

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Jim Burleson an Example

DANIEL in the Lion's den had an easy job compared to that of Jim Burleson, as narrated by H. A. Lemmon in this issue. It is a little epic of how a street car conductor, through the power of his personality, tamed the Mexicans at the apex of their anti-gringo feeling, merely as a part of his day's job. "Human nature" is probably the only reason to assign for the fact that only death and the funeral procession brought recognition of his work.

Unheralded and unsung, it is the Jim Burlesons that really can solve the question of "public relations" in the railway industry and cause the expression to be forgotten as a problem. In no other public utility is there so much contact between employees and the public, but this powerful agency is but little used by railway managements. Publicity with personality is a necessity and the educated crew is the agency to obtain it. Let us have more recognition and use for the Jim Burlesons as transportation salesmen.

The Silver Tongue and the Transportation Superintendent

IN ADDITION to the other qualities which are necessary or desirable in a superintendent of transportation, that of being able to deliver a lucid public address should not be overlooked. A "good talker" is especially needed in this position because he has to solve the problem of inspiring the platform men and supervisors with the real spirit of service and salesmanship. He needs to discuss with the men, sometimes in large numbers, the delicate question of wages and working conditions. He is the intermediary between the management and the largest group of employees. And quite frequently he has an opportunity to address organizations of citizens, which he should be prepared and eager to do. The superintendent has a wonderful opportunity. If his men and the public are convinced of his sincerity and know that his words do not outrun his deeds, he will always be a welcome speaker at gatherings of employees and others. If he is not, something is wrong.

A good talker is not necessarily one who comes within the class of "spellbinder," but is rather the speaker who is in sympathy with his audience, has a real message which this audience wants or needs, has a reasonable command of the English language and is willing to forget himself. The electric railway business does not offer many opportunities for the display of elocutionary or oratorical talent. However, here as in all other fields of human endeavor, the man who can think on his feet and express himself clearly has the advantage over the diffident man, everything else being equal. It must be granted that everything else is not always equal, because the reserved man is apt to be one who thinks more deeply than another who is more loquacious. This does not vitiate the statement, however, that the clear

thinker who expresses himself forcibly and trenchantly has the advantage in getting his ideas over. Young men who are training for ultimate superintendencies ought not to neglect this side of their education.

Your Problems Are Not Unique— Come and Discuss Them with Others

IF THERE was ever a time in the history of the American Electric Railway Association when intimate counsel and discussion between the various electric railway men was necessary and valuable it is at present. Engrossed perhaps in the detailed problems of his individual property, each railway man is apt to regard his own problems as unique, but fundamentally they are the same as those faced by other railway men, and there is no one but can both give and gain something valuable at the convention which is to be held at Atlantic City.

Some have indicated that the absence of exhibits would detract so much from the convention that their attendance was doubtful. But while that particular feature of the convention will be missing, it will give both cause and opportunity for every one to devote himself more assiduously to gaining benefit from the sessions of the parent and its affiliated associations.

The industry today is on the mend. But this fact does not remove the other fact that it is still in a critical condition and needs and deserves the leadership which can develop and grow as a result of constructive discussion of its problems.

There are at least four major problems today. One of these is that of the trackless transportation, and there can be no definite conclusion reached at this early stage either on the attitude of the public or on the technical or economic factors themselves, as compared with railway transportation. Another problem is the public's attitude with reference to municipal ownership or to partnership with railways. This emphasizes today the question of public relations and franchises. Another problem is the financial one, by which is meant that of adjusting the financial structure to meet both the best business practice and best public policy of today. This point has already been emphasized by the Federal Electric Railways Commission and later by President Gadsden in the suggestion of making the nominal capitalization equal the valuation. A fourth and equally important subject is the labor situation, not only as it has presented itself in the past from the standpoint of wages, agreements, and dickering with unions, but the more constructive question of how best to place railway labor on the plane of skilled labor, so that trainmen at least will have more of the transportation business or sales attitude.

Certainly with problems such as these confronting the industry there is plenty to talk about at Atlantic City. The program as arranged touches most of these subjects as well as others and provides ample time for

discussion. In addition, the mechanism of the association is being better fitted to the times and the advice and counsel of every man active in the business are needed in this work. The best constitution and association organization should result.

What is needed is a rousing attendance of enthusiastic railway men at Atlantic City from Oct. 3 to Oct. 6. If you have not already done so, make your plans to come.

Seats per Passenger as a Traffic Unit

THE point was made in an editorial in the issue of Sept. 3 that the expressions "Revenue passengers per car-mile," "total passengers per car-mile" and "seats per passenger carried," if used as indexes of traffic density, are apt to be misleading when applied to properties operating under different conditions. Examples were given to prove this contention, particularly how well-filled cars during the off-peak hours would have the same effect on increasing the ratio between passengers and car-miles as if these added passengers came during the rush hours. Since the publication of that editorial a correspondent has expressed the belief that some estimates made in the editorial for the average value of the unit "seats per passenger" are too low. The figure given was from one and one-half to two seats per passenger, when taken on an all-day operating basis, and 0.75 seats per passenger during the rush hours.

Unfortunately, statistics in regard to this ratio, if it is obtained by dividing the seat-miles by the passenger-miles, are very meager. The practice of keeping a record of the seat-miles operated, though comparatively new, is now followed by some electric railway properties, but it is obvious that the passenger-miles on a property having a flat-fare system can be obtained only by a special traffic count, which of course is expensive and applies only to the period of observation. Some figures from traffic counts indicate that the ratio mentioned above has been observed, but others, including some quoted by the correspondent, give a ratio between seat-miles and passenger-miles of from 2 to 2½ for an all-day average, and these are probably in the majority.

Fortunately, so far as the practical application of this index to a single property is concerned, a manager does not have to depend on "passenger-miles," a figure useful but difficult to obtain. Instead of the ratio between "seat-miles" and "passenger-miles" he can use the ratio between "seat-trips" and "passenger-trips," the former being easily calculated on any property where "seat-miles" are kept and the latter being simply the passengers carried. The ratio thus obtained will help a manager to determine whether a company is becoming more economical in seat operation from time to time. Obviously where "trips" are used instead of miles, the comparison is upset if there is any material change in the length of the average trip. For this reason a comparison on this basis between two properties is of no value, because the runs may be much longer on one property than on the other. But on individual properties, where the runs are of the same length or approximately so from one year to another, this difference cancels itself. The aim of the manager should be to reduce the ratio of seats per passenger without crowding the cars.

Welding the Scrap Pile

"WE DON'T have a scrap pile any more, we are too poor to buy anything, so we weld and continue to weld and use everything so long as it will be good for anything." The foregoing is a typical remark by shop foremen and it reflects a creditable condition if it results in real saving, but—

Too frequently the welds break next day or next week, too frequently damage to a welded scrap pile occurs due to small jars, too frequently service tie-ups occur which result in bad schedule mix-ups and irritated passengers, too frequently the labor and material cost involved in repairing junk apparatus for a few days' service results in spending instead of saving.

Only an adequate cost-accounting system in street railway shops and adequate service records will determine when to add to or take from the scrap pile. Guesswork is out of place in the railway business and repair operations should be carefully weighed on an economic basis. Of course the workmen take a kind of pride in doing a repair job that is difficult and in keeping an old cripple still in service, but the item of cost must not be neglected or the result will be false economy. Accurate cost analyses and a good cost-accounting system are the reliable methods to obtain real savings. Another element in the business is the effect on merchandising. It does not seem good business to take chances in service or to leave decrepit equipment operating on the streets. There is more to the railway business than merely economizing in production costs. It pays to advertise and to take no chances with public sentiment.

Machines Save Money in the Shops

SHOP labor used to be cheap—it isn't now. Shop machines used to be designed for low-speed carbon tools—they aren't now. "It is the war" as usual that caused the changes, but the question is, how many shops have taken advantage of new knowledge, machines and tools to save money? Every job takes labor, time and money, and the use of modern high-speed tool steels in modern machines equipped with new devices such as self-centering or magnetic chucks will save all three elements.

The old machines in the shop will not stand the stresses resulting from the use of high-speed tool steels and fast-cutting speeds. The old machines and tools formed the basis for railway shop speed and practice, and it may be that even the war, with its reaction on shop work in other industries, never caused a quiver in many railway shops.

It might pay shop foremen to look around in some reorganized industrial shops and investigate modern practice and machinery to see if the junking of some of the old equipment, tools and methods in their shops in favor of the new would not result in saving money, time and labor on every shop job. It is up to the foremen to show the railway executives how to save money in the shops by taking advantage of present knowledge and equipment, because the executives, too frequently, can see only the requisition for the expenditure of the initial money for the machinery. Some remarkable economies can be obtained by the use of modern equipment and railway foremen should keep posted.

Testing Railway Motor Detail Parts

All Operations of Manufacture Must Be Carefully Worked Out and Every Detail Must Be Followed Closely to Insure that All May Perform Correctly When They Are Assembled in the Completed Motor

BY JOHN S. DEAN

Railway Motor Engineering Department, Westinghouse Electric & Manufacturing Company

TO AID the shop in its work and to provide against failure of motor detail parts, process specifications are prepared covering the most important manufacturing operations and these approved methods are carefully followed throughout the factory. These specifications are the result of experimental and research work, field investigation and study, and a number of years of experience.

In the manufacture of a railway motor all detail parts that enter into its construction are built up complete in the various feeder sections of the shop, and are sent to the assembling department to be put together. This method of manufacturing under conditions of high specialization has a number of advantages, such as: (1) Experienced supervision; (2) skilled and trained labor; (3) specially designed tools, jigs and fixtures; (4) maximum production; (5) minimum costs; (6) large output; (7) improved product.

On the other hand, this method of manufacturing demands that all of these detail parts be very accurately made and carefully checked and tested in order that they can be readily assembled into a completed motor with the least possible expenditure of time and labor. For this reason all of these parts before being sent out from the various feeder sections in which they are made receive a very thorough inspection and test to insure that they measure up to a certain predetermined fixed standard both mechanically and electrically.

The most important tests, which will be described in detail later on, are given in the table on page 430, which shows to what extent all possible precautions are taken to eliminate defects and to insure reliable detail parts in the production of a rugged and dependable railway motor.

Experience has shown that the armature fans, which are made of malleable iron or cast steel and are of comparatively large diameter, are quite frequently out of balance. This is due to certain of the unmachined sections being cast heavier in various parts of the fan. To correct this trouble, which would cause the finished armature to be out of balance, all fans after final machining are pressed on an arbor and given a static balance test. This balancing is done either by chipping away the heavy sections or by welding additional metal to the light sections of the fan.

All shafts have the fits for bearings, spiders or laminations, and for the pinion, ground to exact size on a Norton motor-driven grinding machine. The straight fits for bearings, spider, etc., are gaged, using a micrometer, while the taper fit for the pinion is checked by means of a special tapered gage so designed

that it can be used without removing the shaft from the centers of the grinding machine. This operation is shown in one of the accompanying illustrations. This method of machining and testing these fits produces a shaft with very accurate and reliable fitting surfaces.

LAMINATIONS MADE TO DRIVING FIT

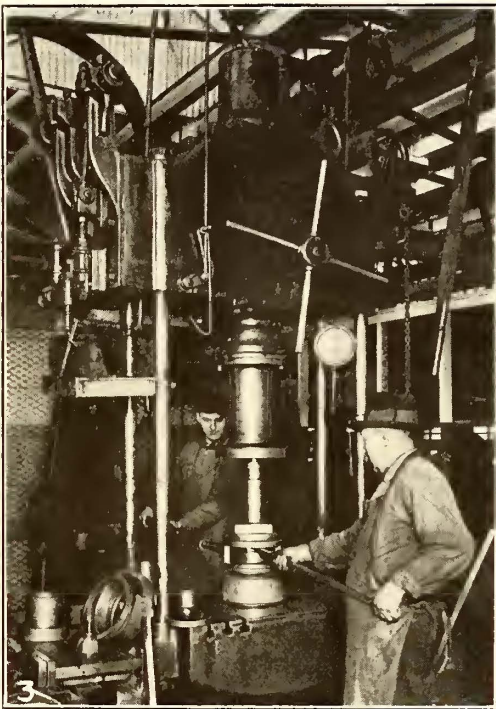
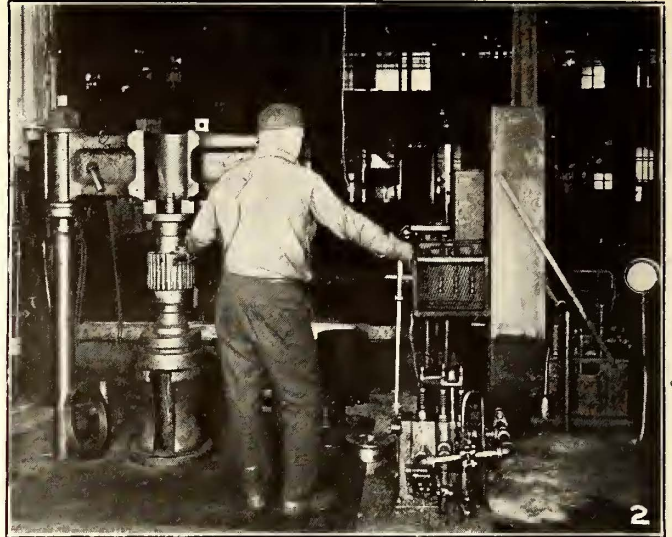
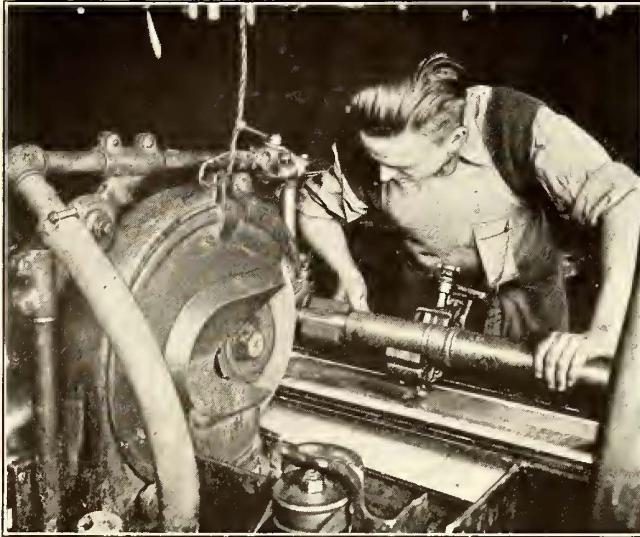
The armature laminations are either built up directly on the shaft or assembled on a spider. In either case the spider or shaft is machined from 0.002 in. to 0.004 in. over-size to secure a tight driving fit of the laminations, thus holding them securely and preventing loose iron in service. These laminations are put in place by

hand and forced down by means of a special hydraulic ram. After the end plate has been driven on, the core is pressed and securely locked under a heavy tonnage. The tonnage used for this operation varies with the size of the machine. For a 25-hp. motor, pressures used are from approximately 30 to 40 tons. This operation insures a core which is tight and free from vibration in service.

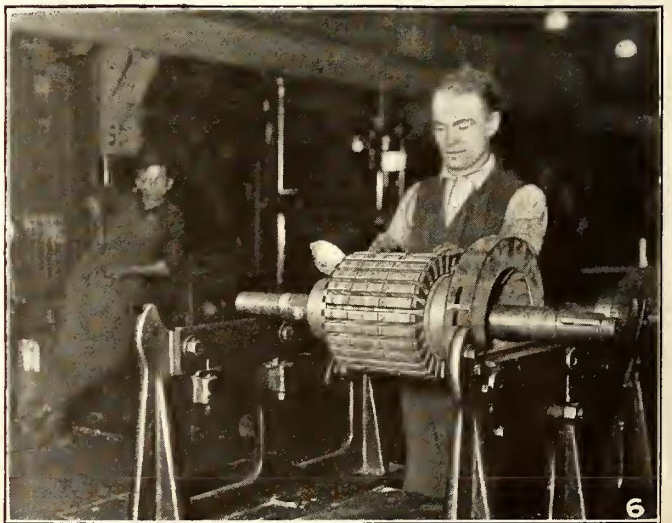
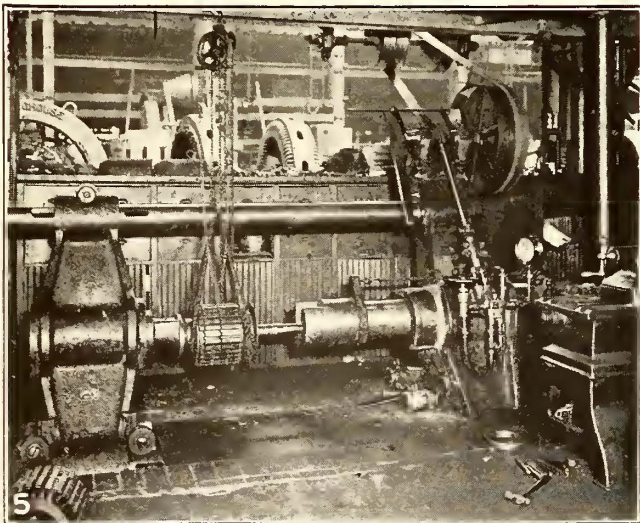
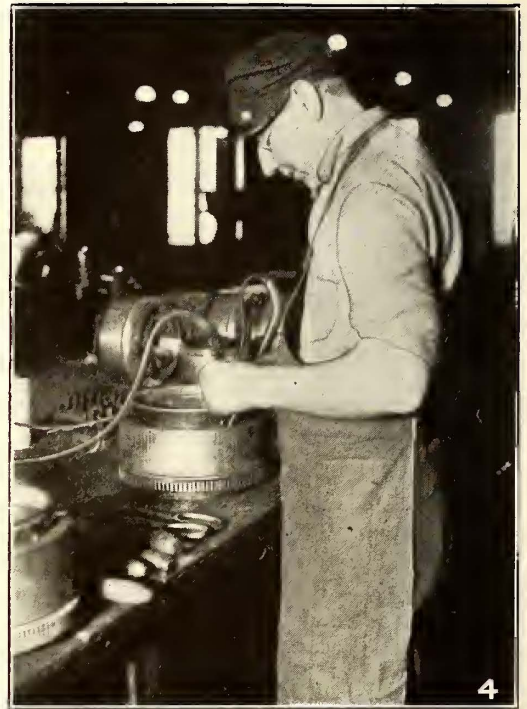
In the case of an armature where the laminations are built up on a spider, the shaft is pressed in the core after these laminations are assembled, pressed and clamped on the spider as a unit. This operation is done on a 150-ton horizontal type hydraulic press. When a key is used, the pressure required on a 40-hp. motor is from 40 to 50 tons. On motors of larger size, and where the key is omitted from the shaft, they are put in using pressures ranging from 60 to 90 tons.

The core when completed, with shaft pressed in, and before the commutator and the windings are put in place, is given a static balance by placing it on two hardened steel parallel bars. The balancing is done by pouring hot metal in the balancing pockets which are opened up on the light side of the core. These pockets, which are distributed around under the surface of the commutator end coil support, are opened up for use by drilling holes into them. This test is necessary to

IN THREE preceding articles which appeared in the **ELECTRIC RAILWAY JOURNAL**, under the titles "Testing Metals and Alloys" (Aug. 16, 1919) and "Testing of Insulating Materials" (May 21 and July 16, 1921), the author described the methods used in selecting and testing various raw materials that enter into the make-up of the detail parts of a railway motor. In the building of these detail parts it is not only essential to have approved materials which measure up to the test requirements, but in addition it is of vital importance that the various operations during the process of manufacturing be carefully worked out and followed in every detail to insure that each part will measure up to its requirements and correctly perform its function when assembled in the completed motor.



Accurate
Machining
and Testing of
Detail
Motor Parts
Are Necessary
to Insure
Efficient Service
to the User



No. 1—Grinding and Gaging Pinion Fits on Armature Shafts.
No. 2—Pressing Assembled Laminations on Cores, Using 100-Ton Hydraulic Press.
No. 3—Pressing and Tightening Commutators, Using 100-Ton Hydraulic Press.

No. 4—Short-Circuit Test on Commutators.
No. 5—Pressing Shafts in Armature Cores, Using 150-Ton Hydraulic Press.
No. 6—Static Balancing of Assembled Armature Cores Prevents Failures in Service.

secure a well-balanced armature and to prevent pounding and vibration of the armature which rapidly deteriorates the bearings of a motor.

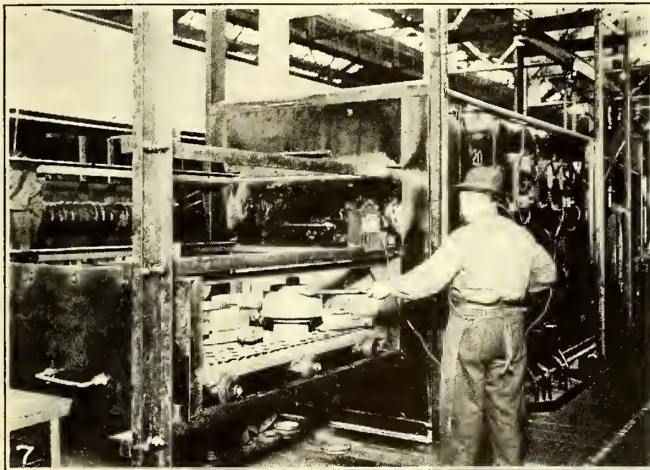
COMMUTATOR BUILDING TESTS ARE VERY IMPORTANT

In the construction of the commutator, great care is taken to select clean-cut segments free from sharp edges and fins. These segments after being bright dipped are assembled in special clamps and the V's are machined, after which they are given a 500-volt test between bars for short circuits. In all machining operations it is essential to use tools which are correctly ground to prevent the dragging over of the copper and the short circuiting of adjacent segments. The built-up segments are assembled on the bushing, and during this operation it is very important to keep all parts clean and free from moisture in order to prevent bars from short circuiting. To check for defects that may develop during the building process the commutator again receives a short circuit test of 500 volts alternating current momentarily between all

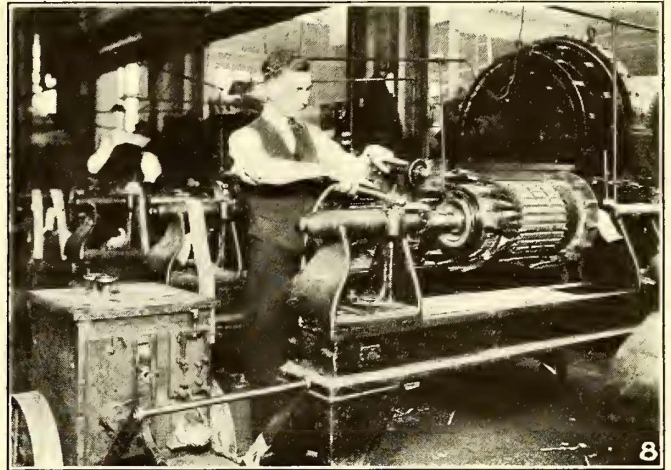
edges that might tend to start breaks in the armature windings directly back of the commutator neck. The mica at the front "V" is protected with insulating material which receives a special treatment of varnish before baking. The commutators are then placed on the assembled core which is mounted in a 60-ton hydraulic press and forced in place, using a pressure of from 10 to 12 tons in the case of a 40-hp. motor.

After being wound in metal-reinforced molds and partly insulated the armature coils are heated in an oven and while hot pressed to a definite size. They are then taped, dipped in a high-grade insulating varnish and baked. The dipping and baking are repeated, after which insulating cells are placed on the straight parts of the coil and taped. The complete insulated coils are then dipped and baked twice. The finished coils are checked and tested between individual conductors for short circuits at 600 volts alternating current momentarily, using a bench type testing box.

The assembled core of the armature, after being insulated at the front and rear coil supports and before



No. 7—TEMPERATURE TEST ON COMMUTATORS BEFORE PRESSING AND TIGHTENING



No. 8—TESTING PARTLY-WOUND ARMATURES FOR GROUNDS WITH PORTABLE TESTING BOX

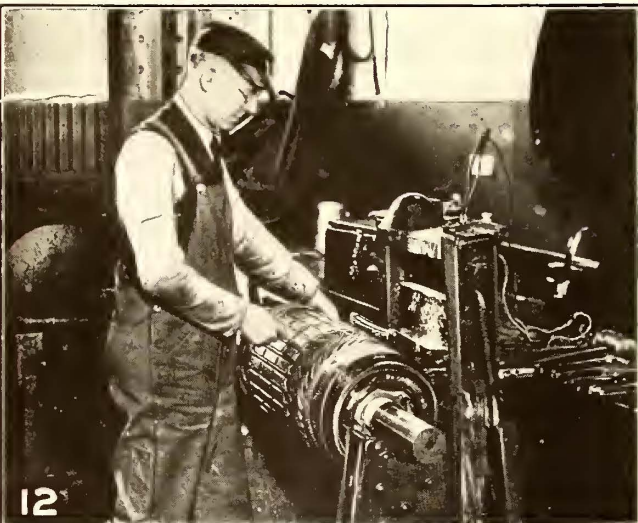
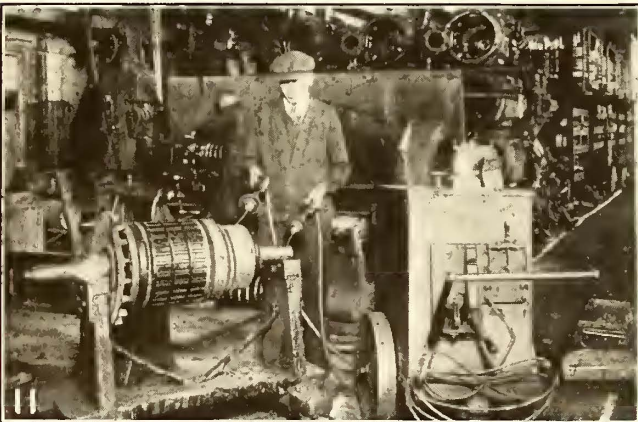
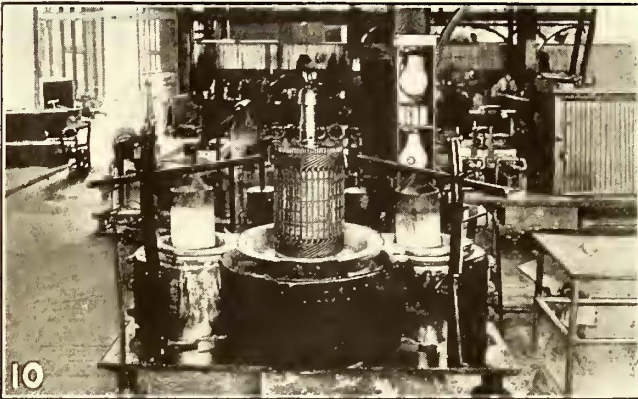
adjacent individual bars. After this test a ground test of 5,000 volts is applied momentarily.

If the commutator passes the above tests satisfactorily, it is put in an oven and baked for several hours at a maximum temperature of 150 deg. C. The outfit used for this purpose consists of an electrically heated oven with automatic thermostatic control so adjusted as not to exceed the required maximum temperature. The commutators when removed from this oven prior to being pressed are checked by means of a pyrometer to make sure that all parts are at the correct temperature for pressing. It is then placed in a 100-ton press and while under pressure (ranging from 20 to 25 tons for a 40-hp. motor) the clamping ring is drawn up tight. This procedure makes the built-up mica flexible and permits of all metal parts being drawn up in place securely, thus producing a compact commutator that will not allow shifting of the segments in service. After pressing, the completed commutator receives a final test of 300 volts alternating current between bars and a final ground test of 5,000 volts.

MOUNTING COMMUTATORS ON SHAFT

When the commutators are received in the winding department they have the sharp corners of the slots in the necks carefully rounded so as to eliminate all sharp

starting to wind, has its commutator tested for grounds using 4,800 volts alternating current. The core is then laid off by the demonstrator and the location of the starting coil in the slots and the location of the starting leads on the commutator are carefully marked for the winder's information. The coils are then placed in the slots and the bottom leads are connected to the commutator, after which the windings and commutator are again tested for grounds at 4,800 volts alternating current using a portable testing box. If the armature passes the above test it is turned over to the connecting department where the windings are carefully lighted out, using a 110-volt lighting out line. All leads are checked and the unconnected top leads are arranged in logical order for connecting. When this test is completed the top leads are connected in the commutator in the order as arranged during the lighting out test, which should give the correct winding connections. As a final check on these connections the completely wound and connected armature is tested for short circuits, open circuits and cross connections, using a portable armature testing yoke such as shown in one of the illustrations. The armature is then given a ground test at 4,400 volts alternating current, after which it is ready to be soldered in the machine which is shown on page 430.



After the armature has been wound and all leads driven into the commutator neck, these connections are brushed with a non-acid flux made from alcohol and rosin and the armature is placed in a vertical position commutator end down in the soldering pot, and the hot metal is forced to flow around these connections by forcing two plungers down into the auxiliary pots containing the molten solder. It requires about two minutes' contact to make a good soldered job of all connections, after which the plungers are raised and the solder flows back into the pots. This method of soldering makes a thorough job and prevents any excess solder getting back of the commutator neck, which would very likely cause a short circuit in the windings. During this operation the temperature of the solder in the pots is kept at 450 deg. C. by means of an automatic temperature controlling device attached to the soldering pots.

All newly-wound armatures, after being soldered and temporarily banded, are heated in an oven for twelve hours at a temperature ranging from 95 to 105 deg. C. thoroughly to dry out and drive off all moisture. While hot they are dipped in a high grade of baking insulating varnish—"Amber Insulator"—for about five minutes, then allowed to drain for about fifteen minutes, after which they are placed in an oven equipped with automatic temperature control and baked for forty-eight hours at a temperature ranging from 95 to 105 deg. C. The time of drying out and baking varies with the size of the armature; the above values apply to an armature for a 40-hp. motor. Experience has shown that this treatment greatly increases the life of the winding and adds to the ruggedness of the armature as it (1) seals up any insulation cracked during the winding, (2) keeps out the moisture, (3) tightens the coils in the slot, and (4) insures that all winding material has been treated.

TESTS ON RAILWAY MOTOR DETAIL PARTS

Fans...	After final machining	Static balance	
Shafts	Grinding	Gaging fits	
Core...	Clamping laminations	Tonnage	
	Pressing in shaft	Tonnage	
	Assembled core	Static balance	
Commutator	Assembly...	Building tests	
		Baking and clamping	
	Final test	Short circuit	
Armature Details	Final test	Ground	
		Short circuit	
		Ground	
Coils...	Final test	Short circuit	
	Mounting commutator on shaft or spider	Tonnage	
Assembly	Winding and connections	Commutator test	
		Winding and commutator connections	
	Soldering-pot, soldering	Ground	
		Dipping and baking	Lighting out
*Final testing of complete armatures	Winding and commutator	Short circuit	
		Ground	
		Open circuit	
Brushholder	Soldering-pot, soldering	Temperature	
		Dipping and baking	Temperature
		Banding	Tension
Frame Details	*Final testing of complete armatures	Short circuit	
		Open circuit	
		Grounds	
Bearings	Brushholder support	Bar to bar	
		Gage carbon box	
		Spring tension	
Housings and axle cap	Babbitting	Ground	
		Pulling test	
Field coils	Pressing in housing	Ground	
		Temperature	
Dipping and baking assembled frame	Housings and axle cap	Tonnage	
		Leaks in oil wells	
Final testing of completed frame	Field coils	Short circuit	
		Open circuit	
		*Temperature	
		Polarity test	
		Ground	

* These operations and tests are not made commercially on all machines

ARMATURE CONNECTIONS AND COMMUTATORS RECEIVE ATTENTION
 No. 9—Lighting Out Armature Connections.
 No. 10—Machine for Soldering Armatures—Test Soldering Pot Equipped with Automatic Temperature Control.
 No. 11—Using a Portable Testing Box to Test a Complete Armature for Grounds.
 No. 12—Testing a Complete Armature for Short Circuits.

Armatures after being dipped and baked are heated in an oven to a temperature of 90 deg. C. and while hot are banded in a specially-designed motor-driven banding lathe fitted with an adjustable tension device to regulate the pull on the wire while banding. Armatures for 40-hp. motors are banded with a high-grade tinned steel piano wire No. 14 B & S gage put on at a tension of 200 lb.

FINAL TEST OF COMPLETE ARMAURE

When permanently banded, the completed armature is turned over to an inspector who carefully checks all important dimensions and further tests the windings for short circuits, open circuits, cross connections, etc., by means of the portable testing yoke. If it passes this test it is given a high-voltage insulation test of 4,000 volts to ground using a portable testing box. The commutator is then undercut and the windings are given a heavy coat of a good grade of protecting and insulating varnish applied by means of an air spray paint pot, after which the armature is sent to the assembling floor to be placed in the motor frame.

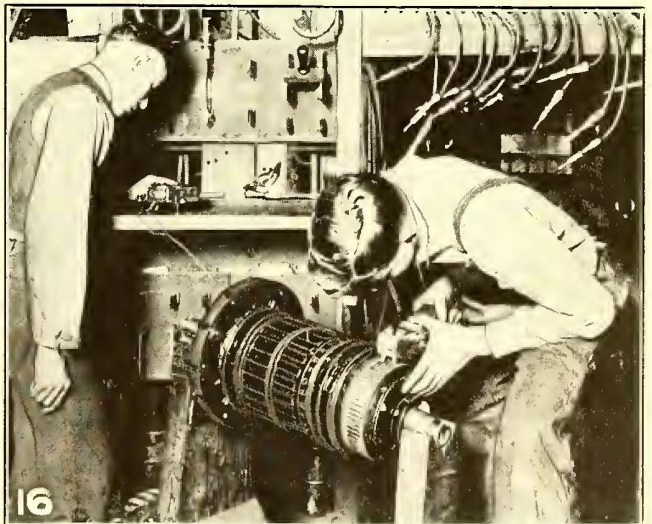
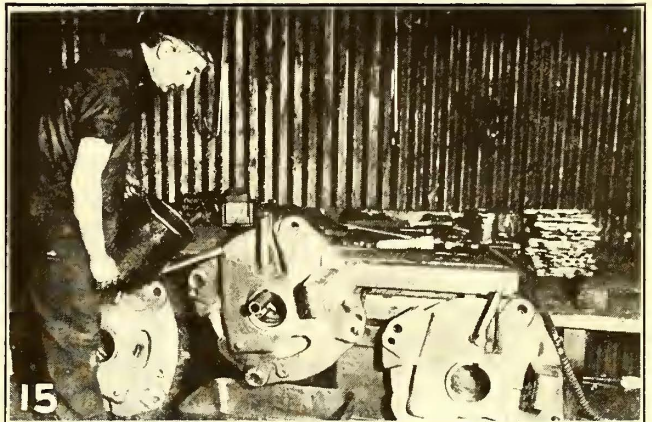
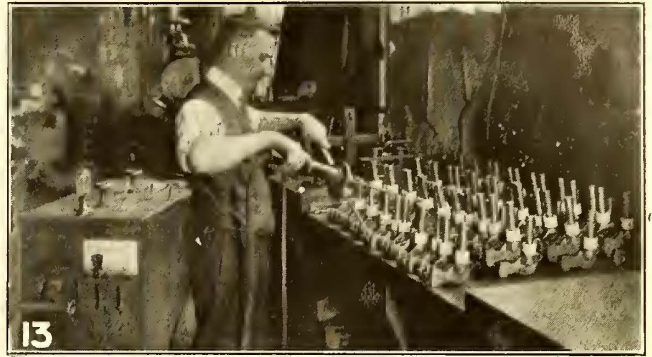
In the case of the armatures that are shipped out as spares where it is not possible to give them a running commercial test, there being no frames available, a bar to bar test is made. This test measures the voltage drop between adjacent commutator bars and is made to check any possible defects in the windings and soldering that ordinarily are detected during the running commercial test.

BRUSHHOLDERS ARE GAGED CAREFULLY

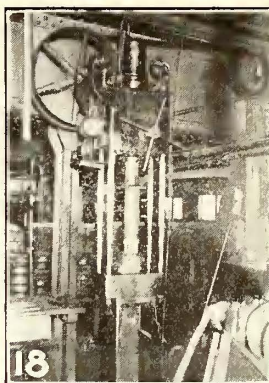
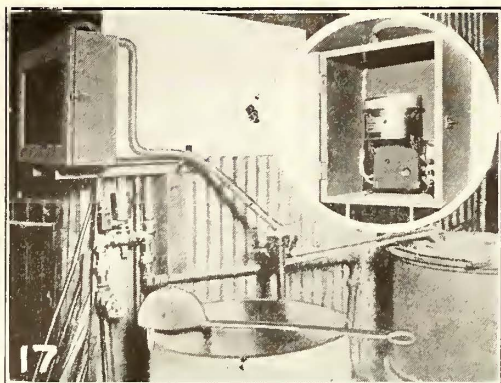
After the carbon boxes of the brushholders are machined they are hand fitted and carefully gaged with allowable working limit of exact size plus 0.002 in. to exact size plus 0.004 in., which insures a good snug fit of the carbon in the finished brushholder. This is very important to insure carbons that will not chatter and break and that will not develop rapid side wear in service. The pressure fingers after being assembled in place and adjusted are measured for tension by means of a spring balance and are finally set at a pressure ranging from 5 to 7 lb. per carbon. After being insulated and finally completed the brushholders are delivered to the inspection table, where they are again carefully gaged and checked in special clamping blocks to see that the distance from the center line of the supporting pin to the center line of the box is accurate, thus insuring correct neutral setting when the brushholder is clamped in the motor frame. The final test consists of a 5,000-volt ground test.

Separate brushholder supports with insulated studs are used in connection with the brushholder constructions of certain larger type motors. When assembled these are given a pulling test of 3 tons. This is essential to eliminate all defective and poor-fitting insulating tubes. This test is made on a specially designed machine fitted with a set of high multiplying power compound levers. The test insures the use of mechanically strong supports that will withstand the severe vibration and shocks to which they are subjected in service. After these supports have passed the mechanical test they are given a high voltage ground test of 5,000 volts similar to that applied to the complete brushholder.

The armature and axle bearings are made either of malleable iron or a high grade of bronze alloy, depending upon the type of motor and size of axles. They are



TESTING BRUSHHOLDERS AND ELIMINATING LEAKY HOUSINGS
 No. 13—Portable Testing Box Used for High-Voltage Insulation Test on Brushholders.
 No. 14—Pulling Test on Insulated Brushholder Supports.
 No. 15—Testing Oil Wells of Housings for Leaks and Casting Defects.
 No. 16—Bar to Bar Test on a Complete Armature.



No. 17—PYROMETER AND AUTOMATIC TEMPERATURE CONTROL FOR BABBITTING PARTS. No. 18—PRESSING BEARINGS IN HOUSINGS, USING 50-TON HYDRAULIC PRESS. No. 19—TESTING FIELD COILS FOR SHORT CIRCUITS

accurately machined and carefully gaged to secure interchangeability of all parts. The babbitting or tinning of all bearings is done by expert workmen who have been carefully trained and are skilled in this kind of work. The bearing metal used is a carefully-selected high-grade babbitt prepared in the alloy department under the direct supervision of the metallurgist of the research department, which guarantees a uniform reliable bearing metal. During the process of babbitting the alloy is heated in pots that are fitted with automatic temperature control which holds the temperature of the molten metal within certain predetermined limits of 462 deg. to 480 deg. C. This has been found to give the most satisfactory results in connection with this work. After babbitting, some of the common sizes of armature bearings are broached, which gives a compact and smooth bearing surface.

All castings for housings are given a test to eliminate leaky oil wells. Each individual casting has carbon oil poured into its oil well and this is allowed to stand for five minutes to test for cracks and defects in the casting. All castings that show signs of leaking oil are discarded. This test is important and guarantees the use of castings that will not allow the oil to leak out through the casting instead of lubricating the bearings. This precaution reduces one of the possibilities of hot bearings due to insufficient oil. After this test the castings are boiled in a concentrated solution of lye in order to clean off all the core and molding sand. This operation is found necessary in order to get rid of all the sand and grit which might otherwise be carried by the oil to the journals and damage the bearings. As a further precaution against loose particles of sand, the inside of the oil wells of all other motor castings is painted while hot with a special grade of air-drying gray enamel.

The field coils after being wound are insulated and impregnated in order to improve their moisture repelling, heat resisting and insulating properties. They are carefully gaged and checked to keep them within predetermined maximum limiting dimensions so they will have a snug fit on the poles and can be readily assembled in the motor frame with sufficient clearance to allow for proper ventilation. All coils are given a short circuit test which eliminates all coils that have had the insulation damaged during the process of manufacture. They are also tested for open circuits, on the same test set used in making the short circuit test, by short circuiting the leads or terminals of the individual coils.

To meet certain requirements of operation under severe weather conditions, some types of motor frames,

after coils are assembled in place with connections made, have the entire frame dipped in a good grade of insulating varnish and are then baked. This treatment is similar to the method outlined in connection with the dipping and baking of armatures.

Under certain conditions some assembled frames of railway motors are connected up to a testing circuit and direct current is passed through all of the field coils and their polarity checked by means of a compass needle or a polarity indicator made up from a small piece of steel banding wire magnetized and suspended at its center by a thin thread. This test is made to check the assembly of coils on the poles and the wiring around frame connections to insure against reversed coil windings.

The field coils and wiring around fields are given a high-voltage insulation test at 4,000 volts, alternating current to ground, momentarily. This test is made by using a portable testing box. The frame is then sent to the motor building floor, where the armature and bearing housing are assembled in place, after which the completed motor is sent to the testing department for its commercial or engineering tests.

Train Stop Part of Signaling System

THE train stop on the Metropolitan Railway of London is a part of the signaling apparatus which in the event of the signal being passed when at danger puts on the brakes and shuts off the power to bring the train to a stop. The brakes are applied by a vertical lever, known as the trigger and fixed on the right side of the leading locomotive coming in contact with the train stop arm, which mechanically opens a valve in the train pipe. The opening of this valve allows the air for holding off the brakes to escape, the brakes throughout the train being immediately applied, the power cut off and the train stopped. After this application and before the brakes can be released the motor-man must get down on the line and reset the trigger on the train to the vertical position.

The train stop arm, 4 in. wide where it engages the trigger, is fixed on the right side of the line opposite the signal, and when in the "stop" position is 3 in. above the rail level, the center of the arm being 8 in. from the running edge of the rail. On a train leaving a block section the signal in the rear comes to the "off" position and the train stop arm, operated by a motor fixed in a cast iron box and bolted to the ties, moves to its off position, the arm then being below the top of the rail, unable to engage the trigger on the train when passing.

Control Trailers Used in Washington

In Order to Use Its Two-Car Train Service on Stub-End Lines the Washington Railway & Electric Company Has Equipped Some of the Remodeled Trailers with Control Equipment and Necessary Switches

SINCE the publication of the article in the *ELECTRIC RAILWAY JOURNAL* for January 22, 1921, describing the trailers remodeled from open Narragansett cars by the Washington Railway & Electric Company two of these trailers have been equipped with control equipment, using straight "K" type control. Further details regarding the mounting of door engines and door and step control are now available. The provisions made for operating the two-car trains from the trailers were found necessary in order to adapt the two-car train operation to stub-end lines where it was necessary to operate from either end of the train. This was accomplished by using the remote control reverser and line switches on the motor car and by equipping the trailer with a separate resistance and one type K-66 controller with additional necessary circuits. Two additional jumpers, making four in all, are used between the cars. These are connected from receptacles mounted on the dash. Two are used with the control, door signal lights, buzzer and motorman's bell signal wire and two with the main motor wires and negative bus lines. The positive bus lines are carried one on each side of the coupler. The coupler is of the Tomlinson air-connecting type. On account of the electric switches used it is necessary to carry a current-collecting plow on both cars and always to operate from the plow on the leading car.

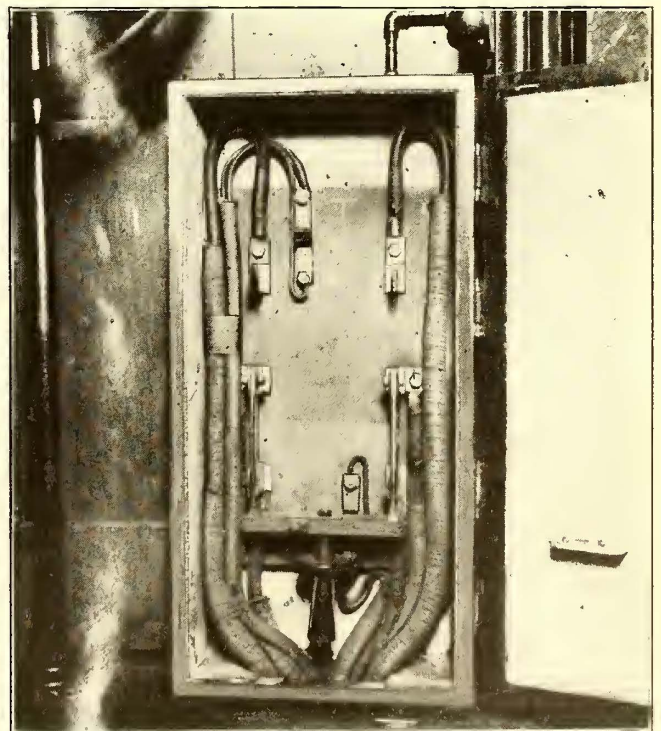
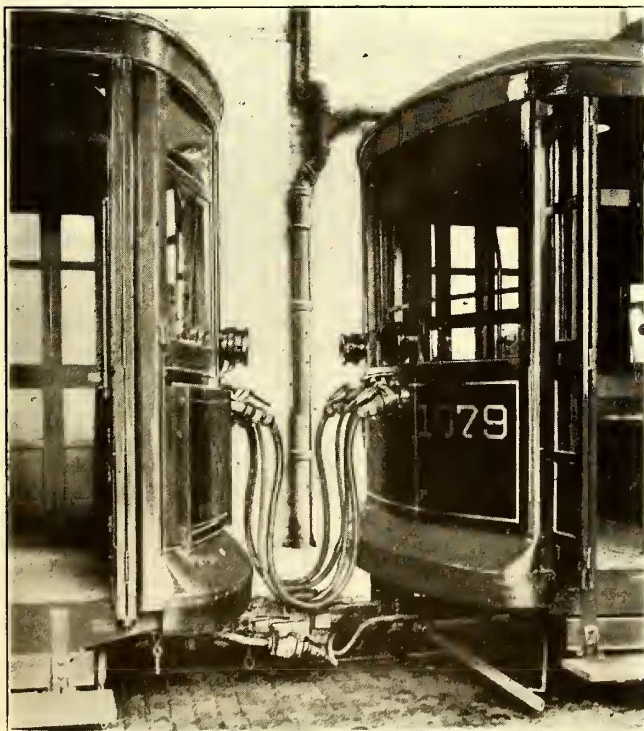
The leads from each plow are brought to a double-pole, double-throw changeover switch mounted in the vestibule of the motor car, and from this switch the current is fed into the two bus lines. An accompanying illustration shows this switch. The use of this

switch was necessary to prevent the possibility of two plows being connected so as to short circuit the line. To make sure that the plow on the leading car will be used the ratchet switch wires from each controller are brought to two contacts on this switch. The connection between these wires is made when the switch is thrown in either direction, thus interlocking the controller on the leading car with the plow on that car. In order to eliminate a "push-in" if one plow is disabled, the controller on the end of the motor car adjacent to the trailer is arranged to operate from either plow. An accompanying illustration shows the arrangement of the jumper leads, together with the couplers and connections between cars.

SOME DETAILS OF DOOR AND STEP CONTROL

As stated in the previous article regarding these cars, they are equipped with pneumatic folding doors and folding steps, which are of an improved type furnished by the National Pneumatic Company. The doors and steps are operated by a G.M. 2½-in. x 4½-in. door engine placed in a pocket over the door. The valve for operating the engine to open or close the doors and steps is located directly on the engine, which insures a minimum consumption of air. As the conductor is stationed in the center of the bulkhead opening on the car floor proper above the platform level a pedestal control stand is used. The operation of the valve on the door engine is effected by a small handle at the conductor's station through a series of shafts, levers and rods.

By placing the door engine in the pocket above the



AT LEFT, VIEW OF ARRANGEMENT OF JUMPERS AND BUS LINES BETWEEN MOTOR AND TRAIL CARS; AT RIGHT, DOUBLE-POLE CHANGEOVER SWITCH USED FOR CONNECTING LEADS FROM PLOW

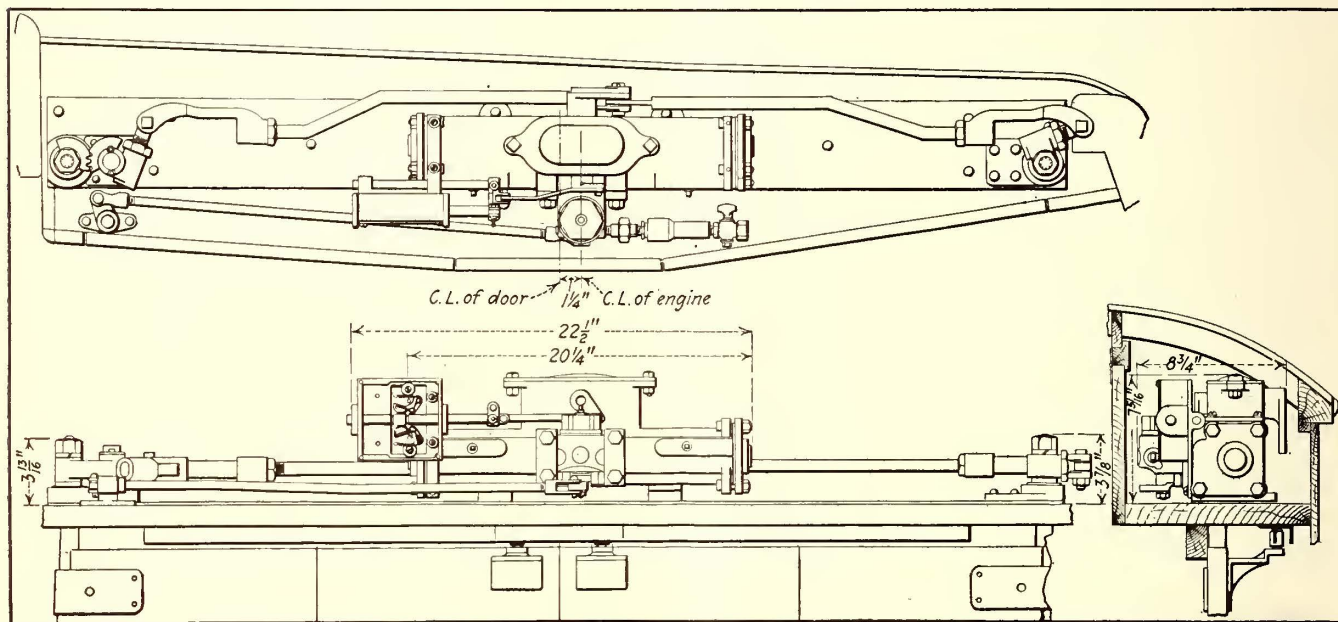
doors on a $\frac{1}{8}$ -in. x 5-in. steel plate which continues to both door shafts a more substantial construction is obtained. The door shafts pass through this plate with their bearings riveted to it. The seats of the engines in turn are bolted through the plate and door header. The door shafts are operated from the engine by connecting rods through adjustable levers on the top of the door shafts in the pocket. The steps are operated from the bottom of the door shafts through a slide bar type connection.

The great advantage of this construction is that the engine and the door shafts are tied together as one mechanical unit. A diagram of this construction is shown in an accompanying illustration. Other advantages are the accessibility of the engine and connections for inspection, adjustment and oiling, the fact that these parts are practically inclosed in a dirt and dust proof inclosure and the high drainage point which eliminates

Pneumatic Company's standard type with combination ball bearings and thrust collar construction, which take both the side and end thrust wear.

The steps are of the three-arm type, ball bearing, with adjustable balance spring to insure even, smooth operation both opening and closing. The arms are mounted on the shaft by which the step is operated by an adjustable lever and connections through the slide bar to the door shaft. By using the same ball-bearing and thrust-collar construction as on the door shafts a self-aligning step is obtained. Further, the steps may be struck by obstructions on the street and the hangers thrown out of line to a decided degree before the step would fail to operate because of the thrust-collar construction.

The cars are equipped with the National Pneumatic Company's motorman's signal light system, which gives the motorman a light in his cab when all doors in the train are closed and constitutes the starting signal. The



DOOR ENGINE INSTALLATION IN HEADER OVER DOOR

moisture from the engine valve and prevents freezing trouble in winter.

The air supply for the engine is taken directly from the train line at regular service pressure. The consumption of air is about $\frac{1}{30}$ of a cubic foot for each complete opening and closing cycle. The air is strained through a curled hair strainer before reaching the engine valve to eliminate particles of sand or pipe scale. The engine has splash feed lubrication, similar to the automobile transmission principle, and will run two years with one filling, the grease which works out with the exhaust air being returned to the gear for further service.

The opening and closing movements of the doors and steps are checked or cushioned, thus preventing the abuse and deterioration due to "slamming." The regulation of this "cushioning" feature is accessible only to the shop men by means of proper tools. This is done to prevent the train crews from changing or tampering with the speed of the doors and thus altering the "cushion." The speed of the doors is predetermined and set before the cars go into service, which eliminates abusive use by the train crews and saves adjustment, wear and tear on door panels, glass breakage and reduces maintenance cost on all parts of the doors, steps and rigging. The door shafts are the National

door-switch contact for passing the signal light to the motorman is mounted directly on and mechanically connected to the engine to reduce the possibility of mechanical or electrical failure. In addition to this it is so arranged that should there be a mechanical or electrical failure the motorman would get the danger signal and would not start the train until the trouble was located.

In adopting the pneumatically operated doors and steps the railway had in mind the advantages from a fare collection standpoint, there being no physical effort necessary on the conductor's part, so that he is more physically and mentally alert to attend to his work. This is an especially important factor when trains are operated between single-car units on the same track.

Standards recently approved by the American Engineering Standards Committee include four copper specifications submitted by the American Society for Testing Materials as "tentative American standard." They are as follows: Soft or annealed copper wire; Lake copper wire, bars, cakes, slabs, billets, ingots, and ingot bars; electrolytic copper wire bars, cakes, slabs, billets, ingots, and ingot bars; and battery assay of copper.

Atlanta Making Electrical Survey

A Complete Miniature Equivalent of the Electrical Distribution, Overhead and Track Circuits Aids Electrical Department of Georgia Railway & Power Company in Its Study to Revamp Its Distribution System and Relocate Substations

IN ORDER to get a real test of various proposed schemes for revamping its distribution and overhead system and for relocating its entire group of substations, the Georgia Railway & Power Company, Atlanta, Ga., has constructed a complete miniature of the electrical system of the Atlanta railway property. The two accompanying illustrations show, first, a complete view of the entire miniature layout and, second, a close-up view of the central portion of the city, which will indicate some of the details of construction of this miniature system.

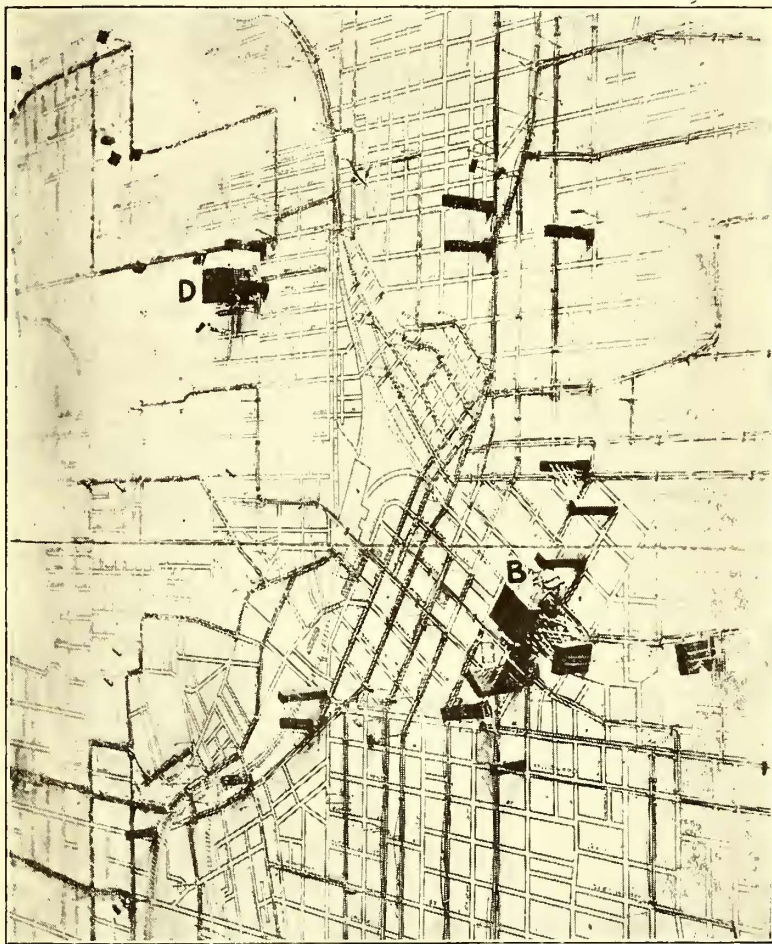
The present arrangement in Atlanta is, as noted, that there are two main stations located rather close to the center of the city, which is, of course, the main or practical load center of the railway system. These two stations are fed with energy from incoming high-tension transmission lines from the company's state-wide distribution system connected with its water power and steam generating stations. As Atlanta has grown during the past few years, it has necessitated sending more and more of this electrical energy, after transformation into direct current, to the outlying portions of the city to take care of the rapidly increasing railway load. It appeared to the electrical department that probably it would be most economical, with existing apparatus and information available, to locate the substations nearer the outer edge of the city, so that the electrical energy would not have to be transmitted clear to the center as alternating current and redistributed, practically back over the same course, to the outlying portions.

It appeared that possibly a belt, or 600-volt bus, with a radius of a mile or more, perhaps, should be installed with substations located at strategic points along this circular bus. Energy could be delivered to these substations and after transformation distributed both in and out from this circular bus, thus making probably the most efficient combined transmission and distribution system. Another advantage of a scheme such as this would be that almost the best possible type of network would be created so that if any one substation, or even two substations, went out of commission, the rest could carry the load most effectively.

The above conclusions were reached merely as a result of a preliminary investigation, and it was thought that the quickest way to determine the real answer to the most economical location of substations and the most economical use of copper in the distribution and overhead system would be to make actual experiments on the system. This would have involved an impossible cost and so the idea was adopted of building a complete miniature.

A map of Atlanta was laid out on a vertical board some 8 ft. or 9 ft. high and 12 ft. or 14 ft. long or

wide. On this map the system was constructed as follows: For every single track, that is, every pair of rails, a wire was laid which had exactly the same resistance per unit of track as represented on the map as did the actual track between the same two points on the system, so far as could be determined, taking

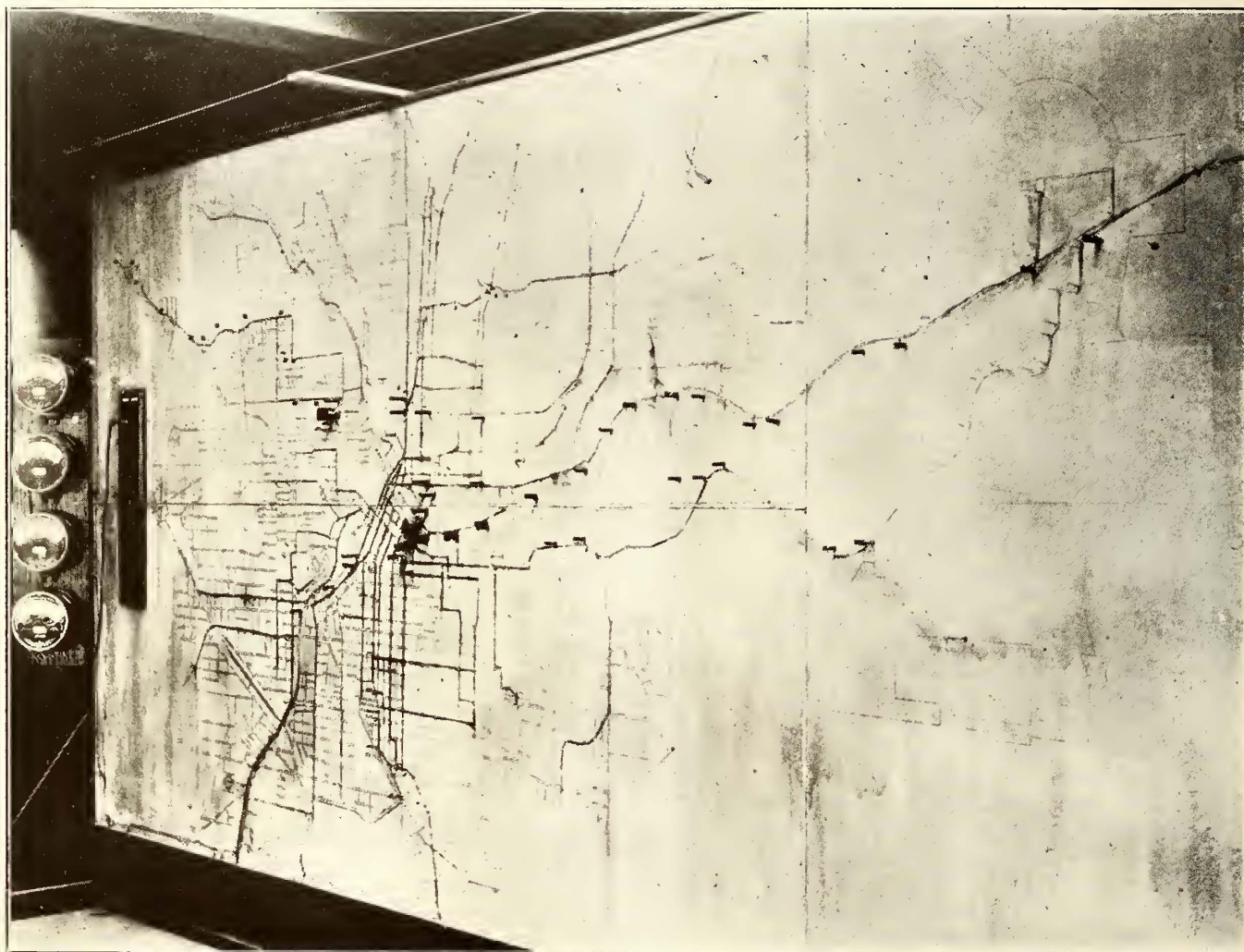


CENTRAL PORTION OF ATLANTA MINIATURE SYSTEM

into consideration the earth resistance also. Thus, single-tracked streets carry one wire and double-tracked streets two wires. The overhead was constructed on small poles or pins representing poles, and each overhead contact trolley is represented in the miniature by a small wire of exactly the same resistance between any two points on the map as between the two corresponding points on the real system. Likewise, the feeder system is reproduced on the poles, all taps being reproduced exactly as they exist on the actual property. Substations are represented by large blocks, as indicated in the accompanying illustration. To represent the loads, for each of the various types of cars in use at Atlanta a small resistance unit has been made up, so that when placed by clips between the trolley wire and track, its resistance is such that it will draw 1/100 of full-load current when 6 volts is applied across the trolley and track.

A large storage battery constitutes the power plant for providing energy. This is a 6-volt battery, 1/100 of the voltage used in service in Atlanta. By means of the plug board at the left of the miniature map, this 6-volt battery can be connected to any one or any number of various points which may be chosen as distribution centers or locations of possible future stations. From this plug board there are semi-permanent connections to the various possible places on the system that are being considered as substation sites. Voltmeters and ammeters and millivoltmeters are available with accurately calibrated leads, to meas-

ured as possible substation sites, energy applied there with the resulting distribution characteristics noted. Other substation sites are chosen, ring buses at 600 volts can be installed, the distribution system entirely revamped in the miniature and the result accurately noted. The load drawn from various substations at various assumed positions is also studied, so that it will be possible to determine whether one-unit or two-unit or three-unit substations are needed at certain points. Anticipating results somewhat, the electrical department feels that the survey may show the economical advantage of applying automatic substations at several points



COMPLETE ATLANTA RAILWAY SYSTEM CONSTRUCTED IN MINIATURE FOR TEST PURPOSES

ure the line voltage at various points, the current in various feeders, and the line drops between various points on the system respectively.

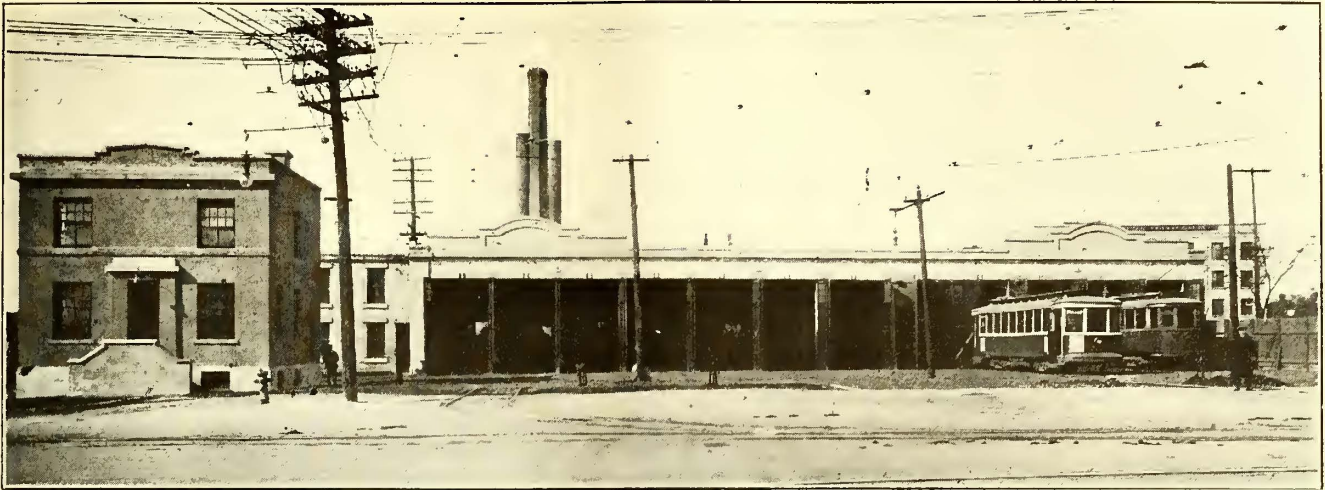
A large blueprint hanging on an adjacent wall has plotted on it the several distributions of cars which it is desired to study. For instance, there is on this blueprint, in symbols, the location of each car on the system at the maximum peak of the system. Other distributions of cars may also be indicated on this blueprint. When it is desired to study any particular load on the miniature, the various resistances representing street car loads are placed on this miniature map in the position indicated on the blueprint of the system and there is reproduced then the instantaneous load representing some certain average time.

And so studies are being made. Different points are

on such a ring bus as being the most economical substation scheme for the system. This, of course, is only a prediction.

The map is made up on a scale of 200 ft. to the inch. Voltage and current values are 1/100 of actual values, as indicated. The peak load on the miniature is something over 600 volt-amperes, corresponding to a 6,000-kw. peak load on the system in reality.

This whole installation has been designed and constructed under the direction of H. L. Wills, the electrical engineer of the Georgia Railway & Power Company. The results of the actual study are not available as yet, as the study has not been completed, but they will doubtless prove interesting when they are available as indicating the value of such a laboratory scheme of making surveys of this sort.



RECONSTRUCTED CAR SHOPS IN WINNIPEG

Repair Shops Rebuilt in Winnipeg

A Disastrous Fire Last Year Destroyed the Shops and Carhouses of the Winnipeg (Canada) Electric Railway—These Have Been Rebuilt and Greatly Improved

BY W. N. SMITH

Consulting Engineer Winnipeg Electric Railway

THE carhouses of the Winnipeg (Canada) Electric Railway, at Main Street and Assiniboine Avenue, in Winnipeg, were destroyed by fire on April 7, 1920. They had been constructed in 1901 with brick walls and roof of 3-in. T. & G. boards on steel beams, with tar and gravel roofing and flat glass skylights over the two center bays. There was a 21-in. fire wall between the carhouse and machine shops in the rear with three through repair tracks, two of which had pits underneath. The openings in the fire wall were protected by Underwriters' tin-clad fire doors and these were closed by the men on duty before the fire reached the west end of the carhouses. These fire doors, although so badly charred that they had to be renewed, prevented the fire breaking through to the machine shop.

The fire wall and the brick wall on the south side between the carhouse and storerooms were severely tested by the intense heat of the fire and the brick "spalled" on the face, but these walls and the repair pit walls were found to be sufficiently strong to be used again in the reconstruction. The walls on the Main Street and Assiniboine Avenue elevations were, however, pulled down.

It was decided to use reinforced concrete with brick walls for the reconstruction. On the Assiniboine Avenue side 8-in. brick walls with "HB" reinforcement and 13-in. pilasters every 12 ft. were used to lighten the dead load and save underpinning the old foundations, which would otherwise have been necessary due to the increased dead load from the concrete roof slab. In the spandrels between the pilasters "Fenestra" steel

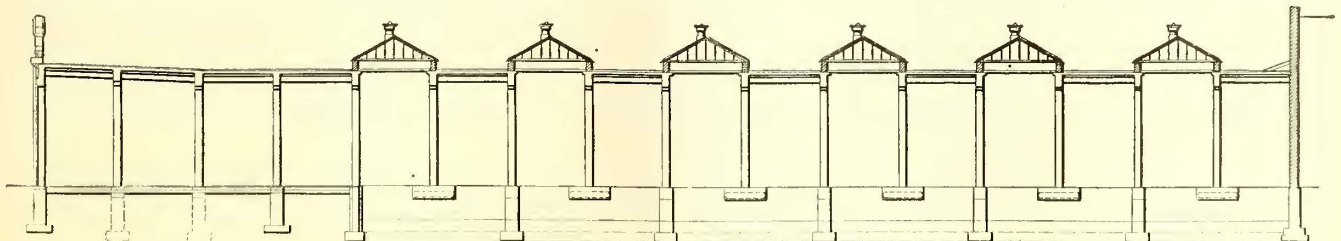
sash were installed, double-glazed with cast-wired glass on the outside and 16-oz. sheet on the inside to reduce the heat losses in winter. This double glazing saves approximately 40 per cent of the heat units ordinarily lost through a single-glazed window.

The track doors on the Main Street front are of wood hung on heavy strap hinges and have wired glass panels in the upper portion. There are twelve pairs of these doors. The building is 132 ft. wide, divided into four 33-ft. bays with 12-in. x 12-in. concrete columns. Where the columns occur the hinges were built into the concrete, and intermediate columns of channel iron were used to support the remaining doors.

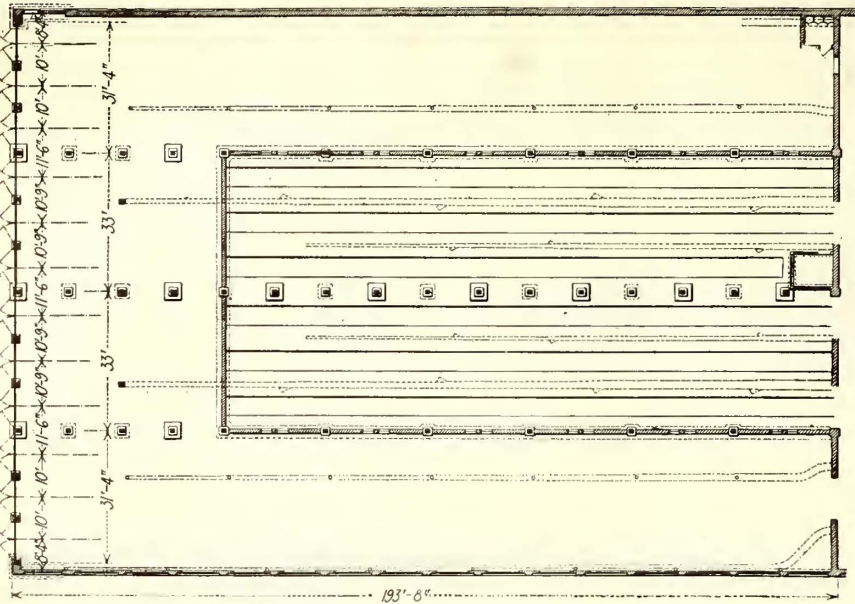
SKYLIGHT CONSTRUCTION OVERCOMES TROUBLE FROM CONDENSATION

Considerable trouble had been experienced in the old carhouse from condensation on the skylights and roof. To overcome this the skylights were constructed of cast-wired glass on galvanized iron frames and a flat ceiling light with 16-oz. glass was built in below the skylight curb walls at the ceiling line. Ventilators with regulating dampers were carried through these ceiling lights to carry off the moisture and smoke from the car heaters. The concrete roof slab was insulated as follows: "Insulite" (a compound wood pulp product of high insulating value) was cemented with hot asphalt directly on top of the slab and on the Insulite a Barrett specification felt and gravel roof was built up. This, together with the double glazing of the skylights, has proved quite satisfactory during the past winter.

The lighting consists of eleven rows of lights, placed above the runways between tracks, the outlets being at 24-ft. centers and equipped with 150-watt distributing-type porcelain enameled reflectors. Four 300-watt "nitro" lamps with weatherproof angle reflectors are placed above the entrance doors to light the tracks outside, together with an arc lamp at the street



END ELEVATION OF RECONSTRUCTED SHOPS



SECTION OF NEW SHOP BUILDING

The two center bays are heated by four ducts in the repair pit slung under the wooden sidewalks that run between the tracks. Regulating dampers are placed on all the main ducts. From 3.5 to 5 lb. of steam pressure is carried on the steam coils. The condensation is returned to the boilers by "Cole" tilting return traps.

The concrete roof slab is 4½ in. on 12-ft. spans with ¾-in. round bars. The beams have a span of 33 ft. and are supported by concrete columns 12 in. x 14 in. Where available, the old footings were used, and where new footings were necessary these are of reinforced concrete. The roof beams and slab were pitched so as to shed rain water to six hoppers in the roof. Pratt & Ross, architects and engineers, were responsible for the design and construction.

line. The repair pits are lighted with angle reflectors, throwing the light out horizontally from the side walls and column bases in the pit. All the above lights are controlled from a panelboard located beside the office of the carhouse foreman. In addition to the above there are twenty-one plug receptacles on the columns in the repair pit and above the track level for extension-cord lamps. All wiring is run in conduit using 110 volts alternating current.

The trolley wires are supported on brackets fastened to a wooden trough which is supported by the concrete roof beams. The trough was painted on all sides before erection to preserve the timber. Pieces of 2-in. x 12-in. plank 4 ft. long were fastened to the concrete roof beams by expansion bolts. These pieces project 18 in. on each side of the beams and the trolley trough is bolted to these pieces 6 in. from the ends, so that there is no possibility of a metallic contact with the reinforcing rods in the beams should a trolley pole jump the wire when a car is being moved inside the barn.

A fan and steam coils located in the machine shop supply heat for both shop and carhouse. Four galvanized-iron ducts are carried overhead with outlets every 24 ft. looking downward at 45 deg. Two of these are carried under the roof beams on each side bay.

The company also built a small brick and stucco office building facing Main Street immediately in front of the stores. This provides accommodation for the supervisors and cashier on the ground floor and for the construction department on the second floor. Ample toilet accommodation for motormen and conductors is provided for in the basement.

Track Labor Costs

Relaying Operations Reduced in Connecticut by the More Extended Use of Machinery, Better Organization, Smaller Gangs and Other Improved Methods —Interesting Statistics Given

BY P. NEY WILSON

Formerly Roadmaster the Connecticut Company, New Haven, Conn.; Now Assistant to the Engineer of Surface Roadway, Brooklyn, (N. Y.) Rapid Transit Company

THE Connecticut Company has obtained some interesting results by comparing the labor cost per foot of single track relaid in 1914 to the same unit as determined during relaying operations in 1920. Before this analysis was made it was expected that the unit costs would rise in proportion to the increase in the rate of pay per hour for labor. In fact, we thought our costs



THE FIRST VIEW SHOWS THE COMPLETED TRACK READY FOR CONCRETE PAVEMENT—THE CONCRETE MIXER IN OPERATION IS SHOWN IN THE SECOND VIEW



JACKING OLD TRACK OUT OF THE STREET—WHEN JACKED OUT THE STEAM SHOVEL LOADS THE SURPLUS MATERIAL ONTO TRUCKS

would be even higher than this due to the inefficiency of labor during the war period. While it was perfectly evident that the men in the trench were not producing as much work per day in 1920 as they were in 1914, we were somewhat surprised to find that the use of labor-saving machinery, smaller gangs, better organization and other improved methods more than offset the indifference of the man with the pick and shovel.

In 1914 no special track machinery was used, all trackwork being done by hand. The rate per hour for labor was 15 cents. In 1920 we used a power shovel, tamping machines, arc welders, etc., paying labor 50 cents per hour. For obvious reasons small gangs were used and we were in closer contact with them. We believe that a first-class track foreman can handle only twenty men efficiently, and this belief was borne out by the results obtained.

The psychological effect of being close to the men in the gangs should be considered, as surprising results may be gained when there is a correct mental attitude in the men in the trench. This was only possible occasionally during the war period, as the demand for labor was so great that indifferent workmen were the rule. One exception to this rule was called to our attention. The same gang rebuilt a certain piece of track, laying half of it in the fall and completing it in the spring.

The cost for labor for the first half of the work was \$1.73 per foot of single track, whereas the cost of the same unit for the second half of the work was only \$1.34. In the second instance the men were facing the end of the job and were induced to try to finish it as soon as possible, whereas under the first condition they were just beginning the work and were making wartime motions and receiving a day's pay. The following figures give the cost of labor per foot of single track in various relaying jobs during 1914 and 1920:

COST OF LABOR IN VARIOUS JOBS PER FOOT OF SINGLE TRACK

Case No.	1914	1920	Per Cent Increase 1920 Over 1914
1	\$1.19	\$1.65	.....
2	1.07	2.06	.....
3	1.09	1.61	.....
4	1.08	1.75	.....
5	.90	.....	.....
6	1.09	.....	.....
7	.79	.....	.....
Average.....	\$1.03	\$1.77	72
Rate per hour.....	.15	.50	233

NOTE.—Unit costs per foot in this table do not include paving charges, maintenance of machines, overhead, etc., but include labor charges only.

The question naturally arises whether the 1920 work was fairly comparable with that in 1914. Most of the operations consisted of relaying 7-in. 70-lb. plain girder (high T) rail in macadam streets and was carried on by the same foremen who held, throughout the period covered, the same nucleus of a track-laying organization. An intimate study of the conditions involved shows the comparison to be as fair as any comparison can be. Slightly different conditions were encountered on each street as compared with other streets, but we consider that the averages take care of these inequalities.

The results are surprising and may be a coincidence. However, the economies effected are certainly encouraging.

Valtellina Locomotive Rheostat

THE new type of locomotive furnished by the Westinghouse company for the Valtellina electrification, which is three-phase, has a novel arrangement for the liquid resistances used to control the induction motors. The rheostat consists of a metal tank with conic ribs and plate electrodes, between which the electrolyte—a soda solution—closes the circuit when the solution is raised by compressed air. The valve controlling the air is operated manually by a lever in the engineer's cabin, but is also controlled by a spring which is actuated by the moving element of a wattmeter. The current coil of the wattmeter is in the grounded phase and the potential coil is between the two overhead lines. At starting, the driver places the lever in a certain position, thereby admitting air to the liquid rheostat, which causes it to start. If the input increases beyond the value corresponding to the lever position the deflection on the wattmeter is increased accordingly, and, by means of the spring, partly closes the air valve and so reduces the input to the proper amount.

In this way the locomotive automatically takes a constant input when starting, this input being determined by the position of the lever. Pulsations in the supply pressure are also compensated for in this manner.

When a slow speed is attained the liquid starter is automatically short-circuited. The volume of the soda solution is about 900 liters and the liquid is actively circulated to assist cooling and so to provide more uniform resistance and less evaporation.

Automatic Train Registering

The Brooklyn Rapid Transit Company Has Installed Two Registering Instruments in the Chief Dispatcher's Office to Show Time Trains Pass Various Points and Stations

BY A. A. ROBERTS

Assistant Signal Engineer Brooklyn (N. Y.) Rapid Transit Company

A NOVEL and interesting system for registering the passage of trains has recently been installed by the signal department of the Brooklyn Rapid Transit Company that provides the central dispatching office with a continuous, graphic time record of train movements at certain critical locations. Two registering instruments known as "Hedwaygraphs" are used. These devices are manufactured by the Cleveland Electrical Instrument Company, which adapted for the purpose one of its standard types of recording pyrometers. An accompanying illustration shows the two Hedwaygraphs mounted directly behind the chief dispatcher's desk on the top of a cabinet, the interior of which contains the controlling relays and most of the local wiring.

One of the two instruments, each of which is equipped for making four independent records, is employed



TWO HEDWAYGRAPHS ARE LOCATED IN THE CHIEF DISPATCHER'S OFFICE

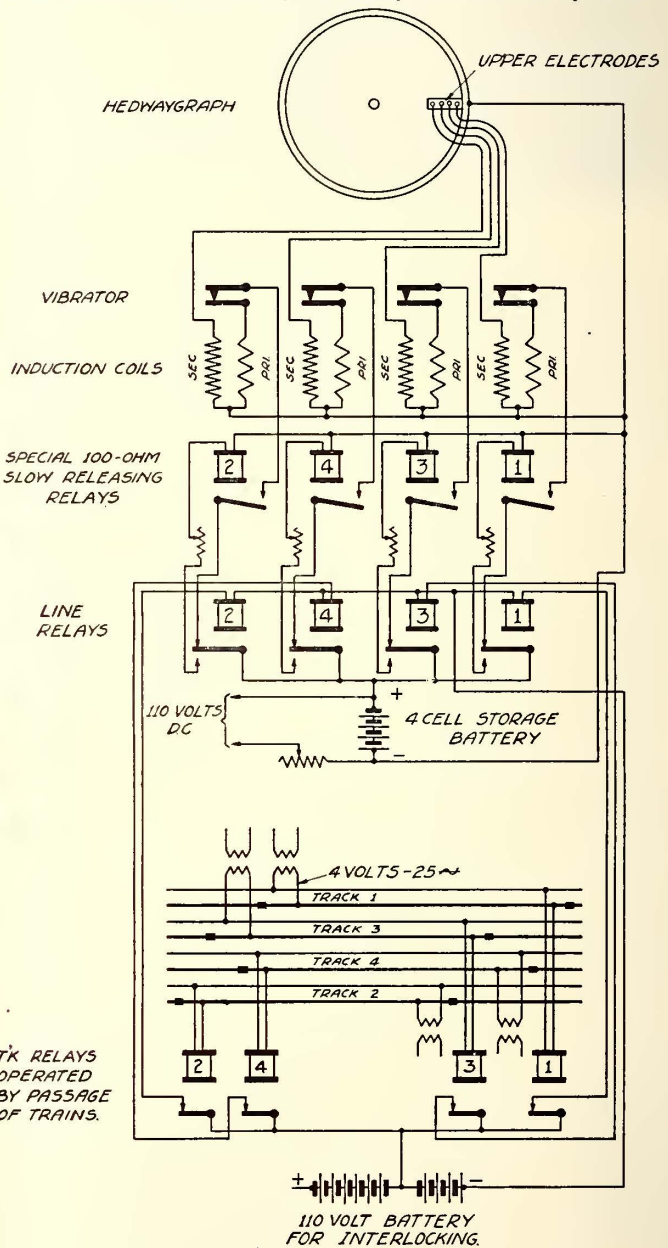
to register the time of trains passing on each of the four tracks of the Broadway subway at the Thirty-fourth street station in Manhattan. The other instrument makes a similar record for the two tracks over the Williamsburg Bridge near the Essex Street station and also for the two tracks of the Montague Street tunnel near the Court Street station.

Each Hedwaygraph consists essentially of a 24-in. dial of paper rotated by a self-winding clock mechanism and inclosed in a circular case of spun sheet metal. A glass-paneled cover permits ready inspection of the chart at all times. The chart is virtually a twenty-four hour clock dial divided by radial lines into hours with subdivisions of ten minutes each. Circular bands near the margin of the dial serve mainly to obtain a suitable color contrast, so that blue printed copies of the record may be made without difficulty. The automatic record of the passing of trains is obtained by the discharge of a spark from suitable electrodes which puncture the charts. A view of the four adjustable spark electrodes mounted in an insulating plate of Bakelite is shown in one of the illustrations. The discharge passes through the paper dial to a common electrode located under the chart and directly beneath the four upper spark points.

The time interval between trains under conditions of maximum traffic is seldom less than ninety seconds, corresponding to a linear distance of approximately 0.06 in. on the circumference of the inner band of the dial, which is 18½ in. in diameter. Since successive punctures are readily distinguished even when spaced at distances considerably smaller than 0.06 in., little difficulty is encountered from indistinct traces.

METHOD OF CONTROL USED

The method of control employed and the sequence of the various operations that take place in producing a record on the chart may be easily understood by refer-



WIRING DIAGRAM FOR CONTROL OF HEDWAYGRAPHS

ring to the typical wiring scheme shown. The four tracks indicated in the lower portion of the diagram represent the location at which a check on the uniformity of train movements is desired. The track circuits and track relays are those employed for the block signal system. These track relays are located adjacent to the track circuits and control energy taken from local storage batteries through the company's telephone cables to the line relays, which are located in the cabinet in the dispatcher's office and serve to repeat the opera-

tion of the track relays and thus to confine locally most of the special wiring. These relays are of the simple and inexpensive type commonly made use of in telegraph systems.

Special 100-ohm relays were furnished for this installation by the Chicago Railway Signal & Supply Company. These are of the familiar type used in direct-current block signal work, but having certain modifications designed to secure a retardation of approximately one-quarter second in the time required for the con-

A train entering upon the governing track circuit, for instance on track No. 1, starts the sequence of events by shunting open the track relay, which in turn opens the corresponding line relay No. 1. A back contact on the line relay then completes the circuit from the four-cell local battery that energizes the special relay and closes the contact thereon. This condition holds until the track and line relays are again energized due to the train leaving the track circuit. At this instant a circuit is completed from the local battery through the primary

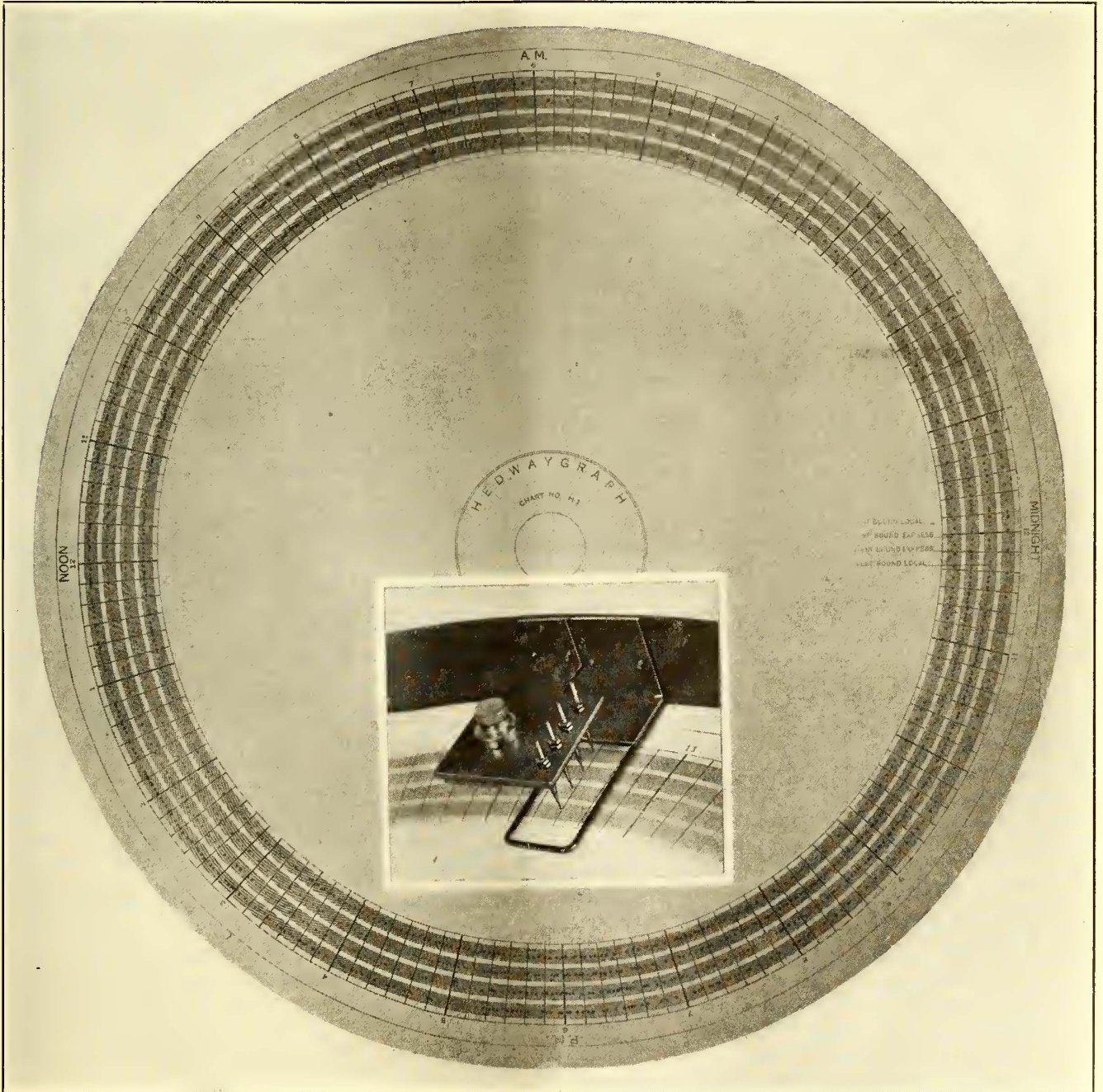


CHART SHOWING ACTUAL RECORD FOR TWENTY-FOUR HOURS—INSERT SHOWS MOUNTING OF FOUR ADJUSTABLE SPARK ELECTRODES

tacts to open after the relays become de-energized. The degree of time delay in contact opening necessary to produce a spark discharge of the proper duration was determined experimentally previous to the selection of the type of control apparatus to be used. Adjustable resistances inserted in the coil circuit of the special relays furnish a simple means of varying the retardation sufficiently to meet all requirements.

of the induction coil and front contacts of the line and special relays that energizes the coil and causes the discharge of the secondary to puncture the chart.

This system has now been in successful operation for about eight months and the instruments and control apparatus require very little attention. Maintenance consists mainly in the occasional cleaning of the electrodes and their replacement at infrequent intervals.

What Is Service?*

BY H. A. LEMMON

PERFECT service is electric energy always available without interruption at a constant standard voltage. From El Paso we operate a street car line into Juarez, a little city just across the Rio Grande in Mexico. About ten years ago relations between the two countries were somewhat strained. Our army had dropped a few shells into the Mexican city, and if there were any Mexicans who were lying awake nights consumed with love for their American cousins, they very effectually concealed that passion.

Operating our street cars across the two international bridges was attended with difficulty—with adventure; in fact, our cars had a way of losing their windows on the journey, and our conductors of coming back without any cash, but plenty of torn clothes and black eyes and explanations. There were reasons why we determined to keep going, and selecting car crews was quite an important task.

Employed on the El Paso lines was a conductor named Jim Burleson. Burleson hadn't attracted any particular attention. He was just an ordinary, quiet, peaceable chap, with a dry sense of kindly humor, who attended strictly to the business of the company and made it his own business. Some one suggested placing Jim on the Mexican line. He took it as all-in-the-day's work.

He didn't know much Spanish, but he learned to say "Gracias Señor" and picked up a few more words, until he could exchange a sentence or two of amiable banter with every frowsy señorita and dirty Mexican kid who ventured to get on his car. Mexicans and Americans, they all looked alike to Jim, and all received the same kindly treatment. He came home with the cash, with all of his windows intact and with no black eyes, and because he did these things he just dropped out of sight, as it were. No one paid any attention to him. He didn't figure in the day's news one way or the other.

And then one day Jim Burleson contracted pneumonia. Forty-eight hours later he was dead. The newspapers of El Paso recorded Jim's passing away in a four-line conventional notice. He had lived and he died in a little shack near the carhouse and was without surviving relatives to arrange the details of the last ceremonies. A group of his fellow employees got together and appointed themselves pallbearers. They went even further and engaged a carriage to convey the minister to the cemetery.

At the appointed hour the funeral started, but in some respects not quite according to the original conception. Instead of merely a few of his fellow workmen and the carriage containing the minister, there appeared upon the scene and in the procession the old, gray-haired, gray-bearded Mayor of Juarez, who had sworn never again to set foot on American soil; his City Councilmen, a delegation of Mexican customs officials, a group of other Mexican federal officials, and a little escort of Mexican soldiers (in civilian clothes because of the strained relations and because of the international law). And there also was the Mayor of El Paso and his fellow members of the City Council, representatives of the United States Customs Service, an unofficial representation of officers and soldiers from

Fort Bliss, and carriage after carriage filled with the substantial citizenry of the bustling Texas city. And even this was not all. There were over a half mile of Mexican people on foot and in rented, broken-down, dilapidated carriages, who, for the time being, had set aside their hatred of the gringo. Among them were the school teachers and mothers of Mexican children, and, perhaps, greatest tribute of all, three huge wagon-loads of dirty, ragged, unkempt Mexican school children themselves.

Every school in Juarez was closed the entire day of Jim Burleson's funeral; every business house was closed that afternoon, and in the little old church for which Juarez is far-famed throngs of worshippers crowded in from morning until away late in the night, offering prayers for the repose of the soul of a man who didn't measure service with a voltmeter.

What is service?

Changes in Retail Prices of Food

THE U. S. Department of Labor, through the Bureau of Labor Statistics, has completed the compilations showing changes in the retail cost of food in August in fourteen principal cities of the United States.

During the month from July 15 to Aug. 15, 1921, there was an increase in all of these cities. In Philadelphia there was an increase of 6 per cent; in Bridgeport, Chicago, New Haven, Providence, and Washington, 5 per cent; in Kansas City, 4 per cent; in St. Louis, Springfield, Ill., and Birmingham, 3 per cent; in Peoria, 2 per cent; in Salt Lake City, Denver, Little Rock, 1 per cent.

For the year period Aug. 15, 1920, to Aug. 15, 1921, there was a decrease of 28 per cent in Denver, Little Rock, St. Louis and Salt Lake City; 27 per cent in New Haven and Birmingham; 26 per cent in Peoria and Springfield, Ill.; 25 per cent in Philadelphia; 24 per cent in Kansas City; 23 per cent in Bridgeport, Chicago and Providence; and 21 per cent in Washington.

Corrosion of Cables in St. Louis*

THE latter part of June, 1913, the Union Electric Light & Power Company of St. Louis began the operation of a substation at which power was received from the Mississippi River Power Company, Keokuk, Iowa, and distributed to its city substations through seven 13,200-volt, 25-cycle, and 13,000-volt, 60-cycle, three-phase, cambric insulated, underground cables. The United Railways Company also received power at this substation and converted it there into direct current for the operation of some of its cars. The cables of the two companies occupy the same duct run for a considerable part of their length. Part of the duct was tile and another part was fibrous conduit.

Burnouts on these cables began to occur and these became serious in 1914 and reached a maximum in 1916. A thorough investigation of the trouble was begun by engineers of the two companies with the co-operation of the Bureau of Standards.

When all the data were collected and analyzed there appeared to be five causes for the burnouts, which in the order of their importance are as follows: (1) Electrolysis due chiefly to lack of drainage at the time the cables were installed; (2) overheating due to

*From a paper, "Public Relations," read at the convention of managers of New England companies, New London, Conn., by Mr. Lemmon, as printed in *Stone & Webster Journal*, August, 1921.

*Abstract of paper by K. H. Logan, United States Bureau of Standards.

deterioration of the insulation, caused possibly by mechanical injury to the lead sheaths, possibly by nearness of the ducts to the street surface and possibly by the restriction of circulating air because the duct was too small; (3) chemical corrosion during periods in which the street railway substations were inoperative due to the collection of alkali about the sheaths as the current flowed to them through the earth; (4) surges set up by switching and burnouts; (5) mechanical injuries, etc.

Letters to the Editors

Need of Definition for "Heavy Electric Traction" Suggested

NEW YORK, Sept. 8, 1921.

To the Editors:

The editorial in the issue of your magazine of Aug. 27 on "Wanted, Specific Data on Electric Locomotives" is very well taken, and no doubt will have a very direct bearing in future committee work pertaining to heavy traction matters in general.

With the thought in mind referred to in your editorial, would it not be consistent at this time to undertake some definition or limitation regarding heavy traction electrical engineering? I have in mind matters pertaining to electric locomotives in general. By way of illustration, each month the ELECTRIC RAILWAY JOURNAL will usually have some reference to an electric locomotive either being built or put into service by some steam, electric railroad or traction company. The apparatus may be either a 5-ton, 250-volt mine engine or a 250-ton, 11,000-volt equipment for a steam railroad such as the Pennsylvania or New Haven might use.

Obviously such steam railroads as are interested in freight transportation over long distances and with train tonnages well over 2,000 tons are not interested in the 5-ton, 250-volt equipment. No disparagement is intended of the engineering talent used in the development of the smaller equipment, but it must be admitted that there is a wide difference in the engineering procedure responsible for the two classes of engines. Extending the comparison even further, is it not a fact that in general the railroads of the United States, with the enormous tonnages handled annually and the large units in which this tonnage is moved, have very little, if anything, to learn from European practice in this particular field of electric motive power? For light passenger service and terminal electrification the difference is somewhat less.

If electrification is to bring about the results as referred to in your editorial by "decreasing the operating ratio," it is evident that the size or tonnage of trains must be increased or the running time between terminals must be reduced, or both must be accomplished to bring about an adequate saving as a return in the investment. In either case a larger horsepower or tractive effort must be available at the head of the train. It is self-evident that, if we are to take the present tonnage handled by our larger steam locomotives as a bench mark, we must necessarily design an electric locomotive of considerably larger horsepower than the steam engine which it will replace.

Is it not consistent then at this time to assume a

premise for any discussion of "Heavy Electric Traction" based on the above principle? Could it not be consistently shown that an electric locomotive weighing less than 100 tons, or some other similar weight, should not be classed as a heavy traction unit? Likewise, locomotives with axle loads less than a minimum value should not be considered. An overhead system for heavy traction should operate above a minimum prescribed voltage. These suggestions are not intended as a reflection on the engineering deductions which brought about the adoption of any particular system (such as the 600-volt third rail), but more as a basis for classification. As an example, it would hardly be expected that the Pennsylvania Railroad would extend its third-rail system between New York and Philadelphia. It has been conclusively shown that for general use of the electric motive power for freight transportation services over long distances, a much higher voltage and much larger sizes of units must necessarily come into use than those in use fifteen years ago.

If the engineering efforts of the many committees working on heavy traction are to be favorably received by the managers and directors of steam railroads it will be chiefly through the channel of development along the lines of

(a) Larger and heavier freight train units.

(b) Faster freight train schedules between terminals.

If you can, in some manner, start something along the lines above suggested, I am confident that the "heavy traction" subject will be more interesting to the average steam railroad official than it has been in the past. "ENGINEER, HEAVY ELECTRIC TRACTION."

Making Valuations Under Special Circumstances*

NEW YORK CITY, Aug. 22, 1921.

To the Editors:

We have read the recent articles on the subject of valuation, which were written by A. E. Knowlton and published in the ELECTRIC RAILWAY JOURNAL,* with a good deal of interest. Valuation is one of the vital elements in almost every rate determination and our constant contact with proceedings of that character causes us to scrutinize all literature on the subject very carefully.

Mr. Knowlton's point of view is decidedly interesting and the results accomplished were undoubtedly effective. We feel, nevertheless, that the following comment is pertinent.

The study used and required in this case was of a highly organized company managed by exceptionally competent people and having an unusually good record system. It is obvious from Mr. Knowlton's articles that a good deal of the speed and success which were obtained was due to the condition of the records. This is highly creditable to the Connecticut Company and is an example which might be followed to general advantage. It is an unfortunate fact, however, that there are not many, even of the larger companies, which have such well-organized record systems as this company. Another helpful feature in connection with the work was that Mr. Knowlton and his associates were not only familiar with the property but were known to be familiar with it and competent to pass upon the facts. In

*See issue of May 21, 1921, page 947; issue of May 28, 1921, page 985.

other words, from the standpoint of expert witnesses, the presumption was in their favor rather than against them.

Mr. Knowlton and his associates were in the employ of a public service commission which could in a large measure direct the manner in which the facts should be assembled. Its decision was presumably to rest upon those facts, and it probably realized that if the results obtained were even reasonably satisfactory there would be no appeal. The commission was not in the position of a litigant—certainly not in the situation of a litigant meeting opposition of the harassing type which is sometimes met in rate cases. The ordinary company could not rest a case upon general proof such as the commission could employ—in fact, we doubt whether a valuation of this sort would be admissible as evidence at all under ordinary circumstances.

There is no doubt but that the view taken of this problem by the Connecticut Commission was a broad, practical one and decidedly in the interest of securing a generally satisfactory result in a minimum of time. We think, however, that the ELECTRIC RAILWAY JOURNAL has as a duty the necessity of advising its company subscribers against adopting valuation methods of this sort in rate proceedings in which they are litigants. We are fearful that, despite the precedent established in Connecticut, a company which might have a good deal at stake but which attempted to adopt this method of valuation might put itself in a situation where its evidence would not be entertained and that its case would fall.

We do not intend this letter to be a condemnation or even a criticism of the method employed but merely desire to point out that the plan adopted worked in this instance because of special circumstances. The letter is prompted by our constant interest in the electric railway industry and our desire to have those similarly interested avoid any of the pitfalls which we might see.

H. C. HOPSON.

Competitive Merchandising Necessary

MILWAUKEE, WIS., Sept. 9, 1921.

To the Editors:

Neither court injunctions nor municipal ordinances nor state laws can or should crush the competitors of the street railway, or prevent the introduction of the jitney, the motor bus, the trackless trolley or other swift and mobile vehicles where public necessity or *public preference* calls for them.

The street railway industry, whimpering in courts, councils and legislatures for protection against the results of its own slothfulness, its own lazy failure to provide the new line of goods demanded by the public, is ridiculous.

Instead of asking to be protected against competition, the industry must get busy and do some intelligent competing on its own account. It can if it will install and operate the new services, supplementing and in part profitably replacing its existing service, more cheaply, efficiently and safely than its shoestring competitors. This is the way and the only way that the street railway industry can be relieved and saved from destructive competition, with the public approval. If it won't adopt this way it will and should go broke and pass out of the hands of its present owners into the hands of city hall politicians. I may add right here that several years of constant knocking of their own

business as a business by owners and operators of American street railways has not only damned its credit with investors but has also made city hall politicians shy about asking the public to buy it; even the politicians begin to regard the street railway industry as a white elephant.

As a matter of fact, aggressive merchandising management applied to the street railway business can again make it what it used to be—as dependable a producer of net income as any other utility. FRANK PUTNAM.

More Discussion on Association Reorganization

Shall Other Forms of Transportation Be Admitted?

F. R. Coates, president the Community Traction Company, Toledo, Ohio, has addressed the following letter to a large number of the members of the association, touching upon a very important point. This letter is here reproduced, with Mr. Coates' consent.

THE COMMUNITY TRACTION COMPANY

TOLEDO, OHIO, Sept. 6, 1921.

DEAR SIR: You have received the special report of the executive committee to the American Electric Railway Association covering proposed revision of the constitution and by-laws. If you will refer to the first paragraph on page 8 of the report you will learn that it is proposed, under certain restrictions, to let down the bars of membership to other forms of urban and inter-urban transportation than that form indicated by the name of our association. Such a movement at this time is prejudicial to our interests and is entirely unnecessary and uncalled for.

We are an electric railway organization and should stand our ground on the foundation we have built. Our method of transportation is not dead or dying, although it has been rather ill the past several years. Why should it not have been, with the kicks and cuffs it has received, and from the unfair competition which has sprung up in many quarters? And are we not ourselves greatly responsible for past conditions? Have we always come out frankly and openly and presented our problems to the public? Has the public always been treated in a manner calculated to make friends?

There are millions of dollars invested in electric railways in this country. Shall we protect this investment, or are we complacently going to watch its dissipation? It is a foregone conclusion that we will protect our interests with all the force and ability at our command. So let us wake up! Instead of affording strength to the other methods of transportation by giving them the opportunity to become members of our organization, let us direct our efforts toward the removal of all unfair competition by having enacted ordinances and legislation which will regulate "other than electric transportation units or companies" similarly as we are regulated. Let us devote our energies toward placing our service, our public relations and our investment on the highest possible plane.

We must face this issue fairly and squarely.

Please give serious thought to the question of admission into our organization of forms of transportation other than our own. Go to the Atlantic City convention and cast your vote so as to insure a continuance of the electrical transportation industry. F. R. COATES.

Equipment and Its Maintenance

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

Air Compressor Piston Clearances

Small Clearance Between the End of the Compressor Piston and the Cylinder Head Is Very Important if Efficient Operation Is to Be Maintained

BY F. J. FOOTE

Superintendent of Power, Ohio Electric Railway

THE writer has found that many repairmen, including some very good mechanics, do not understand the importance of keeping the clearance between the end of compressor pistons and the cylinder heads down to the smallest practical amount. One case came to the writer's attention where the clearance by accident was about $\frac{3}{8}$ in., and the workman on the job could not understand why the compressor would only pump up to about one-half the normal pressure at full speed.

The reason for keeping this clearance small is to prevent the air left in the clearance space at the end of a stroke from expanding and occupying so large a percentage of the cylinder volume on the return or intake stroke as to reduce the free air taken in. The air left in the clearance space must expand down to a pressure slightly below the atmosphere before any free air will be drawn into the cylinder, and the larger the clearance space the less free air will be compressed per stroke.

The natural law which governs this problem is that for any given quantity of air at a constant temperature, the volume will be inversely as the pressure, or stated in another way: Pressure* \times Volume = A constant. For example, if the pressure is doubled the volume will be only one-half, or again if the volume should be doubled the pressure would then be only one-half and so on.

To illustrate this, take the case of a single-acting air compressor with cylinder $5\frac{1}{2}$ -in. diameter and $4\frac{1}{4}$ -in. stroke. The piston will have an area of practically 24 sq.in. and will create a piston displacement of 102 cu.in. per stroke.

Let us assume that the actual clearance between the piston and the cylinder head is $\frac{1}{4}$ in. and that the space in the parts between the valves and cylinder is also equivalent to this. We will then have a clearance space equal to $\frac{1}{4}$ in. for the $5\frac{1}{2}$ -in. cylinder, or 6 cu.in. Let us assume that the compressor is pumping against 100 lb. gage pressure (114.7 lb. absolute), then the air left in the clearance space will be at 114.7 lb. absolute pressure at the end of the stroke. We will assume that this air must expand down to 14.6 lb. absolute ($\frac{1}{8}$ lb. below atmosphere) before any outside air will enter the cylinder.

With the above facts in mind let us consider what happens to the small quantity of air confined in the clearance space at the end of the stroke. It has been shown that the volume of this air is 6 cu.in. and that it is under 114.7 lb. absolute pressure. Now applying

our law (Pressure \times Volume = A constant) we get,
 $114.7 \times 6 = 688.2$

This 688.2 is then the "constant" for this small quantity of air, and no matter how much the pressure is reduced, by the backward stroke of the piston the pressure multiplied by the volume at any point will equal 688.2. Therefore when the pressure is reduced to 14.6 lb. as above, the volume will be $688.2 \div 14.6 = 47.14$ cu.in., which is 46.3 per cent of the total displacement, from which we see that little more than one-half of the effective volume of the cylinder is filled with outside or free air per stroke.

If the clearance between the piston and the cylinder head is reduced to $\frac{3}{8}$ in., which would be about the proper amount, the clearance in the ports will be the same as before so that we would have a clearance equivalent to $\frac{1}{4}$ in. plus $\frac{3}{8}$ in. or $\frac{5}{8}$ in. Computing the actual volume of the clearance we get 3.75 cu.in. Applying our law to this,

$$114.7 \times 3.75 = 430.1$$

430.1 is then our constant for the quantity of air in this smaller clearance space, and when this air is expended down to a pressure of 14.6 lb. per sq.in. the volume will be, according to our law,

$$430.1 \div 14.6 = 29.6 \text{ cu.in.}$$

which is 29 per cent of the total piston displacement as against 46.2 per cent in the case of the larger clearance. The capacity of the compressor would therefore be increased in the ratio of 17.2 to 53.8, or 32 per cent, by reducing the clearance between piston and cylinder head from $\frac{1}{4}$ in. to $\frac{3}{8}$ in.

The foregoing proves conclusively the very great advantage of keeping the clearance down to the smallest practicable working limit. Having shown the importance of small clearance, let us go a step further and point out a few of the causes of clearance being too large and the cure for same.

CAUSES AND CURES FOR LARGE CLEARANCE

Cylinder head gaskets may be too thick. The writer has seen rubber gaskets $\frac{1}{8}$ in. and $\frac{1}{4}$ in. thick used. The obvious thing is to use paper gaskets or something similar to this and get them about as thin as permissible. Rainbow or any other rubber compound is not suitable for cylinder-head gaskets as the oil attacks the rubber and soon ruins it.

Worn bearings and especially worn connecting-rod ends should be avoided. It is the practice in some shops to continue taking up these connecting-rod bearings till the babbitt is practically worn out. When this is done the effective rod length constantly grows shorter as most of the wear comes on the side next to the piston, with a consequent increase in the clearance between piston and cylinder head. A suitable jig for re-babbitting these rods should be provided, and the rods should be re-babbitted whenever the rod bearings show appreciable wear.

*Pressure here means absolute pressure, which is 14.7 lb. per square inch greater than gage pressure for ordinary altitudes.

A jig for this purpose devised by the writer and used for several years by the Ohio Electric Railway was published in the *ELECTRIC RAILWAY JOURNAL* for Aug. 20, 1921. This jig is made so as to give the babbitt rod bearings the proper size to fit the crank pin without any machine work and also to make the rod the correct length, thus preventing any mistake being made in the rod length after re-babbiting.

There are some other things that may affect the clearance slightly, but the two mentioned are the most usual causes.

It is very desirable that some kind of test be made on compressors each time they are overhauled to determine if they will pump up to the required pressure in a reasonable length of time. There are various methods, more or less elaborate, for doing this, but where the power conditions are reasonably steady and all compressors the same size, a very simple and fairly satisfactory test is to connect a small reservoir of 15 or 20 cu.ft. capacity to the compressor and note the time it takes to pump up to 100 lb. If this is done on all compressors and a record kept of same, a standard time that should not be exceeded will soon be found.

A more exact and scientific method is to count the number of revolutions of the crankshaft required to pump up the pressure on a given reservoir from 70 lb. to 100 lb. This is particularly advisable in locations where the power used in operating the compressor is variable. I am informed that one compressor maker contemplates the use of a cork gasket, which will probably make it necessary to let the piston extend slightly beyond the end of cylinder at the end of a stroke so that the clearance will be less than $\frac{1}{8}$ in., which is considered to be entirely practical.

A Crawling Tractor Crane

A CRAWLING tractor crane, manufactured by the Industrial Works, Bay City, Mich., has been developed to meet the use for a full-revolving tractor crane which can be operated independently of rails. The crane is built in two types—the type BC, with a capacity of 20,000 lb. at 12-ft. radius, is equipped with continuous-crawling tractor belts; and the type BT, with a capacity of 18,000 lb. at 10-ft. radius, is equipped with four broad-gage tractor wheels. Having exceptionally large capacities in ordinary lifting, they prove a valuable adjunct in those many erection jobs which are inaccessible to the railroad crane. They can be equipped to handle a hook and block, grab bucket, drag scraper bucket, wood grapple, electric lifting magnet, shovel dipper and piledriver leads with drop hammer. Operation is by means of an internal-combustion engine. When not in operation no fuel is consumed and it is not necessary, as often with a steam-operated machine, to have a licensed engineer as operator.

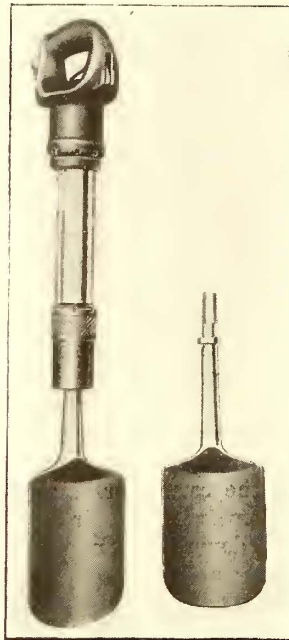
The steering of the crawling tractor crane while propelling is controlled by the operator, from his position in the revolving upper works, by manipulation of the friction clutches and brakes controlling the motion of each tractor belt. By means of these clutches and brakes either tractor belt can be readily and instantly disconnected from the motor while the other belt continues traveling at the normal rate of speed. The disconnected tractor belt can be held stationary by applying the brake, can be allowed to coast with the brake and clutch both disengaged, or the clutch can be

allowed to slip, thus allowing the operator to turn as sharp or as wide a corner as he may select. All the clutches, brakes and lever mechanism for steering are located in the revolving upper works, where they are much more accessible than when a portion or all of this mechanism is located on the car body.

New Pneumatic Scoop

EXCAVATION work in stiff clay, hard pan and fine gravel is ordinarily laborious and expensive where the large steam shovel or trenching machines cannot be used and the material must be loosened for removal by

means of the hand pick. An air-driven spade pick has recently been placed on the market by the Ingersoll-Rand Company, New York, to handle this sort of work. It is known as the No. 56-H "Little David" hammer and scoop. The tool consists of a long stroke hammer fitted with special handle and provided with a scoop held in place by a safety retainer. In operation the blows of the hammer drive the scoop into the ground, prying loose the material for removal. The air hammer is of the same rugged type as has proved successful in other work of a similar character, such as picking coal, tearing out light concrete, etc.



AIR-DRIVEN SPADE PICK

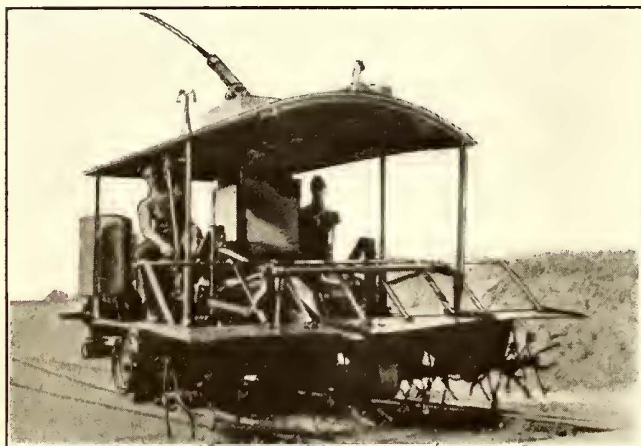
On contract jobs covering both tunnel and trench excavation in clay, these tools have been found to be important labor savers, increasing the rate of earth removal per man from 100 to 150 per cent or more. In one sewer tunnel job in Detroit where the bore is about 9 ft. 6 in. in diameter they are averaging 17 lin.ft. of sewer per day of eight hours with four miners or about 11 cu.yd. per man per day. The material on that job is a medium hard blue clay, fairly stiff, no bracing or timbering being needed to hold the roof.

Mix Thermit Thoroughly Before Using

OCCASIONALLY thermit welders find that they are unable to produce the requisite amount of steel from the thermit which they are using. This is entirely due to the fact that the ingredients (iron oxide and aluminum) have become unmixed. The importance of mixing thermit thoroughly before using cannot be too strongly emphasized, whether a whole bag or part of a bag is to be used. It is logical also, as the iron oxide is in the form of a flake and the aluminum is in the form of a little round ball, that as they are so different in specific gravity, they will segregate in the vibration caused by transit. The bag, therefore, should be dumped and the material thoroughly mixed by hand before putting it into the crucible. In a recent case the Metal & Thermit Corporation, New York, N. Y., investigated the variations in the speed with which thermit reactions took place; this variation was found to be due to segregation of materials and was entirely eliminated by remixing.

A Gas-Propelled Weed Cutting Machine

THE picture reproduced herewith shows a weed and grass-cutting machine built at the shops of the Texas Electric Railway for use on its interurban lines. The machine is designed to remove grass and weeds growing between the rails and for a distance of 2 ft. 10 in. on each side. This is accomplished by rotating at 1,100 r.p.m. a 3-in. shaft which is attached to a four-wheeled car. The weeds and grass are torn and cut by a series of stiff wire cables spaced 3 in. apart



A WEED CUTTER FROM TEXAS

on the shaft and secured with set screws. The motive power for operating the shaft is a 15-hp., 1,200-volt, d.c. motor belted to it. The shaft can be raised or lowered by a series of levers to clear cattle guards and other obstructions.

The car itself is propelled by a six-cylinder gasoline motor taken from a damaged automobile. Located over and parallel to one set of wheels is the motor which drives them through a chain passing over a sprocket on the end of the axle. The car can be run at a speed varying from 4 to 40 m.p.h., but 4 m.p.h. is the average speed when cutting through heavy grass and weeds. Two men are required to operate the apparatus, while the average cost per car-mile is 70.2 cents. This cost includes labor, repairs to machinery, oil, gasoline, etc. The same work performed by hand would cost several times this amount. One of these machines will easily take care of 300 miles of track.

How to Machine Aluminum

THE use of aluminum to an increasing extent in the railway industry to secure lightness of parts has introduced questions regarding proper methods for machining. Some very good practical advice on this subject is given in a handbook published by the British Aluminum Company.

For turning, drilling or milling, a high speed is best and the tool should have acute cutting edges, preferably finished on an oil stone. For the clearance angle of a lathe tool 15 deg. to 20 deg. is advised and with a smaller angle a 5 deg. top rake is given. This top rake should be modified according to the rigidity of the work, as with light work there is a tendency for the tool to dig into the metal. Cutting speeds of about 600 ft. per minute are permissible and a heavier and faster speed may be used than can be used with brass.

For screwing purposes the British Aluminum Company supplies a special alloy and recommends the use

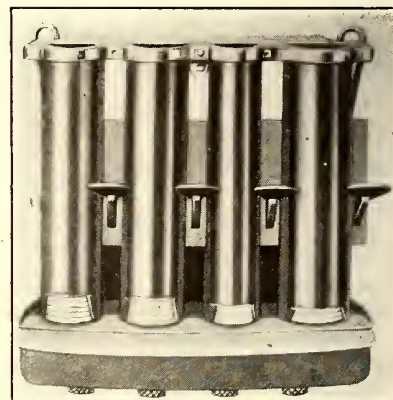
of paraffin as a lubricant instead of turpentine, which tends to leave a resinous deposit and may cause the screw to bind.

In milling the best results are said to be obtained by the use of a built-up tool, the cutters being ground with sharp corners. The cutters should only cut at the extreme points and not have a scraping action as with brass. Cutter speeds of 500 to 600 ft. per minute are used. For grinding aluminum the wheel of any type such as emery, corundum or carborundum should first have a piece of paraffin wax held against it to fill up the pores. The company states that crystolon grinding wheels give best results.

It is advised that filing be done with a single cut file, as other files are plugged easily and require frequent cleaning with a brush. A quick method of cleaning is to immerse the file in a strong solution of caustic soda which dissolves aluminum, but the file so treated must afterward be washed in water and dried in sawdust as it will rust quickly. For finished filing the file should be kept wet with paraffin or even with water.

Adjustable Change Carrier

A NEW change carrier which is to be manufactured by A. F. Nelson, Harrisburg, Pa., and distributed by the Cleveland Fare Box Company, has the particular feature that it can be adjusted to eject from one to five coins of any denomination by simply turning a thumb screw at the base of each barrel. It is a lever-operated changer, utilizing a flat spring made of special non-corrosive metal and bent to the proper form without tempering, instead of the usual steel spring, a feature which it is claimed will eliminate breakage. The carrier is made entirely of liberty silver to avoid rust or tarnish and rather generously proportioned to give



NEW ADJUSTABLE-EJECTOR
CHANGE CARRIER

a capacity which is said to be 33 per cent greater than any other change carrier on the market. When made up with four barrels it weighs 12 ounces and measures 5 in. wide by 5½ in. high over all. The barrels are 4 in. long. The top of the device is hinged so that it may be raised more readily to insert coins or for the purpose of emptying all of the coins out of the changer, upon making the turn-in.

The usual location of the barrels has been reversed so that those containing the smaller, more frequently used coins are on the right-hand side. This is claimed to save the conductor from the necessity of reaching across the carrier to the left-hand side many times, lessening his work and quickening change making.

The ready adjustment of the ejector is said to be particularly advantageous when a conductor changes from hand collection to fare box collection in taking out different cars, for it is only a matter of a few seconds to readjust the ejector to fit the case. The device is called the "Rapid Ready-Lever Change Carrier."

Programs of Meetings

National Association of Railway & Utilities Commissioners

THE thirty-third annual convention of the National Association of Railway & Utilities Commissioners will be held in Atlanta, Ga., Oct. 11 to 14 inclusive. The headquarters and place of meeting will be the Ansley Hotel.

The following program is announced:

TUESDAY, OCT. 11

Morning Session: Address of welcome—Thomas W. Hardwick, Governor of Georgia; annual address of the president of the association—James A. Perry of Georgia. *Afternoon Session:* Report by John E. Benton, general solicitor of the association.

WEDNESDAY, OCT. 12

Morning Session: Consideration of reports of standing committees; annual election of officers. *Afternoon Session:* Address by Hon. Joseph B. Eastman, member Interstate Commerce Commission; round-table discussion, topic: "After-the-War Phases of Regulation," chairman, Hon. E. I. Lewis, member Interstate Commerce Commission, formerly State Commissioner of Indiana.

THURSDAY, OCT. 13

Morning Session: Reports of three committees—valuation, litigation and state and federal legislation. *Afternoon Session:* Round-table discussion, topic: "Automobile Transportation—Omnibus and Jitney," chairman, Hon. George McAneny, chairman New York Transit Commission; automobile drive about the city of Atlanta as guests of the Presidents Club of Atlanta. *Thursday Evening:* Annual dinner at Piedmont Driving Club as guests of Presidents Club of Atlanta.

FRIDAY OCT. 14

Morning and Afternoon Sessions: Devoted to reports of committees and discussions; some time during this day the convention will be addressed by M. H. Aylesworth, executive-manager of the National Electric Light Association.

National Safety Council

AT THE Tenth Annual Congress of the National Safety Council to be held at the State House, Boston, Sept. 26 to Sept. 30, there will be meetings of the Automotive Section, Chemical, Construction, Education, Electric Railway, Engineering, Mining and many others.

The first session of the Electric Railway Section, to be held on Sept. 27, will include an address by F. R. Coates, president and general manager of the Toledo Railway & Light Company, entitled "Reflections of the Executives on Safety," and "Rejecting the Grundys from Safety First," a discussion by Miss Laura Roadifer of the Philadelphia (Pa.) Rapid Transit Company. At the second session an address will

be delivered by John E. Cullen, United Railways & Electric Company, Baltimore, Md., entitled "The Attitude of the Public Toward the Railway's Participation in No-Accident Week Campaigns." A discussion will follow on "Nationalizing and Standardizing Railroad Crossing and Grade Signs," by R. S. Messenger, claim agent of the Rochester & Syracuse Railroad, Syracuse, N. Y.

Pacific Claim Agents Meet

THE Pacific Claim Agents Association held its annual meeting in Butte, Mont., on Aug. 25, 26 and 27,

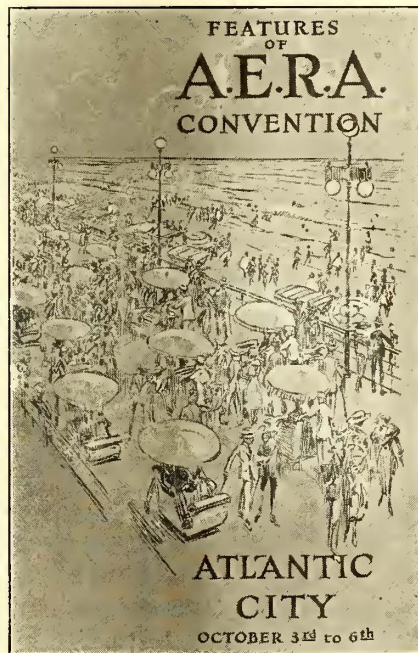
with representatives of most of the leading Pacific coast electric railway companies in attendance. A series of eight papers were presented at the meeting, all covering live questions in the claims department.

The following officers were elected for the ensuing year: President, Frank D. Oaklen, Puget Sound Electric Railway, Tacoma, Wash.; first vice-president, C. M. McRoberts, Los Angeles (Cal.) Railway; second vice-president, P. O. Solon, Tacoma Railway & Power Company, Tacoma, Wash.; third vice-president, J. W. Grace, Sacramento (Cal.) Northern Railway.

American Association News

Convention Entertainment Features

IN AN attractive leaflet just issued by association headquarters, there is outlined in connection with the daily program of the convention at Atlantic City the various entertainment features which have been arranged for the idle hours.



ATTRACTIVE COVER OF CONVENTION LEAFLET

Early birds at Atlantic City will find arrangements for the golf tournament to start on Sunday, Oct. 2, all ready for them. A Sunday evening musical concert at the Marlborough-Blenheim has also been arranged.

On Monday evening the annual reception has been scheduled in the Venetian ballroom, Hotel Ambassador, at 8 p.m., which hotel has been designated as the social headquarters for the convention.

On Tuesday evening a combined dinner and evening meeting have been arranged as previously announced, this also to be held at the Hotel Ambassador, Renaissance Room.

On Wednesday evening in the same room at the Hotel Ambassador will be held the annual ball.

No special arrangements have been made for the last evening, Thursday, but the entertainment committee calls attention to the various attractions at the theaters along the Boardwalk.

As usual the entertainment committee has provided an interesting program for the ladies in attendance at the convention. On Monday afternoon will be held the obstacle golf tournament.

On Tuesday afternoon there will be an informal afternoon tea for the ladies at the Hotel Ambassador, with special orchestra. On Wednesday afternoon the usual ladies' bridge tournament will be held and on Thursday afternoon in the Trellis Room of the new Ritz-Carlton will be held a ladies' tea party. Music will be furnished by Veschey's Parisian band.

The leaflet also contains all of the regular program material, the whole arranged by days. It forms an interesting reminder of the advantages of attending the convention and should tend to encourage those who may at present be in doubt to come to Atlantic City as they should.

Executive Committees Meet at Atlantic City

EXECUTIVE COMMITTEE meetings of the American, T. & T. and Engineering Associations have been called to convene at Atlantic City on Sunday and Monday, Oct. 2 and 3. All of them will be held at the Marlborough-Blenheim as follows:

The meeting of the American executive committee will be held on Monday, Oct. 3, at 11 o'clock.

The meeting of the T. & T. executive committee will be held on Sunday morning, Oct. 2, at 9 o'clock Eastern standard time, in the committee room on the first floor below the office.

The meeting of the Engineering executive committee will be held in the committee room on the first floor below the office on Sunday morning, Oct. 2, at 11 o'clock, Eastern standard time.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Detroit's Municipal to Buy Canadian Power

Negotiations are being continued between the city and the Hydro-Electric Power Commission of Ontario for the importation of power to Detroit to operate the municipal street railway system. The commission has offered power to the city at \$36 per horsepower, but Mayor Couzens is confident that he will be able to obtain it at a lower price than that.

The Mayor intimated that he favored importation of power commencing on a small scale, possibly not more than 10,000 or 15,000 hp. By bringing power in on a small scale at first the Mayor says it would not be necessary to make any great capital investment and the commission could provide the city with 15,000 hp. from the lines already running between Windsor and Niagara Falls.

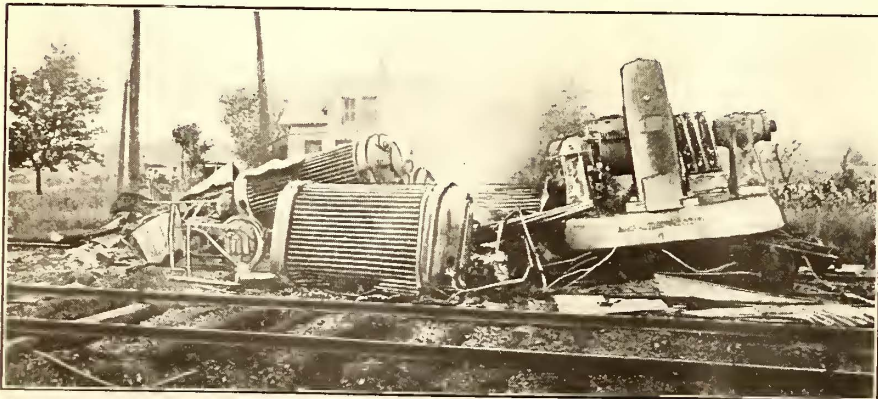
MAYOR TAKING NO CHANCES

According to the *Detroit Free Press* the Mayor is quoted as saying: "I believe we will do better by importing only a small amount at the beginning. Take any large business and the men behind it will tell you that had they started business on a large scale they would have made a mistake. If we go into this business on a small scale at first, we will make fewer mistakes, and as there is practically no capital investment, we stand no chance of a loss."

When negotiations first started with the Ontario commission, the Mayor believed that eventually it would be possible to provide sufficient power to enable the city to retail it to industrial concerns.

Lightning Destroys Substation

A terrific electrical storm swept over Chicago and the surrounding country in the early evening on July 7 and caused considerable disturbance to the various electric railways. The accompanying picture shows the remains of



PORTABLE SUBSTATION DESTROYED BY LIGHTNING AND FIRE

a portable substation which was destroyed by fire as the result of lightning. This was located on the line of the Chicago & Interurban Traction Company at a point known as Stone Quarry, about midway between Harvey and Chicago Heights, Ill. The car on which the substation equipment was mounted was built with a wood underframe and corrugated iron superstructure. The equipment and car were a practically complete loss. The substation was covered by insurance.

On the same evening lightning caused an interruption in the high-tension power supply of the Chicago, North Shore & Milwaukee Railroad, which was so serious that service was off on the north end of the line from 6 o'clock until the following morning.

Labor Men Told What They May Expect

The city administration and the street railway commission will not discuss wages and working conditions until the entire municipal system has been completed, Mayor Couzens recently informed the Detroit Federation of Labor.

The Mayor stated that the street railways now operating did not bring in returns sufficient to pay the bond interest nor the taxes nor put anything aside for a sinking fund and that the city was in no position to discuss wages or working conditions until the whole system was in operation so it could determine its financial situation under the complete scheme.

Chaotic Conditions in Dayton

Immediate Action Necessary if Transportation Catastrophe Not Unlike Des Moines Is to Be Avoided

The electric railway situation in Dayton, Ohio, presents a problem probably unparalleled in the history of Ohio municipalities. The most pressing immediate need is to restore co-operation, such as existed between the operating companies prior to the trainmen's strike in July. There are four independently operated systems in Dayton and they have been rent by dissension since the strike.

AS A result of the difference among the railways, the bus lines, which have been in operation since July, are making a very strong bid for the passenger business of the city, but to date their success has been of no large consequence other than the assistance obtained from the City Commission, which, following the strike, passed an ordinance compelling the railways to reduce fares from 7 to 5 cents.

In addition to the four railway systems, two interurban companies—the Cincinnati, Hamilton & Dayton Traction Company and the Dayton & Xenia Traction Company—operate lines from the heart of the city to the outlying

suburbs. The other interurban lines, which merely enter the municipality, are the Dayton & Western Traction Company, the Dayton & Troy Traction Company, the Dayton, Covington & Piqua Traction Company and the Indiana & Eastern Traction Company.

The break among the city railway systems resulted when the People's Railway and the Dayton Street Railway granted their employees 48 cents an hour, instead of 45 cents, which the motormen and conductors on the lines of the City Railway and the Oakwood Street Railway are receiving today. Officials of the latter companies would not yield to the demands of their employees, and as a result many of the men operating the cars on these lines are non-union, while the union is picketing and urging the people not to ride on the cars operated by these companies.

When the men went on strike the Oakwood Street Railway and the City Railway, which is the largest of the four systems, informed their employees that they could not pay them more than 45 cents an hour and that if this pay was not satisfactory the men need not return for work. Following the first day of the strike, the city manager of Dayton informed the officials of the Oakwood and the City Railways that if they did not operate their cars the city would.

Non-union men were employed to

take the places of the strikers, and in twenty-four hours after the city manager's order was issued every car on the lines of these two companies was running. In the meantime the People's Railway and the Dayton Street Railway settled the controversy with their employees, who returned to their posts, after an idleness of four days, for 48 cents an hour. This was 3 cents more on the hour than the motormen and conductors were receiving on any of the other city railway systems. Prior to the strike trainmen employed by the four companies were getting 62 cents an hour.

BUS LINES NOW OPERATING

Immediately following the strike the City Commission licensed bus lines, which are still in operation. These carriers to date have offered most competition to the City Railway and the Oakwood Street Railway, which are the only roads that refuse to recognize the union. The trade of the buses, which are competing with the railways under conditions most unfavorable to the trolleys, is largely drawn from union sympathizers and visitors.

The Oakwood Street Railway probably felt the effect of the strike less than any of the other lines, because 70 per cent of its employees are non-union and the places of the union men were easily filled.

Shortly after the People's Railway and the Dayton Street Railway settled their differences with employees the City Commission adopted an ordinance requiring the operating companies to reduce fares as follows: Adults, 5 cents; children, 3 cents; transfers, 1 cent. Under the old system fares were 7 cents for adults and 4 cents for children, with transfers free. The railways put the new rate in effect on Aug. 27, although the date specified in the ordinance was Sept. 17.

Dayton has not been free in the past from occasional bickerings between the railways and the city, but with the adoption of the commission form of government, which gave the city officials a wider range of action, the railways and other utilities came under fire. In other words, in the public utility industry Dayton has become known as a "tough" town in which to operate. Despite all these hindrances the railways have thus far evaded receivership.

NEW FARE ORDINANCE OPPOSED

W. A. Keyes, president of the Dayton Street Railway, said that the new ordinance regulating fares eventually would mean the confiscation of the company's assets. When the time arrived that his company could no longer operate under the new fare provision, it reserved the right to adopt such a course, without regard to the fare ordinance, as was best calculated to protect the interests of the stockholders.

The railway officials opposed the new fare ordinance on the ground that the

City Commission was making no strenuous effort at the time the measure was passed to eliminate the bus lines. The bus lines, according to the traction officials, were to cease operation after the railways had restored adequate transportation service. Today the bus lines are operating on a basis of \$11 a month, \$10 of which is national tax and \$1 city tax.

The railway officials contend that if the City Commission permits the bus lines to operate on the present basis it will drive the railways from the field. On the other hand, the question is raised as to where, in the event they cease to function, is the city going to collect the \$250,000 revenue which comes from the railways yearly. In addition to the \$250,000 tax, the railways bear a certain portion of the cost of improving streets on which their cars operate. Under the present arrangement the bus lines, for \$11 a month, are permitted to operate over streets which the railways help to keep in condition. They are also permitted to do business without indemnity insurance.

COMPELLED TO CUT WAGES

Henry Gebhart, general manager of the Oakwood Street Railway, said that the road was compelled to cut the employees' wages to meet operating expenses. Last year the company, according to Mr. Gebhart, had to borrow money to meet its obligations. Mr. Gebhart said that before the company would continue such a policy it would junk the equipment. In an interview with a representative of the *ELECTRIC RAILWAY JOURNAL* Mr. Gebhart said:

The amazing thing is the fact that employees on our road wanted a higher wage on an open-shop basis than the men employed on the line of the Cincinnati, Hamilton & Dayton Traction Company, which is the only strictly closed-shop line operating in this territory.

Another important feature is that no wage agreements are made between the companies and employees. Everything is done by bulletin. The action of the People's Railway and the Dayton Street Railway in granting their employees 48 cents an hour instead of 45 cents did not meet with the approval of the two other city systems. This has caused dissatisfaction on both sides and may prove detrimental to the combined systems at this particular time, when the bus lines are attempting to disrupt this business.

The Bulletin of July 19 setting forth the scale of wages, with arbitration, accepted by the employees of the People's Street Railway follows:

1. Properly authorized officials of the company shall meet and treat with a properly accredited committee of the employees upon any and all grievances and complaints, except that of dishonesty, that may arise between them during the life of this bulletin. If an agreement cannot be reached in this manner, the question in dispute shall be immediately submitted to a board of arbitration, composed of three men, one of whom shall be selected by the company, one shall be selected by the employees, both to be selected within a period of ten days from date of notice of submission to arbitration. The third arbitrator shall be selected by the two arbitrators first chosen, provided they can agree within a period of

five days; upon failure to agree within the specified time they shall jointly request the appointment of a third arbitrator by the Judge of the United States Court for this District.

When this board is complete they shall meet daily for the consideration of such matters as are properly before them and report their finding promptly in writing to the parties hereto. The decision of a majority of this board shall be final and binding upon the parties hereto.

2. That all employees of the company shall immediately return to their respective positions as they were on July 5, 1921, without discrimination.

3. That all regular runs shall be nine hours as near as schedules may permit, and that time and one-half be paid for all time in excess of regular scheduled runs.

4. All employees to return promptly to their respective posts of duty upon a wage of 44 cents an hour for men of less than three months of service, 46 cents an hour for those of three months and less than one year of service, 48 cents an hour to those of one year or more, for a period of six months; or, all employees of the company shall return to their respective positions as provided above, and without a rate of wages for a period of thirty days, the rates of wages shall then be submitted to a board of arbitration as above provided, who in fixing the award shall give consideration to two points: First, a living wage for the employees; second, the company's ability to pay. The findings of the board shall be for a period of six months from date of resumption of service.

5. That each conductor shall be furnished with the necessary amount of change for the proper operation of his car.

6. Negotiations upon a new bulletin shall be opened up thirty days prior to the date of expiration of this bulletin.

7. The company will, as in the past, maintain the open shop policy. This bulletin and the provisions herein shall be in force on and after July 6, 1921, until July 5, 1922. A modification or repeal of the present fare ordinance will automatically open up the wage provisions herein for adjustment after the six months period stated above.

The same working agreement was accepted by the motormen and conductors on the line of the Dayton Street Railway, although the bulletin is worded a little differently.

The recent strike was a repetition of the one in 1920, when the men were out on all systems for twenty-one days. This year the strike lasted sixteen days, although some of the railways operated cars during the strike controversy.

NEW BUS ORDINANCE INTRODUCED

The City Attorney of Dayton has prepared a new bus line ordinance which if passed by the City Commission will virtually put the bus owners out of business. This measure has been given its first reading by the commission.

The city manager must approve all applications for licenses.

Penalties for violation of the ordinance range from \$50 to \$500 and imprisonment from ten days to six months.

Bus owners say the license fee, indemnity bonds and front and rear exit provisions of this measure if unaltered will prohibit the operation of buses in Dayton. They are planning to circulate a referendum petition on the ordinance.

Efforts are being made by Charles Mendenhall, City Commissioner, who represents the labor element, to have certain provisions in the ordinance changed, so as to enable the bus line owners to continue operation.

The proposed ordinance becomes operative thirty days after the date of passage.

Wage Decrease Advised

Nebraska Commission Denies Application for Fare Increase and Advises Wage Reduction

The Nebraska State Railway Commission has denied the Omaha & Council Bluffs Street Railway an emergency relief rate of 8 cents, recently requested on account of a decrease of nearly 6 per cent in gross revenue for the year. The company applied for this temporary rate pending the determination of a permanent rate case now before the commission, the hearing upon which was resumed Sept. 12. In its finding on the temporary rate application the commission recommended that the company reduce the wages of trainmen from 10 to 15 per cent. The board of directors of the railway met Sept. 8 and decided to hold in abeyance the wage reduction until R. A. Leussler, general manager, shall have made a thorough survey of wage conditions for street railway employees throughout the country.

On Aug. 10, 1919, the commission authorized the following temporary rates which are now in effect pending the outcome of the application for permanent rates: Cash fare 7 cents or four tickets for 25 cents; children 5 to 12 years, ten tickets for 30 cents; school tickets 5 cents each. The application just denied asked for a cash fare of 8 cents or four tickets for 30 cents, with children's tickets at 4 cents.

CAUSTIC COMMENT BY COMMISSION

The railway estimated that the proposed 8-cent rate would yield increased revenue of \$722,725 a year and contended that this sum was required if a fair return on the value of the property was realized. The commission found that the reduction in the number of revenue passengers has been 4 or 5 per cent compared with the same period a year ago, and stated that this rate of loss continued up to the week of Aug. 15, 1921, when the loss was 6.1 per cent.

The following are excerpts from the order of the State Railway Commission, denying the emergency rate of 8 cents:

Under the estimates based on April, 1921, the net income would have lacked \$111,460 of paying the interest on the Nebraska portion of the outstanding bonds, which amount to \$10,000,000. The actual interest deficit, January to July, inclusive, was \$27,009.19; that is, the company lacked that much revenue to meet its bond interest. On this basis, the total deficit for the year would amount to \$49,730.04, which is \$61,730 less than estimated. The applicant has outstanding \$4,000,000 in preferred stock, covering the property as a whole. Dividends at 5 per cent on this preferred stock would amount to \$200,000. This added to the prospective deficit in bond interest indicates a total deficit for the year of \$250,000. There is thus presented a serious situation, for the company must, if it maintains its credit, at least pay the interest on outstanding bonds, and it should, if its general credit is to be maintained, be able to pay the dividends on its preferred stock. This is essential to the continuation of good service, and the public for this reason is as vitally concerned in the payment of interest and dividends as are the stockholders and the management.

The applicant asserts that its only remedy is to increase rates again. It is quite obvious, however, that it does not

require \$725,000 of added money merely to meet interest on the bonds and dividends on the preferred stock. This is an emergency proceeding and applicant stipulates orally that it will accept, as a measure of its immediate necessity, a net return sufficient to pay the interest on its bonds and dividends on its preferred stock.

Consideration of the evidence in this record and of general industrial and financial conditions, of which it must take cognizance, leads the commission to the conclusion that relief for the company lies not in again raising its rates but in reducing, if that be possible, its operating costs. Wages paid labor have receded to a marked degree throughout the country. An exhaustive investigation made by this commission during the summer of 1920, prompted by a threatened strike, disclosed that the applicant was at that time paying trainmen wages in most cases as high and in several cases higher than is paid in other occupations of a comparable nature. The time appears to be ripe, therefore, for action on the part of the applicant looking to a readjustment of its labor costs down to a basis comparable with that experienced by other industries. Laboring men in other walks of life whose wages have been reduced and who are compelled to use the street cars to go to and from their work have a right to ask that wages paid to street railway men be reduced also, if that is necessary to prevent a further increase in fare; this being on the assumption that street railway wages were raised during the period of the war to meet abnormal conditions.

The commission also went on to point out that other economies could be expected as a result of a reduction in material costs, and that if it reduced wages and used a portion of its depreciation reserve allowance, it should be well able to meet its interest on bonds and dividends on preferred stock, making unnecessary the increase in rate which has been asked.

The commission also pointed out that the existing industrial depression, a large number of unemployed and the prevailing discontent were such that it was impossible to estimate or forecast the effect of an increase in fare, were it granted. The increase, unless it were very slight, might result in accelerating the present loss in traffic where added revenue could not be secured, and in its opinion the necessities of the company at this time were not sufficiently great to make it necessary for the company to assume the hazard of such a loss. If, however, the company, after putting into effect the suggested economies, still does not succeed in accomplishing results desired, then the only alternative will be an increase in rates.

In a supplementary expression Thorne H. Brown, member of the State commission, stated: "This utility (the street car company) is second to none in the country in point of service and modern equipment. It has made an enviable record during the period of high operating costs."

Railway Officials at Clam Bake—Edward H. Chapin, vice-president of the National Car Wheel Company of Rochester, entertained the officials of the New York State Railways at a clam bake at his cottage at Conesus Lake near Geneseo, N. Y., on Sept. 1. Upwards of fifty or sixty were present. Last year Mr. Chapin entertained the officers of the same company at a large dinner at his home in Geneseo. A very enjoyable time was had by all on both occasions.

Detroit Ouster Delayed

Merchants Want Issue Put Before People—Other Railway Matters Also Submitted

The proposed ouster of the Detroit United Railway from Fort Street and Woodward Avenue in the city of Detroit has been delayed by the filing of petitions by interested business men located on the thoroughfares in question. The petitioners ask that the issue be put to a vote of the people. Under the provisions of the ouster ordinance passed by the City Council, the company would have had to commence removing its tracks on Sept. 2.

The steps taken by the business men on both streets where franchises have expired are a continuation of the protests against the removal of the tracks, voiced when the ordinance came up for action in the City Council following the company's refusal to accept the offer of \$388,000 for the Fort Street and Woodward Avenue lines made by the Street Railway Commission.

The filing of the petitions to put the question on the ballot will delay the ouster proceedings, and has been termed a stumbling block to the municipal program by Mayor Couzens.

OTHER QUESTIONS GO TO VOTE

Two other questions pertaining to street railways will probably be voted on at the primaries on Oct. 11. A resolution has been presented to the Council at the request of Mayor Couzens providing for a vote on a charter amendment enabling the Street Railway Commission of the city of Detroit to acquire, construct or purchase and to own, maintain and operate gasoline motor buses, trackless trolleys or such other type of trackless transportation as may be deemed necessary or desirable for the purpose of supplying transportation to the inhabitants of the city within a distance of 10 miles from any portion of its corporate limits that the public convenience may require, together with all required equipment.

The other question to be incorporated in the amendment is a provision that contracts of construction, purchase or other matters entered into by the Board of Street Railway Commissioners shall not be required to be made through the department of Purchases and Supplies and shall not require the confirmation or approval of the Common Council.

The buses and equipment referred to may be operated either independently of, or in conjunction with the Municipal Street Railway System. This will settle an issue existing among the councilmen as to whether or not purchases for the Street Railway Commission must be made through the Department of Purchases and Supplies the same as for other city departments.

Arbitration of the price to be fixed on the day-to-day lines which the city seeks to take over from the Detroit United Railway was further delayed for additional investigation with regard to the value of materials and equip-

ment involved. The taking of testimony in the hearing relative to the valuation of the 29 miles of day-to-day lines was reported as completed at the City Hall. It is not expected that a final evaluation will be reached or the findings of the board presented for several days.

200,000 Fewer Riders a Day in Cleveland

Further efforts, some of them of the most drastic nature, are being taken by the Cleveland (Ohio) Railway in an effort to end heavy losses the company is incurring by reason of a tremendous falling off in its receipts, due to heavy decreases in the number of car riders.

The company is now carrying 200,000 fewer riders each day than the same time a year ago. During July, for example, the number of car riders for the month dropped to 32,396,891, a decrease of nearly 17 per cent over the number carried in July, 1920. Passenger earnings were \$1,382,733. This is a loss of more than 7 per cent over the same month a year previous, although the cash fare is now 1 cent higher than it was then and the ticket rate is $\frac{1}{2}$ cent higher.

As a result of the decrease in the number of car riders resulting in great losses of revenue, the company's interest fund, which is the fare barometer, now shows a deficit of \$139,254. It originally contained \$500,000 and calls for a fare reduction when it reaches \$700,000 and a fare increase when it drops below \$300,000. However, the company is now operating at the maximum rate of fare permitted by the ordinance, namely, 6 cents cash, nine tickets for 50 cents, with a 1-cent charge for transfer.

Steps now being taken to curtail the company's losses are:

1. Operation of one-man cars at least on one line.
2. Establishment of a five-day work week for employees in the company's main shops at Harvard Avenue and East Forty-ninth Street.
3. Curtailment of all except vitally essential maintenance work.
4. Further salary and wage reductions now under consideration as well as reduction in the daily hours for shop men from nine to eight hours.

Operation of the one-man cars takes effect on the Harvard-Dennison cross town line beginning Sept. 16. The eighteen cars on that line will be manned by only a motorman. This will decrease the number of conductors by twenty.

So as to prevent any confusion when one-man car operation goes into effect, the company moved the fare box forward and for a week prior to the change the conductor has been collecting fares and issuing transfers at the front end of the car.

John J. Stanley, president of the company, says that if the one-man operation is a success, cars on other lines will be operated in a similar manner.

In July the company's mileage run was 3,026,802, a decrease of 11 per cent. In view of the heavy decrease in travel due to the industrial depression, further cuts have been ordered.

Saginaw's Patience Tried During Fair Week

Five weeks ago the Saginaw-Bay City Railway went into the hands of a receiver. Since then Saginaw along with Bay City, a neighboring community, has been forced to accept jitney buses as the only means of transportation. "How much longer is this going to last?" has been a question asked many times recently, but the owners of the railway and Otto Schupp, the receiver appointed by the United States district court, have had nothing to say. Apparently the suspension is indefinite.

COUNTY FAIR WEEK

This week the annual county fair is taking place. The traffic has been so heavy that the jitneys and other makeshift conveyances which have been brought into use have failed to carry the crowds. As a result Mayor B. N. Mercer, who has always contended the city should have electric railway service exclusively, has asked all owners of automobiles on the way to the fair to pick up people not so fortunate. In 1920 more than 250,000 persons went through the turnstiles at the fair grounds. The fair management, cognizant of the need for electric railway service, did everything in its power to get street cars running for this week, but the company said it was beyond its jurisdiction to resume service, and the receiver has been out of the city for the past two weeks and could not be reached. Even had Mr. Schupp been in town it is doubtful if a satisfactory arrangement could have been made.

Since the railway suspended the Council has had up for consideration the matter of passing a suitable ordinance regulating the buses, but it has not been passed for the simple reason the members started in to require a suitable indemnity bond for compensation if any of the passengers were injured and the jitney owners said that if the Council passed the ordinance they would ask a referendum on the question. The members of the Council then gracefully backed down.

MAYOR FAVORS INSURANCE

The Mayor took the stand that each bus should carry a policy which would provide \$5,000 for the injuries to one person, or \$5,000 for one accident. The bus owners claimed the premium was prohibitive. The other members finally agreed to a \$25,000 policy for one accident and now matters have reached a point where the Councilmen are about ready to accept a policy of \$1,000 for one person and \$5,000 for one accident.

Several companies have offered to come into the city and operate motor buses, but as yet nothing has come of these offers. One Detroit concern wanted \$150,000 worth of transportation sold in advance, but this was finally disapproved by the board of commerce committee which investigated the proposition. The Imperial Omnibus Company, New York, has forwarded a proposition

to establish a line in Saginaw and officials of the company may be invited to present their plan.

Wage Cut in Topeka

Wages of employees of the Topeka (Kan.) Railway have been cut from $7\frac{1}{2}$ to 10 per cent, effective to Dec. 31.

The new wage award in cents per hour is as follows:

	Two-man cars	One-man cars
First six months.....	40	43
Second six months.....	41	44
Third six months.....	42	45
Fourth six months.....	43	46
Fifth six months and after	47	50

In a statement issued in connection with the Topeka wage adjustment Judge W. L. Huggins said that the railway property was suffering financially from the jitney competition in the city, that only a very meager return upon its investment was being made. However, living costs have come down 20 per cent since the former wage award of 1920 and that it was on this decrease that the recent cut was based.

10 Per Cent Wage Cut in Fort Wayne

Officials of the Indiana Service Corporation, Fort Wayne, Ind., have announced a reduction in wages effective on Sept. 16 of approximately 10 per cent, affecting practically all employees. A decrease in business, with a falling off in the number of passengers handled on the city lines during the previous month as compared with the same month of last year, is given as the reason for the action.

Robert Feustel, president of the company, in commenting on the reduction, said:

Our company has been up against the same decreases in business that have affected all other lines of industry. These decreases have been continuous since the first of this year. We have been slow in making the reductions in wages because we were slower than some of the industries in making increases in the past.

Our increases in the past were made regardless of our ability to afford them, but because the increased cost of living made increased wages absolutely necessary. For six months after our increase in fares the Fort Wayne city lines were on a self-sustaining basis, but from March, 1921, the net revenues have decreased rapidly.

There were 225,000 fewer passengers handled on the Fort Wayne city lines in August this year than were transported in August, 1920.

We are making an average cut of 10 per cent, whereas the last increases made in 1920 averaged 25 per cent. With the next scale of wages in effect, 80 per cent of the Fort Wayne city trainmen will receive 50 cents an hour. This rate is still 100 per cent increase over the average trainmen's wages in effect in 1914.

We, of course, cannot tell what the future will do for us, but the best service that it is possible for us to give is the aim of the company. This property must continue the building up process for good service that has been in effect for the past four years if all of our communities are to be well served.

May Electrify Lines.—It was announced at San Francisco on Sept. 6 that William Sproule, president of the Southern Pacific Company, had been authorized by the board of directors of the railway to investigate the feasibility of electrifying the Southern Pacific lines between San Francisco and peninsula points.

Financial and Corporate

Receivership Terminated

United Electric Railways at Providence, R. I., Freed from Receiver—
Old Claims Liquidated

By decree entered in the Superior Court on Sept. 6 by Justice Tanner the receivership of the Rhode Island Company, Providence, R. I., has been terminated. The decree directs the receivers to deliver about \$1,070,000 in cash and all their books and accounts to the United Electric Railways. The Rhode Island Company, controlled by the New York, New Haven & Hartford Railroad, which set out to control the trolley lines in Rhode Island, went into receivership on Jan. 30, 1919.

The receivers for the railway were Frank H. Swann, Theodore F. Green and Z. W. Bliss. The United Electric Railways at the time the hearing was held controlled the greater portion of all general claims against the estate of the Rhode Island Company and maintained that a continuance of the receivership would be an unnecessary expense.

It appears that the following claims against the Rhode Island Company have been liquidated and allowed pursuant to orders and decrees of the court by William B. Greenough, special master, to whom they were referred:

New York, New Haven & Hartford Railroad	\$4,123,411
New England Investment & Securities	593,992
Rhode Island Company 5 per cent secured gold notes.....	1,696,625
Miscellaneous general contracts and property damage claims..	10,707
Other claims	35,148
Total.....	\$6,459,815

The first three classes of claims have been acquired by the United Electric Railways. In addition to the liquidated claims allowed by Mr. Greenough there are now on file and pending before him tort claims to the extent of \$3,030,903. Also pending before R. E. Lyman, special master, is a claim of the Sea View Railroad amounting to \$1,181,000. An agreement has been reached in regard to this last claim by which it has been acquired by the United Electric Railways.

The outstanding tort claims against the Rhode Island Company estate are said by the receivers to amount, when liquidated and allowed, to not more than \$175,000. Of these the United Electric Railways has acquired judgment claims of the face amount of \$24,800, and negotiations are pending for the balance of these claims.

General and tort claims not entitled to preferential treatment have been made the subject of an offer on the part of the United Electric Railways to pay 25 per cent, if agreements are made before next April.

Cash in the hands of the Rhode Island Company receivers approximates

\$1,700,000. All of the properties operated by the Rhode Island Company, except the Union Railroad, Pawtucket Street Railway, the Providence Cable Tramway and the Rhode Island Suburban Railway, were operated at a deficit and the cash now in the hands of the receivers was received from the operation of these properties.

The deed of conveyance, dated Aug. 12, 1921, transferred all the properties purchased by C. H. W. Mandeville under a decree of sale to the petitioning company and the receivers delivered possession to the United Electric Railways at midnight, Aug. 19. The petition before the court for the dismissal of receivers sets forth that the need no longer exists for continuing the receivership.

Bond Issue Offered

Bonds amounting to \$600,000 will be placed on sale shortly by the Johnstown & Somerset Railway, Somerset, Pa. The bonds will be in denominations of \$1,000 and \$500. Somerset county residents recently bought \$400,000 of the railway bonds. This makes \$1,000,000 up to date against the \$1,500,000 voted by the directors of the property when they took up the work of financing building operations about three months ago.

In connection with this bond issue it is said that the company will shortly meet its interest obligations at the Equitable Trust Company, New York, N. Y., the financial agent of the traction concern.

Binghamton Deposit Agreement Changed

Holdings of the 5 per cent first mortgage consolidated gold bonds of the Binghamton (N. Y.) Railway have been notified by the Fidelity Trust Company, Buffalo, of certain changes in the bondholders' agreement. The most important change says that "the period of five years is specified as the period in which the depositors will be entitled to the return of the securities which they have deposited hereunder or the receipt of new securities on reorganization or readjustment."

Ferry E. Wurst, Buffalo, secretary of the committee, says that inasmuch as the changes materially affect the rights of depositors any depositor may withdraw from the agreement at any time upon surrender of his certificate of deposit and upon payment of 1½ per cent of the face of each bond deposited. The assessment of 1½ per cent covers contribution toward the compensation, expenses and obligations of the committee. Those who surrender their certificates will receive bonds to the amount represented by the certificates surrendered.

Steam Line Seeks Electric

Western Pacific Would Formally Acquire Extensive Holdings of California Electric Line

The Western Pacific Railroad has applied to the California Railroad Commission for authority to acquire the Sacramento Northern Railroad properties as feeders to its system and to approve the financial arrangements for consummating the transaction. It is proposed to acquire the Sacramento Northern Railroad through a new company, the Sacramento Northern Railway, organized as a subsidiary of the Western Pacific. The Sacramento Northern Railroad joins in the application requesting authority to sell all of its properties, rights and franchises to the Northern Railway for the sum of \$730,000 cash.

The Western Pacific Railroad Corporation of Delaware, which is the owner of all the capital stock of the Western Pacific Railroad now owns more than 97 per cent bonds of the Sacramento Northern Railroad and trust certificates representing more than 95 per cent of the outstanding stock.

The Sacramento Northern Railway now seeks authority from the commission to issue and sell for not less than 100 par 9,950 shares of its capital stock to the Western Pacific Railroad and from the proceeds to obtain the \$730,000 to be paid to the Sacramento Northern Railroad for its properties and franchises the remainder to be used as working capital. The Western Pacific Railroad asks to be allowed to use money from the sale of its \$20,000,000 first mortgage 5 per cent bonds, previously authorized, to acquire the stock of the Sacramento Northern Railway, the subsidiary corporation in the transaction.

The Sacramento Northern Railroad has outstanding \$5,224,373 of bonds and outstanding stock as follows: \$1,808,362, first preferred; \$793,152, second preferred, and \$1,883,382 of common stock, all of which is deposited in trust with the Union Trust, San Francisco, under a voting trust agreement. Under the arrangement approved by the bondholders and stockholders the bonds of the Sacramento Northern Railroad are to be exchanged for Western Pacific Railroad bonds in the ratio of 100 to 80 and the stock is to be purchased at \$27.50 a share for the first preferred, \$15 a share for the second preferred and \$6 a share for the common.

In support of its application to acquire the extensive electric lines of the Sacramento Northern, the Western Pacific states that it is in great need of branches and feeders to furnish traffic to its main line and the present electric system is admirably adapted to its purpose.

The acquisition of these electric lines, it is pointed out, will avoid expensive duplication and the sale will be of mutual benefit as the Northern Electric line is now being operated at a loss.

Interborough Receivership Case Again Postponed

Judge Julius M. Mayer in the Federal District Court Sept. 9 adjourned until Sept. 21 the hearing on the application for a receiver for the Interborough Rapid Transit Company recently made by the Continental Securities Company. Judge Mayer in granting an adjournment said: "In view of the notes being scattered throughout the world and in view of several of the bondholders being out of town on vacation, I adjourn this proceeding to permit deposit of the outstanding notes and shall not appoint a receiver for this company unless it is unavoidable." The previous history of these proceedings was described in the ELECTRIC RAILWAY JOURNAL, issue of Sept. 3, page 376.

James L. Quackenbush, attorney for the Interborough, in reviewing the situation in connection with the three-year Interborough notes maturing Sept. 1 this year, said: "Since the argument a week ago and up to the close of business yesterday 710 holders had deposited notes to the principal amount of \$4,432,200 and have agreed to the extension. This brings the total deposits and extensions up to \$33,444,100, which is equivalent to 87.68 per cent of the notes outstanding. While this result is most gratifying in the amount of notes represented, the number of depositors, 4,140 out of a total of 7,610 known holders of these notes, indicates that the 3,430 non-depositors for the most part are holders of small amounts."

William D. Guthrie, representing the Empire Trust Company and supporting the Interborough's petition for an adjournment, said that his company is trustee of 97 per cent of the Interborough Rapid Transit stock, composed of 340,000 shares. Elijah Zoklin, attorney for the Continental Securities Company, in opposing an adjournment, told the court that there should be immediate action on the application for a receiver in view of the company's having no funds and was unable to obtain additional securities to satisfy matured obligations. Dwight W. Morrow of J. P. Morgan & Company appeared in behalf of the holders of the 5 per cent bonds and 7 per cent notes of the Interborough Rapid Transit Company. The group of bankers he represented, he said, had no interest whatever in the bonds or stocks of the Interborough Consolidated Company nor had they any interest in any of the New York surface lines. His sole connection with the transit situation in New York City, he said, was as representative of the group of bankers who secured for the Interborough Rapid Transit approximately \$200,000,000 in connection with construction of extended subways.

Mr. Morrow added that J. P. Morgan & Company have always been of the opinion that, receivership or no receivership, holders of the 5 per cent bonds and 7 per cent notes will ultimately be paid principal and interest. He was very much averse to a receivership because there are so many small holders

of securities to whom the interruption of interest would be a severe hardship and who in fact might be compelled to part with their bonds and notes at a great sacrifice. Therefore, such a result should be avoided if possible.

Increased Fare Has Little Effect on Receipts

The 7-cent fare on the lines of the Louisville (Ky.) Railway put into effect following an injunction granted by Judge Walter Evans scarcely has improved the company's general financial status since Feb. 21, it has been declared.

In the six months period from Feb. 21 to Aug. 25 the increase under the 7-cent fare over the same period in 1920 was approximately \$175,000. This is an 8.4 per cent increase in gross revenue, instead of 20 per cent as expected. But the expense for track maintenance, fuel and wages in the half-year period will be approximately \$150,000 greater than in 1920, according to officials.

There has been a great decrease in the number of passengers carried during the year. It is estimated that the total number of cash passengers in 1921 will be between 65,000,000 and 68,000,000. In 1920 80,000,000 cash passengers were carried.

Officials said that while it was true that the jitney buses had diverted some of the passengers who formerly rode on street cars, the big decrease could not be explained except as due to general business depression and a consequent curtailment in the number of car passengers. Automobile use also has increased, it was said.

Payments Deferred Until Termination of Receivership

Upon receipt of a letter from George B. Tripp, receiver of the South Carolina Light, Power & Railways, A. B. Leach & Company, Inc., representative of the stockholders, sent out a letter to the noteholders stating that no payment would be made on the \$650,000 of 7 per cent notes until the receivership had been terminated, but that it had every reason to believe that within a reasonable time the receiver would be successful in developing the situation so that the property could be returned to the company and a financial agreement made satisfactory to the stockholders.

In the communication to Leach & Company Mr. Tripp outlines the progress of the railway under the receivership, which was authorized in February of this year. The recent increases in fares and power could not be determined at the time of his writing (July 30), but that beginning Aug. 1 it was expected that the net income would show a substantial amount over operating expenses and fixed charges. The receiver also expressed the hope that in September, when the municipal elections took place, amendments could be secured and modifications made in the regulation of electric railway service.

Financial News Notes

Line Operating Again—After being idle for six months over a wrangle to increase fares, the city lines of the Kentucky Utilities Company in Somerset were placed in operation again on Aug. 26, with new cars, and with a 7-cent fare in effect.

Wants to Abandon Another Line—The Pacific Electric Railway, Los Angeles, Cal., has sought permission of the State Railroad Commission to abandon its line between San Bernadino and Arrowhead. The line is more than 7 miles long.

Municipal Bonds for Sale—It will be necessary for the residents of Eureka, Cal., to buy in \$25,000 of bonds for the purchase and rehabilitation of the Humboldt Transit Company. The city now has in prospect \$105,000 of the required \$130,000, the First National Bank having fulfilled its agreement to take that amount. The plans to have the city take over the property have been reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Stockholders Will Be Protected—Following the application for a receivership for the Interborough Rapid Transit Company, New York, N. Y., a committee was formed to protect the interests of the stockholders of the Manhattan Railway, New York, N. Y. Alvin W. Krech is chairman of the committee. A depositary agreement is in process of preparation under which the Equitable Trust Company will act as the depositary.

Sale Under Foreclosure Postponed—The sale of the property of the Second Avenue Railroad, New York, N. Y., which was set for Sept. 1, has been adjourned until Dec. 1. The sale was under foreclosure proceedings instituted to satisfy mortgage judgment on its defaulted bonds, amounting to \$3,473,511. Part of the property to be sold consists of the carhouse block bounded by First and Second Avenues and Ninety-sixth and Ninety-seventh Streets. The company also has 22 miles of tracks.

Railway Being Reorganized—The Brunswick & Interurban Railway, Brunswick, Ga., now being organized will be the successor company to the Brunswick Street Railway. The new incorporators are all members of the Young Men's Club, who submitted a plan for the operation of the local property. When the final order of sale is issued by Judge Evans it is believed sufficient capital stock will have been paid in to purchase the property and carry out the plans of reorganization. It was announced in the Aug. 6 issue of the ELECTRIC RAILWAY JOURNAL that no bid for the property had been received and that the line would probably be sold as junk.

Traffic and Transportation

Duluth Fights Fare Increase City Gets Injunction Against Increase and Appeals from the Decision of the Commission

An injunction was granted Duluth on Sept. 10 by the District Court whereby the Duluth (Minn.) Street Railway was prevented from putting into effect an increase in fare granted by the State Railroad & Warehouse Commission. The order of the court is to remain in effect until three judges pass on the merits of the request of the railway.

COMMISSION CUT COMPANY'S DEMAND

The State Railroad & Warehouse Commission, to which the Duluth Street Railway appealed for a 7-cent fare or four tickets for a quarter, denied this request, but ordered a 6-cent fare to go into effect Sept. 1 pending a permanent fare arrangement, contingent on a valuation of the company's property now being made. The railway asked for 6 cents at a time when the high costs of operation were pressing it very hard, but the city refused the increase, the people voting against it twice, although the issue both times was complicated by collateral matter.

Following the decision of the commission, John B. Richards, city attorney, stated that the issue would be taken into the District Court immediately in an attempt to obtain an injunction forbidding the collection of a higher fare until November at least, when the valuation of the property has been finally determined.

In his demand for a stay, Mr. Richards took the position that there was no basis for the claim that there was an emergency within the meaning of the statute. The commission authorized the increase on that basis, while denying that the company needed the 7-cent fare requested in its petition.

Commissioners F. W. Putnam and Ivan Bowen filed a majority order granting the increase, while Chairman O. P. C. Jacobsen issued a dissenting opinion denying the existence of the emergency and suggesting that through the co-operation of the City Council economies might be effected.

CITY WELCOMES DELAY

The entire legal battle is expected to take several months, and such a delay would be welcomed by the city because, by November, Byron C. Gifford, the city valuation expert, will have completed his survey of the company's property and the commission will then be enabled to make its final decision as to a proper fare to be determined by allowing the company a reasonable return on a fair valuation.

In its decision the commission said:

A fare of 6 cents will produce an increase in revenue of approximately \$189,000 per annum. This amount of additional revenue is necessary to enable the company to

meet the existing emergency. The commission further finds that the rate of fare of 6 cents cash is a reasonable fare and will not return the Duluth Street Railway more than a reasonable return on the fair value of the street railway property within such city as an operating system.

Legal Battles in Bridgeport

The jitney-Connecticut Company-Utilities Commission controversy in Bridgeport continues to be a legal skirmish with first one side and then the other the victor.

The third injunction since state enforcement agencies commenced carrying out the provisions of the new jitney law was granted the Bridgeport Bus Association by Judge Walsh of the Common Pleas Court. It restrained the police from enforcing the order of the Public Utilities Commission until Oct. 11.

On Sept. 1 the buses were stopped by the police and there followed two days of marking time and this calm was followed by the injunction proceedings. The buses had been operating as free buses or on the club plan but the police arrested the drivers for not having a "J" marker as per the order of the Utilities Commission. After the buses stopped the Connecticut Company increased its service and taxicabs with "O" markers entered into the game.

Following the injunction the jitneys began operating in full force without interference from the police. The status at present leaves the jitneys in possession of the field with tentative moves by the Connecticut Company to quash the injunction.

Chairman R. T. Higgins of the Public Utilities Commission has announced that the commission had tentatively agreed on Sept. 22 as the day for a rehearing on petitions for jitney routes in Bridgeport. The new hearings are to be held in response to a petition of the board of Aldermen of Bridgeport. The petition also requested the commission for a hearing on a reduction of trolley fares, but this matter will not be touched upon in the hearing scheduled for Sept. 22.

Will Not Fight Fare Reduction

At a special directors' meeting held last month it was decided that the Washington Railway & Electric Company, Washington, D. C., would abide for the present on the decision of the Public Utilities Commission which authorized a fare reduction to five tokens for 35 cents effective on Sept. 1.

In a statement giving the company's views on the cut in fare Mr. Ham of the railway stated that the new rates would receive a fair trial though it was conclusively proved that they would not net an adequate return. Meanwhile the directors of the company

will look for justice from the public and remedial legislation from Congress in the form of relief from taxation and other burdens.

Albany Jitneys Suppressed

Breach of Injunction Order Held by Judge to Be Criminal Contempt of Court

Supreme Court Justice Harold J. Hinman, in the Albany, N. Y., special term on Sept. 11, fined eleven jitney men \$100 each, with the alternative of serving thirty days in jail, for criminal contempt of court in violating his injunction order and announced he would sign a blanket injunction applicable to all jitney operators "who persist in defying the law."

The court, in passing sentence, also gave warning that the punishment meted out for the first convictions will not be the measure of future penalties. This is regarded as the signing of the death warrant for the jitneys that have been operating in territory served by the electric railway. Justice Hinman said:

Such publicity has been given the fact that the operation of jitneys has been held to be illegal that no person can longer believe he is engaged in a legitimate business in continued operation. There can be no further excuses for violation of the law and persistence must be deemed willful. They have doubtless seen other means intended to enforce the law laughed and scoffed at and fail in its purpose.

A further appeal by the men convicted is considered unlikely. Those represented by Mr. Murray, by the pleas of guilty interposed by him in their behalf, are precluded from taking an appeal. The others, it is pointed out, were in default, because even though they appeared, they failed to avail themselves of the opportunity, given them in the order served on them, to show cause why they should not be adjudged guilty on the evidence contained in the moving papers of the traction company's attorneys.

WILLFUL VIOLATION CHARGED

An appeal to the appellate division may be taken by Mr. Murray, however, from the order overruling his demurrer to the traction company's complaint, on which the injunction order was granted. Such an appeal, however, would have no bearing on the status of the defendants convicted of violating the temporary injunction while it was in effect.

Following the argument on the demurrer to the injunction order, granted against 211 alleged jitney operators named in the application of the United Traction Company several weeks ago, John E. MacLean and J. Stanley Carter, representing the company, presented a petition charging seventeen of the defendants with willful violation of the order forbidding them from illegally competing with the company by operating automobiles without the consent of the local municipalities or a certificate of convenience and necessity, required by section 26 of the transportation law.

Court Prevents Fare Increase in Twin Cities

In both Hennepin and Ramsey County District Courts the order of the Minnesota Railroad & Warehouse Commission granting an emergency increase in trolley fares from 6 to 7 cents, as outlined in the *ELECTRIC RAILWAY JOURNAL*, issue of Sept. 3, page 380, has been suspended, for further hearing as to the merits of the cases. This means that the Minneapolis Street Railway and the St. Paul City Railway could not put into effect the advance rates ordered effective Sept. 1. The court took cognizance of the cases through appeal by the city attorney in Minneapolis and the Corporation Counsel in St. Paul. The Minneapolis hearing began Sept. 12, the St. Paul hearing will begin some time in October.

Judge J. C. Michael of Ramsey County said that the contention that the finances of the St. Paul company necessitated an increase "seemed to be considerably exaggerated." He said that "no valuation of the railway property was made by the commission and the city's request for a reasonable postponement to enable it to make a valuation of the properties as required by law in such cases was denied by the commission."

O. P. B. Jacobsen, chairman of the commission and the dissenting member when the order was issued, said: "I believe the testimony of the experts introduced by the street railway company failed to disclose any urgent need for an increase in fares at present or until such time as this commission is able to obtain a reliable valuation of the company's property."

Judge E. A. Montgomery in the Hennepin County District Court said:

In the first place, I hold that the law is constitutional. As to the question of the rate, I do not believe that the evidence before the commission was sufficient to justify the finding that the company was not getting a fair and reasonable return on its investment. I very much doubt whether, under the evidence presented to the commission, any emergency was proved to justify the commission in fixing its temporary increase at this time. I am very clear, however, after reading the order of the commission and all the evidence in the return and all matter presented to me upon this hearing, that there is no emergency existing which would justify carrying into effect the order of the commission granting the street car company an increase to 7 cents. No emergency existing, the fair and just thing to do now is to suspend the order of the Railroad & Warehouse Commission until the hearing of an appeal fixed by the city. I therefore will make an order suspending the operation of the increase until the final determination of the case which is now in appeal is made.

Jitney Licenses Allowed

Pending approval of the Park Board, jitney licenses were issued recently to operators in Tulsa, Okla., over the objections of the Oklahoma Union Railway and the Tulsa Street Railway. The line will run from the post office out Denver Avenue and Easton Street through Owen Park to the monument in Irving Place.

The Oklahoma Union Railway protested that the establishment of the line would probably result in the railway's abandoning its Owen Park service. The Tulsa Street Railway claimed

that a jitney line on West Easton Street would cause a cut in service on its Main Street line.

Three-Cent Fare Petitions Filed

Signed by 13,582 names, Councilman Oliver T. Erickson's initiative petition has been filed with City Comptroller Carroll of Seattle, Wash. The petition provides for the maintenance and operation of the Municipal Street Railway out of funds raised by taxation, and payment of interest and principal of the \$15,000,000 debt owed by the city to the Stone & Webster interest out of operating revenues only.

Although the proposal makes no specific mention of the amount of fare to be charged on city street cars under this proposed plan, the petitions have been known during their circulation as "Three-Cent Fare Petitions," because that is the fare which Councilman Erickson has estimated would be required to meet the interest payments if all other charges were made to taxes.

Under the city charter, initiative petitions must be signed by 10 per cent of the number of voters who cast ballots for office of Mayor at the last municipal election before such petition can be placed on the ballot. This initiative measure must bear the names of 8,470 registered voters if it is to be voted on at the next municipal election in May, and work of checking over the signers is under way. Councilman Erickson announces that an active campaign in support of this measure will be started early in November under auspices of the Public Ownership League, which sponsored the circulation of the petitions. Following is the petition:

We, the undersigned qualified voters of the City of Seattle, Washington, propose and ask the enactment as an ordinance of the following bill, or measure, to-wit: An ordinance relating to the municipal street railway system of the city of Seattle, and declaring the fiscal policy of the city in relation thereto.

Whereas, It is to the public interest that the City of Seattle declare and establish a fiscal policy in relation to the municipal street railway system whereby the cost and expense thereof shall be borne, as nearly as may be, by all who benefit thereby; now, therefore,

Be it ordained by the City of Seattle as follows:

Section 1. That from and after the first day of January following the taking effect of this ordinance, all cost and expense of the maintenance and operation of the Municipal Street Railway system of the City of Seattle shall be paid wholly out of the revenues of the City of Seattle derived from taxation.

Section 2. That from and after the taking effect of this ordinance, the City Council of the City of Seattle shall annually, in the manner prescribed by law, provide for the levy of tax on all the taxable property of Seattle sufficient to defray the cost and expense of the maintenance and operation of said railway system for the ensuing year.

Section 3. That the cost and expense of maintenance and operation, as used in this ordinance, shall be computed pursuant to, and in accordance with, the requirements of the laws of the State of Washington or of any commission or bureau thereunto authorized by such laws.

Section 4. That there be and hereby is created a fund to be known as the "Extension and Depreciation Reserve Fund," into which the City Council shall set aside, monthly, from the gross receipts of the municipal street railway system, an amount not exceeding 1½ cents for each pay passenger, exclusive of policemen and firemen. The amount thus set aside shall be expended solely for extensions and renewal of track and equipment.

Seattle Jitneys Will Try U. S. Supreme Court

Jitney interests in Seattle recently took the only means left to them to escape temporarily the ban of the city, backed by the final order of the State Supreme Court, when they served notice that they will present to Chief Justice Emmet N. Parker of the State Supreme Court a petition for writ of error to the Supreme Court of the United States. As a result of this action, Chief Justice Parker directed that the final order of the State Supreme Court, vacating the injunction which now protects the Sound Transit Company buses, be held in abeyance until after this petition is heard in Olympia.

The city, expecting receipt of the final order, planned to put it into effect immediately and oust the jitney buses from the street. It was anticipated, however, that the jitney interests might endeavor to prolong their existence by an appeal to the federal court, and the city is prepared to resist this, contending that the case has no federal aspect, as pointed out by all court decisions rendered so far in the city's long battle with the jitneys.

A compromise proposal has been submitted to the City Council by the Auto Drivers' Union, whose buses are at present banished from city streets by the jitney regulatory ordinance, as the union drivers do not enjoy the protection of the McGlothorn injunction. The union drivers proposed to limit their operation to long haul lines and to limit the number of buses operating there, where they would be in competition with the railway. The proposition was referred to the public utilities committee.

Twin City Railways Handle Fair Crowd

To handle the crowds that annually attend the Minnesota State Fair, this year from Sept. 3 to Sept. 10, the Twin City Lines placed all the front-exit cars in operation on the interurban trolley line, the fare between the two cities being 12 cents in two payments. Although somewhat confusing to the traveling public because the cars are front exit the first half of the distance and front entrance the last half of the distance between the starting points in the two cities; and pay-as-you-enter for the first half and pay-as-you-leave the second half, the system worked well.

Persons entering the cars between the municipal limits of either city and the neutral zone division line within the limits of St. Paul, on payment of fare received an identification slip which they surrendered on exit. Persons riding the entire distance paid a second cash fare of 6 cents upon leaving. The street railway opened a fixed car loading terminal at the fair grounds this year, which facilitated removal of the big crowd at rush times. The average attendance at the fair was 50,000 daily and a good proportion of the people attending the fair used the street car service.

Public Service Railway's Last Stand

Company Covering Practically All Jersey Fights in Court for Increase in Fare Denied to It by Public Regulatory Body

Federal Judges Rellstab and Davis of New Jersey and Wooley of Delaware in the United States District Court at Trenton, N. J., heard argument on Sept. 13 in connection with the application of the Public Service Railway for a preliminary injunction to enjoin the State Public Utility Commission from interfering with the company in instituting a 10-cent fare. The commission recently denied the company a 10-cent fare and directed it to continue its 7-cent fare, but allowed it an increase from 1 to 2 cents for transfers. This increase the company contends is totally inadequate and insists that if a substantial fare increase is not granted, it will be forced into bankruptcy.

THE railway was represented by Frank Bergen, general counsel, former Attorney General Robert H. McCarter and Richard V. Lindabury, special counsel. The utility board's interests were looked after by L. Edward Herrmann, general counsel. Attorney General Thomas F. McCran was present for the State, which is a co-defendant in the suit. Newark, Jersey City, Elizabeth and Passaic were represented by counsel who made application to be admitted as co-defendants in order to fight the prospective fare boost.

George L. Record, special counsel for Jersey City, in renewing his application, denied at a preliminary hearing, to have Jersey City admitted as a co-defendant, insisted that the city had an interest apart from the State in the proceedings. He argued valuation was necessary in rate making.

To this Judge Rellstab replied:

Where a deficit has resulted the valuation cuts no figure. Is that not the opinion of the court of last resort in New Jersey?

In reply Mr. Record said:

I attack the theory. I say that in normal times there is no decision of our courts where valuation is not the determining factor.

Judge Wooley pointed out that if a number of municipalities were admitted as co-defendants, the issues in the case might be confused in the multiplicity of ideas.

Mr. Record said the company was asking the public to pay the company's business losses, which he contended the directors of the company were solely responsible for.

Mr. McCarter said that Congress had by statute foreseen that the public had an interest in rate making cases and had given their interests into the hands of the attorney general. It was the duty of that official, Mr. McCarter said, to look after the public's interests. He said he noted that the Attorney General, with his assistants, was present.

Mr. McCarter said that the ordinances of Newark and Jersey City fixing fares had been repealed and this fact, he insisted, nullified most of the argument of Mr. Record. He said further that Jersey City could certiorari the rate in the State Supreme Court if not satisfied with it and the same course could be followed by other cities. He objected to the admission of any of the cities in the case except as "friends of the court" by briefs.

Frank H. Sommer of Newark, associated with counsel for the municipalities, said that nothing should operate

against the rights of the municipalities to be heard. Judge Wooley speaking for the court said that there was not sufficient time to consider the questions raised and render an opinion immediately, but a decision would be rendered at the proper time.

The main case was then taken up. Mr. McCarter said he would not press at any length the attack on the constitutionality of the New Jersey rate-making law and Attorney General McCran said this would shorten his argument as he was prepared to defend the state statute.

VALUATION TESTIMONY RULED OUT

The court refused to admit as evidence the great mass of testimony taken by the utility board on the question of the valuation of the company's property on which the 7-cent rate was fixed. The court said this testimony could not be admitted as a whole, but intimated that part of it would be accepted if the Board of Public Utility Commissioners would indicate those parts pertinent to the present argument. Mr. Herrmann for the board took exception to this ruling.

Mr. Bergen's brief sketched the organization of the company and pointed out that in the years 1918, 1919 and 1920, "the company earned \$1,635,691 less than the amount necessary to pay its operating expenses, taxes and fixed charges and of course nothing on its capital stock of \$48,731,600 outstanding." Because of the failure to allow an adequate rate, the railway property had depreciated so that "in the past four years physical property of the plaintiff worth \$5,000,000 has been actually taken and used by the public without compensation, and its property is still being taken for that purpose in direct violation of the fourteenth amendment." Mr. Bergen said further that "according to the defendant's own order property of the plaintiff to the amount of \$2,000,000 has been consumed since 1917 in serving the public."

Decision of the higher courts of New Jersey and other States, as well as numerous decrees of the Supreme Court of the United States, were quoted by Mr. Bergen, in support of the legal propositions set forth in the brief. He pointed to the O'Brien case wherein the courts held that the company was entitled to an increase in rate sufficient to meet increased costs and added that

the utility board's action "in refusing to respect the law as stated in the O'Brien case was emphatically condemned by the Supreme Court of New Jersey," the brief adding: "We have therefore two solemn adjudications of the highest courts of New Jersey in this very matter which entitle the plaintiff to the relief sought by its bill—that is an increase of revenue at once."

Mr. Bergen stated that although he did not think it necessary to discuss or decide the question of the valuation of the company's property on the pending motion, the company was quite willing to meet it. The brief declared that the utility board in arriving at a value of \$82,000,000 rejected most of the intangible values and ignored the fact that every consolidation agreement by which the plaintiff was enlarged and every lease now operated "was when made, and still is strictly legal in every particular." It is asserted that the application for injunction is based "on substantial facts which cannot be seriously disputed and rules of law that are settled beyond controversy."

What are declared to be "a few of the important particulars in which the reports of the defendant and the orders based on them are plainly erroneous" are set forth in the brief. Summarized they are:

1. In ascertaining the present value of the tangible property of a utility company by the reproduction method present costs must be used. The defendant recognized this rule of law but added only \$12,000,000 to its estimate of pre-war cost of construction which testimony and affidavits demonstrate is much less than should have been allowed. In an affidavit Prof. Henry C. Anderson estimates the difference at \$43,000,000.

2. No allowance was made for the value of the contract under which the railway receives current to propel its cars, although the courts have repeatedly held that such a contract is valuable and must be included in the valuation of a utility for the purpose of a base rate.

3. Allowance was not made for "Cost of Money" amounting to millions of dollars, although "no one disputed the correctness of the figures or denied that the expenditure is a legitimate part of the cost of construction of the plaintiff's property." It is pointed out that the utility board excluded this item from its valuation of the property and said it would consider it in fixing a rate of return but failed to do so.

4. The proof shows that \$5,000,000 worth of the plaintiff's physical property has been taken for public use without compensation during the last five years and that taking is still going on.

5. The railway owes the electric company \$2,500,000 for power which indebtedness was allowed to accrue because the plaintiff was seeking increased rates but if such increase is not allowed the electric company must and therefore will discontinue furnishing power.

6. The experience of the plaintiff from Aug. 4 to Sept. 6 indicates that the income from the additional cent for transfers will amount to \$266,911 less per annum than the utility board estimated, and instead of there being an increase of 1.31 per cent in passengers as the board figured, there will be a decrease of 6.94 per cent, making the company's gross revenue \$1,999,266 less than the utility board figured it would be.

7. In the O'Brien case and in the more recent case decided last July, the courts of New Jersey have held that the plaintiff is entitled to an increase of rates sufficient to pay for the increased expenses of maintenance and operation and taxes. "No increase in rates allowed by the defendant to the plaintiff since Jan. 1, 1918, has obeyed those decisions."

8. During the past eighteen years the company has expended more than \$2,000,000 a year on the average to maintain its property. Such amounts must continue to be spent if the property is to be kept up and the money must be obtained, sixty per cent from a depreciation fund, and

forty per cent new capital. The rates allowed by the utility board do not permit the company to earn any depreciation fund and it will be impossible to get new capital without a substantial increase in revenue.

"The recital of fact could be much extended," Mr. Bergen says in concluding his brief, "but it is unnecessary. From what clearly appears it is manifestly impossible for the plaintiff to continue to operate or to maintain the unity of its property, unless additional income is provided at once and the company protected in the exercise of its rights by the injunction of this Court."

Messrs. McCarter and Lindabury before going into a discussion of the facts pointed out that the plaintiff has an inherent right to appeal to the United States Court for relief. Among authorities quoted sustaining the company's petition were the late Chief Justice White and Justice Peckham of the United States Supreme Court.

In discussing the law and the facts the brief goes into the board's order and report with great particularity and combats the findings therein expressed, supporting the plaintiff's contention with quotations from decisions in similar cases. The lawyers contend that the board's orders and reports are fallacious and altogether wrong and are based on a misapprehension of the board's duty.

After setting forth the general principles involved and treating them and the law applicable to them the special counsel direct their attention to what they term the "improprieties" of the board's report. These are set forth under sixteen headings each of which is discussed in more or less detail and which are as follows:

1. The failure to give to the Ford, Bacon & Davis report the presumptive evidence to which it is entitled by the statute.
2. The board improperly ignored the railway's power contract with the Public Service Electric Company.
3. The board's figure of \$12,000,000 for what is called "appreciation" is ridiculously small.
4. The board erred in rejecting as an element of value the amount actually expended in procuring capital required for the work of construction by the plaintiff.
5. The report is obviously wrong in that it allows so little revenue that it will be impossible for the plaintiff to obtain any new capital.
6. The report is wrong in that it makes no provision whatever to reimburse the plaintiff for the deficiency in operation during years 1918, 1919 and 1920, aggregating \$1,635,691.
7. The board totally ignored the fact that the railway is indebted to the electric company in the sum of \$2,500,000 for power furnished.
8. The board grossly erred in only allowing the sum of \$12,000,000 for what it called "going value."
9. The board's treatment of the subject of depreciation of the value of the physical property of the plaintiff is erroneous.
10. The board erred in making no allowance for unearned profits during the past three years.
11. The income purported to be provided by the board's figures assuming their accuracy in all respects is itself insufficient and confiscatory.
12. The board having required in 1918 that the company should annually appropriate \$800,000 for depreciation and expenses for replacements and renewals, and being aware that owing to its minimized revenue, the company has only been able during the three years to appropriate \$448,002 for the purpose, nevertheless instead of allowing a rate that will promptly make up this deficit spreads it out over a period of five years.
13. The board erroneously concludes that the sum of \$715,000 will be annually raised

from the additional 1 cent permitted to be charged for an initial transfer.

14. The board has improperly minimized the amount of the plaintiff's revenue that will be required to pay for accidents.

15. The board improperly underestimated the taxes the company will be required annually to pay amounting to at least \$100,000.

16. The amount allowed by the board for depreciation and maintenance is at least \$1,200,000 less than the sum that must be spent within the next year.

Fare Changes on Michigan Property

A 10-cent cash fare with four tickets for 25 cents and children's fare at 5 cents was put into effect on Sept. 5 by the Michigan Railroad in Jackson and Battle Creek. The same rate was authorized in Lansing except that the cash fare was 8 cents.

The Michigan Public Utilities Commission, in whose hands the matter of a temporary fare was put for Kalamazoo, made the rate for that city the same as Lansing. The commission made an audit and an appraisal of the Kalamazoo property. A hearing has been set for Sept. 21 and an authorized rate of fare is looked for sufficient to pay operating expenses and taxes and to net a fair return on the value of the property.

In Jackson the Mayor appointed a Citizens' Committee for the purpose of establishing a rate of fare, much on the same principle as the commission's plan for Kalamazoo. Lansing will also make an audit of the books and an appraisal of the property.

The story of the fare troubles in the cities in which the Michigan Railroad operates was told in the *ELECTRIC RAILWAY JOURNAL* for Sept. 3.

Chicago's Eight-Cent Fare Attacked

The fight for a 5-cent fare on the Chicago Surface Lines was renewed before the Illinois Commerce Commission on Sept. 14. For several days preceding this hearing the city attorneys issued statements charging that the companies had been making excessive profits and that the 8-cent fare was unreasonable.

Williston Fish, general manager of the Surface Lines, gave out a statement in which he showed that the \$8,237,948 which had been referred to by the city as "profits" for seven months ended July 31 were only the net earnings after deduction of operating expenses. He explained that from this amount the city would get \$1,970,997 as its share of the net divisible receipts. Further deduction of \$4,809,159 would be made for interest on bonded debt and loans, also \$207,083 for sinking fund requirements, and \$109,447 for corporation expenses and federal corporation taxes. This would leave net for stockholders \$1,141,263.

The amount left after paying the city's 55 per cent would mean a return at the rate of 6.73 per cent per year on the recognized valuation of the properties. In view of declining business it was estimated that the return for the

year would not exceed 6.5 per cent. This was identical with the return for the year ended Jan. 31, 1917, which had been referred to by the city as a "banner year" under a 5-cent fare. The fact that the companies will not have a larger return under an 8-cent fare was due to greatly increased wages and material costs. The management insists that a 5-cent fare is impossible and it would only be feasible to grant a 7-cent fare by a drastic cut in the wage scale.

Transportation News Notes

Seven Cent Fare Ends Tieup.—An agreement was reached recently between the City Council of Somerset and the Kentucky Utilities Company whereby the company will charge a 7-cent fare for operation of the railway line. The company discontinued service several months ago because the Council would not grant a 10-cent fare.

Another Bus Line Started.—The Connecticut Company recently organized a new bus line in Hartford. The bus had its trial trip on Aug. 27 and carried such distinguished passengers as Mayor Brainard, Chief of Police Farrell, Police Commissioner Cady and others. The bus is No. 16 and starts from Union Station, going over the High Street route.

Bus Line for New Orleans.—A local automobile delivery company has asked for a franchise to operate bus lines on the principal streets of New Orleans and has promised to order fifteen buses when a favorable answer has been received. The application states that ultimately they expect to have 200 buses in operation, each one to cost \$5,100 and to seat thirty passengers. The proposed fare is to be 6¼ cents.

Improved Service Praised.—According to the annual report of the Public Utilities Commission service on the lines of the Washington Railway & Electric Company, Washington, D. C., has been improved by a rerouting scheme and by the addition of a few one-man safety cars. On the subject of jitneys the report states that during the year twenty-seven applications were approved for the operation of jitneys over prescribed routes.

Jitneys Not Very Active.—Jitney buses are not causing nearly so much trouble as they did just after the 7-cent fare on the lines of the Louisville (Ky.) Railway went into effect. Drivers have found that there is no money in it, while the city officials are now forcing the autos to quit blocking corners in the business sections, and prosecuting them for violation of traffic regulations, parking laws, etc. A few more weeks and it is believed the jitneys will be out of business.

Personal Mention

L. C. Bewsey Local Manager in Kalamazoo

L. C. Bewsey, electrical and mechanical engineer, has been appointed superintendent of the Michigan Railway Company's lines in Kalamazoo, Mich. At one time Mr. Bewsey was superintendent of transportation of the Buffalo, Rockport & Rochester Railway, which has headquarters at Rochester, N. Y. From 1911 until he went to Rochester, Mr. Bewsey was the local superintendent for the Union Traction Company of Indiana at Indianapolis. Mr. Bewsey was born in Clinton, Ind., in 1882. His first railroad experience was as a fireman and brakeman for the Baltimore & Ohio Railroad and the Big Four Railroad. In 1899 he entered the service of the Lafayette (Ind.) Railway and served as motorman and shop foreman until he became connected with the Union Traction Company. In 1909 when the "Muncie Meteor" was put on by the Union Traction Company, he became motorman and continued in that position until he was appointed local superintendent.

Toledo Claim Agent Elected County Recorder

Arthur D. Hill has just left the Toledo Railways & Light Company to take the position of recorder of Lucas County, Ohio, having been elected on the Republican ticket for a two-year term. Mr. Hill is a much valued member of the Doherty family in Toledo. His rise in the company has been rapid, due both to his ability and capacity for making friends and for always working for the success of the company and the men in position over and under him.

Mr. Hill first became connected with the company in August, 1913, as chief clerk for the claim department. He continued in this work until he went to the Mexican border in June, 1916. After returning from France in 1919 he returned to the claim department, and when the separation of the traction property from the light and power properties came in February of this year he was appointed claim agent for the Toledo Railways & Light Company, the Toledo Beach Company, the Toledo, Ottawa Beach & Northern Railway, and the Adrian Street Railway. He also was in charge of the safety-first work.

His war record has been as brilliant as his success with the company. In fact, he is an old-time military man. He enlisted as a private in the Ohio National Guard in 1895 and was in the military service continuously for over twenty-four years, having served in every grade of the service from that of private to that of major. He commanded the first battalion of the Sixth Ohio Infantry on the border, and after

war was declared with Germany and the Sixth Ohio Infantry was made the 147th Infantry, he commanded the first battalion of the 147th in France. It is said that he left the service with the respect and confidence of every officer and man who served under him, an enviable record indeed.

Mr. Coryell in Oklahoma

A. B. Coryell, who at present is superintendent of power for the Laurel Light & Railway Company, Laurel, Miss., has been appointed general superintendent of the Muskogee (Okla.) Electric Traction Company and the Shawnee & Tecumseh Traction Company with headquarters at Muskogee.

Mr. Coryell has a wide knowledge of the utility field, having had more than thirty years' experience in the construction and management of electric railway, light, power and gas properties. He expected to take up his new duties about Sept. 15. His successor has not yet been appointed.

Previous to his present connection in Laurel, Miss., Mr. Coryell was power superintendent of the Port Huron Gas & Electric Company, Port Huron, Mich. Previous to that he was in business for himself in Buffalo, N. Y. During the time that he has had charge of the construction and management of different properties his connections have been mainly in the southern states. He was, however, for four years superintendent and purchasing agent of the Moncton Tramways, Electricity & Gas Company, Moncton, N. B.

C. M. Chandler Again Head of Georgia Railroad Commission

C. Murphy Chandler was elected chairman of the Georgia Railroad Commission for his sixth consecutive term at a meeting of the commission held Aug. 28. Mr. Chandler was elected to this place by unanimous vote of the other members, Paul B. Trammell, James A. Perry, J. D. Price and John T. Boifeuillet. At the same meeting Mr. Trammell was re-elected vice-chairman.

Chairman Chandler has served twelve years as a member of the Railroad Commission until April 1 this year. He was a member of the State Legislature as a representative of DeKalb County when first named to the position twelve years ago. He resigned as member of the Legislature to take up the new duties. He had served six terms in the Legislature.

During his term as chairman of the State Railroad Commission Mr. Chandler has presided over some of the most famous and most important railroad and public utility cases that have ever been considered in Georgia. He suc-

ceeded Fuller E. Callaway, of La-Grange, as a member of the commission, and succeeded H. Warner Hill as chairman of the body.

Mr. Trammell was re-elected to the commission last fall. He has presided as vice-chairman in several important cases when Mr. Chandler was absent from the city.

Transportation Commission Now Operating Toronto Railway

With the formal passing of the Toronto (Ont.) Railway into the possession of the citizens of Toronto on Sept. 1, General Manager H. H. Couzens of the Toronto Transportation Commission was appointed general manager of the property and D. W. Harvey, assistant manager of the civic car line, was made assistant manager. R. J. Fleming, former general manager, will continue in the service of the Toronto Railway as operating head of the Toronto & York Radial Railway, which is owned by the Toronto Railway.

The members of the Toronto Transportation Commission are P. W. Ellis, chairman, Frederick Miller, George Wright, and H. H. Couzens.

W. G. Foster now fills the position of auditor of the Aurora, Plainfield & Joliet Railroad, Joliet, Ill. Chester G. Moore was formerly the auditor on this property.

Neill W. Funk, superintendent of the claim department of the Louisville (Ky.) Railway, and son of the late Thomas Funk, for years superintendent of the company, while recovering from serious injuries at his home, had a fall last week in which he fractured his leg. Mr. Funk was in an automobile accident some weeks ago while returning from an outing of the Round Table Club.

R. E. Shartell has been appointed to the organization of the Minneapolis, Northfield & Southern Railway, Minneapolis, Minn., in the capacity of purchasing agent and claim agent. Also, E. T. Selmer has been added to the staff in the capacity of general freight and passenger agent. Art Cutland now fills the position of engineer maintenance of way and roadmaster, left vacant by E. L. Norton.

Robert D. Armstrong, examiner for the Public Service Commission of Indiana, has resigned, effective Oct. 1. He will complete advanced courses in an Eastern law school and return to Indianapolis to practice law. He will be succeeded by Frank Faris, assistant examiner. Mr. Armstrong has been a member of the commission staff since leaving the army at the close of the war. He was also connected with the commission before the war. He has conducted the hearings and prepared orders for the commission in a number of important cases.

W. Harry Stone, who was superintendent of electrical construction and has been with the Los Angeles (Cal.) Railway for many years, has resigned and entered business with his sons. Mr. Stone has taken an agency for

art materials, with offices in the Pacific Electric Building, Los Angeles.

M. Holt is no longer connected with the St. Paul Southern Electric Railway, St. Paul, Minn., as auditor. His duties have been taken over by the assistant general manager, C. T. Kuckler.

Edward Flad, St. Louis, Mo., member of the Missouri Public Service Commission since April 15, 1917, has tendered his resignation to Governor Hyde to become effective Oct. 1. He was appointed by Governor Gardner for a term expiring April 15, 1923. His relations with the other members of the commission have always been pleasant, but a desire to return to his old profession of civil engineer had become so strong that he felt he could not resist it any longer. He will return to St. Louis when his resignation becomes effective and resume his profession. His work on the commission has been regarded highly because of his long experience and wide knowledge of engineering.

Obituary

L. D. Howard Gilmour, general solicitor of Public Service Railway, Newark, N. J., died after an operation for appendicitis Aug. 21. Mr. Gilmour had gone to the hospital on the day before and had been attending to his regular work practically up to the time he was taken to Newark from his home at Fair Haven. He was a familiar figure in the state and noted for his kindness and genial disposition.

J. J. Landers, auditor of the York, (Pa.) Railways and president of the American Electric Railway Accountants' Association, died on Sept. 9. Mr. Landers had been connected with public utility undertakings for the greater part of his business career, mostly in accounting work. Mr. Landers was born in 1876 in Bucks County, Pa. At an early age he moved to Philadelphia. He received his education at St. Joseph's College and shortly thereafter entered the employ of the Philadelphia Traction Company, later the Union Traction Company, as chief clerk to the superintendent of power. This position he held until 1899, when he went to Scranton as the chief clerk in the auditing department of the Scranton Railway. In 1903 he was appointed cashier of the Conneaut & Erie Traction Company, then under construction. When operations started he assumed the duties of treasurer and manager. In 1905 he was appointed superintendent of the Rock Hill (S. C.) Light & Water Company, and after two years in the South returned to Pennsylvania as auditor for the York Railways and subsidiaries. Mr. Landers was for three terms vice-president of the Accountants' Association and last year was promoted from the office of first vice-president.

Manufactures and the Markets

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

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

A Flurry in Copper

Shading of Prices, After Attempt to Hold Up Levels, Expected Unless Demand Improves

Copper is slightly more active than it has been for some time with prices still firm. Most of the larger producers are now quoting 12 to 12½ cents a pound for Lake and electrolytic copper. Inquiries from domestic and foreign consumers are increasing.

During the past week those in control of the copper situation put up their prices ¼ to ½c. per lb., and the others followed in the hope of getting the higher prices, but fearful of the outcome of such a move. As a matter of fact there seems to be no excuse whatever for putting up prices ¼ to ½c. under the conditions prevailing at present. The market has been in a stagnant condition for so long that consumers could not be expected to crowd each other to pay the advances.

The reaction was that domestic consumers showed more interest in the market, and while they had been hesitating somewhat after the advance was made, it is the opinion in the trade that practically all the users are bare of supplies and would find it necessary to get into the market to cover for their requirements.

It is learned that more than one selling interest was in favor of a still greater advance in quotations, but the more conservative interests are opposed to such a move, pointing out that several months ago when the demand was holding comparatively well, a sharp upturn in quotations caused the withdrawal of buyers from the market, and resulted in the lowest quotations on record.

While none of the leading authorities in the industry is looking forward to any great buying movement, it is felt that users having been holding off for so many months will be compelled to enter the market for their needs in the near future, and unless an attempt is made to rush up quotations, it is believed that a healthy and steady increase in buying will be experienced.

The revived interest, however, was short lived, for domestic consumers again withdrew from the copper market and as a result there is some unsettlement in the situation. It is merely a repetition of what has occurred on numerous occasions in the past. Just when consumers appear to be ready to come into the market for fair quantities of the metal some of the big interests insist upon advancing quotations and the result has again been the same, namely, the withdrawal of buyers and the struggle between buyers and sellers for supremacy as to prices.

Domestic consumption so far this year has averaged about 52,000,000 lb. a month, or at the annual rate of about 624,000,000 lb. a year. If no change occurs, therefore, in the rate of deliveries, there will have gone into consumption during 1921 approximately 1,180,000,000 lb. of copper. As near as can be estimated the refinery output of this country for the first seven months of this year, which includes imports of copper matte from South America, aggregated about 560,000,000 lb., or an indicated excess of deliveries over refinery output of about 136,000,000 lb. Carrying this method of figuring a little further, or to include an estimate of the full year on the basis of unchanged monthly refinery output and domestic and foreign deliveries, it is to be observed that indications point to a reduction in the surplus stocks of metal of upward of 400,000,000 lb. Even if the actual refinery output proves larger than it is possible now to estimate, there is also a strong likelihood of increased sales of copper in the last quarter of this year, which, although not immediately translated into deliveries, would have a stimulating effect on the market because of the plain inference of marked reduction in surplus soon after the beginning of 1922.

Under such circumstances it is well within the realm of possibility that something will happen in the copper market similar to that which has recently taken place in cotton. With no increased consumption to speak of in cotton, but with a bearish government report as to the 1921 crop outlook, there has been wild speculation in cotton futures and prices have advanced 85 per cent.

Railway Motor Repair Parts Reduced 10 per Cent

One of the largest manufacturers of railway equipment on Sept. 1 made public a price reduction of 10 per cent in the repair parts for railway motors, controllers and air brakes. This cut also applies to circuit breakers, car switches and fuse boxes. Other manufacturers have not made any definite cuts along this line but claim that their prices are gradually being revised according to changes in labor and raw material prices. Apparently they have not seen fit to bring about a sweeping reduction in an effort to stimulate buying as one has done.

Demand for motor repair parts is, of course, fairly constant and has been of good volume, it is reported. Deliveries are favorable since shipments can be made immediately from stock for parts of standard equipment in general use.

Prices of Overhead Line Material Cut

On Sept. 7 practically all manufacturers of overhead trolley line material announced a price reduction on all malleable iron parts ranging from 2 to 7 per cent. This includes the whole line of malleable iron suspensions, turn-buckles, ears, clamps, strain plates, frogs, etc. No change was made in the prices of bronze and composition material.

Several of the large manufacturers report that there is a very steady demand of this class of supplies, most of the sales going to fill maintenance requirements. Stocks are in good shape and it is possible for buyers to receive shipments of any regularly listed articles in about a week's time.

New Brill Company in Canada

J. G. Brill Company, Philadelphia, announces the formation of a new company for the sale and construction of electric and steam railway rolling stock in the Dominion of Canada. This new company, which is known as the "Canadian Brill Company, Ltd.," has taken over the plant and equipment of the well known Preston Car & Coach Company, Ltd., Preston, Ontario, and has a number of orders now in process of construction.

This plant is a modern car shop having 11½ acres of ground located on the outskirts of the city. Railroad facilities for the shipment of its products to all parts of Canada are provided by the Grand River and Grand Trunk Railways.

The executives of the "Canadian Brill Company, Ltd." are: Samuel M. Curwen, president; H. K. Hauck, 1st vice-president; Alfred Clare, 2nd vice-president; H. D. Scully, general manager and secretary; and E. P. Rawle, treasurer. Mr. Scully, who has been officially identified with many important Canadian enterprises, is located in Preston and, as the resident manager, will direct the operation of this new Brill plant.

Extension of Electrification in Australia

It is reported in the *Times* (London) *Trade Supplement* that the Victorian Railways Commissioners (Australia) are about to convert a further 100½ miles of their lines from steam to electric traction and that the work is to be completed by the end of February, 1923. In addition to this electrification, which covers the passenger carrying routes, a number of lines exclusively used for freight traffic are to be converted and the electric system extended over several of the busier sections of the country lines. This work will entail the overhead wiring of considerably over 100 miles of track, the erection of a number of sub-stations additional to those already in use, the replacement of the existing signaling equipment, and the construction of several workshops fully equipped with machine tools.

Rolling Stock

Toronto (Ont.) Transportation Commission has ordered seven motor buses for experimental purposes during next winter. One bus will be supplied by the Leyland Company, London, England, another by the Eastern Motor Truck Company, Hull, which will be built similar to those operated by the Fifth Avenue Coach Company, New York, while the fourth bus will be supplied by the Associated Equipment Company, London, and the fifth bus by the Fifth Avenue Coach Company, New York. The cost of each bus will average between \$13,000 and \$14,000.

Franchises

Indiana Service Corporation, Fort Wayne, Ind., has petitioned the Board of Public Works of that city for franchises covering the proposed changes and extensions of the city street car lines on Pontiac Street, Oxford Street and West Main Street. The lines in some instances will be double-tracked and certain of the extensions will require the opening of new streets. A period of five years is asked for in the construction of the double-track lines on Oxford Street from Calhoun Street to Turpie. The company, however, in its petition agrees to complete the Pontiac and West Main Street changes by the fall of 1922. It is stated by the officials of the Indiana Service Corporation that a petition will soon be presented to the board of public works asking that a franchise be granted which will permit the double-tracking of the Columbia Street line to Anthony Boulevard. This work will also be completed before the end of 1922. If the franchise is granted the delay until that time will be necessary in order to permit the completion of the fill at the new bridge over Delta Lake.

Track and Roadway

Claremont (N. H.) Railway expects to re-lay 2 miles of track with A. S. C. E. 70-lb. T-rail with continuous joints, to reclaim 1,500 joints of 60-lb. T-rail with continuous joints and to replace the ties in 3 miles of track with standard chestnut ties.

Mesaba (Minn.) Street Railway has completed most of the road and trackwork on the new right-of-way at Hibbing, and the stringing of trolley wires will be finished shortly. The engineers of the company will provide some means of electric car service although this will be a problem until the new power plant is built in Hibbing.

Portland Railway, Light & Power Company, Portland, Ore., has completed engineering estimates and plans for a \$30,000 street improvement job on Third Street, between Washington Street and the approach to the steel bridge at Franders Street. The work involves the complete reconstruction of the track, roadway and paving on the west half of the street, only one side of which will be improved at this time, so as to avoid serious impairment of traffic. The work will require about one month.

Power Houses, Shops and Buildings

Claremont (N. H.) Railway will build a 35-ft. extension to its carhouse. It will also build a workshop 15 ft. x 35 ft.

Cincinnati (Ohio) Traction Company has awarded the general contract for a \$30,000 electric transformer station, which will be built on Walnut Street, to the Hazen-Jones Construction Company of Cincinnati. It will be of concrete and steel construction. The improvement, one of a series being built about Cincinnati, will enable the traction company to obtain its motive power from the Union Gas and Electric Company.

The Tokio (Japan) Municipal Railway lost by fire, on Aug. 21, the Hamimatsu-Cho repair shop and carhouse, which is the largest one of the Tokio municipal system. According to information received by Kazutada Sakurai, equipment engineer of the street railway lines in Tokio, who is

now in New York, about 100 double-truck cars, principally of wooden body construction, were destroyed. One thing which the meager information so far received does not explain is how such a disastrous fire could occur in this carhouse, which is of the most modern type of reinforced concrete construction.

Trade Notes

William Colin Robinson, vice-president and chief engineer of the Underwriters' Laboratories, died on July 31.

Railway & Industrial Equipment Company, Houston, Tex., has been organized by Arch McDonald, D. L. O'Connor and J. S. O'Connor, and will do business generally in the South, especially in Texas, and also in Mexico, in the line of railway and industrial supplies and equipment.

John A. Roebing's Sons Company, Trenton, N. J., manufacturer of wire rope and other wire products, has preliminary plans under way for a new one- and two-story addition, 500 x 850 ft., for the production of copper and other wire, estimated to cost about \$150,000.

The Service Bureau of the American Wood Preservers' Association has just been established, with headquarters at 1146 Otis Building, Chicago. It is intended to make the Service Bureau a headquarters for the source of reliable information on the practice of and the results obtained from the art of wood preservation.

Metals Coating Company of America, manufacturers and distributors of the Schoop metal spraying process, by means of which metallic coatings of any kind may be sprayed onto any surface, is now in full operation at its new plant, 495-497 North Third Street, Philadelphia, having removed from its former locations in Boston, Mass., and Woonsocket, R. I.

The Brush Electrical Engineering Company, Leicestershire, England, lost by fire recently one of its timber sheds containing a valuable stock of seasoning timber for rolling stock manufacture. Manufacturing operations have not been curtailed in the least, nor will any unemployment be caused. The large stocks of cars, buses and similar work in process of manufacture were not harmed.

Dwight P. Robinson & Company, New York, have been retained by the Brazilian Federal Government to supervise a large amount of engineering and construction work in connection with the government's plans for the reclamation of its semi-arid states. This work, which is located in the states of Ceara and Parahyba, will include the construction of five large dams, involving nearly a million cubic yards of concrete, to create storage reservoirs. The ultimate importance and economic value of this project is comparable to the irrigation work carried on since 1903 by the United States Government.

New Advertising Literature

Insulators.—The Porcelain Insulator Corporation, Lima, N. Y., is distributing bulletins No. 1 and 2, covering its "Pinco" insulators.

Surge Arresters.—The Electro Service Company, Marietta, Ga., is distributing a four-page pamphlet illustrating the "Bennett" surge arresters.

Resistor Arc Welder.—The General Electric Company, Schenectady, N. Y., is distributing a four-page pamphlet covering its type AW resistor arc welder.

Switches and Accessories.—The Hart & Hegeman Manufacturing Company, Hartford, Conn., has issued catalog H, covering its "H & H" barrier 600-volt switches and all types of switches and accessories.

Safety Starting Switches.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is manufacturing a switch with quick-make and quick-break action, known as type WK-55, for both alternating-current and direct-current motors.

Small Motor Starter.—A new type of motor starter, the WK-20, has been developed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., for starting small alternating-current motors by connecting them directly to the line.