn

THERE is now under construction at the works of the Westinghouse Electric & Manufacturing Company the largest turbine generator ever constructed in a single unit. It is for the new Hudson Avenue power plant of the Brooklyn Edison Company and will have a rating of 62,500 kva., three-phase, 60 cycles, 13,800 volts at 80 per cent power factor. The turbine will operate at 265 lb. steam pressure, 200 deg. F. superheat, and 29 in. of vacuum.

For use in connection with this unit two 70,000-sq.ft. surface condensers are also under construction.

French Water-Power Development and Railroad Electrification

VICE-CONSUL FULLERTON, Lyons, France, in a report to the United States Department of Commerce, gives data regarding the rapid development of French water powers. The electrification of the railroads is playing an important part in this development. In 1913 only 930,000 hp. was generated by water, while in 1921 the total was 2,100,000 hp. Of this total 650,000 hp. is used for lighting, heating and minor motor power; 1,300,000 hp. for industrial purposes; 50,000 hp. for traction, and 100,000 hp. for agriculture and other miscellaneous uses. Important individual projects mentioned by Mr. Fullerton include the Rhone development, which has the navigation and irrigation phases as well as its power features; and the project for harnessing the hydro-electric portions of the river Dordogne, involving seven generating plants and the world's largest dam at Chambon. A considerable part of the Dordogne power will be required for railroad electrification.

Equipment and Its Maintenance

*Short Descriptions and Details of New Apparatus of Interest
to the Industry. Mechanical and Electrical
Practices of All Departments*

New Line Car Built in Trenton Shops

An Emergency Repair and Wire Stringing Car with Closed Section Provided with Bins and Racks Carries Materials for Repairs and Replacements

ACCOMPANYING illustrations show a new double-truck line car recently constructed in the shops of the Trenton & Mercer County Traction Corporation. The car was designed by Herbert Krouse, master mechanic of the company, to meet a long-felt need for a car which would combine the features of an emergency repair car and a wire stringing car. The underframe was constructed from an old abandoned passenger car, but all other material used was new. The car as constructed has an over-all length of 32 ft., and is provided with an inclosed body 23 ft. long and 8 ft. 2 in. wide. The roof is arched to provide sufficient drainage. The interior of the closed portion is provided with bins and racks to give ample storage space for carrying a full supply of line materials for repairs and replacements. A tower has been fitted to the roof of the closed portion. This has a revolving platform and can be rapidly raised or lowered by a very simple, manually operated device. When raised to its extreme height the platform reaches a point 16 ft. above the rail, and when placed at right angles to the center line of the car has sufficient projection over the side of the car to meet all requirements for line work.

The open end of the platform is arranged for mounting the wire reel, and due to the large space provided the necessity for hauling a trailer car is done away with. A sheave is mounted at the edge of the roof and acts as a guide for the wire as it leaves the reel. This is also an aid in aligning the overhead wire as it is strung. The car is wired for double-end operation, the control equipment being mounted inside the closed portion. The open section of the car is not of sufficient length to make operation from this end hazardous.

Other items of equipment include straight air brakes, electric heaters, high-powered Golden Glow

headlights with dimming attachments, and mechanical sanders provided with 2-in. iron pipes instead of sand hose ordinarily used.

Automatic Control of Fire in Car Shops

A RECENT instance of the control of fire by automatic sprinklers in the freight car erecting shop at the Turoot Works of the Canadian Car & Foundry Company, Ltd., near Montreal, Que., Canada, is of particular interest to engineers having to do with the construction and maintenance of railway shops.

This erecting shop is a large one-story building, 80 x 800 ft., all one area. The walls are of brick and glass in metal sash; the roof, light planks supported by unprotected steel beams and trusses. The distance from floor to roof is 39 ft. Five tracks run the length of the building. At the time of the fire they were filled with box cars, seventy-five in all. The shop is equipped throughout with a dry-pipe automatic sprinkler system controlled by six automatic air valves. Five metal fire curtains under the roof divide the system into six sections.

The fire broke out early in the morning of Oct. 17, in a box car spotted in the center of the building. It was discovered by the watchman who gave the alarm. A line of hose was stretched by the night shift at the plant, and before this was brought into play the sprinklers overhead began to open. The fire burst through one end and the doors of the car and ignited the corners of near-by cars. The water from the sprinklers blanketed the blazing car and extinguished the fire in the near-by cars, thus confining the fire to the locality of origin. As the fire was directly beneath one of the divisional fire curtains the sprinklers in two sections opened, ten in one and eleven in the other, twenty-one in all. The principal fire damage was to the burned box car, but no practical loss resulted as the car was to be rebuilt. The entire damage to the building amounted to only \$50.



OPEN END OF CAR USED FOR WIRE STRINGING. A TOWER IS FITTED TO THE ROOF

Extension Lights with Reel Attachment

AMONG the conveniences installed in the inspection pits of the new carhouse for the Department of Street Railways, city of Detroit, Mich., are extension lights with a reel attachment. This provides a very neat arrangement and increases the life of the cord, as it is never left lying on the floor where it is subject



INSPECTING RESISTANCE GRIDS WITH PORTABLE LIGHT WITH CORD EXTENSION FROM REEL

to the deteriorating effects of oil, grease and other abuse through being stepped on or mistreated. The trade name of the equipment is "Reelite" and is manufactured by the Appleton Electric Company, Chicago, Ill. An accompanying illustration shows the installation of one of these reels in the shop pits and the convenient use that can be made of it.

An Unusual Job of Lathe Work

ACCOMPANYING illustrations show an unusual job that was done at the West Springfield shops of the Indiana, Columbus & Eastern Traction Company recently. It was found necessary to overhaul an outfit used to drive a large air compressor. The outfit consisted of an old-type railway motor mounted in the usual manner on a car axle carrying both car wheels, one journal being cut off close to the hub of the wheel,

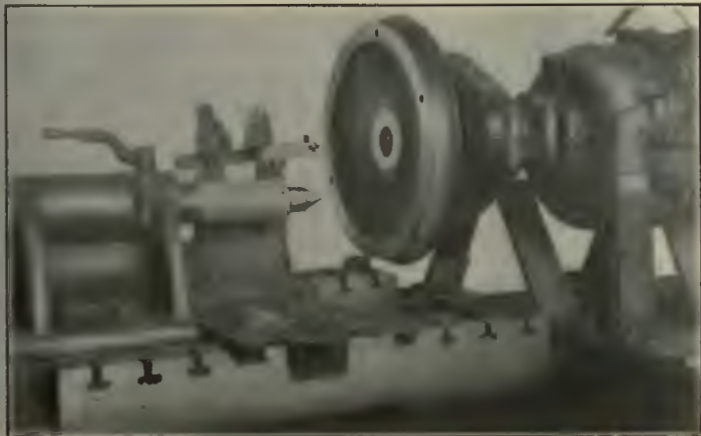
and the wheel faced off to fit into a recess in the flywheel of the compressor, to which it was bolted with six bolts. In overhauling this outfit, it was found that the faced-off portion of the car wheel was out of true, so that it was necessary to reface it. It was also desirable to face the wheel with the axle running in its own bearings.

To accomplish this the complete motor was set in place and lined up in a lathe. The wheels were rotated by means of the motor using the slide rest of the lathe to hold the cutting tool. As first mounted, it was found that the speed was too fast to get a satisfactory job, so an arrangement was resorted to by which the wheels were driven from the lathe spindle. As shown in the illustration, the center of the axle was about 5 in. higher than the lathe centers. Therefore a heavy bar of steel shown at A in the second illustration with a hole to fit over the journal was clamped to the wheel next to the lathe spindle, and a heavy bracket or arm shown at B extending out somewhat past the steel bar was bolted to the lathe chuck. When the lathe was started this arm came in contact with the bar, thus rotating the wheel to which it was attached. The arrangement gave a slightly non-uniform motion on account of the two centers not being in line, but this variation in speed was not found objectionable, and a good job was secured.

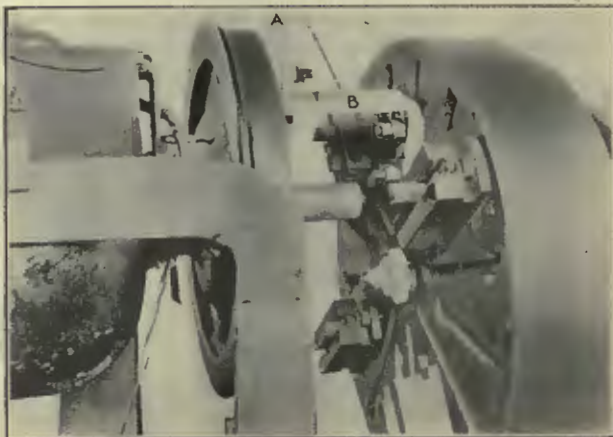
Germans Experts on Fuel Combustion

THE chief mechanical engineer of the United States Bureau of Mines, O. P. Hood, recently returned from a visit to Europe, during which he made an economic survey of the power and fuel situations in several countries. He was particularly impressed by the fact that no smoke issues from the innumerable tall chimneys in the industrial communities of Germany, in spite of the feverish manufacturing activity in these communities. Moreover, the average German plant burns fuel having only a third of the heat value of the commercial coal used in America.

Mr. Hood concludes that the Germans have studied combustion to good purpose, as evidenced by the absence of smoke. He states that briquetting is common practice in Europe, and recommends it for the recovery of fine coal in this country. He was also impressed by the research work being done by Great Britain, along fuel lines, in the great laboratory at Greenwich. As a result, he states, the British are well advanced in work which the United States has not even started.



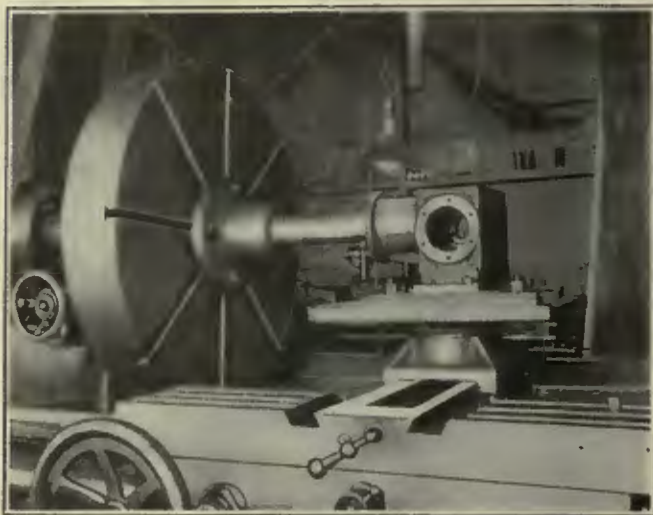
OUTFIT FOR DRIVING COMPRESSOR, SHOWING WHEEL WHICH REQUIRED REFACING



ARRANGEMENT ADOPTED FOR DRIVING THE AXLE FROM THE LATHE CHUCK

Special Lathe Attachment Facilitates Reboring of Compressor Cylinders

THE time of setting up compressor frames for the reboring of cylinders has been shortened considerably through the use of some special attachments for a 44-in. lathe in use in the shops of the Wheeling Traction Company, Wheeling, W. Va. A special face plate with holes drilled for fastening the various types of



SPECIAL TOOLS FOR REBORING COMPRESSOR CYLINDERS SAVE CONSIDERABLE TIME

compressor cylinders is used. This is fastened to the base on which the tool post of the lathe is ordinarily located. The face plate is accurately machined, so that the compressor frames can be installed readily without danger of their being out of alignment. The boring is done by a special boring bar which is attached to the face plate of the lathe. This boring bar is made in two pieces. A casting carefully machined is used for bolting to the face plate and in this is pressed a steel boring bar. This is carefully lined up so as to assure accuracy in boring. Through the use of these attachments about half the time ordinarily taken for setting up a compressor frame for reboring is saved.

Modernizing Old-Style Field Coils

THE Grand Rapids (Mich.) Railway Company has a number of GE-57 motors in service. As originally furnished this type of motor has field coils wound in a brass shell, the coils being wound with ribbon in two sections. In rewinding these fields, difficulty was found in insulating the edges of the winding and grounds

were more frequent on this type than in other field in service, and when a ground once occurred it was necessary to tear the coil apart and rewind it in order to locate the ground.

With the intention of making a field coil less liable to trouble and which could be more easily repaired William Goldner, master mechanic of the railway, conceived the idea of making a form-wound coil, which could be fitted into the old shells. In order to use a coil of this type with the old field shell it was necessary, of course, to divide this through the center so that the shell could be installed in two parts. In installation the bottom part of the field shell is first placed in position, then the form-wound field coil over this and then the top part can be inserted. A canvas gasket is installed at the top and bottom of the form-wound coil which provides additional insulation and prevents grounding.

The old metal field shells are used by sawing them apart and then by beveling the corners so as to make certain that when these are placed inside the form-wound coils there is no danger of damaging the insulation. Accompanying illustrations show the old type of field shell, the new type as used by cutting apart, and a form-wound coil as is now used.

In order to wind the new type of field coil a special form consisting of three parts was made up, as shown in another illustration. One end of the form is removable and a filler piece is used to fill up the space of the coil, while the first section of ribbon is wound in place. With the first section completed, the filler piece is removed and the second section can then be added.

Through this rearrangement of the field coils much time is saved in winding, and grounding in the shell has been entirely overcome. The form-wound coil permits better insulation, and should a ground occur the point of the short circuit can be readily located without tearing the coil completely apart.

Effect on Special Trackwork of Reversing Direction of Car Movement in Vancouver

ON JAN. 1, 1922, the British Columbia Electric Railway, Vancouver, B. C., reversed the direction of operation of its cars, changing to the right-hand rule of the road from the previous left-hand operation. This change was accomplished with little difficulty, thanks to adequate preparation, but there were natural some incidental effects which could not be prevented. The general story of the change-over was covered in articles by W. G. Murrin, assistant general manager,



NO. 1—METAL FIELD SHELL AS ORIGINALLY USED. NO. 2—FIELD SHELL SAWED IN TWO PIECES AS USED WITH NEW FIELD COIL. NO. 3—FORM-WOUND FIELD COIL READY FOR INSTALLATION. NO. 4—WINDING FORM FOR USE WITH NEW TYPE FIELD COIL

the issues of this paper for Nov. 19, 1921, and May 27, 1922. A. C. Eddy, engineer of way, has recently furnished additional information regarding a few track troubles which developed.

The principal difficulty experienced at the time of the change-over was in the facing switches at junction points, street intersections, etc. The cross-overs were all changed over, and the switches became trailing switches. The facing points at the intersections, although they were all manganese tongues of modern design, had become somewhat worn through service. When the traffic started against these points there was considerable trouble with the switches splitting—that is, there was a slight movement of the tongue on the floor of the switch after the passage of the first truck.

An attempt was made to build up some of these uneven floors with shims and with the electric welder, but with rather unsatisfactory results. It was impossible to do accurate grinding on the electric weld with portable hand grinders, and the shims rapidly wore out. It was necessary, therefore, to replace several of the facing switches with new switches. In some cases facing switches were transferred from one track to the other, thus keeping them in the original direction.

Another trouble that developed was the breaking of rail ends, due to the pounding of the wheel on the high rail. Before the traffic changed over there was a drop from one rail to another at a number of joints, and in several cases the rail had become slightly cupped, although the company endeavors to keep cupped rails built with the electric welder. When the traffic was reversed, there was a jump at these points instead of a drop, and some breakage occurred as mentioned. The broken joints were repaired by putting in sections of slightly worn rail, and the low rail was built up to the level of the high one.

Battery Tractor Switches

A STORAGE-BATTERY tractor is used exclusively by the Cleveland (Ohio) Railway for switching passenger trailers about the Harvard shops. The tractor has demonstrated its flexibility even to the extent of pulling up a trailer to be coupled to a motor car as is shown in an accompanying illustration. Handling trail cars in this manner rather than with electric switchers saves considerable time in moving cars around among the various shops by eliminating trips out to the transfer table in order to reach a car on another track.



SWITCHING CARS IN THE SHOPS OF THE CLEVELAND RAILWAY. THERE IS EVEN ROOM FOR THE TRACTOR TO MANEUVER BETWEEN THE TWO CARS BEING COUPLED



THE COMPACT STORAGE BATTERY UNIT WHICH HAS A TRACTIVE EFFORT OF 1,000 LB.

This tractor, which has been in use since 1918, is a four-wheeled machine equipped with forty Edison cells. The unit, which weighs 2,580 lb., has a drawbar pull of 1,000 lb. and a maximum speed unloaded of 7 m.p.h. Roughly, its over-all dimensions are 77 in. x 40 in. The maximum turning radius is 71 in. The controller is designed with three speeds forward and two reverse and in such a manner as to eliminate the use of resistances.

The trailer was made by the Mercury Manufacturing Company, Chicago.

Painting Methods of Texas Electric Railway

Efficient Results Have Been Obtained Through the Use of Oil Enamel for Painting Rolling Stock—Varnish Is Not Used Over the Enamel

BY W. W. BUNNELL

Foreman Painter Texas Electric Railway, Dallas, Tex.

THE painting of cars has always been a problem that is open to betterment, but results obtained on our property indicate that the problems in regard to painting have been largely solved through the introduction of oil enamel. We have obtained approximately three times as great service from our equipment painted with oil enamel as was obtained by the use of the old varnish system. We are now bringing cars into the shop after more than four years of service which are still in excellent condition, and are turning them out again from the paint shop in from five to seven days.

We find that the doors and sash are the first to break down and to need repainting. Our method of repainting doors and sash that are in bad condition and weather beaten consists of scraping off all loose paint and then sandpapering the surface. A straight coat of lead and raw linseed oil is then applied or a good wood primer of a color suitable to the standard body color which we are using. All nail and screw holes are puttied with hard putty and then a second lead coat is applied, which is followed with a knifing coat. Finally two coats of oil enamel are applied. We use an imitation mahogany color for city cars and imitation oak for interurban cars.

In painting a new all-steel car we are very careful to remove all mill scale and rust. Great care is used to see that the iron is particularly bright, clean and free from rust. We then apply a coat of red lead and fill all the largest holes and file marks with hard-drying putty. A knifing coat is then applied which is well sanded, and then one coat of a good sealer is applied. This is followed by two coats of oil enamel, the second

coat being applied twenty-four hours after the application of the first coat. We letter and stripe the cars the next day after the application of the last coat of oil enamel.

METHOD USED IN REFINISHING CARS

In repainting cars which have been previously finished with oil enamel, we first clean and touch up the bare spots and then apply one coat of oil enamel and the necessary lettering and striping. This puts the car in good condition for service again. Cars that are in very bad condition have the paint burned off down to the wood or steel and we then follow the same method of repainting as for a new car.

We also use oil enamel for finishing the inside of cars and find that it works equally well on wood, steel or agasote, and the extreme hot weather which we have here in the South does not seem to affect it when used on roofs. Our headlinings are finished in white, as we have found that this color greatly increases the

Tilting Mechanism for Headlights Prevents Glare

A FEW months ago the Indiana, Columbus & Eastern Traction Company was involved in an accident which resulted apparently from a driver mistaking the interurban car in the dark for some other conveyance. The driver was trying to cross the street diagonally in front of an oncoming car and was struck and killed.

All cars of the company are equipped with a powerful arc headlight, capable of throwing a strong beam some 2,000 ft. in advance of the car. A small "bull's-eye" semaphore lens is also mounted directly beneath the headlights. The government of Springfield, Ohio, in which the accident occurred, would not permit the arc light to be burned inside the city limits and for this reason only the small lamp was used.

Following this accident, the traction officials took up the problem with the city government in an effort to eliminate or at least reduce the hazard. As a result,



MECHANISM FOR TILTING ARC HEADLIGHTS ON INTERURBAN CARS, AND, AT RIGHT, LEVER AND CONNECTING MECHANISM FOR TILTING HEADLIGHTS

illumination over headlinings that are finished in darker shades.

Results of tests indicate that white and light buff colors reflect approximately 80 per cent of the artificial light. Pale gray reflects 60 per cent, pea green 50 per cent, and the dark greens and browns 15 per cent. White oil enamel seems to have a luster that reflects and throws off light to a very marked degree so as to increase the efficiency of the lighting system and thus give the same intensity of illumination with less lamps and consequently with an appreciable reduction in power consumption.

For painting baggage cars, express cars, work car tool boxes and the like, we simply give them a coat of a good primer and then apply one coat of oil enamel. The lettering and numbering are done with an imitation gold ground in the same vehicle. For painting roofs we are using a paste paint thinned with raw linseed oil and fish oil used in equal parts, with about 2 lb. of melted paraffin wax to 5 gal. of oil. This is a government specification for a canvas preservative, and we are getting very good results from its use. We have come to grief in attempting to use varnish over the enamel, as we found that it is certain to check and alligator.

the city officials approved the suggestion made by the traction men that the arc headlights be kept burning within the city limits but be tilted downward to an angle so that the center of the beam of light would strike the ground approximately 35 ft. ahead of the car.

By this means it was felt that the light would prove ample, so that an oncoming interurban car could be readily distinguished and at the same time the tilting of the headlight would avoid a glare of light in the eyes of motorists and pedestrians. This suggestion was tried out and has met with success. As a result all of the cars of the company have now been equipped with a mechanism for tilting the headlight.

Accompanying illustrations show the mechanism and the mounting provided. A strap iron bracket is added to the dasher of the car just underneath the front window. The support for the headlight hangs from this bracket, the upper end fitting into slots, which enables the bottom end to be moved in and out by a connecting arm at the bottom. This tilting device is operated by the motorman from the inside of his cab by means of a small lever located just to the left of the air-brake operating valve. The headlight fits to its support in the usual manner, and can be removed readily

by lifting off. The mechanism was designed by F. J. Foote, superintendent of motive power and equipment for the Indiana, Columbus & Eastern lines, and has been approved for service by the city authorities in Springfield, Ohio.

Cream Separator Cannot Be Used for Oil

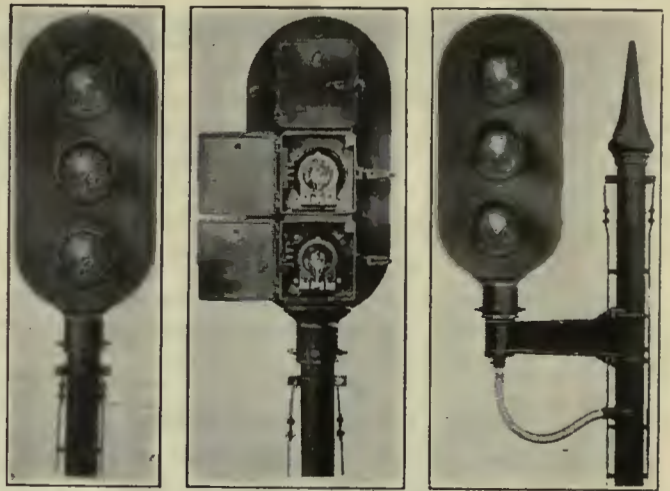
SOME rolling stock engineers have tried to utilize an ordinary cream separator for purifying and reclaiming oil. The separator used for this purpose looks like a cream separator on the outside, but it is constructed on a different principle. The cream separator is a proportional proposition. No matter what fluid goes into it there will always be a discharge from both the cream and skimmed milk spouts. The operation of the oil purifier, however, is governed by the specific gravities of the liquids going into it. If clear water is put into the machine there will be no discharge from the oil outlet, while if pure oil enters the machine there will be no discharge from the water outlet. From this explanation it will be seen that there is really no relation between the mechanisms of the oil and the cream separators, except that in both cases centrifugal force is used.

What's New from the Manufacturers

New Developments in Color Light Signals

THE General Railway Signal Company, Rochester, N. Y., has recently placed on the market a long range, unit-type, color light signal which has advantages over former types of color light signals and which is particularly suited to the protection of electric railway traffic. A satisfactory color light signal for fast electric railway service must give a distinct indication, clearly visible under adverse sunlight conditions, at a reasonably long distance. When the proper lenses have been used and lamps accurately focused, little difficulty has been experienced to secure a signal of the proper range but, due to the irregularities in lamps, it has been necessary to make adjustments to secure the correct focus each and every time a lamp is replaced. These adjustments have not always been accurately made with the result that the range of the signal has sometimes been reduced to the point where the signal indications were not satisfactory.

In the new color light signal a double filament lamp is so placed that the effective light from both filaments is in the focal center of a doublet lens, thereby giving the maximum range for the combined wattage of both filaments. To insure that signals will retain the long range secured in the factory by accurate focusing, all lamps are rebased, using the single contact medium bayonet base, and all lamp receptacles are jig-set. Therefore in changing lamps in the field no adjustment for focus is necessary.



THREE UNIT COLOR LIGHT SIGNAL—AT LEFT, FRONT VIEW
SIGNAL ON TOP OF MAST—CENTER, REAR VIEW—AT RIGHT,
BRACKET MOUNTED SIGNAL.

The signal has a range of 4,500 ft. under adverse sunlight conditions and maintains this range in service. The advantage of using a double filament lamp so made that both filaments will not burn out simultaneously will be evident to users of light signals. The signal has the further advantage of unit construction throughout. Each light unit is complete within itself, the signal being composed of these units bolted together. The doublet lenses used in each unit are so mounted that both lenses may be easily removed as a unit or either lens may be removed without disturbing any adjustments. The unit construction permits of any combination of lights after installation and greatly simplifies the stocking of parts. For example, suppose two indication signals are originally installed and later it is desired to change to three indication signals—all that is necessary is to add another unit to each signal. A single-light unit may be used as a take siding signal or for other special purposes.

Each light unit is equipped with a range finder which enables one man to focus the signal to any point desired on the track. Provision is made for the easy adjustment of the signal for grade or curve. The signal may be mounted on top of a 5-in. signal mast or by the use of brackets one or more signals may be mounted on the same mast. Backgrounds may or may not be used, as desired.

New Trolley Frog and Insulated Adjustable Crossover

AMONG the new devices recently introduced by the Ohio Brass Company, Mansfield, Ohio, is the BC trolley frog. A trolley wheel travels through this switch pan on its groove instead of on its flange. It can be placed, successfully, closer to the track switch point, thus reducing the drag and consequent wear on the main line trolley wire. The runners are high enough so that the trolley wheel flanges do not cut the pan of the frog. The BC frog is provided with 6-in. cam tips. It has six pull-off eyes.

Another new development is the type C insulated ad-



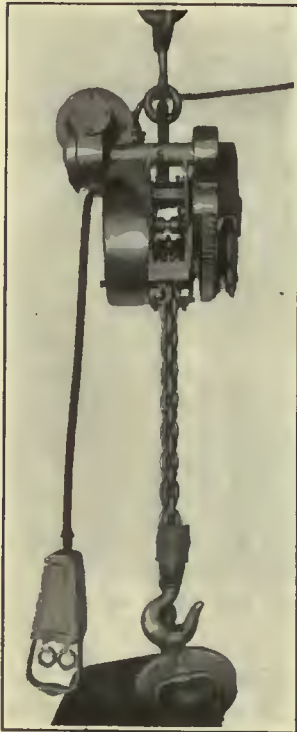
AT LEFT AND CENTER, NEW TROLLEY FROG. AT RIGHT, INSULATED ADJUSTABLE CROSSOVER

justable crossover, which is used at trolley wire crossings where it is desired to insulate the two wires from each other. Ordinarily the crossing is installed without cutting either of the wires. However, if desired, the insulated leg may be used as a section insulator. In that case the trolley is dead ended in the rocker clamp lugs on the main beam. These clamps have a cam action so that the higher the trolley tension the tighter their grip on the wire.

The crossing is adjustable from 90 to 45 deg. The angle may be reduced to 20 deg. by sawing off the ends of the fiber runner pieces. These runner pieces are renewable, as are also the 6-in. cam tips.

Motor-Driven Chain Hoist

AN ELECTRICALLY OPERATED chain hoist, known as the Motorbloc, has been placed on the market by the Motorbloc Corporation of Philadelphia, Pa. This new device has been developed to serve the operations lying between the field of the standard hand chain hoist and that of the usual form of traveling electric hoist.



MOTOR-OPERATED CHAIN HOIST

The Motorbloc is a rugged, portable hoist, which can be installed without engineering preliminaries in any location where electric current is available. The self-contained pendant controller permits convenient operation by plugging into the nearest electric circuit. It consists of a standardized chain hoist of steel construction, electrified by the application of a specially designed heavy-duty motor, reduction gearing and slip friction clutch, applied by means of a malleable iron supporting bracket comprising a self-contained electrifying unit, to which the pendant controller is also attached. In this way a mechanism has been developed for the elec-

trification of the standard spur-gear chain hoist in capacities ranging from $\frac{1}{4}$ to 10 tons.

The pendant controller is operated by the fingers of one hand, leaving the other hand free to guide the load. This arrangement makes it possible for one man to accomplish what would otherwise require two or more men for lifting and placing the same load. The 1-ton size complete weighs 148 lb.

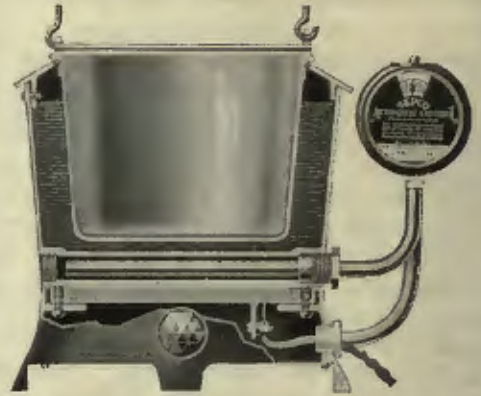
Glue Pot with Automatic Heat Control

GLUE is more readily applicable and possesses the greatest holding quality at a temperature of 140 deg. to 150 deg. F. When permitted to heat to a temperature of 176 deg. or more it loses its tensile strength. Generally if cooled to 104 deg. or less there is a decided fluctuation in the strength and holding quality.

To meet these requirements of proper heating temperature J. D. Wallace & Company, Chicago, Ill., have brought out an automatic heat-control device and in-

corporated this in a new bench glue pot, which keeps the temperature of the glue between the limits of 140 and 150 deg. F.

A tube is installed immediately above the heating element containing a sensitive volatile substance, which contracts and expands with the change in temperature



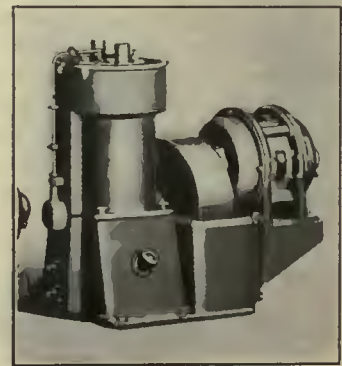
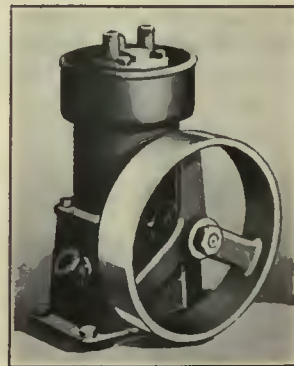
SECTIONAL VIEW OF GLUE POT WITH AUTOMATIC HEAT CONTROL

and provides a dependable action of ample power to actuate the control switch. When the heat reaches the proper temperature the control turns off the current. When the temperature falls a few degrees the heat is turned on again, and the action is entirely automatic. A temperature gage dial which constitutes a part of the equipment shows the heat attained and, together with a jewel set in the base casting, acts as a visible check on the heat maintained.

This bench glue pot functions either as a water bath, hot air or dry heat pot and can be operated from any electric lighting circuit by merely turning the switch. The glue container is of cast aluminum, supported by special retainer lugs which prevent floating when the pot is but partly filled. Part of the bail extends across the center of the pot as a brush wiper to eliminate overflow and dripping.

New Line of Small Vertical Air Compressors

THE Ingersoll-Rand Company, New York, announces a new line of small vertical air compressors known as Type 15. These are either belt or motor driven. The motor-driven units have the motors mounted on a common sub-base. Special features include a constant-level lubrication system, constant speed unloader for plain belt-driven machines, centrifugal unloader for start and stop control machines, and increased size of water reservoir cooling pot. A bulletin has been issued which gives a detailed description of the important features.



SMALL VERTICAL AIR COMPRESSORS

Utilities Commissioners Meet in Detroit

Valuable Reports Were Presented by Committees on Motor Vehicles, Public Ownership and Operation, Safety, Rates, Service, Statistics and Accounts, and Allied Topics — Abstracts of a Number of the Reports Are Given Below

DURING the week just closed the American Association of Railway and Utilities Commissioners has been holding its thirty-fourth annual meeting at Detroit, Mich. Abstracts of a number of committee reports presented are given below. A report of the meeting and discussion will appear in a later issue of this paper.

MOTOR-VEHICLE TRANSPORTATION

The committee on motor-vehicle transportation is a new committee of the association, the present being its first report. Director E. V. Kuykendall, Washington (Department of Public Works), is chairman. The committee pointed out that the study and regulation of motor-vehicle traffic is in a formative period, but transport regulation which fails to embrace this important facility is necessarily illogical and incomplete. The remarkable development and growth of motor-vehicle transportation are rapidly compelling its regulation. The general trend toward some degree of uniformity of regulation among the states is an influence toward the general assumption of regulatory powers over motor transportation throughout the nation. There should be no disposition on the part of regulatory bodies to evade a responsibility which they must inevitably assume sooner or later.

Regulatory powers of some character are now vested in regulatory bodies in at least twenty-five states, in the Hawaiian Islands, in the Philippine Islands, and in the District of Columbia. Some states have recently assumed the exercise of regulatory powers over motor-vehicle transportation under old general statutes, authorizing the regulation of common carriers, while others having very similar laws have not construed them as applicable to motor vehicles, or at least have not yet begun their regulation thereunder.

There are so many distinctive features in relation to auto transportation that more satisfactory results can be achieved by the enactment of new legislation recognizing the essential differences between auto and rail transportation.

Practically all new legislation on the subject requires auto transportation companies to furnish some sort of bond or insurance to protect the traveling public in case of negligence resulting in death, personal injury or damage to property. In fact, many states not exercising general regulatory powers over auto transportation have statutes requiring the furnishing of such bonds or insurance. Statutes of this kind might properly prescribe maximum and

minimum amounts, but between those levels the regulatory body should be authorized to exercise discretion.

In most jurisdictions exercising regulatory powers over auto transportation the statutes require the securing of a certificate of public convenience and necessity as a prerequisite to beginning operation. Many statutes, however, fix a test date and provide that all persons actually operating in good faith on such date shall be granted certificates without regard to the question of public convenience and necessity. The time so fixed is usually a date prior to the enactment of the statutes. The certificate-of-public-convenience feature, at least as to all new operators entering the field, is desirable and should be a requirement of every statute. In no other way can responsible operators, adequate equipment and reliable service be encouraged. Actual experience has proved its benefits to the public by eliminating needless duplication of facilities, and tending toward economy and efficiency of operation in all lines of utility service. It is more essential in the regulation of motor-vehicle transportation than in any other field for the reason that it is a character of business that may be entered with a minimum of investment.

Many difficult problems are encountered in determining whether public convenience and necessity justify the granting of certificates to stages and trucks operating in competition with railroads. Transportation by rail and water is undoubtedly the economic backbone of the country. It moves goods and persons in large masses at comparatively low cost. The automobile, on the contrary, supplies individual transportation at comparatively high cost. The bus and the stage come into the heart of the big city, meander through the little one, stop almost everywhere for everybody. The trucks will come to you for the goods you want to move. Automotive transportation, the committee stated, is not now and probably never will be in a position entirely to take the place of railroads. We need both rail and automobile in a healthy national life. We cannot afford to impose impossible burdens on automobile transportation, neither can we allow the railroads to become crippled or paralyzed. Ways and means should be studied to correlate the services.

Stated briefly, the wishes of the majority of the residents of a given locality constitute an element to be considered in determining whether public convenience and necessity warrant the establishment of automotive transpor-

tation. If this principle is observed by regulatory bodies, it will result in the establishment of the new and modern modes of transportation in communities only to the extent that public sentiment is ripe to demand and receive them. The committee did not wish to convey the impression, however, that stage or truck service should be permitted in every instance where popular sentiment seems to demand it. There may be other conditions which would outweigh the element of popular demand.

As to the effect on highways, where the evidence indicates that the operation of a stage or truck line would result in damage disproportionate to the benefits to be derived from the service, then the regulatory body should, as a matter of common sense and justice to the public at large, refuse the certificate. More people are inconvenienced by ruined roads than are benefited by stage or truck service.

In order to avoid confusion as to the intent of statutes, the committee expressed the belief that the statute should place under the control of the regulatory body all motor vehicles which perform a common carrier service, whether operating regularly and between fixed termini or otherwise, except those operating exclusively within the corporate limits of cities or towns.

Every regulatory body, continued the committee, assuming the regulation and control of motor-vehicle traffic in a thorough and efficient manner should take notice at the outset that the task is great. It seems to have been the experience of commissions which have assumed this burden that the regulation of motor-vehicle traffic is approximately equal in time and trouble to all the other work of the regulatory body combined. This is especially true during the first year or two of regulation.

A more extended abstract of this report will appear in the December issue of *Bus Transportation*.

PUBLIC OWNERSHIP AND OPERATION

In its report this committee, of which Commissioner A. G. Patterson, Alabama, is chairman, pointed out that the committee was created in 1917, and that it has made four reports. The conclusion reached in the last report was to the effect that private ownership and operation under public regulation is logical, just and equitable, and the best system for conducting the business of public utilities that has been or can be devised to meet the needs and requirements of both the utilities and the public served by them. While conditions have changed materially

since the last report was made, these have not changed the inherent basic principles upon which the conclusions of last year's report were predicated.

Referring to the federal control of American railways, adopted solely as a necessary war measure, the report points out that its effect in practice included the following unfavorable elements:

1. Loss of normal incentive for economy and efficiency on the part of subordinates.

2. Loss of competition and the advantage accruing therefrom.

3. Loss of efficiency by reason of the necessary adoption of certain policies, such as: Organization of a highly centralized management, issuance of uniform orders without regard to varying local conditions, disregard of the fundamental relationship which should economically always exist between revenues and expenses, maintenance policy adopted and failure to provide necessary additions to and renewals of plants and plant equipment, extravagant distribution of freight car equipment, and labor policies involving the abolition of piece work and the adoption of the standardization of wages by general classification.

The combined effect of the above was to increase the operating ratio from 70.6 per cent in 1917 to 81.5 per cent in 1918, to 85.3 per cent in 1919, to 93.7 per cent in 1920, and to 82.6 per cent in 1921.

Continuing, the report stated that the public utility business is essentially a private business, always provided that the public be given fair and adequate service at a reasonable cost or rate. It is, of course, always understood that reasonable rates shall be based upon the fair value of the property owned or held by the utility and devoted exclusively to public service. Also, in order to secure a continued adequate service, reasonable allowance must be made in the construction of rates for maintenance, depreciation, reasonable contingency reserve, etc.

On the other hand, the report stated that many utilities are bringing to bear every known pressure that their high degree of business organization and money affords, in order to block or prevent public utility commissions from justly reducing the prevailing high rates. Also the various highly organized labor organizations are likewise resisting reductions in wage scales. On the one hand, the committee pointed out, litigation to delay rate reductions must be made at the expense of the public. As to the labor situation, although government ownership and operation of public utilities is not the most desirable, efficient or economic method of operation, unless such amicable adjustment can be arrived at between labor and capital as to insure to the public adequate and efficient service at reasonable rates, or unless other adequate, efficient and prompt means be devised to secure the same

results, it is almost certain, as is presaged in President Harding's address to Congress on Aug. 18, 1922, "that the inherent right of the public to such service at reasonable rates will in fact ultimately force upon the nation public ownership and operation of its public utilities."

Taking up for discussion the Railway Labor Board, the committee pointed out that the existing dual system of control of the railroads of the country is a failure. It is now agreed, or will soon be agreed, that the Railway Labor Board must go. In the opinion of the committee, the only logical, reasonable and practical solution of the present perilous situation is to abolish the board and transfer its functions to the Interstate Commerce Commission; and then enact a law "with teeth in it" which will enable the commission to enforce its decrees and orders. The proper solution of this problem will have a tremendous effect in retarding the sentiment favoring government ownership and operation of railroads and other public utilities, which sentiment, it must be admitted, is rapidly growing among certain classes and in certain sections of the nation, and which, if it should be adopted as a national policy, would prove to be a most destructive and disastrous governmental experiment.

SAFETY OF OPERATION OF PUBLIC UTILITY COMPANIES

The report of the committee on safety of operation of public utilities, of which Commissioner John F. O'Ryan, New York (Transit Commission), is chairman, was presented with the thought of offering general ideas along the line of safety rather than suggesting a concrete plan. It seems necessary, stated the report, that some movement be inaugurated which will result in a more general agreement as to what safety standards should be, and then when the standards have been determined to make every effort to have them adopted and enforced by the regulatory bodies of the United States.

Of the forty-eight railway and utility commissions in the United States, twenty-nine have adopted safety rules relating to the construction and operation of electrical supply and signal lines, and of these about eight follow the National Electrical Safety Code, or vary from it only in unimportant details. Five have recommended this code as the proper one for use by the utilities, while the balance have deviated from the code in important matters or have not followed the code to any considerable extent. In view of the work which has been done by the engineers of the United States Bureau of Standards, and of the fact that the American Engineering Standards Committee has approved the National Electrical Safety Code (with the understanding that a sectional committee will revise or will consider revisions of Part 2 of the code which may be deemed necessary

by interested parties), it appears that this code can without error be adopted as a guide.

It is suggested that safety rules following the N. E. Safety Code be worked out with the aid of an advisory committee, composed of persons interested in all industries and utilities affected by the rules.

The committee further recommended that special efforts be made by the association to impress upon the management of utilities, first, the economic value of safety work; second, that the facts which were prominent a few years ago have quite disappeared; third, that some sound, reasonable plan should be followed consistently.

PUBLIC UTILITY RATES

The committee on public utility rates for 1922, of which Commissioner Lewis E. Gettle, Wisconsin, is chairman, dealt largely with the subject of hydro-electric power. It pointed out that in the early days of public utility regulation, commissions naturally gave much attention to the problem of formulating such types of rates as would secure the most equitable distribution possible of the cost of service. The same problem confronted the utility interests themselves. What may be termed the mechanics of rate making will always constitute an important study, but the committee stated that there are no recent developments to report upon at this time.

The committee discussed the relation of kind and location of power plants to rates for electrical energy, with particular reference to the hydro-electric plant, taking the position that proximity of a city or village to a water-power development should not give it a priority of interest in that development. As this matter is somewhat analogous to the subject of paying and non-paying lines in electric railway systems, the following suggestion of the committee will be of interest: The transmission lines which make possible the delivery of the energy generated by water power plants to the community in which it is to be used should be treated to all intents and purposes as if they were part of the power plant. The power system could not exist without the market, and the facilities which make it possible to reach the market, assuming that good business judgment has been exercised in their construction, must in practice be regarded as part of the power system, and the cost incident to transmission be regarded as part of the power cost, or else there will be many instances in which the development of hydro-electric plants will be delayed awaiting the growth of a near-by market, if not prevented altogether.

RAILWAY SERVICE ACCOMMODATIONS AND CLAIMS

The report of this committee, of which Commission President George E. Erb, Idaho, is chairman, pointed out

that service, to reach its maximum of value to the public, must be furnished in quantity and character and at times as necessity requires. The public, however, is quite prone to ask for and expect service not demanded or warranted by the traffic afforded. The carriers, on the other hand, while diligent in affording service which they deem warranted by the traffic, are too often negligent and careless in affording the accommodations, reliability and safety which give the service the value which it should have. Service and accommodation, on account of the intimate contact of carriers and patrons in the transaction of business, are matters productive of much friction, resulting in dissatisfaction and consequent complaints to the regulatory body. In no other utility field are commissions called upon to handle so many essential causes of friction between the utility and its patrons.

Continuing, the report stated that in considering the service which may justly be expected and required of a carrier, it should be borne in mind, (1) that the carrier can only be required to furnish service for which, as a whole, it is reasonably remunerated, and (2) the patron can only demand that service which, as a whole, will reasonably remunerate the carrier. It is not to be understood, however, that each particular class of service is to bear a pro rata of the reasonable remuneration.

The problem to be met and solved by the carrier is to afford that service which as a whole will best serve the needs, by the development of the natural resources and establishment of industries within the territory served and, as a whole, afford reasonable remuneration for the service afforded.

Most commissions throughout the country have been called upon during the year last passed to consider applications for permission to discontinue or curtail service heretofore afforded. Service once furnished for any considerable time tends to stimulate certain lines of activity, build up certain industries and results in certain investments. The discontinuance or serious curtailment of such service, after same has existed for any considerable time, results in killing these activities, destroying these industries, and partially, at least, destroying the values of these investments, and should only be permitted by a regulatory body after full notice to the public, full opportunity on the part of both public and security holders to be heard, and, after full investigation, an unquestionable necessity therefore shown, and only to the extent absolutely necessary to avoid confiscation.

The report then went on to emphasize, in detail, the importance of relieving freight-car shortage and improving distribution through co-operation between the I.C.C. and the state commissions; the duty of the railways to provide satisfactory station facil-

ities; the importance of establishing good public relations between the management and the public through courteous and respectful employees, etc.

CAR SERVICE AND DEMURRAGE

The committee on this subject, of which Commissioner Alexander Forward, Virginia, is chairman, stated that car service was hardly an acute problem anywhere since 1920, until the beginning of the railway strike in July, 1922. It was impossible to report this year on the result of the strike.

In recent years most demurrage matters have been handled by agreements between a committee of railway traffic executives appointed by the American Railway Association and a committee of the National Industrial Traffic League. In most cases the I.C.C. has accepted almost all agreements regarding demurrage rules and charges entered into by these committees. An exception occurred in 1921 when an agreement was entered into for an increase in the demurrage charges contingent upon modification of certain traffic rules. The committee of the league agreed that the carriers might file tariffs carrying these increased charges on less than thirty days statutory notice. This caused a dissension among the members of the league, and the I.C.C. refused to approve the demurrage agreed to between the league and the committee of the carriers.

While a number of decisions have been rendered by the I.C.C. during the past year on the subject of demurrage charges, practically all are merely interpretations of the rules with a view of determining whether or not the carrier has made the proper charge to the shipper; though some, however, relate specifically to the reasonableness of the charge itself.

While the action of a committee like that of the National Industrial Traffic League, the report concludes, may not always meet with the approval of all the membership of the organization, it would seem that as a general proposition it saves much labor and obviates many disputes to have some such agency created to deal with the carriers on questions of demurrage rules and charges.

STATISTICS AND ACCOUNTS OF RAILROAD COMPANIES

The committee on this subject, of which Commissioner B. H. Meyer, I.C.C., is chairman, dealt largely with the steam railroad situation, particularly with reference to the extensive investigations now being conducted by the Bureau of Accounts of the Interstate Commerce Commission and the Railway Accounting Officers' Association. The I.C.C.'s program of revision, however, was stated by the committee to apply also to the accounting classification for electric railways and other common carriers. While these groups of carriers are not affected by new legislation in the same degree as the steam roads,

the accounting regulations applicable to some of them are incomplete and generally should be brought up to date in the light of the experience gained in their practical application.

The report called attention to the fact that under the transportation act of 1920 the I.C.C. is required to prescribe for all carriers subject to the act "the classes of property for which depreciation charges may properly be included under operating expenses, and the percentages of depreciation which shall be charged with respect to each of such classes of property." The commission has established a depreciation section within its Bureau of Accounts to collect the data necessary for this action. Depreciation accounting under its present regulation is mandatory with respect to equipment, but optional as to fixed improvements. The determination of the rates of depreciation and the classes of fixed improvements which shall be considered depreciable for accounting purposes has been left to the judgment of the carriers, who, however, must be prepared to justify the rates employed.

Early in the course of its investigations and study of the subject the commission perceived the advisability of dealing with each class of carrier separately and it seemed advisable from the progress made to proceed with the telephone companies first.

The above excerpts from the report of the committee are given to indicate where the work of the I.C.C. with respect to electric railways stands. As stated earlier, most of the details in the present report relate to steam railroads.

SAFETY OF RAILROAD OPERATION

The committee on this subject, Commission Chairman C. C. McChord, I.C.C., chairman, called attention to the necessity for extending the installation of preventive safety appliances. The need for a systematic program for extension of the automatic block system, pointed out in previous reports, was reiterated. During the year ended Jan. 1, 1922, there was an increase of but 517.6 miles of road of automatic and 66.5 miles of road of non-automatic block signal systems in the United States. Attention was called to the fact that in June, 1922, the I.C.C. issued an order requiring each of forty-nine railroads to install on one passenger engine division on a designated portion of its line, on or before Jan. 1, 1925, automatic train stop or train control devices, applicable to its need and according to the prescribed specifications and requirements.

Automatic train stop or train control devices, as defined by the commission's order, comprise a system or installation so arranged that its operation will automatically result in either one or the other or both of the following conditions: (1) Automatic train stop; the application of the brakes until the train has been brought to a stop. (2) Automatic speed control; the application of the brakes when the speed of the train

exceeds a prescribed rate and continued until the speed has been reduced to a predetermined and prescribed rate.

In regard to maintaining power brakes, the report pointed out that the efficient braking of a train can be secured only by the maintenance in the proper condition of the brakes on each individual car. No car should be considered as satisfactory for service unless its brake equipment is free from excessive leakage, it has the proper length of piston travel and its triple valve has been cleaned and oiled within the prescribed period.

RAILROAD RATES

A report of the committee on railroad rates, written by the chairman, Commission Chairman Campbell Russell, Oklahoma, dealt largely with the relation of the Interstate Commerce Commission and state commissions with respect to jurisdictions. The central feature was an account of the co-operative plan developed as a result of a suggestion made by Commissioner C. C. McChord of the I.C.C. to Commissioner C. D. Jackson, Wisconsin, president of the association. A committee was appointed by the latter to confer with a committee of the I.C.C. and as a result on May 3, 1922, a formulation of the plan was issued. The states generally have given approval to this plan, notwithstanding that by so doing they lessened the chances, for the time being at least, of securing any amendment to the transportation act.

The co-operative plan grew out of the fact that conflicts of jurisdiction between the two systems of public regula-

tion have arisen from time to time, resulting in litigation and action by the courts. It was recognized, however, that the federal and state commissions were alike created in the public interest and have a common purpose, namely, the maintenance of a transportation system which will in all respects best meet the public needs. In general the co-operative plan provides for conferences and joint hearings where petitions are filed with the I.C.C. alleging that intrastate rates unjustly discriminate against interstate commerce, or persons or localities engaged therein. It was recommended that joint conference be held on complaints, attacking interstate rates in those cases where the decision of the I.C.C. appears likely to affect, in substantial and important respects, the relationship between state and interstate rate structures. Likewise, conferences should be held in the case of complaints attacking intrastate rates in those cases where the decision of the state commissions appears likely to affect, in substantial and important respects, the relationship between state and interstate rate structures.

The report concluded with the statement that practice has gradually drifted away from state regulation of state railroad rates to the federal control of such rates. The I.C.C., under the transportation act of 1920, exercises supreme control over railroad rate regulation. Unless there is a repeal or amendment of this act, the states themselves, except in a co-operative way with the I.C.C., can have very little to do with railroad rate regulation.

railway and the license fees paid by owners of motor vehicles; also whether it is better to tax the railways for paving, with consequent higher fares or poorer service or both, or to pay the cost from the general budget. The debate, if such it may be called, did not serve to bring the debaters into agreement, but did bring out the really fundamental questions involved. Mr. Pinckney concluded by saying that if the railways could demonstrate to the public that the amount of damage done to paving is not equal in cost to the expenditure on maintaining track paving, the matter would be equitably adjusted. These two speakers continued to debate the question as to whether it would be practicable to do as Mr. Davison suggested in his paper, namely, assess on the street railway the cost of the damage which its tracks cause. Mr. Pinckney thought it would not, on account of the enormous amount of detailed investigation required. He preferred making an assessment at some agreed-upon figure.

This closed the discussion, but some communications were received by title. An essay upon the subject of reciprocal obligations of the railroad and the municipality as it relates to repairs to pavements, by A. P. Hartmann, city engineer of Yonkers, was presented in printed pamphlet form. Abstracts of other typical communications follow:

ARE CAR TRACKS A NECESSARY EVIL?

George W. Tillson, consulting engineer, LaGrange, Ill., wrote that street car tracks in a street are a nuisance, but necessary. During the last few years much discussion has taken place as to whether the company should lay and maintain the pavement in the track area, this obligation having been imposed upon nearly all street railways in the past. The question of this obligation is complex, it being the fact that the cost of pavement and its maintenance must be paid for by the general public or by the car rider or by the abutting property owners.

In Mr. Tillson's opinion, in no case should the abutting property on a street be put to extra expense on account of the existence of a car track upon its surface. The cost per yard for any pavement on a street car track, he stated, is considerably more than on a street where there is no track. This is true also as to maintenance. From 1913 to 1918, inclusive, the cost of repairs to asphalt pavements in Brooklyn, N. Y., on streets with car tracks averaged 3.9 cents per square yard, while on streets without tracks it was 2.2 cents. This was on more than 40,000,000 sq. yd. of pavement. Previous to 1907 the Philadelphia Rapid Transit Company was required to pave from curb to curb all streets upon which its cars were operated. In that year a contract was entered into between the city and the company under which the latter pays a lump sum annually.

As a street car company operates in a public thoroughfare, where it has no inherent right, it must pay something for the privilege of operating. Admit-

Street Paving with Regard to Electric Railway Tracks

At Closing Session of Conference Held Under Auspices of Engineers' Club of Philadelphia Prominent New York Attorney Outlined Situation in Clear-Cut Fashion, Answering the Question "What Should Be the Responsibility of the Street Railway Company as to Cost of Installation and Maintenance of Paving?"

THE third and concluding session of a conference on street railway track paving and allied topics, held under the auspices of the Engineers' Club of Philadelphia, occurred on the evening of Oct. 9 following a dinner served under the auspices of the club. Reports of the earlier sessions of the conference were given in the issues of this paper for Nov. 4, page 747, and Nov. 11, page 788. A full report will be published in an early issue of the club's publication, *Engineers and Engineering*. The presiding officer at the evening session was Dr. Robert H. Fernald, president of the club and professor of mechanical engineering University of Pennsylvania.

The paper of the evening was by A. T. Davison, general counsel Third Avenue Railway System, New York City, in which the author covered the subject in a lucid, impartial and convincing manner. An extended abstract of the paper is given elsewhere in this issue.

C. M. Pinckney, New York City, took

issue with Mr. Davison, claiming that the street railway should not be entirely free of the paving obligation, although in its present form under conditions of modern traffic, the obligation is not scientifically sound. The track, said Mr. Pinckney, does injure public property, but the difficulty is to measure the extent of the damage. He suggested that observation should be made of a street in which part is occupied by a surface railway, the occupied and unoccupied parts being paved alike. He pointed out also that railway franchises were granted to a certain extent because the public thought that the railway would provide paving. Divided maintenance of the streets, he continued, is bad for everyone concerned. One party should do the whole thing.

Following Mr. Pinckney's general remarks, an animated dialogue occurred between him and Mr. Davison. Mr. Davison's questions were intended to bring out Mr. Pinckney's ideas as to the relative reasonableness of the paving and other charges exacted from the street

ting that the company must pay for its franchise, the principal conditions to be determined are the amount of the paving to be laid and maintained, if any, and what shall be done about snow removal.

In Mr. Tillson's opinion it is logical to expect a railway to construct and maintain the pavement in and between its tracks and such a distance outside the rails as may be disturbed in repairing or laying new tracks, and it should remove the snow from the same area. These points should be carefully considered, however, when the rate of fare is fixed. Mr. Tillson expressed the belief that all investors in a deserving public utility should have a fair return on their money. He believes further that as a general proposition where a needed public utility, operating under a long franchise, which in a business way cannot pay dividends on account of the advanced costs of operating, it should be permitted to increase its rates for service rather than to modify franchise conditions and so decrease costs.

G. Tracy Rogers, president Waverly, Sayre & Athens Traction Company, Binghamton, N. Y., sent a letter in which he spoke of the effort being made in New York State so to amend the law as to relieve street railways from the unjust and unfair obligation of paving. He spoke of one property in which he

is interested where if the company is forced to do certain paving, it will have to go into bankruptcy.

C. E. De Leuw, consulting engineer, Chicago, sent a contribution in which he traced the history of the paving burden and said that any charges which are not solely the result of creating transportation and which are assessed against the car rider prevent his obtaining service at cost. Therefore, from the financial side alone all charges such as the maintenance of paving, sprinkling and sweeping the right-of-way, and the like, should be borne by the public rather than the car rider through payment of fares. However, as track and paving are of intimate construction and design, and as the tracks cannot be repaired without the removal of the paving, it is a difficult matter to draw a sharp line of demarkation in making a separation of the direct charges. Further, paving will be disintegrated should the rails be poorly secured to the ties or should the track foundations fail.

In view of the conditions outlined Mr. De Leuw suggested that a separation of track and paving be made and that the burden of cost to the car rider be held to the lowest possible amount, as determined solely by the actual value he receives from his purchase of transportation.

is who have loaned their money for public utility purposes receive a return on the money they have invested.

The position of that class of persons who loan their money to a street railway in order that the public transportation may be furnished is parallel with, and no different from, the case of the investors in municipal bonds the proceeds of which are used for the purpose of the construction of a street railway. If, as we all agree, a municipality which owns and operates a street surface railway should not be required to allocate and charge to and collect out of the fares received any expense of paving, no more should the street railway, which is constructed by capital invested by investors of the same character as investors in municipal bonds, be required to bear paving burdens.

PAVING CHARGE AFFECTS RATE OF FARE

All money paid by street railways for paving obligations must be charged to operating expenses and paid out of the fares collected. Since the operating expenses must include paving obligations, the public is required to pay just that much more in its rate of fare. In the last analysis the cost of paving requirements must come out of the passenger, provided the rate of fare is sufficient to cover a fair return on operating expenses including paving charges.

In practically all municipalities, street railways are the only means of public transportation. If persons were not carried on street cars, they would necessarily be carried in other vehicles which would use the streets in greatly increased numbers and thus greatly increase the wear on and deterioration of the pavement by vehicular traffic.

Admitting for a moment that street railways do cause damage; so do other vehicles, and yet no attempt is made to make them pay. The streets are there to be used by the public and, in proportion to the volume of the public actually served or carried, the damage caused by street cars as compared with other vehicles is negligible.

If vehicular traffic were entirely excluded from that portion of the street known as the railroad area and the street railway lines were given the exclusive use of such area, no greater paving obligations could possibly be imposed than is now imposed, to wit, to construct and at all times maintain the pavement in that area.

Inasmuch as the paving in the streets, including that portion in the so-called railroad area, is used by all classes of vehicles and so is subject to the wear of such vehicles, the only fair method of placing the paving burden where it should lie is to include the expense of paving and maintenance of the entire streets in a general tax levy, of which the street railway would pay its share as a large taxpayer.

SOME CONVINCING DATA ON THE SUBJECT

A canvass of the subject made by the American Electric Railway Association in January, 1919, showed that only nine companies located in nine

The Paving Tax Burden Should Be Eliminated*

The Legal Aspects of This Mooted Question Are Set Forth and the Situation as it Exists Today in Most Urban Communities So Explained

BY A. T. DAVISON,

General Counsel Third Avenue Railway System, New York City

ALL PAVING requirements are tax burdens. Not only have the courts upheld the imposing of street paving obligations on street surface railways as an exercise of the taxing power, but from a practical and accounting standpoint as well the paving charge must be regarded as tax. The payment annually by street surface railways of large sums of money for paving and maintenance of paving in the so-called railroad area secures nothing of value to them. No property, either of a revenue-producing nature or otherwise, is added, and the only purpose served is to add to the convenience of the people of the municipality and particularly to a class of persons (owners of motor vehicles, both passenger and freight-carrying) who are not patrons of the street railway.

The attitude and policy of the several states toward street railways, in common with other public utilities, has been radically changed during the last two decades. Formerly the railways were regarded as profit-making corporations, privately owned and privately managed, from which large revenues by way of taxation could be collected because of their ability to meet these tax requirements by reason of the fact that at that

time they were unburdened with rate or service regulations by public utility commissions. Now all is different. The states have, by assuming control of the earnings, service and even accounting methods of the street railways, changed their policy toward these public utilities and converted them into publicly managed properties. Hence the municipalities must also change their attitude with respect to the street railways and no longer treat them as privately managed properties able to meet any and all taxes imposed upon them.

PROBLEM NOT AFFECTED FUNDAMENTALLY BY OWNERSHIP

There is, and can be, no distinction between the use of the public streets by the public when riding in private vehicles and the use of such public streets by the public when riding in street cars. The street railway corporation does not, and cannot, under our regulatory and public service commission laws, use the streets for private profit, because the capital invested can never under these laws make any profit over and above a fair return on the capital invested. If the municipality itself owned and operated the railways the paving would be taken care of by the general tax levy. In such cases the investment of capital would still be necessary. It makes no difference whether the municipality earns enough money to pay the interest on its bonds, or whether the investors

*Abstract of paper before conference for discussion on "Design and Construction of Streets for Street Railway Traffic," held at the Engineers' Club of Philadelphia, Oct. 9, 1922.

states of the Union and two companies located in Canada reported that they are not compelled to pay for original paving. Only seven companies located in seven states reported that they are not compelled to pay for paving renewals and maintenance. Twenty-five companies located in seventeen states and one company located in Canada reported generally that they are compelled to pay for repaving when the streets have been torn up by the municipality for purposes other than repairing for street railway purposes.

Although there are varying conditions with respect to the requirements for original paving and for renewal and maintenance, nevertheless the general situation throughout the country is approximately the same. The street railways are carrying an unwarranted and unfair tax burden in the obligation to construct and maintain paving.

The paving obligations now imposed on street railways are a relic of the days of the horse cars. Although the necessity for the statute disappeared with the removal of the horses from the cars, the statute still remains and the amounts required to be paid thereby have, as a result of the improved art and increased cost of street paving, multiplied many times.

From 1911 to 1920, the street railways of New York State each year expended for paving alone an average of 23.4 per cent of their net income, approximately 5 per cent of the total operating expenses. During the same period in the metropolitan area, for every dollar spent for track and roadway purposes, other than paving, from 40 to 80 cents additional was expended for paving.

In streets where street railways operate, new and more costly types of paving are constantly being substituted for pavement which is still in good condition, for the simple reason that the railway companies must finance a large part of the cost of such improvements, the remainder generally being assessed upon the municipality at large.

On streets where there are double tracks, the street railways are required to pave and keep in repair from 18 to 19 ft. of the roadway, or from one-third to two-thirds of the entire paving obligations on those streets. The percentage which the area maintained by street surface railroads bears to the total paved area in those streets is as follows in several cities: New York, 35 per cent; Utica, 38.6 per cent; Syracuse, 46 per cent; Rochester, 56 per cent.

The use of private automobiles and motor buses has decreased the riding on street cars, reducing the income of the street railways, and at the same time these motor vehicles have greatly increased the wear and tear upon the pavement in the streets upon which they operate. The vehicular traffic in the railroad area amounts to from 40 to more than 90 per cent of the total vehicular traffic in the streets. The railway company not only pays for the pavement worn out by vehicles, but owing to the large proportion of vehicles

using the railroad area, it pays for a larger proportion of damage done by vehicles than is borne by the municipalities with respect to the remainder of the street.

The only theory upon which the present drastic paving obligation could be justified, if at all, would be on the theory that all vehicular traffic was excluded from the railroad area.

PAVING CHARGE IS ILLOGICAL

The obligation on street railroads to do any original paving should unquestionably be entirely eliminated. Obviously the only purpose of paving the railroad area is to make it more convenient for purpose of travel by vehicles other than street cars. In other words, the presence of the tracks in the streets has nothing to do with the requirement that the street should be paved.

If the municipalities are to assume the responsibility for placing direct paving burdens on street railways, regardless of the effect of such action, then the most which the street railway should be required to do in the way of keeping pavement in repair is to restore to its former condition so much of the pavement of the streets as shall have become in need of repair in consequence of the existence and use of their track. If, as has been argued by some, the work of modern electric cars causes vibration, which is increased by flattened wheels or defective rolling stock, and thus the pavement is caused to be disintegrated, the obligation to restore to its former condition so much of the pavement as shall have become in need of repair in consequence of the existence and use of such track fully meets the situation.

The same argument applies to the claim by city engineers and authorities that the street pavement adjacent to the railroad track is weakened by reason of the many and several lines of cleavage or joints existing here, allowing considerable surface water to percolate through these joints into the subsurface and weakening the foundation of the roadbed. It also applies to the claim that it is impossible to maintain any modern satisfactory pavement adjacent to any car-track construction, unless such construction is made rigid, and if, as has also been claimed in this connection, the companies usually refuse to do this because of the cost involved. It applies further to the claim that where tracks exist it is practically impossible to make repairs without removing at least 9 ft. of paving space on extended reconstruction work; that long before the expiration of the life of the road pavement the railway companies are compelled to disturb the pavement to shim joints, renew bonds, replace broken rails and retighten joints, and that in doing this work it is necessary to disturb fully 20 in. of pavement on each side of the rail and much more than this in cases where it is necessary to replace the ties.

If, as has also been argued, the life of the roadbed of a railroad company is about twelve years and the life of a

durably constructed pavement is more than twenty years; and if, as is claimed, engineers generally hold that no matter how well a pavement is constructed it will heave along the rail line and does not settle back in the spring as it should; and if, as is also argued, the life of a pavement on any street on which the street cars are located is reduced 50 per cent, the answer is still the same.

COMMISSION OUGHT TO DECIDE MATTER

The question may be asked: "What tribunal is to determine whether the need of repair is in consequence of the existence and use of the track?" Obviously, if no other tribunal is selected, the courts must determine this. However, because the question is somewhat technical, it would seem appropriate that all questions under such obligations should be referred to and determined by the public utility commission which has control of the street railway in question. The repair itself should not be delayed pending determination of responsibility. In case of dispute or refusal of the railway to make the repair, the city itself can do the necessary restoration and then recover from the railway such amount, if any, as the public utility commission shall determine should be paid.

There is no legal obstacle in the way of altering the present paving obligations, notwithstanding that such paving obligations are embodied in the franchises themselves. The United States Supreme Court has upheld the authority of the state to alter the obligations contained in franchises granted by municipalities and accepted by the street railway companies.

Executive Committee on Welded Rail Joints Holds Well Attended Meeting

THE executive committee of the committee on welded rail joints operating under the auspices of the American Bureau of Welding met in the rooms of the American Society of Mechanical Engineers, New York, Nov. 13. Those present were G. K. Burgess, chief of the Division of Metallurgy, Bureau of Standards, Washington, D. C., chairman; E. M. T. Ryder, Third Avenue Railway, New York, N. Y.; W. Spraragen, National Research Council, New York, N. Y.; C. A. Adams, Harvard University, Cambridge, Mass.; R. C. Cram, Brooklyn Rapid Transit Company; G. C. Hecker, New York, N. Y.; E. J. McIlraith, Philadelphia Rapid Transit Company; H. M. Steward, Boston Elevated Railway, and W. W. Wysor, United Railways & Electric Company, Baltimore, Md.

The committee discussed details of making the bending and tensile tests previously outlined. Mr. Steward exhibited a number of photographs showing results of tests made at the Massachusetts Institute of Technology. It was decided that the auxiliary head for the Emery testing machine, which is to be used in the tests, should be

adapted to take 7-in. rails only. The rotary service testing machine was discussed and a communication from Mr. Ryder was read setting forth his views in regard to essentials in making these tests. Copies of this letter are to be mailed to every member of the committee on welded rail joints, with a request for each member's opinion in regard to the matter under discussion. A sub-committee on the design of the rotary testing machine was appointed, with W. W. Wysor as chairman. A resolution was passed thanking the American Electric Railway Engineer-

ing Association for the fund provided and several other resolutions were adopted regulating the procedure for disbursement of the fund, for approving bills, for requisitions and for accounting methods. The style of letterhead to be used by the executive committee was approved. Impact tests previously outlined were discussed and the committee members expressed themselves as considering this a most vital part of the tests to be made. A committee to work out details and equipment for making these tests was appointed, with E. J. McIlraith chairman.

and insisted that relief must be obtained from the heavy burden of local rates on the value of the tracks and of maintenance of the road surface between the rails and between the tracks, as required by British law. P. M. Heath, town clerk, Manchester, discussed the legal aspect in Britain on the question of liability for damage done by electrolysis of pipes and other underground structures by leakage of electric current from the rails of tramways. He dealt especially with the fact that it is now a settled law that the negligence of the Postmaster-General in selecting the places for his telegraph or telephone cables did not relieve tramway undertakers from paying the cost of alterations of these cables necessary to remedy damage by electrolysis from tramway currents. A change in the law appears necessary.

British Municipal Tramways Men Meet

Feature of Principal Interest Was Discussion on Decrease of Car Weight and Provision of Better Suspension, Better Bearings, Etc.—Brief Abstracts of a Few Papers Are Given

AT THE annual conference of the Municipal Tramways Association held in Newcastle-on-Tyne Sept. 13, 14 and 15, several papers were presented and discussed. Perhaps the most interesting paper from the American point of view was one on tramway rolling stock by E. S. Rayner, general manager and engineer of the Hull Corporation Tramways. In the course of this he said that in the endeavor to emulate steam-road rolling-stock practice the tramway designer and engineer had forgotten or neglected the essential difference between the resilient sleeper track of the railroads and the super-solid rigid track of the tramways. The mistake was that tramway engineers had attempted to build their rolling-stock on the same principles as they built their track. Rigidity has been their fetish. Existing troubles are traceable to this rigidity together with the excessive unsprung weight on the axles, and the inadequate spring supporting of the remainder of the weight.

Weight has been increased out of all proportion. Present double-deck cars weigh from 11 to 15 tons, while the weight might be easily below 9 tons. There is no reason why tramcar construction should not follow that of the motor vehicle. The outstanding feature of the latter is the small amount of unsprung weight, due to the type of drive adopted, the propeller shaft with bevel or worm gearing. There is no insurmountable difficulty in adopting this type of drive for tramway work. The evil of unsprung motors has disappeared. With a worm drive the gear ratio can be increased, the speed of the motors increased, the weight reduced, and a smooth start obtained with a comparatively low starting current. The road clearance can be increased and smaller wheels can be used. The principal drawback of the worm gear is the amount of wear between the worm and the wheel, but the advantages are well worth a little extra cost.

Another bad feature of tramway work is the solid axle without a differential, causing slip between wheels and rails on curves, producing wear of the rail and torque on the axle. Nearly the whole of this can be eliminated by the use of a split axle. In regard to bear-

ings, insufficient advantage has been taken of roller and ball bearings. The saving in friction amounts to about 20 per cent, but the principal saving is in the decreased starting effort, and the reduction in the cost of lubrication attention, inspection, and renewal.

Mr. Rayner said that he is convinced that the greasing staff can be reduced by 50 per cent and the repair bill cut down by a similar amount. There will be no dropped armatures, smoking axle boxes or worn axles. As to brakes, they need redesigning. The weight of the brake rigging of an ordinary tramcar is about 600 lb., while the brake gear on a motor vehicle weighs about 100 lb. There should be no serious difficulty in applying the ordinary internal expanding brake of an automobile to tramcar practice. Equal braking power can be obtained with a fraction of the force required with the existing design. The weight of a truck designed on the lines suggested can be decreased at least 25 per cent over present designs. Wheels and axles can also be reduced.

Mr. Rayner said that the Hull tramway department is now working on the design of a new car embodying the points discussed. This car will have a split back axle with a double worm drive and two high-speed motors suspended clear of the axle. The wheels, other than the drivers, will be free and drum brakes will be used. A continuous frame will carry the body, which will be kept low and platform cantilevers will be omitted. The spring arrangement will be kept as flexible as possible and the weight will be reduced to the lowest possible figure compatible with safety and stability. Ball and roller bearings will be used throughout.

The other papers presented at the meeting dealt with subjects of less interest to American operators as they related to British conditions. Ernest Hatton, engineer and general manager of the Newcastle Corporation Tramways, argued in favor of the penny fare for short distances, instead of having a minimum of 1½d. or 2d. He based himself on actual experience in Newcastle. Henry Mattinson, general manager of the Manchester Corporation Tramways, introduced a discussion on the highway cost borne by tramways,

Motor Bus Association Organized

THE National Motor Transport Association, composed of bus companies operating passenger-carrying buses over regular routes, was organized at a meeting held Nov. 16 at the Hotel Pennsylvania, New York. Better bus transportation service throughout the country is the association aim. Letters were read from bus operators in a number of states. At the meeting it was decided that there should be three classes of membership: operators, manufacturers and individuals. Patrick Healey, president of the Connecticut Motor Stage Association of Waterbury, Conn., was elected president, and E. B. Burritt, formerly secretary of the American Electric Railway Association, was elected manager.

Personnel Experts Confer

A THREE-DAY national forum of personnel experts was held in Pittsburgh, Pa., Nov. 8 to 10 under the auspices of the National Personnel Association. Among the notable reports presented was one dealing with co-operation with engineering colleges, outlining ways and means by which, through the association, assistance can be rendered by industries to the colleges. The committee on shop training reported that at no previous time has there been the same appreciation by wage earners of the value of practical education which pertains to their job.

One committee reported on psychological tests and rating scales, stating that these are used today by a number of corporations and their use is being extended within those companies and to still other companies. A few companies are now satisfied that their devices are really worth while and have incorporated them as a part of the regular machinery of administration. A larger number of companies are feeling their way and trying out the tests usually upon restricted groups of employees. Other topics considered at the meeting were immigration, trade apprenticeship progress, economics for employees, industrial and public school relations, personnel problems of small offices, job analysis, etc.

Traffic Signal Colors Being Studied

THE American Electric Railway Association is one of about forty interests represented on the sectional committee on colors for traffic signals organized under A.E.S.C. procedure. This committee will investigate the use of various types of semaphores and silent policemen, as well as the efficiency of all color signals now in use as traffic signals. The reason for adopting certain colors for specific uses will be ascertained. Original studies of specific colors for definite uses will be made as a check upon previous researches and to establish certain colors for traffic signals. Non-luminous signs and signals will also be made the subject of research. The chairman of this sectional committee is Charles J. Bennett, State Highway Commissioner of Connecticut.

C. E. R. A. Meeting

THE Central Electric Railway Association will hold its annual meeting in Louisville, Ky., at the Seelbach Hotel on Jan. 18 and 19, 1923.

Safety Institute Awards Medal

ON NOV. 2 the Safety Institute of America awarded to Judge Elbert H. Gary the Louis Livingston Seaman medal for "conspicuous achievement in the conservation of human life." The award in particular recognized Judge Gary's work in connection with the recent "safety week" campaign conducted in New York City. This campaign, said Arthur Williams, president of the Institute, resulted in the saving of forty-seven lives, assuming that without it the same number of persons would have been killed as last year, even allowing for seven persons who died later from safety week accidents.

The Safety Institute awards several safety medals annually, among them the Anthony N. Brady medal, which goes to encourage safety among the electric railways of the country.

A Transportation Lesson from the Circus

AT A MEETING of the American Society of Terminal Engineers, held in New York City on Nov. 14, the subject of discussion was freight containers. J. C. Bonner, president Bonner Railway System, Inc., contributed a paper in which he referred to the demountable container, or a van-body equivalent, as the beginning in the journey from unscientific toward scientific terminal freight handling. He then went on to draw an analogy from the ways in which circus vans are transported from city to city, to show that scientific loading of wheeled "strided" containers is to be had with minimum of time and cost. The natural evolution, he said, is from the circus type of four-wheel strided container to an automatic wagon, which will be at home anywhere. This, of course, is the fundamental principle of the Bonner System.

A.E.S.C. Calls Conference on Numbering of Steel

AT THE request of the United States Bureau of Standards, the American Engineering Standards Committee has called a conference to attempt to determine the desirability of applying a uniform numbering system to forging steel, casting steel and structural steel, including plate, tool steel, or other steels not so classified. The conference will be held in Room 704, Department of Commerce Building, Washington, D. C., at 10 a.m., Dec. 6. All who are interested are invited to attend.

American Association News

Suggestions on Publicity Desired

THE association office has sent to all members of the American Association copies of the report of the committee on publicity for the past year, with a request from the committee on publicity that the members read the report carefully and send in suggestions for improving the publicity service.

To California for the Mid-Year?


SECRETARY WELSH is sending out a second letter to member companies requesting an expression of opinion as to the desirability of accepting the invitation of the California members to hold the mid-year meeting on the Pacific Coast. Only 168 replies to the first letter were received from 612 member companies. It is urged that the secretary be advised by letter as to the feeling about the advisability of the California mid-year meeting. The comments of W. R. Alberger, San Francisco, in extending the invitation, were published in *Electric Railway Journal*, page 682, issue of Oct. 21.

Advertising Posters Effective


THE advertising section of the American Association reports that the posters recently issued for the purpose of helping make good will for the railways are proving effective. A new edition is about to be issued. Executive Secretary Welsh desires to ascertain the probable demand so as to determine the number to be printed.



ELECTRIC CARS
SERVE YOU
IN ALL KINDS OF WEATHER




A Square Deal For
Electric Railways
MEANS
Square Meals For Us




ELECTRIC RAILWAYS pay for the paving between the rails

Trucks and other Traffic wear it out!




WOULD YOU BUILD NEAR A "JITNEY" LINE?

Think of the increase in values of property near an ELECTRIC LINE and what the Electric Car means to you EVERY DAY!!



Heavily Loaded Trucks and Wagons Slow Up Electric Cars



When Your Kiddies Are On An ELECTRIC CAR You Know They Are SAFE

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Seeks to Revoke Charter

City of Birmingham Claims Right to Regulate Fares—Jitney Also Issue—Improvements Sought

A suit filed against the Birmingham Railway, Light & Power Company by the City Commissioners in the state courts at Birmingham recently has been transferred to the United States District Court, owing to the fact that the company has been operated by a receiver for some time.

This suit, as filed by the city, would revoke the charter of the company, were it decided in favor of the city. The city contends that the charter issued to the company several years ago, and which fixes the fare at 5 cents, still regulates the amount of fare, regardless of the fact that in 1920 the State Legislature of Alabama created a Public Service Commission and empowered it with the right to fix the charge of all public utilities corporations.

BELATED FARE INCREASE

The company contends that the creation of the state commission with the right to fix rates of all public utilities invalidates that portion of a city charter which refers to rates. Officials of the company say they do not know when this suit will likely be heard. In the meantime the company is collecting an 8-cent fare and an additional 2 cents for transfers, as allowed by the state Public Service Commission, June, 1921.

All during the world war the company operated on a 5-cent fare. After the war the fare was first raised to 6 cents, then to 7 cents and then to the present rate. The company claimed that neither the 6 nor the 7-cent fare would pay operating expenses. According to officials of the company the present fare is barely paying these expenses, and the company has no capital for extensions or improvements of the system. An official of the company says that the suit filed by the city against the company has so greatly impaired the credit of the company that it is impossible to borrow money for extension or any other purpose.

Real estate men and others who have property to develop in various parts of the city are interested in the extension of street car lines to this property. Owing to these facts these citizens have taken the matter up with the City Commissioners with a view to a settlement of the pending suit against the company. Various meetings and conferences have accomplished nothing, and the case still remains on the docket of the United States Court, to be set for a hearing at some future date. With this suit off the court dockets the company claims its credit would be restored and it would be enabled to borrow suffi-

cient money for a number of necessary extensions.

Another matter which has entered into these discussions is that of the jitney. Recently a large number of streets, over which lines of the Birmingham Railway, Light & Power Company are operated, have been paved. The company has been taxed several thousands of dollars by the city for the paving work between its tracks. The company says if it has this paving done, and by so doing places the streets in condition for automobile traffic, it will be creating an opposition to its business by aiding in the establishment of additional jitney lines. This, officials of the company say, should be remedied in some way. This matter has been taken before the City Commissioners, but no action has been taken one way or the other.

Real estate men and other citizens who have discussed the situation with members of the City Council are not entering into a discussion of fares charged. What they want is an amicable adjustment of the pending suit, filed by the city against the company, in order that the railway's credit may be restored to enable the company to secure sufficient funds for the many needed extensions of its lines at this time.

Commission Proposals Receive Cold Reception

Mayor Hylan and the Board of Estimate of New York indicated on Nov. 9 that they would act to forestall any measures or projects set forth by the Transit Commission until after the new Legislature convenes and the Democratic Governor takes office in January.

Plans calling for the expenditure of \$119,000,000 in the Transit Commission's program were virtually rejected on Nov. 9 by the Estimate Board upon the Mayor's recommendation.

The commission's routes for Manhattan and its tunnel route to Staten Island, costing \$30,000,000, and \$25,000,000 respectively, were sent back to the commission for alteration. Its Queens-Brooklyn, Jackson Avenue, Roebling Street, Bedford Avenue crosstown subway route, estimated at \$64,000,000, also received a cold reception.

The \$600,000,000 transit scheme concocted by the Mayor was favored over the plans of the Transit Commission. Mayor Hylan declared that he had investigated the commission's Queens-Brooklyn crosstown project and found it inadequate. Action would have been taken on Nov. 9 to reject the plan had not William G. Fullen, counsel for the commission, appealed for an opportunity for the Transit Commissioners to be heard before final action was taken.

Extension Granted for Report

More Time Granted in Which to Effect Financial Changes in the Cincinnati Street Railway

Committees of the Cincinnati (Ohio) Traction Company and the Cincinnati Street Railway have been given until Dec. 1 to announce a plan for meeting the financial situation that confronts the Cincinnati Traction Company, the operating company, that is satisfactory to Mayor George P. Carrel's traction committee.

The extension of time was granted the committees on Nov. 10, after Walter Draper, vice-president of the traction company, and Attorney Robert Taft, representing the railway, reported to the city's traction committee that committees of the two railway companies are making progress as to a reorganization, but that they would like more time to report. Delay, they said, was occasioned by the illness of W. Kesley Schoepf, president of the traction company, and Judge Rufus B. Smith of the street railway company.

The Mayor's committee several months ago urged representatives of the Cincinnati Street Railway and the operating company to work out a solution of the difficulties that beset them. At a recent meeting of the Mayor's committee the announcement was made that several conferences had been held by the representatives of the two companies and it was likely that a report would be submitted on Nov. 10.

An executive session was held by the Mayor's committee on Nov. 10, after Messrs. Draper and Taft appeared before the committee and asked for an extension of time. At the conclusion of the meeting the following letter, which purports to be the action of the committee, was sent to the Cincinnati Traction Company and the Cincinnati Street Railway over the signature of Mayor George P. Carrel:

In reply to your request for additional time to formulate a plan to solve the traction situation in Cincinnati, I hereby beg to acknowledge same by reporting to you the resolution passed by the committee unanimously as follows:

Be it resolved, That it is the sense of this committee that the request of your two companies, to wit, until Dec. 1 is granted with the understanding that if no positive announcement of your plans, acceptable to this committee is made by that time, this committee will act as it sees fit.

That the two committees should not be permitted to delay their report too long again was urged by Froome Morris, vice-mayor. It was pointed out that the question of again deferring collection of the franchise tax from the traction company must come up Jan. 1. Collection of the tax must be deferred if fares are to remain at 7½ cents. The franchise tax amounts to the sum of \$350,000 a year.

Ordinance Defeated—Traction Tie-Up No Nearer Settlement

Voters of East Liverpool, Ohio, at an election on Nov. 7 defeated by a big majority the initiated railway ordinance. Principals in the traction tie-up intimate that there are no further moves towards resumption of service in East Liverpool and Columbiana County which has been at a standstill since May 1 when carmen employed by the Steubenville, East Liverpool & Beaver Valley Traction Company walked out following a lockout. The ordinance voted on was proposed by the railway as a step toward solving the controversy. It provided for an increase in fares and would place the East Liverpool situation in the hands of the State Public Utilities Commission. Liverpool turned out strong against the passage of the ordinance.

FUTURE ACTION DEPENDS ON COURT RULING

A mandamus action has been instituted in Columbiana County court to compel the railway to operate under the award of the arbitration board and no further steps will be taken until the court rules on the action. A decision is expected in the near future.

The Trades and Labor Council of Wellsville recently held an open meeting, with the railway situation the topic of discussion. Opinions were expressed but a solution of the problem seemed remote. It was stressed at the meeting, as contended by the men since the inception of the tie-up, that the employees are not on strike, but that they refuse to operate cars because of a lockout.

Very little has been accomplished in numerous endeavors to bring about a settlement of the controversy which has caused Columbiana County to be without railway service for a period of six months. The East Liverpool and Wellsville City Councils have held sessions frequently for the purpose of discussing a probable solution, but practically nothing has been accomplished. It was hoped by the company that the passage of the ordinance would be a step toward some solution, but its defeat practically brings the situation back to the status of affairs at the inception of the tie-up, while the citizens of Columbiana County await the court decision on the mandamus action which may or may not be a step toward ending the tie-up.

The strike on these lines has been referred to in previous issues.

RESUMPTION PROMISED SOON

Announcement was made on Nov. 14 from an official source that the cars of the Steubenville, East Liverpool & Beaver Valley Traction Company would begin operation within three or four days between the Pittsburgh & Lake Erie station, Beaver, and the Ohio State line.

Definite notice will be given the men employed on the lines prior to suspension last May that they will be re-engaged if they will apply to the com-

pany, C. A. Smith, general manager, is reported to have said, but that the places will be given to workers from outside if the members of Division 52 do not accept within the time limit.

General Manager Smith expressed the opinion that the 25-cent fare provided for the 11-mile stretch in Pennsylvania, which is the same distance to East Liverpool and Wellsville on which the company was allowed to charge 5 cents, will be sufficient to pay operating expenses with the proper allowance for maintenance, repair and return on investment.

General Manager Boyce, of the Beaver Valley Traction Company, stated that such arrangements had been made to operate cars in connection with the Beaver Valley lines through Beaver.

Ohio Railway Men Discuss the Bus

The bus transportation situation in Ohio was discussed at a meeting of the executive committee of the Ohio Electric Railway Association, held in the office of President F. W. Coen in the Williamson Building, Cleveland, recently. The meeting was called primarily to ascertain from the committee members what effect the bus was having on electric transportation in their respective communities. The question of traction companies operating bus lines in connection with their business also was discussed. It was the sense of the meeting that something should be done in a legislative way to compel buses to be operated under conditions similar to those which govern the operation of electric cars. Another meeting to discuss this subject will be held in President Coen's office on Nov. 20. Representatives of electric railways in adjoining states will be present to give their views on the bus transportation problem.

Governor Smith Refuses to Comment

Abolition of the Transit Commission and its replacement by a new city department to be known as the Department of Transportation, headed by a commissioner appointed by the Mayor, was forecast as one of the first acts of the new Legislature by Comptroller Charles L. Craig in an address on Nov. 13 before the West End Association at the Hotel Ansonia. Mr. Craig reviewed the transit situation in the city at length, explaining that the Board of Estimate had rejected all the plans of the Transit Commission for new lines because they connected with the lines of the present operating companies.

The following day Alfred E. Smith, Governor-elect, declined to state whether or not Charles L. Craig, comptroller, had represented correctly his views on the city transit situation. Mr. Smith in fact is reported to have declined to comment in any way on the comptroller's remarks and said that he was very busy with the consideration of other matters.

Commission Orders Viaduct to Be Built

The Public Service Commission of Louisiana, through Huey I. Long, chairman, and Francis Williams, commissioner, on Nov. 11 issued an order commanding the Southern Pacific Railroad to build the viaduct over its tracks, shop and switching yards, at Newton Street, in Algiers, opposite New Orleans. The railroad is given thirty days within which to file plans with the commission for approval and ninety days for completion of the work. This is the controversy in which the South New Orleans Light & Traction Company has been involved, work upon which the traction company pleaded its inability to undertake, on account of lack of funds, when the viaduct was ordered closed by City Engineer Klorer.

Counsel for the railroad signified its intention of resisting the efforts of the state to place the expense upon the company and it is likely that the case will now go to the courts. This struggle has been referred to previously in the *Electric Railway Journal*.

Buffalo Still Shows Signs of Strike

Intimidation tactics are being used from time to time by striking platform employees of the International Railway, Buffalo, N. Y., and their sympathizers, but car riding continues almost normal with more than 450 cars in operation on the local lines of the company during peak hours. Another interurban car on the old Buffalo-Niagara Falls line was wrecked several days ago by the placing of a heavy granite gravestone on the track. The speeding car was derailed and several passengers seriously injured. Local cars of the company are stoned from time to time and several arrests of strikers have been made.

The results of the November election in Buffalo show the influence of the strike on the masses which make up the majority of the electorate of the city. Robert C. Lacey, former president of the Central Labor Council and chairman of the arbitration committee of the council, who is under arrest in connection with the finding of dynamite after the wrecking of the high-speed line car on the Buffalo-Niagara Falls interurban division, was elected a member of the State Senate by a large majority. The referendum on municipal bus lines advocated by Mayor Frank X. Schwab, who has been fighting the railway company since the outset of the strike July 1, was carried by an overwhelming majority.

Striking employees of the International re-elected their officers a month in advance of the regular election date. A meeting had been called to discuss relief funds when it was suggested that the present officers remain for another year. Such a motion was carried despite the by-laws of the organization that the election shall be held by secret ballot.

Detroit Vote Changes Municipal Railway Plans

Three propositions sponsored by the Mayor and the Department of Street Railways were defeated at the Nov. 7 election in Detroit. The proposal for termination of the permit to the Detroit United Railway to operate interurban service within the Detroit city limits was defeated by a large majority vote. The charter amendment proposed for removing from the street railway system, the cost of paving, repairing and watering between car tracks was rejected and the proposed \$5,000,000 issue of public utility bonds for extensions, additions and betterments of the Municipal Street Railway system failed to receive the necessary 60 per cent of the votes cast. Brief mention of all this has been made before in the *Electric Railway Journal*, but not in its local aspects.

Relative to the failure of the bond issue to carry the Mayor stated that he believed that the voters were not thoroughly familiar with the proposition and that as a result of the vote, the public must wait for several much needed extensions.

No announcement has been made as to what steps will be taken in the case of the Detroit United's interurbans. The proposition backed by Mayor Couzens would have barred the interurbans from Detroit city tracks after Dec. 31, 1924. The possibility of action by the city to obtain a new track rental agreement with the Detroit United Railway has been suggested. The present purchase agreement under which the city took over the Detroit United Lines provides for arbitration of the interurban question. The Mayor believes that the city is not being paid sufficient money by the Detroit United Railway for use of the city tracks, the present sum amounting to approximately \$80,000 a month.

Plans for extensions to the municipal railway to be carried out next spring had been formulated, but they will have to be considerably changed as a result of the outcome of the popular vote on the bond issue.

I. C. C. Rules on Leased Lands

Railroads which lease lands along their right-of-way to private users must charge rentals equal to the sums which private owners would charge for similar property, or the transaction thereafter will be considered by the Interstate Commerce Commission as a form of rebating in violation of law.

The commission on Nov. 6 held that in some cases the fixing of a low rental charge in leases of lands to large shippers had been "in practical effect" a reduction of transportation charges amounting to a refund.

The commission based its conclusions chiefly upon facts brought at Spokane, Wash., and at Fresno, Calif. At Spokane it was found that a city had practically grown up around the right-of-

way of the Northern Pacific, making the lease privileges on the land of railroads as well as others valuable.

Trackless Trolley Application Before Rochester Council

Since mid-summer the possible use of the trackless trolley in Rochester, N. Y., has been under consideration. If Charles R. Barnes, local railway commissioner there, was not the originator of the idea, then he certainly was one of its first advocates. Along with James F. Hamilton, president of the



DASH LINES SHOW ROUTES OF PROPOSED TROLLEY BUSES

company, he was reported months ago as looking into the matter. Three lines were then reported to be in prospect. Gradually the plan unfolded itself until late in September, in fact on Sept. 25, the railway applied to the Council for permits. The outstanding feature of the cross-town line is that it cross connects seven north and south railway lines. The company's application said:

New York State Railways respectfully petitions your honorable body to grant to it consent and permission to construct and maintain necessary poles, overhead trolley wires, guy wires, feeders and appurtenances in the streets hereinafter named, for the transmission of electric current for power and to operate in said streets by means of said electric power a system of trackless trolleys or trolley buses for the conveyance of passengers. The streets and avenues on which said permit is requested are Dewey Avenue, from the end of your petitioner's existing electric railway line to the north city line; also, on Dewey Avenue, between Driving Park Avenue and Selye Terrace; on Selye Terrace, between Dewey Avenue and Pierpont Street; on Pierpont Street, between Selye Terrace and Driving Park Avenue; on Driving Park Avenue, between Dewey Avenue and St. Paul Street; across St. Paul Street to Avenue E; on Avenue E from St. Paul Street to Conkey Avenue; on Conkey Avenue from Avenue E to Avenue D; on Avenue D from Conkey Avenue to North Street; and on North Street from Avenue D to Clifford Avenue; on Clifford

Avenue from North Street to Portland Avenue.

Pursuant to authority contained in Paragraph 16 of the service-at-cost contract, between the city of Rochester and this company, dated Aug. 1, 1920, the commissioner of railways and this company have determined that the interests of good service make it proper and necessary to install the trackless trolley method of transportation on said streets to supplement surface railroad car operation. This method of transportation can be installed in a short time and is a feasible and proper method of transportation over and across Driving Park Avenue Bridge and will be of great convenience to many citizens of Rochester who are now compelled to walk or take a circuitous route of surface railroad cars.

It is understood that the company's plans for installing the new lines are well along in their development, but nothing further about them will probably be done until after the Council has acted on the application.

San Francisco Charter Amended to Permit Purchase of San Mateo Railway Line

At the general election on Nov. 7, San Francisco voters approved by a vote of almost two to one, an amendment to the city charter authorizing the purchase by the city, under certain conditions, of the line of the Market Street Railway which extends into San Mateo County as far as the city of San Mateo.

Authority was given in an amendment passed on Nov. 2, 1920, for the city to arrange the purchase of the private company's property within the city; the new amendment extends this authority to include the San Mateo line, which is the only part of those properties outside the city limits.

The new amendment, which merely adds two paragraphs to article 12 of the city charter, is as follows:

The City and County of San Francisco shall have power to purchase the whole or any part of the street railways, street railway system, street railway properties, equipment, franchises or other property operated, owned or controlled by the Market Street Railway Company and situated within the city and county of San Francisco and the county of San Mateo, and to own, operate, improve or extend the same, and any indebtedness incurred for such purchase shall not be subject to the limitation of Section 9 of Article XII of the Charter.

Proceedings for such purchase may be taken pursuant to the provisions of this Article XII of the Charter, or by initiative of the registered voters as provided in Chapter III of Article XI of this Charter, which is hereby declared to be applicable in the matter of the purchase provided for in this section. Such purchase or acquisition shall not, however, be consummated or become effective in the event such purchase shall involve the incurring of indebtedness or liability exceeding in any year the income or revenue provided for such year, unless the same shall be approved by two-thirds of the qualified electors voting thereon, as specified in Section 18 of Article XI of the Constitution of the State of California.

Seeks Franchise Extension

The Niagara, St. Catherines & Toronto Railway, St. Catherines, Ont., wants an extension of its franchise in return for extensions and improvements in service. About three years ago, despite promises from the company, the St. Catherines City Council turned the proposition down because Sir Adam Beck assured the aldermen the hydro-radials were coming and the railway would be made a part of them.

Five Dollars a Day

Detroit Experiments With Flat Rate for Eight-Hour Day on Its Municipal Railroad

A new pay plan has been put in effect on the Trumbull line by the Department of Street Railways in Detroit for a month's trial. The proposed scheme puts the men on a daily instead of an hourly basis and provides for a basic rate of \$5 for eight hours work. If the schedule being tried out on the Trumbull line proves satisfactory, it will be extended to include car operators on all other municipal railway lines in the city.

FIVE CENTS ADDITIONAL FOR ONE-MAN CAR OPERATORS

Platform men other than operators of the one-man safety cars will be put on an eight-hour day at the present rate. Operators of one-man cars will receive an increase of 5 cents an hour. The minimum monthly wage rate for all platform employees for the first six months will be \$80. After six months' service employees will be entitled to seven days vacation annually with full pay.

After one year the wage rate will be \$5.40 for eight hours for operators of one-man cars, and \$5 for eight hours for other platform men. For time in excess of eight hours, the man will be paid time and one quarter and no provision is made for free transportation of men while not in uniform. Motormen and conductors will receive 50 cents a day in addition to their regular wage scale while instructing students.

Officials of the railway men's union at first voiced objections to some of the provisions and wage scales announced by the city department. The main objections were made on the grounds that the new proposition would virtually amount to a reduction of wages for the majority of the men. One point mentioned in particular was the proposal to reduce the rate for overtime from time and one half to time and one quarter. While the men's counter plan did not differ materially from that proposed by the city, the men were asked to make such revisions as they desired and return with them to a later conference. The main points of difference between the city and the men were in regard to the recognition of the union through the signing of an agreement along the line of the one which the men formerly had with the Detroit United Railway, and the question as to free transportation for men not in uniform.

NO FRICTION NOTED

According to a statement made by Garrett Burns, business agent for the men, the men were satisfied with the recording of an understanding as to wages and working conditions in the form of incorporation in the minutes of the Street Railway Commission, the courtesy of thirty days' notice before changes could be made, and the under-

standing that in negotiations with the men on working conditions, the city would deal with the representatives of the employees in their associated character. He further stated that the men would rather deal with the Mayor and members of the Street Railway Commission than any other men in Detroit, the little differences that originally arose having been adjusted. At no time was any friction between the men and the city noted and at no time did the Mayor and other city officials evidence that they had any purpose of destroying the associated character of the employees, they having no purpose of denying the employees the right to function as an associated body of employees in dealing with the management in effecting and maintaining mutual and collective arrangement of wages and working conditions and adjustments of other matters which may arise.

In a signed statement given to the press the Mayor stated that the city had had no dealings with Division No. 26 of the Amalgamated Association of Street & Electric Railway Employees. Some of the men discussed working conditions just as any committee of employees would do, or the same as any lawyer or other representative of a corporation would do. The Mayor denied the intimation that the city officials had backed down from their stand on recognition of the union, and on monthly contract as to wages and conditions.

Minnesota Road Being Extended

Extension of the Electric Short Line, operating from Minneapolis to Hutchinson, Minn., 44 miles westward to Clara City, Minn., is promised in an application of the company to the Interstate Commerce Commission for authority to issue \$660,000 of fifteen-year 5 per cent bonds. Officers of the company expect approval and they say disposal of the bonds will finance the work, which should be completed in 1923. Of this distance 15 miles have been railed and 27 miles graded. The new territory has lacked rail access to the Twin Cities and it is rich in possibilities for dairy extension and sugar beet raising. The cars are operated by gas-electric engines.

Work on the extension was begun in 1916, but was halted by the war, and it was not resumed until April 21, 1922. Towns already are springing up along the line in expectation of rail service after forty years wait. The first is Cedar Mills, 11 miles west of Hutchinson; Marsh, Cosmos, Thompson, Lake Thorpe, Lake Lillian, Roseland, Prinsburgh and Clara City. The next extension will be to Montevideo, a division point on the Milwaukee road coast line from Minneapolis to the Pacific. At present 60,000 cu.yd. of earth is being moved a month and half a mile of steel is being laid a day. The steel being laid is 72 lb., with 18 in. of gravel ballast. The maximum grade is one-half of 1 per cent.

\$12,000,000 to Be Spent on New Project

A new railroad, to be known as the Missouri Hydro-Electric Interurban Railroad, is being formed by the M. G. Shaner Company, Sand Springs, Okla. The company expects to begin construction work soon and has announced that it will spend \$12,000,000 on the project. The road will traverse the counties of Texas, Dent, Shannon, Reynolds, Iron, Washington and St. Francois. The new railroad, the promoters assert, will make connections with eleven other standard gage railroads.

The proposed railroad will be approximately 300 miles long and the electric power to run it will be supplied by a dam and power plant which it is proposed to build on Current River near Round Springs. The company will be chartered for fifty years and will do a general freight, passenger, mail and express business. The territory to be served is rich with ore and minerals and is without railroad facilities of any kind.

News Notes

May Abolish Terminal Point.—The North Adams, Mass., City Council will appoint a committee to investigate the feasibility of abolishing the use of Main Street as a terminal point for trolley lines running into the city.

Scale in Force for Another Six Months.—An announcement has been made by A. E. Reynolds, general manager of the United Traction Company, Albany, N. Y., of a continuation of the pay scale which terminated on Nov. 1. The scale guaranteed until May 1 is 45 cents an hour for operators of two-men cars and 50 cents an hour for one-man car operators.

Applies for Charter.—The Arkansas City, Winfield & Northern Interurban Railroad has applied to the Kansas Court of Industrial Relations at Topeka, for a certificate of authority to do business as a public utility and to issue \$100,000 in bonds. This company owns the interurban line between Winfield and Arkansas City. It recently was taken over by the Arkansas Valley Interurban and is to be entirely rebuilt.

Camden Employees Meet.—A general meeting of employees of the Camden, N. J., division of the Public Service Railway was held recently at the Newton Avenue carhouse in the interest of the safety first work. The Mayor of Camden and the public service director of safety education were the principal speakers. The Mayor said he was in full accord with the company's efforts in behalf of safe travel in the city of Camden. Director Van Brunt explained to the men the new Schaefer system of resuscitation. The meeting was pronounced a real success.

Financial and Corporate

Opportunities in Traction Bonds

Philadelphia Expert Calls Attention to Well Secured Issues Quoted at Discount

Attention was called by "The Bond Man," writing in the Philadelphia *Public Ledger* of Nov. 13, to the "Availability to Investors of Certain Traction Bonds." That was the caption. Of such securities the writer stressed particularly secured underlying issues of railway companies affiliated with strong light and power companies. To utility men the facts used by "The Bond Man" to get his message across are not new, but the method of their use was. The writer said:

Mention has been made in this column on more than one occasion that the time probably has arrived for those investors who choose to buy good securities at low prices to give some consideration to certain of the traction issues and particularly to the secured, underlying bonds of railway companies that are affiliated with strong electric light and power corporations, and in some instances also the bonds of inter-urban lines.

Electric railways have been and probably will continue to be the chief means of local transportation, and in this connection there are fundamentals whose influence, while occasionally interfered with, is sure to have constructive effect in time. The only way in which people can be effectively transported, in modern, clean cars, at reasonable speed and at low cost, is by moving as large a number as possible in one operation. This is the real answer to the jitney and the omnibus, and it is the reason why travelers return to the trolley after having experimented with these and other more costly methods of movement.

In addition, people have become reconciled to increased fares, there is not so much political aggression as formerly and the movement of population from city centers to the suburbs constantly increases.

Mention is next made to the increasing adoption and use of the weekly pass and to the improved condition of the industry generally, Mr. Todd's figures as given at Chicago being quoted.

As if that were not enough "The Bond Man" went right ahead and assumed the responsibility for making specific investment suggestions. Among the issues which he cited as worth considering at present prices were the following:

Birmingham Railway, Light & Power general 4½s, due 1954, at about 78.

Detroit & Port Huron Shore Line first 5s, due 1950, at about 85, and Detroit, Monroe & Toledo Short Line first 5s, due 1933, at about 90.

Easton Consolidated Electric Company 5s, due 1949, at about 78.

Lackawanna & Wyoming Valley Rapid Transit Company collateral trust 5s, due 1951, around 89.

West Penn Traction Company 5s, due 1960, at about 85.

The Public Service Railway, the transportation department of the Public Service Corporation of New Jersey, has underlying bonds outstanding that are quoted very low. Jersey City, Hoboken and Paterson first 4s, due 1949, are selling at about 60. They have been in the market as a promptly paying

interest-bearing obligation since 1889. North Jersey Street Railway first 4s, due 1948, sell at about 66. These have been outstanding since 1888.

In each instance "The Bond Man" cited how the issue was secured by property, collateral or direct guarantee.

Will Apply for Bond Issuance to Finance Improvements

The Indiana Service Corporation Fort Wayne, Ind., is making application for the issuance of \$750,000 of first mortgage bonds to cover the cost of additions to property of the corporation made during the last three years. Due to the fact that the company has only been paying to its security holders 3 per cent on the money in the property it has been able to invest from earnings the sum of \$900,000 in improvements to property. This is the money which has gone into the building of new lines, purchase of cars and building of sub-stations to improve the service.

These bonds, when authorized by the commission, will be put into the treasury of the company to be held until additional new construction work is required. At that time the bonds will be sold to the public and the cash thus obtained used to make additions and improvements. A detailed list of the construction work done and its cost has been furnished the commission which will make an investigation to determine how the money was spent before authorizing the bond issue.

Kokomo Property Included in Consolidation

Announcement has been made that the properties of the Indiana Railway & Light Company, Kokomo, the Wabash Water & Light Company, the Public Service Company, Rochester, the Noblesville Heat, Light & Power Company, the Sheridan Water, Light & Heat Company, the Logansport Utility Company and the Roann Light & Power Company, all located in north central Indiana cities, have been purchased by the Northern Indiana Power Company. These properties all have been connected by transmission lines and the actual consolidation of the companies will be completed in a short time.

The value of the properties which have been purchased is approximately \$8,000,000 and the total of stocks and bonds to be issued by the new company is approximately the total of the present outstanding stocks and bonds of all the companies. The purchase of the properties has been completely financed. It is the intention of the new owners to connect the plants as soon as possible with the super-power plant for which preparations are being made in the coal fields of the Wabash River.

The Northern Indiana Power Company is owned by the Brewer interests.

One Man-Car Operation Decreases Cost

According to figures compiled by general Superintendent D. W. Henderson, the Seattle (Wash.) Municipal Railway cleared \$22,087 above all actual expenses of operation and maintenance and payment of interest and principal during the month of September. This takes into consideration \$20,000 actually set aside during the month for depreciation charge, instead of \$57,093 marked off on the books for this item, but not actually accumulated. The gross revenues for the month were \$508,303, and the total expenses, including \$70,250, the monthly apportionment on the annual payment of principal, were \$486,216. If the full \$57,093 depreciation is counted, the railway failed by \$15,005 to clear a sufficient amount to meet the month's apportionment of the annual installment on principal. The operating expense, \$384,582 for September was \$33,889 less than for the same month in 1921. The decrease in cost, according to Superintendent Henderson, has resulted largely from increased operation of one-man cars.

President Explains Need for Surplus

Harry Bronner was elected a director of the Third Avenue Railway, New York, at the annual meeting of the stockholders, succeeding the late E. M. Burghard. In commenting on the operations of the company, President Huff indicated that there would be a continuance of the present policy in maintaining a substantial safety fund. The company's present surplus of approximately \$3,000,000 in cash, Liberty bonds and Treasury notes was not excessive, said Mr. Huff. His statement was brought out when a question was raised as to the right of the board to withhold four years' interest payment on the 5 per cent adjustment bonds, when the books show quick assets, exclusive of materials and supplies, amounting to \$4,795,933. There is still 20 per cent unpaid interest on these bonds.

Railways Organize to Effect Resumption of International Trade and Traffic

As a result of a recent conference in Paris of the International Railways, a permanent organization has been created for the study and resumption of international trade and traffic. The delegations were not confined to Europe, but included Japan and China as well. The headquarters of the International Railways will be in Paris and its official language will be French. A Frenchman, M. Mange, was elected president of the managing committee and this fact coupled with the designation of Paris as the seat of the Union, has made the French capital the headquarters of the railways from the Atlantic to the Pacific. The general assembly of the Union will meet in ordinary session every five years.

Financial News Notes

Co-Receiver Appointed.—J. S. Pevear has been appointed co-receiver of the Birmingham Railway, Light & Power Company, Birmingham, Ala., with Lee C. Bradley. Mr. Pevear is manager of the company.

Dividend Declared.—The Middle West Utilities Company, Chicago, Ill., has declared a dividend of \$1.25 on the preferred stock, payable on Dec. 15, to stockholders of record Nov. 30. This is the first dividend at the rate of \$5.

Approve Bond Issue.—Ashtabula, Ohio, voters, on election day, Nov. 7, approved a bond issue for \$60,000 to be used in the purchase of new street cars and improvements to the municipally owned traction system. The vote was 2,618 in favor of the bonds and 1,129 against.

Common Stock for Sale.—A block of common stock of the Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., is being offered by John Nickerson, Jr. The stock, on a 5 per cent dividend basis, is offered at \$59 a share to yield 8.47 per cent.

Director Named.—By unanimous vote of the city sinking fund trustees S. O. Richardson was named the new member of the board of directors of the Community Traction Company, Toledo, Ohio. He fills the place of W. L. Milner, who represented the city's stock and bond interest in the company.

Line Bought.—At a special master's sale at Phillipsburg, N. J., on Nov. 3, the property of the Northampton, Easton & Washington Traction Company operating between Phillipsburg and Washington, N. J., and which has been in the hands of a receiver, was purchased by an attorney for the bondholders for \$25,000.

Sale of Carhouse Postponed.—The sale of the carhouse owned by the New York Railways located between Thirty-second and Thirty-third Streets and Fourth and Lexington Avenues, New York, N. Y., which was to have been auctioned off at the County Court House a few days ago by Joseph P. Day, has been postponed until Nov. 20.

Property Reorganized.—It is announced that the Pottstown & Phoenixville Street Railway Company, Pottstown, Pa., has been reorganized, with John J. Tyler, president; C. Taylor Leland, secretary and general manager; Charles W. Rambo, treasurer, and Harry Swinehart, superintendent. Several improvements to the property are contemplated at once.

Hearing Held on Discontinuance.—On petition of the receiver for the Northern Massachusetts Street Railway, Athol, Mass., the State Public Utilities Commission gave a hearing on Nov. 10

on the proposed discontinuance of the Athol and Orange track in West Main Street, Orange. Suspension is sought owing to the small amount of traffic at that end of the line.

Additional Bonds Authorized.—The Public Service Commission has authorized the Southern New York Power & Railway Corporation to issue \$300,000 additional first 6s, due April 1, 1928, to be sold at not less than 85 and interest. The Associated Gas & Electric Company has underwritten the issue and agreed to take an additional \$200,000 when the approval of the commission is obtained.

Property Sold.—The Asheville & East Tennessee Railroad, which operates between Asheville, N. C., and Weaverville, Tenn., was sold on Oct. 23 by an order of the Superior Court to Morrison & Risman Company of Buffalo, N. Y. The price was \$15,500. It is said that the new owners intend to dismantle the railway and sell the property piecemeal, if the sale is confirmed by the court.

Dismantling Road.—Workmen are engaged in tearing up the rails of the interurban branch of the Cleveland & Erie Railway which operated between Erie, Pa., and Conneaut, Ohio. The work of dismantling has been under way for several days, and while it is in progress a number of bus line operators have made application for a franchise to operate between the two cities. The line had been operating twenty years.

Seeks to Abandon Line.—The Boise Valley Traction Company Boise, Idaho, recently applied to the Public Utilities Commission for permission to abandon permanently its Tenth Street line, to build two blocks of new track and to acquire the Eighth Street line from the Boise Street Car Company. The commission authorized temporary abandonment of the Tenth Street line last June. The city has given its approval for the building of the new line.

Sale Approved.—Sales of the property of the Springfield Terminal & Power Company, Springfield, Ohio, for \$87,000 has been approved by Judge John Weld Peck of the United States District Court at Cincinnati. The property was bid in by Joseph Schoenthal, representing the Central Trust Company, Chicago, Ill., acting as trustee for the security holders. The sale followed the recent bankruptcy action brought against the company by its creditors.

Gold Bond Offering Announced.—Beverly Bogart & Company are offering \$4,000,000 first refunding mortgage 6 per cent gold bonds series A of the Cincinnati, Newport & Covington Railway, Covington, Ky., a subsidiary of the Columbia Gas & Electric Company. The bonds, dated July 1, 1922, and due July 1, 1947, are offered at par and interest. They are callable during the first five years at 107½. A majority of the corporation's \$3,709,000 bonds which matured on July 1 have been exchanged for this new issue.

Agreement Has Commission's Approval.—The Chicago, Aurora & Elgin Railroad, Chicago, Ill., will lease twenty passenger cars and one electric locomotive to Alfred E. Pfahler. An agreement to this effect was recently approved by the Illinois Commerce Commission. The railroad has been authorized to issue and deliver to Mr. Pfahler \$470,000 equipment trust certificates as consideration. The details of the reorganization of the Chicago, Aurora & Elgin property and the plans under which this rolling stock has already been secured have been given previously in this paper.

Preferred Stock Offered.—J. G. White Company, Inc., Spencer Trask & Company and Marshall Field, Gloré, Ward & Company are offering 12,000 shares of 7 per cent preferred stock of the East Penn Electric Company. The price is \$92.50 per share and accrued dividends. This stock has no par value and is redeemable in whole or in part on any dividend date at \$115 per share and accrued dividends. The proceeds will be used for plant extensions. The East Penn Electric owns or controls some public utility properties supplying most of Schuylkill County, Pa., with electric light, power and railway service.

Holdings of Crosstown Bonds Organize.—A committee consisting of Henry W. George, treasurer of the Metropolitan Life Insurance Company, as chairman, John W. Platten and William Carnegie Ewen has been formed in the interests of the holders of the first mortgage 6 per cent forty-year bonds of the Central Crosstown Railroad, New York, N. Y. The committee made this statement: "The properties of the New York Railways, lessee of the properties of the Central Crosstown Railroad, having been placed in the hands of a receiver and the receiver having been ordered by the court appointing him not to pay the principal and interest on said bonds, due Nov. 1, 1922, and the trustee under the mortgage securing the bonds having gone out of existence, the committee has agreed to represent and protect the interests of the holders of the bonds."

Prepared to Absorb Subsidiaries.—Preparations are under way for the absorption by the Interstate Public Service Company, Indianapolis, Ind., of its seven subsidiary corporations said to be worth near \$6,002,000. The Interstate Company will request authority of the Public Service Commission of Indiana for the issuance of \$3,100,000 of securities and authority to assume the \$2,075,000 of underlying obligations or bonded indebtedness of the subsidiaries. The subsidiary properties to be taken into the Interstate Company are the Hydro-Electric Light & Power Company of Connersville, Hawks Electric Company of Goshen, Middlebury Electric Company; Electrical Transmission Company of Northern Indiana; Winona Electric Light & Power Company; Southern Indiana Power Company and Indianapolis & Louisville Traction Railway Company.

Traffic and Transportation

Dallas Case Before Court

Fare Issue Must Be Argued on Its Merits
—City Made Party to Suit
Started by Taxpayer

That the city ordinance passed by the city of Dallas, Tex., on June 24, 1922, extending for one year the 6-cent fare ordinance granted the Dallas Railway should be held inoperative but not void is the substance of an opinion written by Chief Justice George Sargeant of the Fifth Court of Civil Appeals at Dallas. The decision was handed down by that court in the case wherein F. J. Geller, et al., sought by mandamus to compel the City Commission to submit the fare extension ordinance for a referendum vote of the qualified voters of Dallas. The case was decided on appeal from the Forty-fourth District Court of Dallas, which had held that the fare extension ordinance was legally passed by the City Commission and was legally in effect, and that no referendum could be ordered.

NEW FRANCHISE A CONTRACT

As originally entered in the Forty-fourth District Court, complainants in the suit alleged that under the provisions of the franchise granted the Strickland-Hobson interests on Jan. 8, 1917, was a contract entered into between the city and the company whereby the company bound itself to charge a fare of 5 cents during the life of the contract. It was further alleged that the fare ordinance enacted on June 24, 1922, was in effect a franchise grant, and could not become effective except by ratification of the voters of the city in a referendum election and that no emergency existed which warranted the City Commission in enacting the fare ordinance to become effective immediately.

DISTRICT COURT REVERSED

In reversing the decision of the Forty-fourth District Court and in remanding the case to that court for trial on its merits, Justice Sargeant upheld the allegations of the complainant in nearly every important particular.

In summarizing his opinion, Chief Justice Sargeant said:

We conclude that a franchise is not a fixed contract but one subject to constant regulation by the governing body of the municipality granting it; that the ordinance involved in this case was not one granting a franchise but one regulating the rate schedule; that such regulatory ordinance could not go into effect immediately because none of the exceptions creating an emergency existed; that the suspension of the prescribed method of passing ordinances was not required for the immediate preservation of the public peace, health or safety; that the declaration of the Board of Commissioners declaring an emergency existed did not create such an emergency, was not binding and conclusive, but was subject to judicial ascertainment; that the emergency clause in the ordinance in question is void, but that the ordinance itself

is not void but merely inoperative until it shall have been published for the thirty days required by law. And if within thirty days referendum is demanded by the electorate of the city of Dallas in the manner provided in Art. 8, Sec. 2 of the city charter, then such referendum must be held and the ordinance ratified by the people before it will take effect.

Appellant (F. J. Geller) had no adequate legal remedy by mandamus because the declaration of an emergency, coupled with the provision that the ordinance should take immediate effect, cut off his right to file his protest and to proceed under it.

It may be that the proceeds accruing to the company under the 5-cent schedule are wholly insufficient to enable it to make the necessary returns on its investment and properly to carry on its business, but, if such is a fact, this can be shown to the electorate, in whom the power of referendum resides, and the people will see that a just and fair rate is fixed, not confiscatory but adequate.

The judgment of the trial court sustaining appellee's general demurrer and special exceptions is here reversed and this cause remanded to such court for trial on its merits.

Since the development just noted the city of Dallas has been brought into the contest against the 6-cent fare extension granted the Dallas Railway, which extension is being contested by Mr. Geller. The latest move by those opposing the fare increase is the filing of a petition with the City Commission asking that the Dallas Railway be directed to issue a receipt for every 6-cent fare collected and that the 1-cent increase be impounded so that it may be available for refunds to patrons of the traction company in case the 6-cent fare is knocked out. The commission received the petition and referred it to City Attorney J. J. Collins for recommendation.

In the meantime preparations are being made for the rehearing of the injunction case, which was recently reversed and remanded by the Fifth Court of Civil Appeals. The matter was taken to the latter court on appeal when the case was thrown out of court by John W. Pope, sitting as special judge in the Forty-fourth District Court when he sustained the general demurrer filed by attorneys for the traction company. The case was remanded by the Appellate Court for hearing on the issues, and the case will be heard by Judge E. B. Muse in the Forty-fourth District Court.

The Dallas Railway continues to charge a 6-cent fare and is not issuing receipts for fares collected.

Day & Zimmermann Install Weekly Pass at Franklin, Too

Following the installation on Nov. 6 of a weekly pass for the Washington-Alexandria section of the Washington-Virginia Railway, Washington, D. C., reported in the *Electric Railway Journal* for Nov. 11, Day & Zimmermann, general managers of that property, have arranged to try the same plan on the Franklin (Pa.) city lines of the Citizens'

Traction Company. The pass system was started on Monday, Nov. 13, at \$1.25 against a cash fare of 8 cents and a ticket fare of 7½ cents (four for 30 cents). If the pass meets with popular and financial success, it will be applied also to Oil City, which has the same scale of fares.

Rerouting Plan Advanced

This Is One of the Matters Before the Louisville Railway—Transfers Also Considered

Plans are being discussed by the Louisville Railway and city of Louisville relative to rerouting cars and the disposition of one-man cars on several of the smaller lines. Some time ago an agreement was reached calling for the use of about 100 one-man cars, but decision was reserved at that time as to lines on which the new cars would be used. Tentative plans call for rerouting some of the lines and looping them in the downtown district, instead of running them straight through from one side to the other. Nothing definite has been decided upon as yet, and the company isn't ready to discuss the plans.

UNION DEPOT PLANNED

News also broke during the past few days regarding a plan for installation of a union depot or central station in the downtown section for all interurban cars entering the city. At present two stations are now in use. All of the cars going across the river to southern Indiana now leave a station on Third Street, this being the Interstate station. The Louisville Railway handles all of its interurban business from its own station at Jefferson and Green Streets between Third and Fourth. Both stations are small and inadequate, and in the case of the Interstate a good deal of switching is required on a busy street. The company is refusing to discuss this plan at the present time, and won't say whether it has optioned, bought, or even decided on any specific property.

NEW TRANSFER IN PROSPECT

There is also considerable discussion concerning possible use of a new transfer usable on any line, except for a return trip over the line originating. However, the company refuses to comment on this matter. It is one of many ideas advanced, including the sale of weekly or monthly tickets good for unlimited use.

Although Louisville is on a 6-cent ticket fare, or 7-cent cash fare, many 7-cent cash fares are being paid daily. Some people apparently don't want to be bothered with tickets, and some of those who ride only now and then, among them many auto owners, don't care to carry tickets, while the negroes and poor whites except a few of the more frugal never have seemed to care to make a 30-cent investment. It is being shown daily in Louisville that the cash fare of 7 cents is a considerable revenue producer over a ticket fare of 6 cents.

Agreement Carried Out— Fares Reduced

Fares in San Antonio, Tex., were reduced by the San Antonio Public Service Company, which owns and operates the electric railway system in that city, from 8 cents to 6 cents on Nov. 4. This action was taken following an agreement with Mayor O. B. Black and city officials under which the city's jitney control ordinance will be strictly enforced. The jitney ordinance has been tied up in the courts ever since its enactment on Dec. 1, 1921, during which time the jitney drivers have exhausted every legal means at their disposal to prevent enforcement of this ordinance, but the case was decided favorable to the city of San Antonio by the Supreme Court of Texas sitting at Austin on Nov. 1. The ordinance prohibited the operation of jitney buses within the city of San Antonio except on certain streets, and these streets were so designated that jitneys operating on them would not come in competition with the street cars. Six specific routes are established in the ordinance and regulations covering the operation of jitneys are prescribed.

Within one hour after the mandate of the court declaring the ordinance valid had been issued and Mayor O. B. Black had announced that the provisions of the jitney ordinance would be enforced the police had arrested seventy-five drivers of jitneys on charges of violating the provisions of the ordinance. With the enforcement of the jitney ordinance, Mayor Black addressed a letter to the company advising that the jitney ordinance was being enforced and calling on the company to carry out its part of the agreement and reduce fares to 6 cents. The reduction was put into effect immediately.

Steps Toward Permanent Fare Settlement

Steps are being taken by the receiver of the Denver (Colo.) Tramway looking toward a more permanent settlement of the fare situation in Denver. A short time after the appointment of the receiver a petition was filed in the Federal District Court for an injunction to restrain the city from enforcing a 6-cent maximum fare ordinance upon the ground that it was confiscatory. At the preliminary hearing the city claimed that the company was bound to carry passengers under a 5-cent fare provision in its franchise, upon the theory that this constituted a contract.

This contention was overruled by the lower court and the ordinance held confiscatory and a cash fare not to exceed 8 cents or two tickets for 15 cents was permitted to be charged by the court. On appeal, this ruling was sustained by the Circuit Court of Appeals.

The present proceedings are in the same case, but on an application to make permanent the temporary injunction which was granted at the preliminary hearing. The court has entered an order that the case must be ready

for the presentation of testimony on the value of the property not later than March 1, 1923.

Delos F. Wilcox has been retained by the city of Denver as its valuation expert and he is now engaged in inspecting and valuing the company's property, and in connection with this has a copy of the inventory originally brought down to Dec. 31, 1917, and later supplemented to Aug. 31, 1922. A. L. Drum & Company, consulting engineers, Chicago, have been retained by the receiver to handle the details of the valuation.

Morris County Traction New Jersey's First Pass User

New Jersey entered the ranks of users of the unlimited-ride weekly pass on Sunday, Nov. 12, through the leadership of the Morris County Traction Company. This company operates an extensive cross-country and private right-of-way system through a number of small towns, some of which are of suburban and others of more industrial type. The pass is being introduced in two zones at the industrial end of the line, namely, between Wharton and Dickerson Bridge or Kenvil, and Wharton Junction and Rockaway. The cash fare per zone is 7 cents and the corresponding pass for each is sold at \$1.

Before installing the pass the company sent out circulars to its patrons urging their consideration of the merits of the weekly pass, and suggesting that each family have not one but two passes on hand. In the announcement the company said that for the steady, everyday customer the best value can be obtained through the use of the unlimited ride transferable weekly pass.

Will Take Over Erie Passenger Traffic

The passenger service of the Erie Railroad between Bradford, Pa., and Salamanca, N. Y., will be taken over by the Olean, Bradford & Salamanca Railway.

The Erie depot has been leased to the traction company and will be used for the sale of tickets to all points served by the Erie system.

Passenger service on the local branch of the Erie was abandoned during the shopmen's strike owing to an alleged shortage of fuel and promise of early resumption of service was made at that time. Recently, however, announcement was made that an arrangement had been made with the Olean, Bradford & Salamanca Railway to take over the passenger traffic.

Interline tickets will be sold by the company at the Erie station to all points served by or connecting with the Erie Railroad. The regular railroad tariff will be in force through railroad tickets with connections at either Salamanca or Olean. Fare to Salamanca or Olean alone remain at the same rate charged by the traction company.

The traction company's terminus at Salamanca is at the Erie station.

Transportation News Notes

Passengers' Must Call Streets.—All cars of the Los Angeles (Calif.) Railway are to be equipped with signs reading "Please call your street." The company has received many suggestions about this matter.

Vote for Six-Cent Fare Retention.—Voters of Piqua, Ohio, on Nov. 7 voted in favor of continuing the 6-cent fare on the lines of the Dayton & Troy Electric Railway which controls the Piqua Street Railway. The company had announced that it would discontinue service if the 6-cent rate were discontinued.

Arranging for Pass System.—The Valdosta (Ga.) Street Railway is planning to put on sale a weekly pass school ticket good for any number of rides for 50 cents. A weekly transferable pass to sell for \$1 is also under consideration. The company has already received permission from the Georgia Public Service Commission to try these passes out for a period of three months.

Conducts Safety Campaign.—The Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., is conducting a safety-first campaign. As a special inducement for its employees to prevent accidents, the company has offered \$200 to those making the best showing. Two contests, one for city operators and one for interurban operators, have been started. The divisions have been divided into teams and will be scored according to accidents of all types.

Seeks Sunday Tickets.—Asking that Sunday school pupils be provided with street car tickets for Sunday at the same rate as those sold to the pupils of the public schools, Rev. J. P. Anshutz, rector of Trinity Episcopal Church, Tacoma, has written a letter to the Tacoma Railway & Power Company. He recommends a sale of ten tickets for 25 cents good for use on Sunday until 2 p.m. The letter refers to the part the company could play in making available for the children the resources of the churches in the city of Tacoma.

Suggests Safety Stop Lights.—William Jerome Kuertz, street railway director of Cincinnati, Ohio, is investigating the feasibility of a plan proposed by the Cincinnati Automobile Club that cars operated by the Cincinnati Traction Company should be equipped with safety stop lights. Mr. Kuertz said that such a plan is in effect in Cleveland. The system provides for lights of one color while the car is in motion, another while the car is coming to a halt and still another while the car is at a standstill. Mr. Kuertz said that the Automobile Club regards the plan as a big step in the direction of safety.

Personal Mention

Clinton E. Morgan Is Now Vice-President

Arnold Bennett in one of his little homilies says that the path to Mecca is extremely hard and stormy and that the worst of it is "you never quite get there after all." For most people that is, perhaps, true, if they sit in judgment on their own accomplishments, but others often see something accomplished, something done, and a goal reached, where the capable but modest individual himself remains filled with the consciousness of the emptiness of his own attainments.

Fortunately for most of us, others pass judgment in the matter of our achievements. That is just what the directors of the Brooklyn City Railroad have been doing. In consequence they have made General Manager Morgan vice president, saying in effect that their property is well on the road to Mecca. And such certainly appears to be the fact, for the company has recently declared a dividend of 20 cents a share payable on Dec. 15.

The facts speak for themselves. For the year ended June 30, last, the income statement of the Brooklyn City Railroad showed a surplus after all charges of \$1,765,528, equivalent to \$1.47 a share (par \$10) earned on \$12,000,000 of capital stock. For the first quarter of the current fiscal year the surplus after charges was \$460,311.

A REMARKABLE SHOWING, INDEED

This showing is all the more remarkable in the light of the fact that as recently as Oct. 19, 1919, the property of the Brooklyn City Railroad was returned to its owners following a default by the lessee, the Brooklyn Heights Railroad, in the payment of the installment of rent due on Oct. 1, 1919, in accordance with the terms of the lease, which called for annual payments totaling 10 per cent on the stock of the Brooklyn City Railroad.

Only as recently as Jan. 17, 1921, the company began collecting a second 5-cent fare on its Flatbush Avenue line, in order to increase its revenue and preserve adequate service to the public. So rapid has been the recovery of the road since then, however, that the collection of the second fare has now been suspended. This is sound business from the point of view of better public relations, and is in accord with ideas of management expressed previously and publicly by Mr. Morgan. Some of these views Mr. Morgan incorporated in a paper which he read at the recent annual convention of the American Electric Railway Association in Chicago.

It is not on record that Mr. Morgan reduced to dollars and cents in his paper at Chicago the ideas of selling transportation that he has applied in Brooklyn, but the directors of the

Brooklyn City Railroad have now done that very forcefully for him. Incidentally, as stated before, they took occasion publicly to recognize the record that Mr. Morgan has made by electing him vice-president in addition to general manager. Previous to going to Brooklyn in February, 1920, Mr. Morgan received his railroad training on properties in the Middle West. In all Mr. Morgan is the responsible operating official for 525 miles of surface railway track in Brooklyn operated by seven companies.

Duties Rearranged on Columbus, Newark & Zanesville Line

Because of increased duties, F. G. Clunis, who has been serving as division superintendent of the Columbus, Newark & Zanesville traction line, as well as manager of the Columbus Interurban Terminal Company at Columbus, Ohio, has been relieved from the former duties and will devote his full time hereafter to his duties as terminal manager.

E. J. Lemasters, for seventeen years assistant superintendent of the Columbus, Newark & Zanesville line, has been promoted to be division superintendent of the line.

This announcement was made on Nov. 11 by John S. Blecker, general manager of the Columbus, Newark & Zanesville Traction Company. Division offices of that company will be transferred to Newark, while Mr. Clunis will retain the terminal office in Columbus.

The changes were made, according to Mr. Blecker, because it was thought that better results could be secured by having the division offices in Newark rather than Columbus, and because the duties of both offices were becoming so heavy that it was impossible for one man to handle them properly.

Dr. Conway's Book Delayed

Lawrence Chamberlain, of Lawrence Chamberlain & Company, New York, N. Y., chairman of the committee on education of the Investment Bankers Association of America, in presenting the report of that committee at the recent meeting of the bankers in New York said that Dr. Thomas Conway, Jr., has been repeatedly delayed in his literary work. His promised book on "Public Utility Securities" was due last September. The illness of his statistician for a period of months and his own varied engagements have been the leading causes of the delay. More recently the untimely death of Robert M. Stinson has thrown on him, as technical adviser, an unexpected amount of protective committee work. Mr. Chamberlain said that Dr. Conway now hopes to have his book before the committee

by Feb. 1. Dr. Conway is well known in electric railway circles as a consulting expert on fares and finances. He is president of the Chicago, Aurora & Elgin Railroad.

"Jack" Shannahan's Record Reduced to Figures

Tucked away in most unexpected places, sometimes, are the records of what men in industry are doing. Thus a balance sheet or an income statement may contain silent data that are a more accurate record of the measure of a man than any amount of ordinary biographical facts. Everybody in the railway business knows, for instance, that John N. Shannahan, the second vice-president of the American Electric Railway Association, has done a mighty good job in rehabilitating the utility properties at Newport News and Hampton, but few of them have, perhaps, had a really accurate idea of his actual accomplishments along this line. Certainly, they would never learn about them from "Jack" Shannahan himself. He is not that manner of man. But a statement recently issued by a financial house in New York in relation to a block of the common stock of the Newport News & Hampton Railway, Gas & Electric Company, of which Mr. Shannahan is president and operating head, has spread on the record for the benefit of those who care to look beyond the figures the story of the accomplishment of Mr. Shannahan.

EARNINGS PUT BACK INTO PROPERTY

Thus it is learned the company was organized in 1914. Since that time the properties taken over have been welded into an efficiently operated unit with a balance for the twelve months ended Aug. 31, 1922, equal to \$9.62 a share on the common stock. The preferred stock has always been in the investment class, dividends having been paid regularly since its creation. The present common dividend is at the rate of 5 per cent per annum, and the expectation is that the directors will maintain at least this dividend. Moreover, the value of the equity in the property, based on the average reproduction cost during the years 1917 to 1921 inclusive, less depreciation, is equal to \$129 a share of common stock. Incidentally the advertisement offering the stock pays a silent but none the less striking compliment to Mr. Shannahan as a successful public utility operator.

Mr. Burritt with New Motor Transport Association

E. B. Burritt, formerly secretary of the American Electric Railway Association, has been elected manager of the National Motor Transport Association, organized in New York on Nov. 16. The new association will be composed of bus companies operating passenger carrying buses over regular routes. Mr. Burritt has been active for some time in helping to organize the bus men nationally.

New Offices for Monongahela Property—T. R. Norris Promoted

Made effective by an order just issued, the general superintendent of railroads of the Monongahela Power & Railway Company will maintain offices in Fairmont, W. Va., instead of Clarksburg, with a divisional superintendent in charge of the company's affairs in Clarksburg. This order, issued by W. C. Kline, manager of railways, means that J. I. Beals, the general superintendent, will open offices in the Railroad Building in Jefferson Street and conduct his portion of the affairs of the company from that point. It is announced that Theodore Randolph Norris will be the divisional superintendent at Clarksburg.

Mr. Norris has been in charge of the engineering crews of the company in Clarksburg for the past five years, and his promotion will be a popular one, for he is well liked both by the public and his fellow employees. No stranger to the railroad operating game, he has spent much time in the business before going with the local company. He is a native of South Carolina and came to the local system from the Carolina, Clinchfield & Ohio Railway at Erwin, Tenn. He was with an engineering outfit in the world war, doing service at the front.

Mr. Beals has been with the company for a number of years and has resided in Clarksburg.

Sport Writers Turn to Mr. Stigall for Help

E. E. Stigall, purchasing agent of the Kansas City (Mo.) Railways, is declared by sports writers of that city to be one of the most enthusiastic football rooters in that city. In fact, writers there turn to him for "dope," as the rough material is termed out of which stories are made. Mr. Stigall was graduated from William Jewell College at Liberty, Mo., and never misses any of the big college games in that section of the country. Last year he took his vacation during the football season and he made it include the Yale-Princeton and the Harvard-Yale games. So far this year he has seen the Princeton-Chicago game at Chicago, the Oklahoma-Kansas game at Lawrence, Kan., and the Nebraska-Kansas game, also at Lawrence. He also expects to see the Yale-Princeton and the Harvard-Yale contests.

Barron G. Collier, Deputy Police Commissioner

The Department of Public Safety, the newest branch of the New York city government, opened on the morning of Nov. 13 at Police Headquarters under the direction of Barron G. Collier, Special Deputy Police Commissioner, who will have charge of the work to decrease the hundreds of avoidable accidents in this city every year.

Mr. Collier has a staff of expert safety men, including Marcus Dow,

who is president of the National Bureau of Safety and head of the safety service of the New York Central Railroad; Frederick J. Hall, formerly with the Habirshaw Electric Cable Company, and Police Lieut. Edward Walsh. Mr. Walsh said:

Without the understanding of the people generally and without the co-operation of the press and of the people we cannot most quickly and effectively achieve the purpose of this bureau. Chiefly we are looking to the homes and to the individual members of families for help in making New York the safest city in the world.

The majority of accidents in this city—accidents which took the appalling total of 3,483 human lives last year—are due to easily preventable causes, chief of which is individual carelessness. It is toward the abatement of individual carelessness that our people and this department of safety must first devote their thought.

Be cautious and alert and you will be safe.

Makes Plan for Fate of Utilities

Public utilities, traction companies especially, are menaced today by some of the restrictions and regulations imposed on them by the government, and many of them have failed and defaulted on their bonds because of such conditions, John S. Bleecker, general manager of the Indiana, Columbus & Eastern Traction Company, Cincinnati, Ohio, declared in an address in Springfield, on Nov. 7.

Approximately \$15,000,000,000 is invested in public utilities of the country, the meeting was told. To impress his hearers, Mr. Bleecker compared this sum with the national debt of \$23,000,000,000. Of the total invested, approximately one-fifteenth, he said, is invested in Ohio utilities.

The speaker made a plea that his hearers take greater interest in the fate of the utilities, emphasizing that practically every person in the country was hit when utilities were unable to operate at a profit.

J. S. Pevear has been appointed co-receiver of the Birmingham Railway, Light & Power Company, Birmingham, Ala., with Lee C. Bradley. Mr. Pevear has been in active charge of operation of the Birmingham property since 1916. At one time he was president of the New Orleans Railway & Light Company.

Hugh Smith, superintendent of the Pinawa hydro-electric plant of the Winnipeg (Man.) Electric Railway, has left the company's employ after several years of service. He has gone to Vancouver Island, B. C., where he has started business for himself. C. Ferguson, who has been in the company's electrical department for some time, has taken Mr. Smith's position at Pinawa.

S. A. Lane, known among most of the people in Arkansas as "Gus," the general manager of the Bell Telephone Company in Arkansas and one of the most popular and influential young men in the State, was recently honored by being elected the head of the Arkansas Association of Public Utilities. His election took place at the close of its fifteenth annual session in Hot Springs, Ark.

S. Wilkins has resigned as engineer of maintenance of way and structures with the Winnipeg (Man.) Electric Railway after fifteen years of service with the company. Mr. Wilkins has gone to the Pacific Coast and has not made any definite plans regarding the future. His successor with the company has not yet been appointed.

S. H. Anderson, in addition to his duties as electrical superintendent of the Pacific Electric Railway, Los Angeles, Calif., has been appointed acting mechanical superintendent, vice Fred F. Small, who has been temporarily assigned to the study of problems in connection with single units for use on street car lines and on Southern Pacific lines where the present returns are not satisfactory.

M. A. Welsh, superintendent of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., recently wrote a suggestion to the Ford Car Company that it instruct its demonstrators to emphasize the necessity of exercising care at railroad crossings when they are explaining the car to a purchaser. It is Mr. Welsh's belief that impressions made on the "new" automobilist will prove lasting. The *Ford News* of Nov. 1 contains a reprint of Mr. Welsh's suggestions.

Obituary

Robert F. Andrews, one of the pioneers in the Ohio electric interurban industry, died recently at the age of sixty at his home in Cleveland Heights. In recent years Mr. Andrews was not identified with the electric railway business, but twenty-five years ago he was active in and around Cleveland and East Liverpool in promoting and operating some of the first interurbans in those sections. Besides his wife, Mr. Andrews is survived by two sons and two daughters.

Luke Robinson, who was superintendent of the Montreal Park & Island Railway from 1895 to 1900, died on Nov. 11 as a result of injuries received when he was run down by an automobile in White Plains, N. Y. Mr. Robinson left Montreal in 1900 and went to Paris to work on street railways in the suburbs of the French capital. In 1903 he returned to the Montreal Street Railway as general superintendent, which position he held until he received an appointment as general manager of the Dallas (Tex.) Street Railway. The owners of that railway, who were also interested in Standard Varnish, later took him into the Varnish Company. When he left them about three years ago he had charge of the insulating section of the business. He then went into business for himself in New York. His whole career, in fact, had been one of progress and advancement, he having risen from a platform employee of the railway system at London, Ont.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Power Plant Improvements Going Forward

The Louisville (Ky.) Railway is steadily improving its Riverside power plant, and eventually will discard the old station on Campbell Street, and produce all of its power at the Riverside plant, at a considerable reduction in operating costs.

Just recently the company moved two 500-hp. B. & W. water-tube boilers to the Riverside plant from Campbell Street, and installed Westinghouse underfeed stokers to supply these two with fuel. The plant already had eight 500-hp. boilers at Riverside, these having chain grate stokers. The present big battery of ten 500-hp. boilers operates two 6,000-kw. units.

The eight boilers already in operation were hooked up to one large smokestack. The company has just recently completed a second brick stack, 16 ft. at the bottom, 209 ft. high. It was installed by Heinicke, New York and Indianapolis. New soot blowers, meters, new boiler feed pumps, etc., were installed. Surface condensers are used for all condensation at the new plant.

This new stack is equipped for taking care of eight boilers, the same as the first stack. The company may shortly move two more boilers from the Campbell Street house and attach them at the Riverside plant. It still has eighteen boilers, all of 500 hp., left in the old plant. Plans call for eventually placing two more steam turbines in the Riverside plant. One of 3,500-kw. capacity will be moved from the old plant, and another will have to be bought.

At the present time the Riverside plant is carrying about 80 per cent of the twenty-four-hour output of current and about 60 per cent of the peak loads, the old station coming in on the peaks and in emergencies.

It may be some time yet before the company completes its plans for bringing all of its power together in the one plant, and dismantling the old plant entirely. However, the enlarged newer station could be operated at a big saving to the company. When the new plant was built some years ago it was planned to move the old plant equipment gradually, but then with the war and high prices, along with small earnings and inability to secure an advanced fare for some years, the company was forced to sidetrack all of the plans which it had made.

The Riverside plant is conveniently located as to water as well as rail and river shipments, and can handle its coal very economically. At present other than surplus yard stock of some three months supply carried at all times, the company dumps cars direct to hoppers,

from which small cars carry it to the feed bunkers. Loading from yard stock to hoppers is now done by portable conveyors, but eventually a locomotive crane will be installed in the plant for this purpose.

Extensive Track Work Undertaken in Minneapolis and St. Paul

Seasonal track work by the Twin City Lines (Minneapolis and St. Paul, Minn.) has included numerous extensions of existing lines with standard construction and granite block, concrete or tarvia paving; readjustment of some tracks to grade with paving, renewal of expensive layouts and of railroad crossings, also renewal of wood ties on some unpaved streets. In all 1,100 tons of steel were laid in 1922. The standard construction is 93-lb. T-rail.

Memoranda of the work for the season includes:

Johnson Street from Broadway to 18th Avenue NE., double track replaced with standard construction and paved with first class granite on concrete foundation; $\frac{3}{4}$ mile. Chicago Avenue, Thirty-ninth to Forty-fourth Streets, same type of reconstruction paving, 3,300 ft.

Tenth Avenue SE., Eighth Street to Como Avenue, same class of work, 500 ft.

West Broadway, Girard to Second, Logan Avenues, double track renewed, granite blocks, 3,000 ft.

Nineteenth Avenue line, on Morgan Avenue, West Broadway to Nineteenth Avenue, on Nineteenth Avenue to Upton Avenue, 3,400 ft. double track, several blocks dirt on concrete paving, new line ready Dec. 1.

Johnson Street, Eighteenth to Twenty-fifth Avenues NE., readjusted to grade, concrete paving, 2,600 ft.

Johnson Street, Twenty-fifth to Twenty-ninth Avenues, readjusted to grade, tarvia paving, 2,550 ft.

Minnehaha Avenue, Franklin Avenue, to East Twenty-fifth Street, and on Twenty-fifth Street, Minnehaha Avenue to Thirty-sixth Avenue, tracks readjusted and paved with concrete, about 7,600 ft.

Important special work layouts and railroad crossing at Twenty-seventh Avenue and Twenty-seventh Street, at Bloomington Avenue and Lake Street, First Avenue N. and Sixth Street, First Avenue N. and Fifth Street, Hennepin Avenue and Sixth Street, Bryant Avenue and Thirty-eighth Street, Lyndale Avenue and Lake Street, Hennepin Avenue and Lake Street.

On 5,300 ft. of street railway tracks have been laid to side of street to make room for sewer work, then replaced.

The company has constructed and operated since Sept. 11 two short extensions aggregating 2,700 ft. of double track, on Chicago Avenue, Forty-sixth to Forty-eighth Streets and on Thirty-eighth Avenue N. Penn to Thomas Avenues.

A considerable amount of maintenance work has been performed, some of which, such as repairs to track and paving on different streets, had accumulated from previous years. One of the most extensive of these jobs was relaying a large amount of creosote block paving on Hennepin Avenue between Summit Avenue and Thirty-first Street, about $\frac{1}{2}$ miles of double track. Repairs have been made on other streets amounting in the aggregate to a large amount, but nothing so exten-

sive has been found necessary as was required on Hennepin Avenue, where conditions have clearly demonstrated to the engineering department the failure of creosote block paving as a material to utilize in street railway tracks.

In St. Paul about $\frac{1}{2}$ miles of double track were rebuilt with 93-lb. rail from Victoria Street to Nina Avenue. Incidental to this channels for cable equipment had to be removed, a laborious task due to the character of the cement used in setting them.

Tracks were readjusted to grade on Randolph Street for 2 miles, Snelling Avenue to West Seventh Street, two-thirds of which was paved with tarvia macadam, and one third concrete.

Copper Price Trend Upward

Copper prices have moved within narrow limits. The tendency, however, has been slightly upward. Most producers are asking 13 $\frac{3}{4}$ cents to the end of the year, with the result that 13 $\frac{1}{2}$ -cent copper has been difficult to get. The volume of buying has been good. Price of electrolytic copper for domestic shipment is 13 $\frac{3}{4}$ to 13 $\frac{1}{2}$ cents a pound delivered to end of January and 13 $\frac{1}{2}$ to end of April. Price of Lake copper is 14 cents a pound delivered to end of January. Price aside ship New York is 13.70 cents. Prices for European destinations are at levels corresponding with 14 cents c.i.f. Hamburg or London.

Foreign and domestic sales of copper for October are estimated at 110,000,000 to 120,000,000 pounds. This compares with estimated sales of 130,000,000 pounds in September, 100,000,000 in August, 125,000,000 for July, 140,000,000 for June and 210,000,000 pounds for May.

Total sales for last six months are estimated at 820,000,000 pounds, or an average of 135,000,000 pounds a month. Shipments during the last six months have averaged better than 160,000,000 pounds a month.

It is explained that the difference between sales and shipment averages is due partly to conservatism of estimates, but mainly to the fact that sales during the first five months of the year were considerably higher than shipments, making a considerable advance buying that appeared as shipments during the last six months.

Metal, Coal and Material Prices

Metals—New York		Nov. 14, 1922
Copper, electrolytic, cents per lb.	.....	13.875
Copper wire base, cents per lb.	.....	15.625
Lead, cents per lb.	.....	7.05
Zinc, cents per lb.	.....	7.65
Tin, Straits, cents per lb.	.....	36.75
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	.....	\$7.125
Somerset mine run, Boston, net tons.	.....	3.75
Pittsburgh mine run, Pittsburgh, net tons	.....	3.37
Franklin, Ill., screenings, Chicago, net tons	.....	2.625
Central, Ill., screenings, Chicago, net tons	.....	1.87
Kansas screenings, Kansas City, net tons	.....	2.50
Material		
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	.....	6.50
Weatherproof wire base, N. Y., cents per lb.	.....	16.00
Cement, Chicago net prices, without bags	.....	\$2.20
Linseed oil (5-bbl. lots), N. Y., cents per gal.	.....	90.00
White lead, (100-lb. keg), N. Y., cents per lb.	.....	12.125
Turpentine, (bbl. lots), N. Y., per gal.	.....	\$1.57

F. F. Rohrer Made General Contract Manager of Westinghouse Company

F. F. Rohrer, assistant to the manager of both the power and the railway departments of the Westinghouse Electric & Manufacturing Company, has been appointed general contract manager of that company. Mr. Rohrer will hereafter be a member of the staff of W. S. Rugg, general sales manager.

In his new position, Mr. Rohrer assumes responsibility for service to customers under contracts and will have general supervision of all contract and order work of the company. In addition to this general work, he will continue to have direct charge of the contract work of the power and the railway departments, which duties he performed in his previous position.

Mr. Rohrer was born in Harrisburg, Pa., on April 22, 1876. He entered the employ of the Westinghouse Company as a student in 1896. After serving in the shops for four years, during which time he obtained extensive training in the manufacturing and the testing departments, he was transferred to the sales department. His services in the latter department have included a number of positions of responsibility.

During the world war Mr. Rohrer was a member of the Committee of the War Industries Board appointed to conserve the production of turbine-generating equipment for government needs. After the armistice was signed he became the representative of the Westinghouse Company in the settlement of contracts which were terminated as a result of the ending of the war. When this work was completed he served in the capacity of assistant to the managers of both the power and the railway departments, which position he held until his present appointment.

Manufacturers' Association to Meet

The fall meeting of the Stoker Manufacturers' Association will be held at The Homestead, Hot Springs, Va., on Nov. 21-23 inclusive. Committee reports and addresses will feature the sessions. Golf tournaments will be the main diversion.

Rolling Stock

Altoona & Logan Valley Electric Railway, Altoona, Pa., will soon receive a number of newly built one-man cars of the double-truck type.

Ashtabula, Ohio.—A bond issue of \$60,000 has been approved to be used to purchase new cars and otherwise improve the municipally-owned traction system.

Track and Roadway

Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, received permission from the Willard City Council on Nov. 6 to lay a Y in Woodland Avenue at city hall.

Los Angeles (Calif.) Railway will soon start on a big construction job involving intricate special work at the Temple Block and Plaza. Another construction of importance is the double tracking of a part of Temple Street line west of Park View.

Berkshire (Mass.) Street Railway is replacing 9 in. with 6 in. rails in West Street, Pittsfield, because the one-man cars do not require such heavy rails. In connection with repaving operations the tracks in New West Street and on the curve at the junction with West Street are being moved to the west side of the street.

Public Service Railway, Newark, N. J., is laying double trolley tracks on the White Horse Pike, between Park Avenue, Collingswood, and the city line, for the contemplated rerouting of the Haddon Heights branch. When the work is completed the cars will run down Haddon Avenue and White Horse Pike to the cut-off now being built by the company.

Power Houses, Shops and Buildings

United Electric Railways, Providence, R. I., will take bids shortly on the erection of a one-story 535-ft. x 170-ft. brick and steel carhouse on North Broadway, in East Providence. The authorities have issued the building permit and preliminary work is now being done by the company.

Cincinnati, Milford & Blanchester Traction Company, Cincinnati, Ohio, has been awarded the contract to furnish Blanchester and adjoining villages with light and power. Work will be started on 9 miles of new electric line between Newtonville and Blanchester to connect with the Blanchester city line, on Dec. 1. The traction company's power plant is located at Milford.

Interstate Public Service Company, Indianapolis, Ind., operating the interurban line between Louisville, Jeffersonville and Indianapolis, will join with the Louisville Railway in building a union interurban station for use of all electric roads entering Louisville. The Louisville Railway owns a number of traction lines besides the city street railway. The street railway and most of the interurban lines out of the city are built to wide gage whereas the Interstate and one or two other lines out of Louisville are built to standard gage.

Fort Wayne & Northwestern Railway, Kendallville, Ind., has decided to close its power plant at Kendallville and purchase power from the Indiana Service Corporation, of Fort Wayne. The company believes that the expense of overhauling its plant would be too great. The Kendallville plant will be closed in about two months. Towns along the line will be supplied with electric current as heretofore, but twenty-four-hour service will be given instead of twenty-hour service as formerly. The arrangement includes the lighting of the city of Auburn.

Trade Notes

Johns-Pratt Company, Hartford, Conn., announces the appointment of George Saylor as Western sales manager, electrical division, with headquarters at 36-37 South Desplaines Street, Chicago.

Detroit (Mich.) Stoker Company announces the appointment of R. L. Beers as chief engineer. He will be in direct charge of the design and application of the company's single retort and multiple retort underfeed stokers. Mr. Beers has been associated with the Underfeed Stoker Company of America as testing engineer and as assistant chief engineer.

L. A. Christiansen, vice-president of the Corporation Service Bureau, Cleveland, Ohio, has been commissioned to make certain investigations in regard to tramway conditions in the European countries. Incidentally Mr. Christiansen's trip will enable him to visit his old home in Norway after an absence of thirty-six years. Mr. Christiansen has booked passage and is sailing on Nov. 24.

The Florandin Equipment Company, New York, N. Y., which is New York representative of the Conveyors Corporation of America, Chicago, is also representing the Perfection Grate & Supply Company, Springfield, Mass., manufacturer of hand stokers and soot cleaners. C. H. Florandin, of this sales organization, has a wide acquaintance among the power plant engineers of New York and New Jersey, and, no doubt, will be successful in handling the new line.

Link-Belt Company, Chicago, Ill., announces the promotion of W. W. Sayers to the position of chief engineer of the company's Philadelphia works and Eastern operations. For many years Mr. Sayers was a popular representative of the company in its Chicago territory, in the lines related to power house machinery, coal storage, Peck carriers, crushers, etc., and later in charge of the locomotive crane department. His headquarters will be at the Philadelphia office for the future.

New Advertising Literature

Electric Service Supplies Company, Philadelphia, Pa., has issued a new circular, No. 186, describing the Keystone overhead material.

R. D. Nuttall Company, Pittsburgh, Pa., has published Bulletin No. 35, a nineteen page booklet describing Nuttall products for electric railway service.

St. Louis Car Company, St. Louis, Mo., has issued Catalog No. 101 describing and illustrating a number of the latest types of seats manufactured in the shops of the company for city, suburban and interurban cars. Bulletin No. 102 has also been issued covering the St. Louis No. 7 single truck for safety cars.

PEACOCK



BRAKES

Heavy Electric Traction

America's leading traction systems are equipped with **PEACOCK IMPROVED BRAKES**

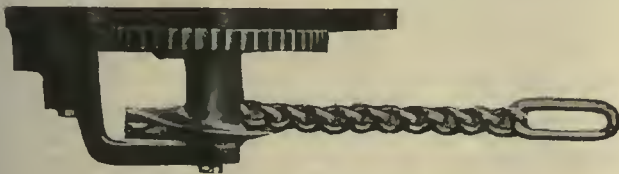
On one of the fastest and finest interurban systems, the Chicago, North Shore & Milwaukee Railroad, and on one of the newest and biggest subway lines, the New York Municipal Railway, Peacock Improved Brakes are installed on every car.

These lines have the most improved and reliable air brake equipment on the market. But the engineers responsible for designing and operating these cars were fully aware that for the auxiliary or emergency hand brakes, only the best should be used. And, after thorough investigation of all that the market offered—they specified *Peacock Improved Brakes*.

For your new cars or for the old ones you are planning to rehabilitate—order Peacock Brakes.

National Brake Company Inc.

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 prices, a mention of the Electric Railway
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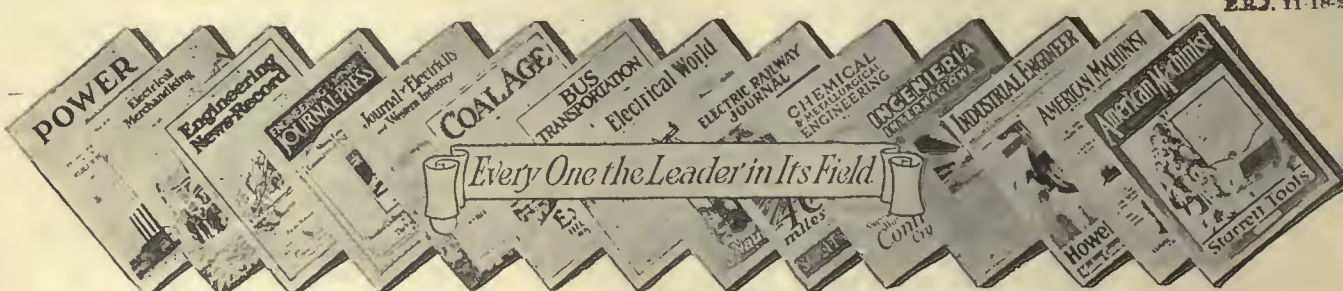
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Fibre Conduit offers several important installation economies.

For example: SPEED. A trench 1500 feet long can be opened, conduit laid, concrete poured, and the trench back filled in one day.

Consider what this means in reduced costs, reduced obstruction of highways and reduced liabilities.

From 12,000 to 15,000 duct feet of Fibre Conduit can easily be laid in one working day.

Furthermore, the Fibre Conduit, by reason of its flexibility, readily adapts itself to curved streets, grade changes and other special requirements.

Orangeburg is the only conduit which permits the interposing of a concrete fire-resisting barrier between adjacent cables.

Plan for Fibre Conduit.

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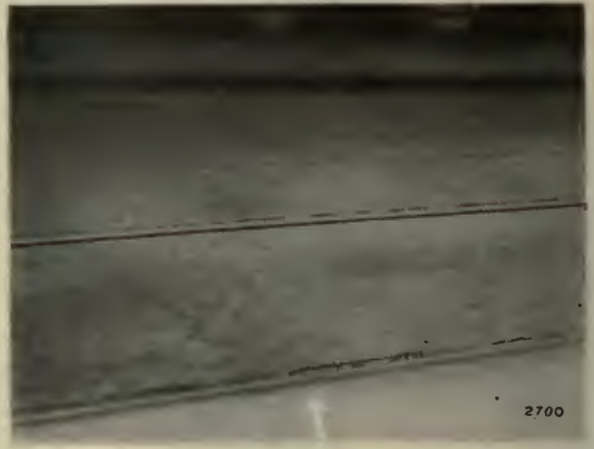


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Carson Street, Pittsburgh, where Thermit Insert Welds have recently been installed. This city has many miles of Thermit track, some sections having welds ten years old and still in excellent condition.



Unretouched illustration of a Thermit Weld installed in Carson St. Puzzle, find the Weld! (See arrow at lower central part of picture.)

Rail Joints—

“When They’re Bad They’re Just Horrid!”

A maintenance-of-way engineer “rang the bell” recently when he declared that rail joints were like the proverbial little girl

*“Who had a little curl
Right in the middle of her forehead.”*

In other words, when they’re bad they’re “just horrid!”

Rail joints and the costs of maintaining them will always be just “horrid” unless you eliminate them by means of

THERMIT INSERT WELDS

Give a continuous running surface to the rail and make the joint last fully as long as the rail.

An inspection of the earliest Thermit Insert Welds installed in Milwaukee, Pittsburgh, San Antonio and Youngstown cannot fail to convince you that

“The First Cost is the Last Cost”

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“ACME” (NESTABLE) CORRUGATED METAL CULVERTS

Water has been running through this “ACME” (Nestable) Corrugated Culvert since 1911. And it has been subjected to extreme changes in temperature, as it is located at Monmouth, Maine. Yet neither the water nor the zero weather have had much effect on it, as it is still in good condition.

Such long service is typical of all “ACMES.” Made of anti-corrosive Toncan Metal, they endure! Strong enough for any culvert service—with or without end walls—under deep or shallow fills—under railroads or highways. Write for folder M-21.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
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What are YOU going to do



The Cause



The Result



The Permanent Cure



The Finished Job

DAYTON

with that bad piece of track?

Is there any item of expense that causes more "grief" than maintenance of roadway?

And is it any wonder when, year after year, over and over again the shimming of low and battered joints takes its annual toll of the profits.

The repairs shown on the page opposite, cost but little more than "temporary" repairs—they postpone rebuilding for six or seven years and they cause no interruptions to traffic while being put in. Resilient Joint Boosters are fast replacing former methods simply because they

have proven entirely satisfactory. They have added years of life to old track and materially reduced the expense of roadway upkeep.

The price of \$4.50 for a joint "Booster" is a small item, since the chief expense of repairing a bad joint is the tearing out of the old pavement and replacing it.

If you are not already using Joint Boosters better ask for complete data. Write today—the time is approaching when you will have to decide what you are going to do with that bad stretch of track.

The Dayton Mechanical Tie Co.

708 Commercial Building

Dayton, Ohio



Resilient
JOINT BOOSTER

Answering Emergency Calls in Brooklyn with a Rail Welding & Bonding Dynamotor

Reprinted from Electric Railway Journal September 16, 1922.



THE B. R. T. WELDING AND GRINDING APPARATUS READY FOR WELDING

Taking the Arc Welder and Rail Grinder to the Job

This Automobile Welding Equipment Recently Assembled in Brooklyn Provides for Speed in Dispatching the Apparatus to the Line

ONE of the more recent developments in the use of the arc welder in the repair of defective joints and special trackwork has been along the lines of portability. The portability feature was necessary so that sites of emergency repairs could be reached more quickly than can be done under the customary scheme of hauling the individual welder to the job.

Under this scheme it is necessary to haul the equipment from job to job, which in turn requires careful routing of an automobile to haul the equipment about and later requires the additional haulage of grinding equipment. Where emergency arc-welding repairs are needed, this all consumes a great deal of time and there is considerable lost time due to delay because of the difficulty closely to follow the welding work with the necessary grinding work. The latter should be done immediately, if the best results are to be obtained in the repairs to cupped joints or to defective parts of special trackwork.

The automobile welding equipment shown in the accompanying views was assembled by the way and structures department of the Brooklyn Rapid Transit System, in order to facilitate the work of emergency repairs. The equipment consists essentially of a 1½-ton Ford automobile having an Olsen extension and carrying a body which was designed by the surface track division under the general supervision of C. L. Crabbs, chief engineer of way and structures.



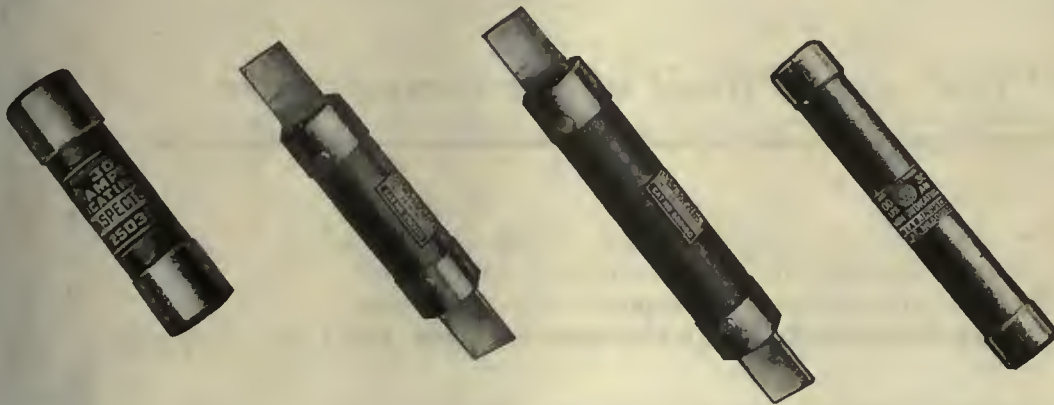
B. R. T. EMERGENCY WELDING AND GRINDING OUTFIT READY TO MOVE

Removed from its usual running gear, a Type "W" Rail Welding & Bonding Company dynamotor welding outfit is mounted on special supports on the truck body immediately back of the cab. There is space between the welder and the tailboard of the truck body for the special swing-frame-type grinding equipment, which has been developed in Brooklyn for the particular needs of grinding special trackwork and minor welds at joints.

The sides of the truck are removable and are made to act as skids upon which to load and unload the grinding equipment. One of the views shows a block and tackle, temporarily installed for assisting in loading the grinder, but the outfit is now equipped with a small winch which better serves this purpose. The auto driver acts as a helper for the welder man, making a crew of two required to operate the outfit.

RAIL WELDING & BONDING CO., Cleveland, O.

EVERY FUSE TESTED
NOARK
 EVERY FUSE APPROVED



Worthy of their name—and of your trust

Noark NON-INDICATING FUSES are new-comers to the Noark line.

But they are every whit worthy of their name—and of your trust. The one thing connotes the other.

Noark Fuses will never be cheapened at the expense of quality.

You cannot buy a Noark Fuse designed for service where protective equipment of another type should be used.

But you can buy a Noark Fuse designed to serve every purpose for which fuses should be used. And in such service you can rely absolutely on the *dependable protection* afforded by Noark Fuse performance.

Whether your requirements are for fuses of 1 ampere capacity or 1,000 amperes—fuses for a 6-volt automobile lighting circuit, 110-volt house lighting service, a 220, 440 or 600-volt power line, a 2200, 4400, 6600 or 13,000-volt transmission line—or any other standard voltage, amperage or class of service—there is a Noark Fuse exactly adapted to your requirements.

Noark Fuses are made with ferrule contacts, knife-blade contacts, post contacts, flush contacts, variously modified for differing service applications, and are supplied in all ratings desired with these respective types.

Noark service is *your* service for every electrical protective problem.

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The New CONSOLIDATED Visible Thermostat

The "just-right" limit of car temperature

Switches the current off the instant interior temperature reaches the pre-determined upper limit. Relieves the trainmen of responsibility and blame. Does automatically what the men so often fail to do.

Visible to everyone—an effective deterrent to breakage through ignorant curiosity or maliciousness.

Sensitive in Operation—Rugged in Construction

A carefully worked-out design, combined with accuracy and perfection of workmanship, render this new Consolidated Visible Thermostat unusually quick and correct in its action.

An important improvement is the new method of supporting the thermometer tube in a way that gives it complete stability and firmness, yet leaves it sufficiently resilient to absorb, without disturbance, the shocks and vibrations of street car service.

Unrestricted visibility with perfect protection is furnished by an outer casing of heavy Pyrex Glass.

Heretofore, the separation of the mercury in the tube of the non-visible types of thermostat has been a serious difficulty, as it is hard to detect. In this new visible type, this defect is noted at once and easily corrected.



This is a real forward step in economical and efficient car heating equipment. Investigate it now.

Consolidated Car Heating Co.

Albany, N. Y.

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Coaticook, Que.





A lot of little power plants on the road

—that is what you have with a bus line

That is why bus operation demands a rigid system of inspection of each unit and careful attention to those details that might shut down one or more of those "little power plants," or cause waste or multiplied loss of power all along the line.

As you are well aware,, one of the most important of these details is *lubrication*.

Therefore we urge that you standardize on TEXACO Motor Oil for bus engines.

With all the conviction at our command, we want to ask you to try TEXACO Motor Oil, check up repairs, mileage and operating expense.

We know Motor Oils

The clear, clean, golden colored, full-bodied TEXACO Motor Oils we have been turning out year after year is eagerly demanded by hundreds of thousands of automobile operators.

Many large fleet owners have, after tests, decided to use only TEXACO Motor Oil for their trucks. Bus operators are following them rapidly.

They find that it pays in oil consumption, in power, in absolute freedom from hard carbon and, at this time of the year specially because its unequaled low cold test makes for easier starting and positive operation in worse than zero weather.

And there's this about TEXACO MOTOR OIL—

wherever you buy it, in any State in the Union, at any time of the year—in barrel, drum, or tank car it is always the same.

Let us quote you on TEXACO Motor Oil. You will find the initial cost interesting and the resulting operating expense gratifying.

Then, too, you will be interested in TEXACO Gasoline, the uniform, high-powered volatile gas; the gasoline that insures instant starting, quick pick-up, flexibility of acceleration and economy in operation.

A bus using TEXACO Motor Oil to save power and bearings and TEXACO Gasoline to develop that power, is a better bus.

What we have done in the way of cutting costs of operation on thousands of street cars, we can duplicate on the buses of this country.

Talk to any official on any of the large number of roads using TEXACO Lubricants and TEXACO Service and you will be assured that TEXACO does what it says.

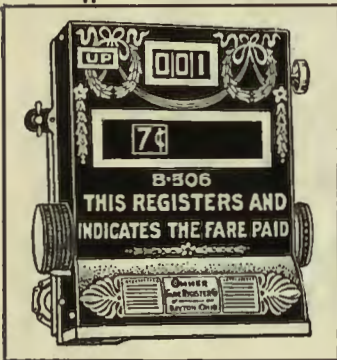
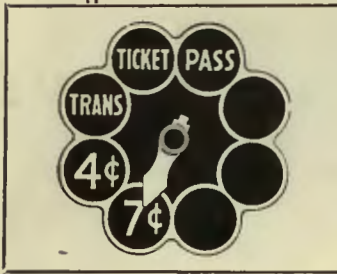
And that is the policy that has pushed TEXACO to the forefront and the lubrication of Street Railways.



THE TEXAS COMPANY
DEPT. R-J, 17 BATTERY PLACE, NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES



OHMER FARE REGISTERS



No retail merchant tries to do business in this day and generation without an indicating and recording cash register. His business is made up of many small sales and each sale must be carefully protected or insidious losses are sure to creep in.

Ohmer Fare Registers apply the same effective protection to the business of selling electric railway transportation. Ohmer Fare Registers indicate the exact fare paid at the time it is paid and makes a printed, untamperable record of it.

Ohmer Fare Register Co.
Dayton, Ohio

Time	Direction In Out	7c	4c	Transfer	Ticket	Pass	Register Number	Date	Inspector No. 5	
* * *	1.	1 4 4 8	1 2 2 2	1 2 8 2	1 1 8 1	1 3 5 7	3108	MAR 14	INSB	
4	3 5P	1 4 4 8	1 2 2 2	1 2 8 2	1 1 8 1	1 3 5 7	3108	11 9	28	
3	4 5P	0.	1 4 4 0	1 2 1 7	1 2 8 0	1 1 7 9	1 3 5 6	3108	11 8	28
2	4 4P	1.	1 4 3 7	1 2 1 5	1 2 7 0	1 1 7 7	1 3 5 3	3108	10 7	28
1	3 6P	0.	1 4 2 9	1 2 1 0	1 2 6 7	1 1 7 4	1 3 5 2	3108	9 6	28
12	2 4P	1.	1 4 1 4 3 4	1 1 9 9 2 3	1 2 6 2 2 0	1 1 6 3 1 2	1 3 4 8 9	3108	9 5	28
12	2 4P	1.	1 4 1 4	1 1 9 9	1 2 6 2	1 1 6 3	1 3 4 8	3108	9 5	15
11	2 7A	0.	1 3 9 4	1 1 9 2	1 2 5 0	1 1 5 2	1 3 4 6	3108	9 4	15
10	3 4A	1.	1 3 8 0	1 1 9 0	1 2 4 3	1 1 4 9	1 3 4 4	3108	7 3	15
9	2 3A	0.	1 3 7 1	1 1 8 3	1 2 3 6	1 1 4 3	1 3 4 2	3108	7 2	15
8	3 3A	1.	1 3 5 3	1 1 7 5	1 2 3 1	1 1 3 7	1 3 3 7	3108	7 1	15
* * *	1.	1 3 5 3 6 1	1 1 7 5 2 4	1 2 3 1 3 1	1 1 3 7 2 6	1 3 3 7 1 1	3108	MAR 14	INSB	
Hours	Minutes A.M. & P.M.	95	47	57	44	20				
				Divisions over which car operated	Trip Numbers		Conductors No. 15 & 28			

15,000 gallons of oil a year saved with one De Laval Oil Purifier



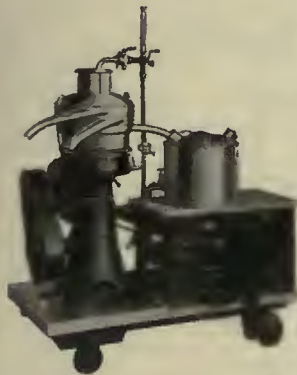
De Laval Oil Purifier

A street railway company in the Middle West was losing 15,000 gallons of oil a year in the waste removed from car journals. A centrifugal extractor was installed to squeeze the oil out of the waste. A De Laval Oil Purifier was installed to centrifugally purify the reclaimed oil. Now about 15,000 gallons of oil, worth 20 to 30 cents a gallon, is saved each year at a reclamation cost of about four cents a gallon.

In the same plant a motor, used to drive pulverized coal handling equipment, was giving trouble. Coal dust in the lubricating oil was cutting bearings and the cost of lubricating the unit was altogether too high. Another De Laval Purifier was installed so that the motor oil is continuously passed through it and purified. As a result bearing trouble has been eliminated and the consumption of oil greatly reduced.

This company also uses a De Laval Oil Purifier to keep in proper condition the oil used to lubricate its prime movers and generators. A fourth De Laval centrifugal has lowered the cost of maintaining the dielectric strength of transformer oil and switch oil. This machine—the De Laval Transformer Oil Purifier—is a portable unit which can be easily moved from one sub-station to another.

Here are four savings which De Laval Centrifugals will make for any street railway—and there are others. In the case of small systems it is often possible for two De Laval's to do the work of the four used by the company mentioned above.



De Laval Transformer Oil Purifier
(Portable Unit)

Mailing the attached coupon for further information may result in lowering your operating costs several thousand dollars a year.

THE DE LAVAL SEPARATOR CO.

New York, 165 Broadway Chicago, 29 East Madison Street

DE LAVAL PACIFIC COMPANY
San Francisco

Sooner or later you will use a
De Laval

Please send Bulletin containing further information regarding

- Reclamation and purification of car axle oil.
- Purification of turbine lubricating oil.
- Purification of Diesel lubricating and fuel oil.
- Purification of motor oil.
- Dehydration of transformer oil.

Name

Company

Address E. R-J.

Announcement

TO enable us to pursue our policy of always providing the brush we believe to be the best for each class of service, we have added to our line by acquiring the agency for Ringsdorff Brushes in the United States, Canada, and Mexico.

We recommend Ringsdorff ET-10 Metal-Graphite Brushes for slip rings of rotary converters operating at speeds up to 6000 feet per minute and usual current densities.

Exhaustive tests of this brush have proved its quality.

The satisfactory results obtained by the use of Ringsdorff ET-10 are due to minimum ring wear and low contact drop, with consequent economy and brush life beyond the average.

NATIONAL CARBON COMPANY, INC.
Cleveland, Ohio San Francisco, Cal.

Canadian National Carbon Co., Limited, Toronto

Another Lifer in the Boyerized Family

Here's a turnbuckle that is as much better than the ordinary turnbuckle as Boyerized pins and bushings are in comparison with the untreated sort.

Instead of a big, coarse-threaded jam nut that needs a two-fisted wrench for application and yet won't stay put, you require only a pocket-size wrench that is applied at a convenient angle.

What's the secret?

The jam-nut idea is replaced by a split clamp with a spring power that just won't be loosened once the little nut you see at one side has been tightened.

The split of this clamp is lined with felt, serving a double purpose: First, to act as an oil feed; second, to keep the oil from working out of the oil pocket which keeps the threads lubricated *always*.

That isn't all, either. The end of the McArthur turnbuckle is so arranged that each half is cut at a different angle, exposing a cross-section of one full tooth. This tooth acts like a cutting tool in shearing off any ice or snow from the threads, as the latter feed into the turnbuckle for adjustment.

For Trucks with Inside-hung Brakes and Motors

The McArthur Turnbuckle is exceptionally valuable. Here with the turnbuckle rods coming directly over the rails there is not enough clearance for a pitman to make a handy turn with the large wrenches needed on jam nuts. With the McArthur, a little wrench calls the turn and calls it right.

Keep a McArthur well bushed and it will

LAST AS LONG AS THE TRUCK

Bemis Car Truck Company

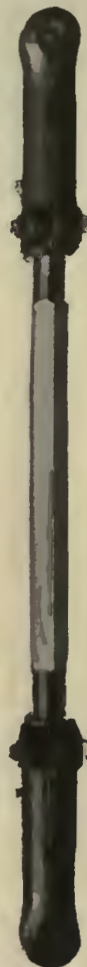
Electric Railway Supplies
Springfield, Mass.

REPRESENTATIVES:

- Edmund Electric Devices Co., Old Colony Bldg., Chicago, Ill.
- F. F. Bodler, 003 Monadnock Bldg., San Francisco, Cal.
- W. F. McKenney, 54 First Street, Portland, Oregon.
- J. H. Denton, 1328 Broadway, New York City, N. Y.
- A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

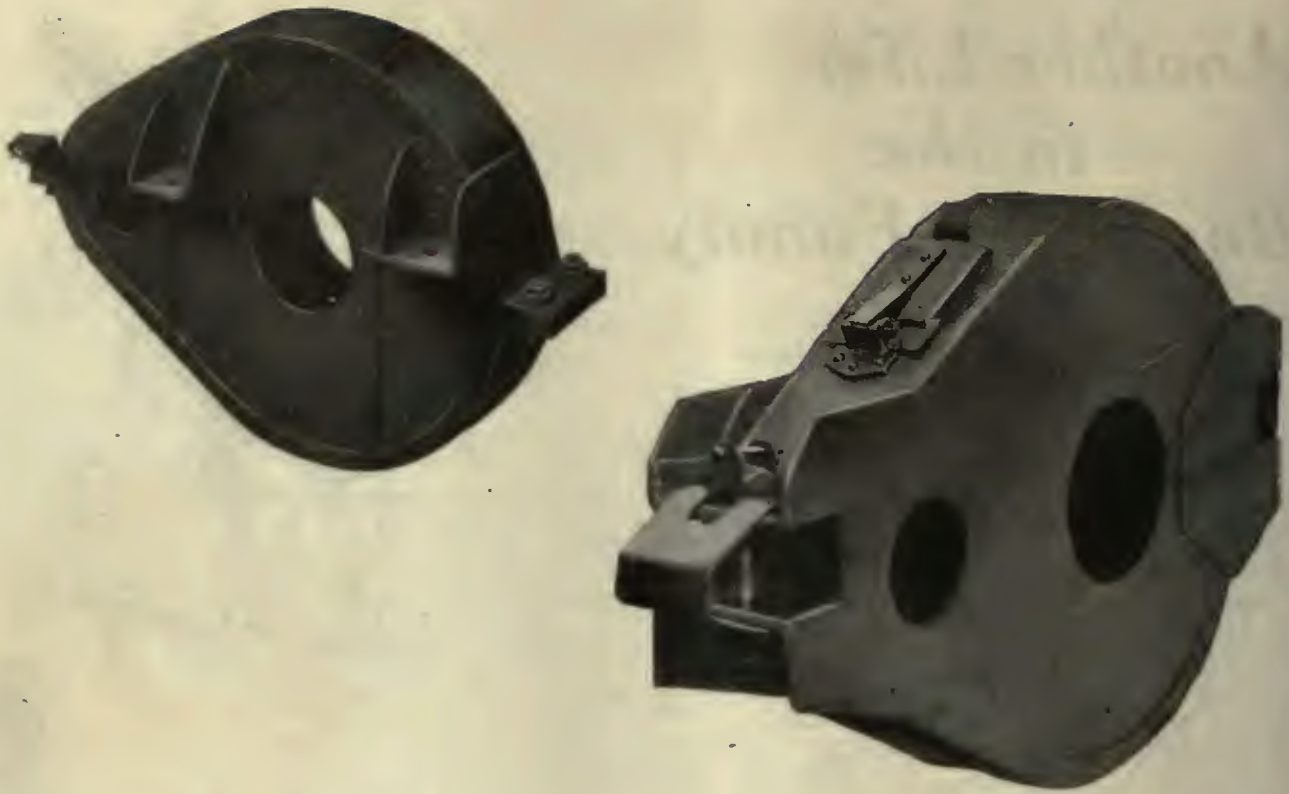


The McArthur Turnbuckle



Other Members of the Boyerized Family

- | | |
|------------------------------------|----------------------|
| Brake Hangers | Center Bearings |
| Brake Levers | Side Bearings |
| Pedestal Gibs | Spring Post Bushings |
| Brake Fulcrums | Spring Posts |
| Bolster and Transom Chafing Plates | |



COLUMBIA GEAR CASES

—reduce winter maintenance worries

Built with especially-designed reinforcement to stand the shocks of dragging over ice-covered pavements, Columbia Gear Cases greatly reduce the number of winter pull-ins for breakage.

This reinforcement consists of three thicknesses of metal where the channel-shaped suspension brackets are attached, firmly riveted to resist the destructive tendencies of winter conditions. We have been making electric railway gear cases for years. Our experts have had ample opportunity to study the causes of gear case breakage, and have learned the way to successfully combat them. This knowledge is what has been applied to the design and construction of Columbia Gear Cases. You can count on saving money, if you equip with Columbia Gear Cases.

Try them out this winter.

The Columbia Machine Works
and Malleable Iron Company
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. Green, Sales Mgr., Brooklyn, N. Y.

E. Keller, Brooklyn, N. Y.

F. C. Hedley, Brooklyn, N. Y.

J. L. Whittaker, 141 Milk St., Boston, Mass.

E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.

F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

Some other Columbia Specialties

Bearings


Motor Coils

Trolley Ears

Trolley Wheels

Line Materials

Send for circulars

T. S. Q. means this 

TEXAS ELECTRIC RAILWAY
MECHANICAL DEPARTMENT
DALLAS, TEXAS

August 7th, 1922.

Tool Steel Gear & Pinion Co.,
Cincinnati Ohio.

Your file CES:MG

Gentlemen:-

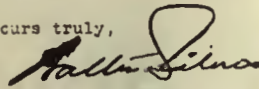
Complying with your request of June 26th, we are shipping you a GE-73 pinion which has been in service for 9 years 8 months, with a total mileage of 678,000. We have some pinions in service which have given much more service than this one and are good for many more years additional service but on account of being used in connection with worn axle bearings the ends of the teeth have chipped off, disfiguring them but doing no particular damage from a service standpoint.

9 2/3
years

678,000
miles

My nine years experience with your gears and pinions has convinced me that if lubricated at proper and regular intervals with the proper lubricant, they should last as long as the motor

Yours truly,



Supt. of Equipment.



and he says "We have some pinions in service which have given much more service than this one and are good for many more years."

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality



July 1, 1922

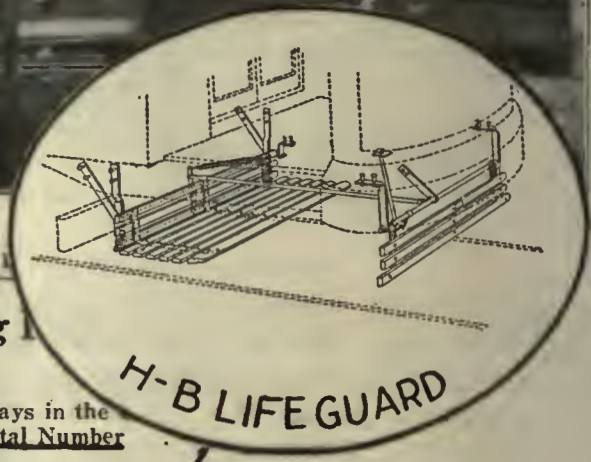
ELECTRIC RAILWAY

Passenger Cars Ordered During Part of 1922

The Number of Passenger Cars Ordered by Electric Railways in the States from Jan. 1 to June 15, 1922, Exceeds the Total Number Ordered During the Entire Year of 1921

From the large number of orders for passenger cars which were being reported in our Rolling Stock columns, it was evident some time ago that a large number of new cars were being purchased by electric railways. To obtain definite information, the editors

information, is 1016. This exceeds the number purchased during 1921. In the information attempt has been made orders for work cars, equipment and for passenger



H-B LIFE GUARD

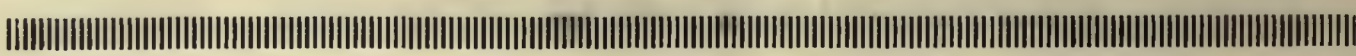
Statistics Show—

more cars ordered by electric railways in six months of this year than in the whole twelve months of 1921. And the orders coming for H-B Life Guards, and Providence Fenders for the majority of these new cars, show that these popular devices are still regarded as standards of safety by electric railway companies.

The Consolidated Car Fender Co., Providence, R. I.

General Sales Agent

Wendell & MacDuffie Co., 61 Broadway, N. Y.





It's the

MILLER TROLLEY SHOE

(Patented)

that is the time-tried successful sliding contact, used by over fifty well-known electric railway companies here and abroad.

It is the MILLER Trolley Shoe that is always highly spoken of when railway men start discussing the sliding contact question.

It is the MILLER Trolley Shoe that has already established its reputation for economy and mileage. Its special metal contact is the result of years of research work by expert metallurgists. Experienced engineers and practical railway operating men have developed its design and construction to its present high state of efficiency.

It is the MILLER Trolley Shoe that meets all requirements for increased efficiency.

Because

It gives better contact
Does not leave the wire
Eliminates arcing and flashing
Lubrication is unnecessary
It is noiseless
The cost of maintenance is less

If you are not convinced of the actual economies of the sliding contact, let us show you. If you are convinced —then *order Miller Trolley Shoes.*

MILLER TROLLEY SHOE CO.

Boston-21, Mass.

Western Representatives: Economy Electric Devices Co., 1590 Old Colony Bldg., Chicago, Ill.

In New York and on Interurban Lines You Will See The Combined Strain Insulator and Sign

Patented June 14, 1921

Made of
porcelain

Practically stone
and bullet proof

Will last
100 years

Choice
territory
still open



Costs
less—
always
clean



Cannot
wear the wire

Made in any language. Lettered on both sides, about 100 square inches space.

NOTICE—To show you the advantages of this low priced necessity, we have a standard package of (8 signs) which will be billed to you for \$15.00.

THE AMERICAN PORCELAIN COMPANY

Manufacturers of Standard Porcelain Circuit Breakers and Other Railway Insulators
East Liverpool, Ohio



EDWARDS Compression Brake Device

*An Anti-Rattler
which Saves and Silences Sash*

An effective and inexpensive cure for noisy, jarring car windows, and a cheap insurance against glass breakage. It saves the glass, the sash frame and the sash lock because it *will not let the window drop*. It must be lowered gradually.

The cost of repairing smashed-up windows, or damages to an injured passenger will more than pay for a complete installation of Edwards Anti-Rattlers.

Send for samples to try

Used on cars of

Philadelphia Rapid Transit
N. Y. Municipal Ry.

and many others

THE O. M. EDWARDS COMPANY, INC.

Executive Offices and Factory
SYRACUSE, NEW YORK, U. S. A.

New York, N. Y.

Chicago, Ill.

ALLIS-CHALMERS

AA-7B Air Compressor

A single acting duplex compressor with crank case and cylinders integral. One-piece cylinder-head for both cylinders contains suction and discharge valves. Trunk pistons operated by connecting rods with bushings provided for taking up wear.

Heavily designed crank shaft of high grade steel turns in journal bearings of ample proportions to insure minimum wear.

Herringbone Gears transmit power from motor shaft to crank shaft with practically silent operation.

Lubrication is positive and efficient. Connecting rods dip into the oil and splash reaches all working parts. Gears run in oil.



Compressor for Street Car Mounting

Send for Bulletin

ALLIS-CHALMERS MANUFACTURING CO.

MILWAUKEE, WIS. U.S.A.

The Plant Behind the Product "IRVINGTON"

Black—VARNISHED CAMBRIC—Yellow

The Standard of the World



Plant of
The Irvington Varnish and
Insulator Co.

The largest and most modern factory devoted exclusively to the
manufacture and development of VARNISHED INSULATION.

Mitchell-Rand Mfg. Co., New York
T. C. White Electric Supply Co., St. Louis
E. M. Wolcott, Rochester

Sales Representatives:

L. L. Fiebig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles

F. G. Scofield, Toronto



A CHILLINGWORTH GEAR CASE

**Especially Designed for the Safety Car
Weighs Only 50 lbs.**

And like the well-known Chillingworth Gear Cases, it's a seamless, one-piece gear case that is without rivets to loosen nor seams to open. An economical equipment because it lasts longer and offers reliable protection to your gears against dust and loss of grease.

Send for Circular.

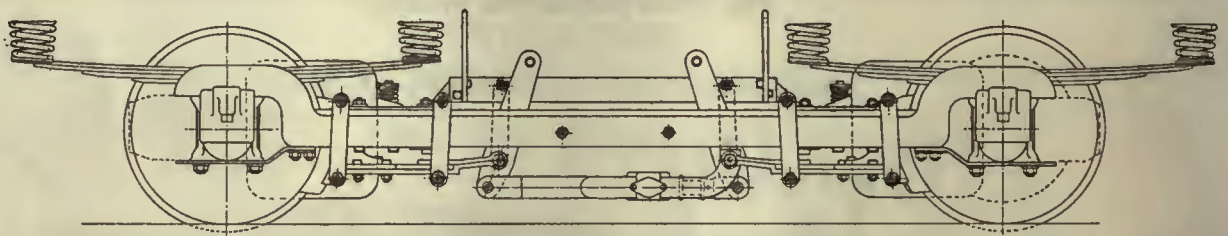
CHILLINGWORTH MFG. CO.

Jersey City, N. J.

Chicago Office: H. F. Keegan Company

J. H. Denton, New York City.
W. F. McKenney, Portland, Ore.
Scholey & Co., London, Eng.
The Normac Co., Japan.

Union Electric Co., Pittsburgh.
P. W. Wood, New Orleans, La.
Railway & Power Eng. Corp.,
Toronto and Montreal, Can.



Gould Automatic Slack Adjuster

Specified for One-Man Safety Cars

The leading electric railway companies of this country request Gould Slack Adjusters on their cars. They know that their automatic operation can be depended upon to always keep the brake rigging taut. They also know that the cost of Gould Slack Adjusters is soon saved by reduced wear on brake shoes and lower air consumption for braking, less labor cost and fewer accidents.

Write for full particulars in connection with our types A, B & C adjusters made for every style of car truck.

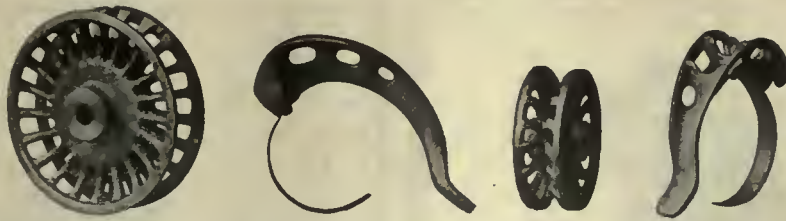
GOULD COUPLER COMPANY

30 East 42nd St., New York City

Works: Depew, N. Y.

The Rookery, Chicago, Ill.





In Time Of Peace Prepare For War

In fine weather prepare for storms.

In the fall season—NOW—prepare for the winter sleet storms.

Nothing is more helpless than a trolley car in a sleet storm unless equipped with sleet cutters or scrapers.

Nuttall has every known practical sleet removing device—big 6-in. cutter wheels and scrapers for interurbans—4 in. cutters and scrapers for city service. And you could buy a barrel of them for less than it costs to tie up traffic ten minutes.

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



R.D. NUTTALL COMPANY
PITTSBURGH  **PENNSYLVANIA**

N-2560

Nuttall



Griffin Wheel Company
 McCormick Building
 Chicago, Ill.



GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

- | | | | | |
|---------|---------|----------------|-------------|--------|
| Chicago | Detroit | FOUNDRIES: | St. Paul | Tacoma |
| | Denver | Boston | Los Angeles | |
| | | Kansas City | | |
| | | Council Bluffs | | |



Ceya

Ceya is a game played among the Zulus which is not unlike our game of "heads-or-tails," except that a great deal of gesticulating and a lot of noise seem to be necessary. But it's fair.

Sticking any kind of a carbon brush on a motor, without regard for the relationship existing between certain compositions and certain classes of work, is a different game. Commonly known as "heads-you-win-tails-I-lose." Unfair to yourself. Terribly unfair to the motor.

Stop taking 100-to-1 shots!

Try Morganite Brushes
Prescribed and guaranteed by experts



Main Office and Factory:

519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp.,
13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co.,
909 Penn. Ave., Pittsburgh

J. F. Drumney, 75 Pleasant St.,
Revere, Massachusetts

W. R. Hendey Co., Hoge Bldg.,
Seattle



Herzog Electric & Engineering Co.,
150 Steuart St., San Francisco

Special Service Sales Company,
502 Delta Bldg., Los Angeles

Railway & Power Engineering Corporation, Ltd.,
131 Eastern Ave., Toronto, Ontario, Canada

3 (Three) Simple Parts

and only three parts, make up White's Porcelain Trolley Hanger. This is a big advantage in shortening the time and labor of installation and in lengthening the service life of the hanger.



WHITE'S Porcelain Trolley Hanger

consists of the sherardized malleable iron yoke, the heavy glazed porcelain insulator and the "stud"—a standard bolt, sherardized or furnished in bronze.

The illustration will convince you of the ease of installation and alignment. You can see that this hanger will give service, too—there is no possibility of the insulation "breaking down" or cracking.

We will send you a sample and it will tell its own story to you. Let us give you quotations on complete hangers or parts which we have in stock for

Immediate Delivery

T. C. WHITE
Electrical Supply Co.
1122 Pine Street, St. Louis, Mo.

The Engineer Speaks:



Nachod Headway Recorders are certainly a big step towards higher efficiency in the operation of Electric Railways. Against the competition of both jitney and private automobiles, the real deterrent is *fast service* with cars the railway company can afford to run on *short headway*.

Exact Operation to Time Points

will help greatly—a feature that can be made effective automatically by the use of Nachod Headway Recorders. Write for Recorder Manual. Nachod Signal Co., Inc., Louisville, Ky., Manufacturers of Block Signals and Highway Crossing Signals.

Nachod Headway Recorders



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the point-coat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltage—Test—Dry 64,000. Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870



IF YOU CAN'T USE IT
Sell It

The equipment you do not need can usually render good service elsewhere. You can reach the largest group of buyers of such equipment at small cost through an ad in the

SEARCHLIGHT SECTION
For Every Business Want
"Think SEARCHLIGHT First"

0155



TRUCK WITH TOWER IN RUNNING POSITION

This 3-Section
TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
Trenton, New Jersey, U. S. A.

American Rail Bonds

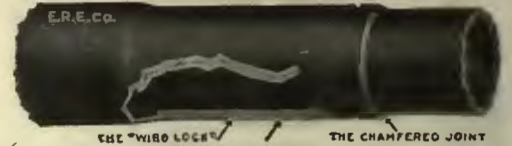
CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

*Send for new
Rail Bond Book*

**American Steel & Wire
Company**
CHICAGO
NEW YORK

ELRECO TUBULAR POLES



COMBINE
Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street



AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE
AND CABLE

PAPER INSULATED
UNDERGROUND CABLE

MAGNETIC WIRE

Reg. U. S. Pat. Office
Galvanized Iron and Steel
Wire and Strand
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 233 B'way

"RIMCO" Insulated Pliers

"The only SAFE PLIERS for linemen and all high tension work"



6", 7", 8" & 9"

Semi-soft
rubber
insulation
bonded to
metal by
Eichemco
process.

Tested and passed at
10,000 volts by The Electrical
Testing Laboratories
of N. Y. C.

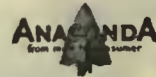
Insulation cannot crack or work loose
Rubber Insulated Metals Corporation
50 Church Street, New York City, U. S. A.

Distributed by The Electric Service Supplies Co., and
other distributors
Export Distributor: International Western Electric Co.



ANACONDA TROLLEY WIRE

ANACONDA COPPER
MINING COMPANY
Rolling Mills Department
CHICAGO, ILL.



THE AMERICAN
BRASS COMPANY
General Offices
WATERBURY, CONN.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way.
Philadelphia, 413 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 38-39 Upper Thames St.



Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.



INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Chapman Automatic Signals

Charles N. Wood Co., Boston



Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

*Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts*

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
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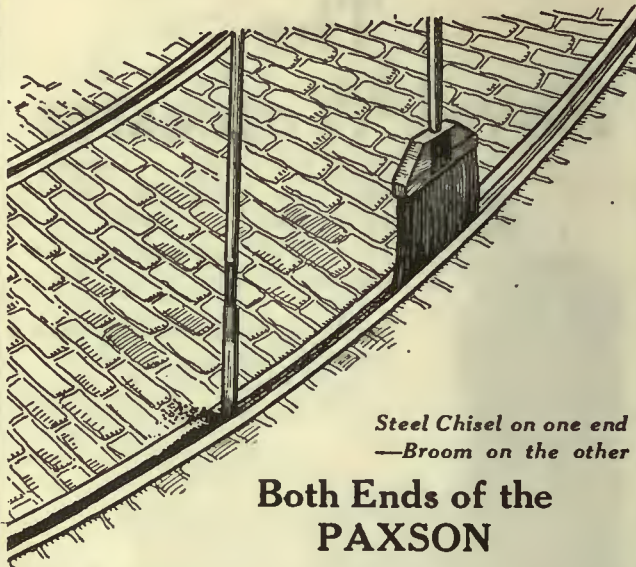
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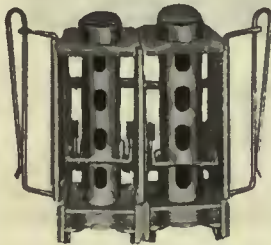
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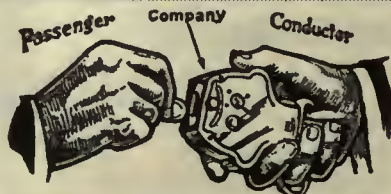
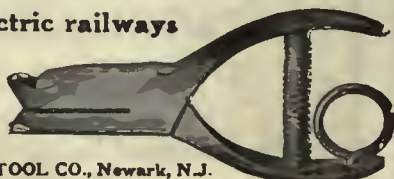
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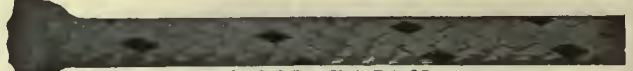
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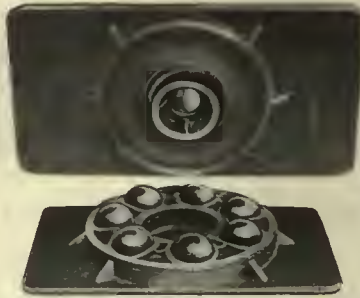
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60 lb. Relaying Rail

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- Anchors, Guy
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Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
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Ramapo Ajax Corp.
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Bemis Car Truck Co.
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Axles, Car Wheel
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Westinghouse E. & M. Co.
- Babbitt Metal
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National Carbon Co.
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Burry Railway Supply Co.
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Stafford Roller Bearing Car
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Co.
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Amer. Steel & Wire Co.
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Bates Exp. Steel Tr. Co.
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Gould Coupler Co.
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Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
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National Ry. Appliance Co.
Wason Mfg. Co.
- Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
- Cars, Self-Propelled
General Electric Co.
- Castings, Brass, Composition
or Copper
Anderson Mfg. Co., A. &
J. M.
Columbia M. W. & M. I. Co.
More-Jones Br. & Metal Co.
- Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Le Grand, Nic
- Catchers and Retriever,
Trolley
Earl, Chas. I.
Elec. Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Catenary Construction
Archbold-Brady Co.
Western Electric Co.
- Centrifugal Machinery
De Laval Separator Co.
- Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.
- Clamps and Connectors for
Wires and Cables
Anderson Mfg. Co., A. &
J. M.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
- Cleaners and Scrapers, Track
(See also Snow-Plows,
Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.
- Clusters and Sockets
General Electric Co.
- Coal and Ash Handling (See
Conveying and Hoisting
Machinery)
- Coasting Recorders
Railway Improvement Co.
- Coil Winding and Winding
Machines
Armature Coil Equip. Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
- Colls, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Colls, Choke and Kicking
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Coin Counting Machines
Intern'l Register Co.
Johnson Fare Box Co.
- Commutator Slotters
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Commutator Trailing Devices
General Electric Co.
- Commutators or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.
- Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
- Compressors, Air Portable
Ingersoll-Rand Co.
- Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Condenser Papers
Irvington Varnish & Ins. Co.
- Connectors, Solderless
Westinghouse E. & M. Co.
- Connectors, Trailer Car
Consolidated Car Heat'g Co.
Elec. Service Sup. Co.
Ohio Brass Co.
- Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Controller Regulators
Elec. Service Sup. Co.
- Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
- Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Conveying and Hoisting Ma-
chinery
American Bridge Co.
Columbia M. W. & M. I. Co.
- Copper Wire
Anaconda Copper Mining Co.
- Cord Adjusters
Nat'l Fibre & Insulation Co.
etc.
- Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
- Cord Connectors and Couplers
Elec. Service Sup. Co.
Samson Cordage Works
Wood Co., Chas. N.
- Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
- Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
- Crossing Foundations
International Steel Tie Co.
- Crossings
Ramapo Ajax Corp.
Crossing Signals (See Sig-
nals, Crossing)
- Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.
- Crossing Manganese
Indianapolis Switch & Frog
Co.
Ramapo Ajax Corp.
- Crossings, Track (See Track,
Special Work)
- Crossings, Trolley
Ohio Brass Co.
- Culverts
Canton Culvert & Silo Co.
- Curtains and Curtain Fixtures
Brill Co., The J. G.
Edwards Co., Inc., The O. M.
Elec. Service Sup. Co.
Moton Mfg. Co.
- Cutouts
Johns-Manville, Inc.
Johns-Pratt Co.
Dealer's Machinery
Elec. Equipment Co.
Foster Co., H. M.
Derailing Devices (See also
Track Work)
Wharton, Jr., & Co., Wm.
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
Detective Service
Wish-Service, P. Edward
Dogs, Lathe
Williams & Co., J. H.
- Doors & Door Fixtures
Edwards Co., Inc., The O. M.
- Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
- Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
- Drills, Rock
Ingersoll-Rand Co.
- Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Elec. Service Sup. Co.
Ohio Brass Co.
- Electrical Wires and Cables
Amer. Electrical Works
Roebling's Sons & Co., J. A.
Western Electric Co.
- Electric Grinders
Railway Track-Work Co.
Seymour Rail Grinder Co.,
E. P.
- Electrodes, Carbon
Indianapolis Switch & Frog
Co.
Railway Track-Work Co.
- Electrodes, Steel
Indianapolis Switch & Frog
Co.
Railway Track-Work Co.
- Engineers, Consulting, Con-
tracting and Operating
Alison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bylesby & Co., H. M.
Day & Zimmerman, Inc.
Dodd, J. N.
Drum & Co., A. L.
Feusell, Robert M.
Ford, Bacon & Davis
Gould, L. E.
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly, Cooke & Co.
Rickey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Sangster & Mathews
Smith & Co., C. E.
Stone & Webster
White Eng. Corp., The J. G.
Witt, Peter
- Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Extension Platform Trap
Doors
Edwards Co., Inc., The O. M.
Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Economy Elec. Devices Co.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.
- Fences, Woven Wire and
Fence Posts
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Elec. Service Sup. Co.
Le Grand, Nic
Root Spring Scraper Co.
Star Brass Works
Fibre and Fibre Tubing
Johns-Manville, Inc.
Nat'l Fibre & Insulation Co.
Westinghouse E. & M. Co.
- Field Colls (See Colls)
- Fire Extinguishers
Johns-Manville, Inc.
Flaxillum Insulation
Nat'l Ry. Appliance Co.
- Floodlights
Elec. Service Sup. Co.
- Flooring, Composition
Amer. Mason Safety Tread
Co.
Johns-Manville, Inc.
- Floor Plates
Amer. Abrasive Metals Co.
- Forgings
Columbia M. W. & M. I. Co.
Williams & Co., J. H.
- Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
- Frogs, Track (See Track
Work)
- Frogs, Trolley
Ohio Brass Co.
- Funnel Castings
Wharton, Jr., Inc., & Co.,
Wm.
- Furniture, Metal Office
Edwards Co., Inc., The O. M.
- Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heat'g Co.
General Electric Co.
Johns-Manville, Inc.
Western Electric Co.
Westinghouse E. & M. Co.
Williams & Co., J. H.
- Fuses, Cartridge, Non-
Refillable
Johns-Pratt Co.
- Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Pratt Co.
- Fuses, High Voltage
Johns-Pratt Co.
- Gaskets
Johns-Manville, Inc.
Westinghouse Tr. Br. Co.
- Gasoline Torches
Economy Elec. Devices Co.
- Gas-Electric Cars
General Electric Co.
- Gas Producers
Westinghouse E. & M. Co.
- Gates, Car
Brill Co., The J. G.
- Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
Westinghouse E. & M. Co.
- Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
- Tool Steel Gear & Pinion
Co.
- Generating Sets, Gas-Electric
General Electric Co.
- Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
- Goggles—Eye
Indianapolis Switch & Frog
Co.
- Gong (See Bells and Gongs)
- Greases (See Lubricants)
- Grinders and Grind Supplies
Metal & Thermit Corp.
Indianapolis Switch & Frog
Co.
- Railway Track-work Co.
Grinders, Portable
Railway Track-Work Co.
Grinders, Portable Electric
Railway Track-Work Co.
Seymour Rail Grinder Co.,
E. P.
- Grinding Blocks and Wheels
Railway Track-work Co.
- Guard Rail Clamps
Ramapo Ajax Corp.
- Guard Rails, Tee Rail &
Manganese
Ramapo Ajax Corp.
- Guards, Cattle
American Bridge Co.
- Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.
- Hammers Pneumatic
Ingersoll-Rand Co.
- Horns, Trolley
Anderson Mfg. Co., A. &
J. M.
- Bayonet Trolley Horn Co.
Elec. Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Western Electric Co.
- Headlights
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
- Heaters, Car (Electric)
Consolidated Car Heat'g Co.
Economy Elec. Devices Co.
Gold Car Heat. & Light Co.
Nat'l Ry. Appliance Co., P.
Smith Heater Co., Peter



The Imperial Tamper Car is a handy portable compressor for many kinds of work.



Imperial Tamperers enable small gangs to equal the work output of large ones.

Further Savings in Track Work

Four men with "Imperial" Pneumatic Tamping Tools will tamp more track than 12 to 16 men working with picks and bars, and do a better and more lasting job.

Besides quartering the cost of tamping ties, "Imperial" Outfits make possible the use of labor-saving methods on other kinds of work. For instance, in breaking-out paving of any character, the Portable Tamper Car supplies air to the pneumatic Paving Breakers, which show savings of 60% to 75% over hand methods.

Other tools used with the outfit are air-operated spike drivers, tie borers, track drills, portable grinders, riveting and chipping hammers, etc.

The sum total of all the savings possible with "Imperial" Tamping Outfits makes them the greatest labor-saving machines for general track work.

Let us tell you how "Imperials" are reducing track costs on other electric railways.

INGERSOLL-RAND COMPANY

General Offices: 11 Broadway, New York

Offices Everywhere



Paving Breakers operated from the Tamper Car show savings up to 75% over handwork.



Other machines such as the screw spike driver can be used with a Tamper Car to reduce track work costs.

- Helmets-Welding
 Indianapolis Switch & Frog Co.
 Heaters, Car, Hot Air and Water
 Elec. Service Sup. Co.
 Smith Heater Co., Peter
 Hoists and Lifts
 Columbia M. W. & M. I. Co.
 Ford Chain Block Co.
 Hoists, Portable
 Ingersoll Rand Co.
 Hydraulic Machinery
 Allis-Chalmers Mfg. Co.
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 Economy Elec. Devices Co.
 Elec. Service Sup. Co.
 General Electric Co.
 Western Electric Co.
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 General Electric Co.
 Irvington Varnish & Ins. Co.
 Johns-Manville, Inc.
 Mica Insulator Co.
 National Fibre & Insulation
 Standard Underground Cable Co.
 Westinghouse E. & M. Co.
 Insulating Compounds & Varnishes
 Sterling Varnish Co.
 Insulating Silk
 Irvington Varnish & Ins. Co.
 Insulating Varnishes
 Irvington Varnish & Ins. Co.
 Sterling Varnish Co., The
 Insulation (See also Paints)
 Anderson M. Co., A. & J. M.
 Electric Ry. Equipmt. Co.
 Electric Service Sup. Co.
 General Electric Co.
 Hemminger Glass Co.
 Irvington Varnish & Ins. Co.
 Ohio Brass Co.
 Western Electric Co.
 Westinghouse E. & M. Co.
 Insulators, Combination
 Strain
 American Porcelain Co.
 Insulator Pins
 Elec. Service Sup. Co.
 Hubbard & Co.
 Insurance, Fire
 Marsh & McLennan
 Jacks (See also Cranes, Hoists and Lifts)
 Buckeye Jack Mfg. Co.
 Elec. Service Sup. Co.
 Joints Rail
 (See Rail Joints)
 Journal Boxes
 Bemis Car Truck Co.
 Brill Co., The J. G.
 Junction Boxes
 Std. Underground Cable Co.
 Labor Adjusters
 Corp. Service Bureau, The
 Lamps, Guards and Fixtures
 Anderson M. Co., A. & J. M.
 Elec. Service Sup. Co.
 General Electric Co.
 Westinghouse E. & M. Co.
 Lamps, Arc and Incandescent
 (See also Headlights)
 Anderson, M. Co., A. & J. M.
 General Electric Co.
 Westinghouse E. & M. Co.
 Lanterns, Classification
 Nichols-Lintern Co.
 Lamps, Signal and Marker
 Nichols-Lintern Co.
 Lathe Attachments
 Williams & Co., J. H.
 Lightning Protection
 Anderson M. Co., A. & J. M.
 Elec. Service Sup. Co.
 General Electric Co.
 Ohio Brass Co.
 Westinghouse E. & M. Co.
 Line Material (See also Brackets, Insulators, Wires, etc.)
 Anderson M. Co., A. & J. M.
 Archbold-Brady Co.
 Columbia M. W. & M. I. Co.
 Electric Ry. Equipmt. Co.
 Elec. Service Sup. Co.
 General Electric Co.
 Hubbard & Co.
 Johns-Manville, Inc.
 More-Jones Br. & Metal Co.
 Ohio Brass Co.
 Western Electric Co.
 Westinghouse E. & M. Co.
 Locking Spring Boxes
 Wharton Jr., & Co., Wm.
 Locomotives, Electric
 General Electric Co.
 McGuire-Cummings Mfg. Co.
 Westinghouse E. & M. Co.
 Lubricating Engineers
 Galens Signal Oil Co.
 Texas Co.
 Universal Lubricating Co.
 Lubricates, Oil and Grease
 Galens Signal Oil Co.
 Texas Co.
 Universal Lubricating Co.
 Machine Tools
 Columbia M. W. & M. I. Co.
 Machine Work
 Columbia M. W. & M. I. Co.
 Machinery, Insulating
 Amer. Insulating Mach. Co.
 Manganese Steel Castings
 Wharton, Jr., & Co., Wm.
 Manganese Steel Guard Rails
 Ramapo Ajax Corp.
 Manganese Steel Switches,
 Frogs & Crossings
 Ramapo Ajax Corp.
 Manganese Steel Special
 Track Work
 Wharton, Jr., & Co., Wm.
 Manganese Track-work
 Indianapolis Switch & Frog Co.
 Meter Car, Watt Hour
 Economy Elec. Devices Co.
 Meters (See Instruments)
 Elec. Service Sup. Co.
 Mica
 Mica Insulator Co.
 Molding, Metal
 Allis-Chalmers Mfg. Co.
 Motor Buses, See
 Buses, Motor
 Motormen's Seats
 Allis-Chalmers Mfg. Co.
 Brill Co., The J. G.
 Elec. Service Sup. Co.
 Wood Co., Chas. N.
 Motors, Electric
 Westinghouse E. & M. Co.
 Motors and Generators, Sets
 General Electric Co.
 Nuts and Bolts
 Barbour-Stockwell Co.
 Bemis Car Truck Co.
 Columbia M. W. & M. I. Co.
 Hubbard & Co.
 Oil Purifiers
 De Laval Separator Co.
 Oils (See Lubricants)
 Omnibuses, See Buses, Motor
 Oxy-Acetylene (See Cutting
 Apparatus Oxy).
 Packing
 Johns-Manville, Inc.
 Paints and Varnishes (Insulating)
 Mica Insulator Co.
 Sterling Varnish Co., The
 Paints and Varnishes for
 Woodwork
 National Ry. Appliance Co.
 Pavement Breakers
 Ingersoll-Rand Co.
 Paving Material
 Amer. Br. Shoe & Fdy Co.
 Pickups, Trolley Wire
 Elec. Service Sup. Co.
 Ohio Brass Co.
 Pinion Pullers
 Columbia M. W. & M. I. Co.
 Elec. Service Sup. Co.
 General Electric Co.
 Wood Co., Chas. N.
 Pinions (See Gears)
 Pins, Case Hardened, Wood
 and Iron
 Bemis Car Truck Co.
 Elec. Service Sup. Co.
 Ohio Brass Co.
 Westinghouse Tr. Brake Co.
 Pipe Fittings
 Westinghouse Tr. Brake Co.
 Planers (See Machine Tools)
 Plates for Tee Rail Switches
 Ramapo Ajax Corp.
 Pliers, Rubber Insulated
 Elec. Service Sup. Co.
 Rubber Insulated Metals
 Corp.
 Pneumatic Tools
 Ingersoll-Rand Co.
 Pole Line Hardware
 Ohio Brass Co.
 Poles, Metal Street
 Bates Exp. Steel Truss Co.
 Electric Ry. Equipmt. Co.
 Hubbard & Co.
 Western Electric Co.
 Pole Reinforcing
 Hubbard & Co.
 Poles & Ties Treated
 American Pole Protective
 Co.
 International Crocoating &
 Construction Co.
 Poles, Ties, Posts Piling &
 Lumber
 International Crocoating &
 Construction Co.
 Le Grand, Nic
 Nashville Tie Co.
 Poles, Trolley
 Anderson Mfg. Co., A. &
 J. M.
 Bayonet Trolley Harp Co.
 Columbia M. W. & M. I. Co.
 Elec. Service Supplies Co.
 Nuttall Co., R. D.
 Poles, Tubular Steel
 Elec. Ry. Equipmt. Co.
 Elec. Service Sup. Co.
 Power Saving Devices
 Economy Elec. Devices Co.
 National Ry. Appliance Co.
 Pressure Regulators
 General Electric Co.
 Westinghouse E. & M. Co.
 Pumps
 Allis-Chalmers Mfg. Co.
 Ingersoll-Rand Co.
 Pumps, Vacuum
 Ingersoll-Rand Co.
 Punchee, Ticket
 Bonney-Vehslage Tool Co.
 Intern'l Register Co., The
 Wood Co., Chas. N.
 Rail Braces & Fastenings
 Ramapo Ajax Corp.
 Rail Grinders (See Grinders).
 Rail Joints
 Rail Joint Co., The
 Rail Joints—Welded
 Indianapolis Switch & Frog Co.
 Railway Material
 Johns-Manville, Inc.
 Railway Safety Switches
 Consolidated Car Heat'g Co.
 Westinghouse E. & M. Co.
 Rail Welding
 Metal & Thermit Corp.
 Rail Welding & Bonding Co.
 Amer. Rattan & Reed Mfg.
 Co.
 Brill Co., The J. G.
 Elec. Service Sup. Co.
 Heywood-Wakefield Co.
 McGuire-Cummings Mfg. Co.
 Registers and Fittings
 Brill Co., The J. G.
 Elec. Service Sup. Co.
 Intern'l Register Co., The
 Ohmer Fare Register Co.
 Rooke Automatic Rg. Co.
 Reinforcement, Concrete
 Amer. Steel & Wire Co.
 Repair Shop Appliances (See
 also Coll Banding and
 Winding Machines)
 Columbia M. W. & M. I. Co.
 Elec. Service Sup. Co.
 Repair Work (See also Colls)
 Cleveland Armature Works
 Columbia M. W. & M. I. Co.
 General Electric Co.
 Westinghouse E. & M. Co.
 Replacers, Car
 Columbia M. W. & M. I. Co.
 Elec. Service Sup. Co.
 Resistances
 Consolidated Car Heat'g Co.
 Resistances, Grid
 Columbia M. W. & M. I. Co.
 Resistance, Wire and Tube
 General Electric Co.
 Westinghouse E. & M. Co.
 Retrievers, Trolley (See
 Catchers and Retrievers,
 Trolley)
 Rheostats
 General Electric Co.
 Mica Insulator Co.
 Westinghouse E. & M. Co.
 Roller Bearings
 Stafford Roller Bearing and
 Car Truck Corp.
 Roofing, Asbestos
 Johns-Manville, Inc.
 Sanders, Track
 Brill Co., The J. G.
 Columbia M. W. & M. I. Co.
 Elec. Service Sup. Co.
 Nichols-Lintern Co.
 Ohio Brass Co.
 Sash Balancers
 Edwards Co., Inc., The O. M.
 Sash Fixtures, Car
 Brill Co., The J. G.
 Edwards Co., Inc., The O. M.
 Sash, Metal, Car Window
 Edwards Co., Inc., The O. M.
 Scrapers, Track (See Cleaners
 and Scrapers, Track)
 Screw Drivers, Rubber
 Insulating
 Elec. Service Sup. Co.
 Rubber Insulated Metals
 Corp.
 Seats, Car (See also Rattan &
 Amer. Rattan & Reed Mfg.
 Co.
 Brill Co., The J. G.
 Heywood-Wakefield Co.
 Seating Materials
 Brill Co., The J. G.
 Heywood-Wakefield Co.
 Secret Service
 Corporation Service Bureau,
 The
 Shades, Vestibule
 Brill Co., The J. G.
 Shovels
 Allis-Chalmers Mfg. Co.
 Brill Co., The J. G.
 Hubbard & Co.
 Side Bearings (See Bearings,
 Center and Side)
 Signals, Car Starting
 Consolidated Car Heat'g Co.
 Elec. Service Sup. Co.
 Nat'l Pneumatic Co., Inc.
 Signals, Indicating
 Nichols-Lintern Co.
 Signal Systems, Block
 Elec. Service Sup. Co.
 Nachod Signal Co., Inc.
 U. S. Elec. Signal Co.
 Wood Co., Chas. N.
 Signal Systems, Highway
 Crossing
 Nachod Signal Co., Inc.
 U. S. Elec. Signal Co.
 Slack Adjusters (See Brake
 Adjusters)
 Sleet Wheels and Cutters
 Anderson Mfg. Co., A. &
 J. M.
 Bayonet Trolley Harp Co.
 Columbia M. W. & M. I. Co.
 Electric Ry. Equipmt. Co.
 Elec. Service Sup. Co.
 More-Jones Br. & Metal Co.
 Nuttall Co., R. D.
 Smokestacks, Car
 Nichols-Lintern Co.
 Snow-Flows, Sweepers and
 Brooms
 Amer. Rattan & Reed Mfg.
 Co.
 Brill Co., The J. G.
 Columbia M. W. & M. I. Co.
 Consolidated Car Fender Co.
 McGuire-Cummings Mfg. Co.
 Sockets & Receptacles
 Johns-Manville, Inc.
 Soldering and Brazing Apparatus
 (See Welding
 Processes and Apparatus)
 Special Adhesive Papers
 Irvington Varnish & Ins. Co.
 Spikes
 Amer. Steel & Wire Co.
 Splicing Compounds
 Westinghouse E. & M. Co.
 Splicing Sleeves (See Clamps
 and Connectors)
 Springs, Car and Track
 Amer. Steel & Wire Co.
 Bemis Car Truck Co.
 Brill Co., The J. G.
 Sprinklers, Track and Road
 Brill Co., The J. G.
 McGuire-Cummings Mfg. Co.
 Steel Castings
 Wharton, Jr., & Co., Wm.
 Steel and Steel Products
 Morton Mfg. Co.
 Steps, Car
 Amer. Abrasive Metals Co.
 Amer. Mason Safety Tread
 Co.
 Morton Mfg. Co.
 Stokers, Mechanical
 Babcock & Wilcox Co.
 Westinghouse E. & M. Co.
 Storage Batteries (See Bat-
 teries, Storage).
 Strain Insulators
 Ohio Brass Co.
 Strand
 Roebelin's Sons Co., J. A.
 Subway Boxes
 Johns-Pratt Co.
 Superheaters
 Babcock & Wilcox Co.
 Sweepers, Snow (See Snow
 Flows, Sweepers and
 Brooms)
 Switchboxes
 Johns-Manville, Inc.
 Switch Stands
 Indianapolis Switch & Frog
 Co.
 Switch Stands & Fixtures
 Ramapo Ajax Corp.
 Switches, Safety
 Johns-Pratt Co.
 Switches, Selector
 Nichols-Lintern Co.
 Ramapo Iron Works
 Switches, Tee Rail
 Ramapo Ajax Corp.
 Switches, Track (See Track
 Special Work)
 Switches and Switchboards
 Allis-Chalmers Mfg. Co.
 Anderson Mfg. Co., A. J. &
 J. M.
 Elec. Service Supplies Co.
 General Electric Co.
 Johns-Manville, Inc.
 Westinghouse E. & M. Co.
 Tamper Tie
 Ingersoll-Rand Co.
 Tapes and Cloths (See Insulating
 Cloth, Paper and
 Tape)
 Tee Rail Special Track Work
 Ramapo Ajax Corp.
 Telephones and Parts
 Elec. Service Supplies Co.
 Western Electric Co.
 Terminals, Cable
 Standard Underground Cable
 Co.
 Testing Devices, Meter
 Johns-Pratt Co.
 Testing Instruments (See Instruments,
 Electrical Measuring,
 Testing, etc.)
 Thermostats
 Consolidated Car Heat'g Co.
 Gold Car Heating & Light-
 ing Co.
 Railway Utility Co.
 Smith Heater Co., Peter
 Ticket Choppers and Destroyers
 Elec. Service Supplies Co.
 Ties, Mechanical
 Dayton Mechanical Tie Co.
 Ties and Tie Rods, Steel
 American Bridge Co.
 Barbour-Stockwell Co.
 International Steel Tie Co.
 Ties, Wood Cross (See Poles,
 Ties, Posts, etc.)
 Tongue Switches
 Wharton, Jr., & Co., Wm.
 Tool Holders
 Williams & Co., J. H.
 Tools
 Western Electric Co.
 Tools, Thread Cutting
 Williams & Co., J. H.
 Tools, Track & Miscellaneous
 Amer. Steel & Wire Co.
 Columbia M. W. & M. I. Co.
 Elec. Service Supplies Co.
 Hubbard & Co.
 Railway Track-work Co.
 Torches, Acetylene (See Cutting
 Apparatus)
 Tower Wagons and Auto
 Trucks
 McCordell & Co., J. R.
 Towers and Transmission
 Structures
 American Bridge Co.
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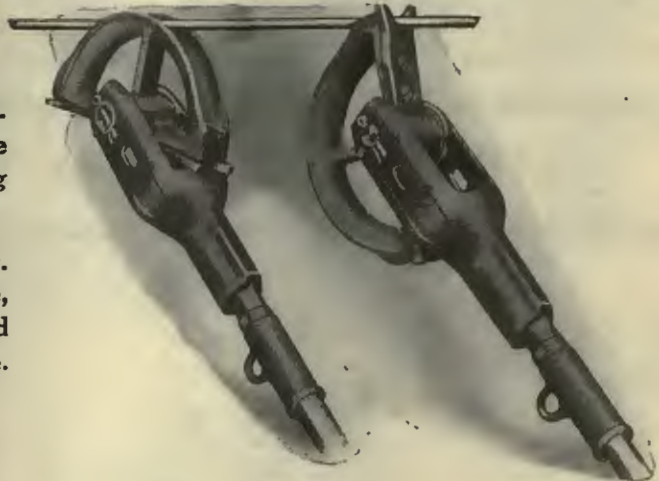
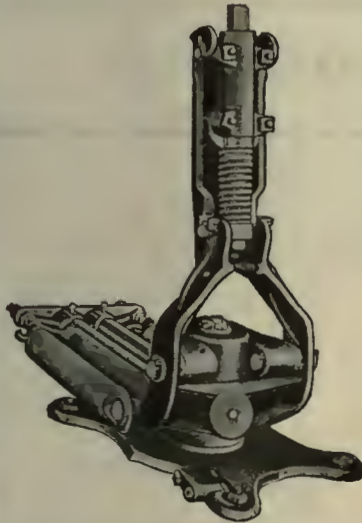
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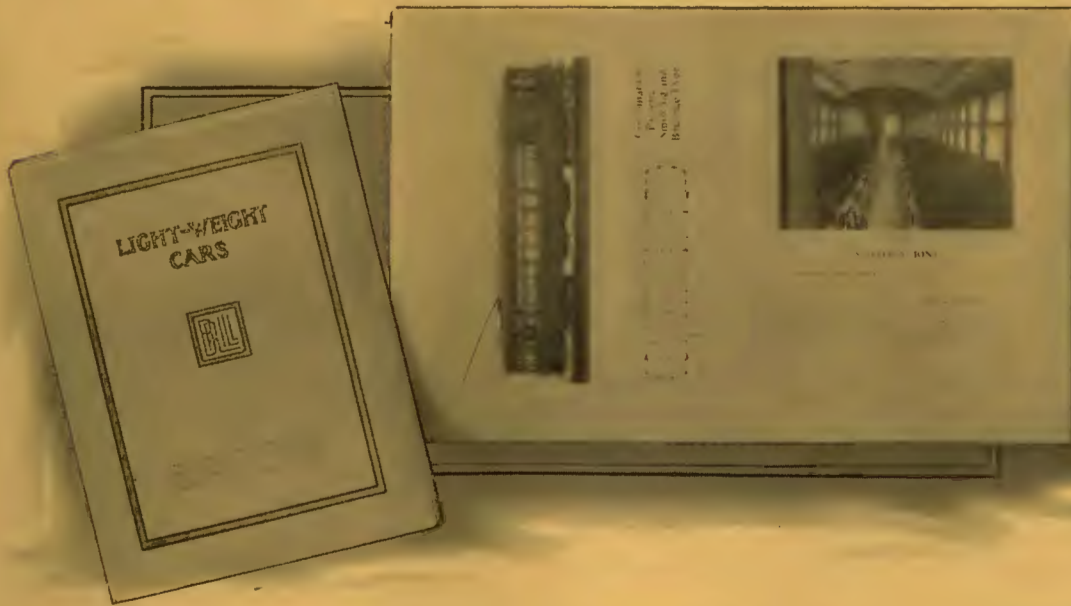
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