

# Electric Railway Journal

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## Will the Screw Spike Replace the Cut Spike on Electric Railways?

A RAILROAD spike seems to be a comparatively insignificant part of a track structure. In spite of this seeming unimportance, the spike is now receiving a great deal of study in conjunction with all other details of what are usually considered minor track fastenings, such as tie plates, rail braces and track bolts. For years our railroads knew no other rail fastening than the so-called standard hookhead or cut spike. Within the last few years, however, the demand for better fastenings and greater permanency has led to experiments with, and adoption of, the screw spike.

This, at first, was hailed as the final solution of the spiking problem. Along with the steam roads, quite a few electric railways adopted it as standard. Nevertheless, a great many electric railway track engineers and not a few of their steam-road brethren have felt that the screw spike did not warrant its greater first cost. This view seems to be supported in the report of the Pennsylvania Railroad engineers covering extensive experiments with the comparative merits and maintenance costs of the two types of spikes, the results of which show that the screw spike is not only much greater in first cost but also greater in maintenance cost, than the cut spike, and less reliable as a permanent fastening. The chief trouble appears to be due to the fact that no satisfactory method has been found which permits the screw spike to obtain a firm hold in the tie, once it has been loosened.

One of the particular points advanced in favor of the screw spike has been its greater holding power or resistance to withdrawal, but experience with its use shows that it ultimately becomes entirely loose under continual raising action of the rail. Meanwhile, under similar circumstances, the cut spike will retain a considerable portion of its holding power.

In the electric railway field, a recent questionnaire covering the screw spike question, circulated by one of the large Eastern companies, resulted in replies the majority of which indicated that electric railway engineers have not found the use of the screw spike justifiable for ordinary electric railway conditions either in private right-of-way or in paved streets. Here it may be noted that the screw spike is not used either in the New York subways or upon the elevated roads, except under certain conditions at stations and other special locations.

We are inclined to the belief that the cut spike will continue as the standard rail fastening for electric railways, but attention is called to the point that recent experiments made at the civil engineering laboratories of Columbia University indicate the value of preboring holes in the ties to receive the spikes. The crushing and bunching of the wood fibers is thus materially reduced and the elasticity of the fibers, upon

which the resistance to withdrawal partly depends, is retained to a far greater degree and over a longer period. It should also be noted that preboring should be done before creosoting or other treatment is applied. Attention is again called to the desirability of making new comparative tests of standard cut spikes made with the regular chisel point and with the Goldie or diamond point. The latter should prove the better of the two because its shape should lessen the crushing and bunching of the wood fibers, due to its better cutting action, and it is believed that the Goldie point will insure the best results when driven in prebored holes. Upon occasion it may be necessary to resort to double spiking in order to reduce the load which each spike must sustain in resisting withdrawal, and it will be found advisable to give close attention to such details if the most effective use of the cut spike is to be obtained.

## Rail-Wear Limits and Economics of Rail Renewals

THE era of appraisals and valuations through which we are passing calls attention to the need for careful consideration of the economics of rail renewal. In the issue of this paper for July 31, 1915, we presented an extended study of this matter prepared by E. M. Haas, and in commenting editorially thereon emphasized the fact that the demands of scientific management together with the magnitude of the investment in rails warranted special attention to the economics of the subject. That it was then having some attention by engineers was attested by the editorial correspondence which followed. Since 1915 much water has flowed under the bridge, and many properties have been subjected to receiverships, with attendant valuations and appraisals. When the owners of a property which was formerly leased find it necessary to resume the management, an appraisal is usually in order. The owners want to know what the lessor has done with the money and in what condition the tracks have been kept. About the first thing that their engineers do is to go out and look at the rails. Here the importance of track records comes into play, but in the final analysis it is the condition of the rails and their probable future life that is used as a basis for future financial operations as well as in passing judgment upon previous management.

The article on rail wear and its causes by R. C. Cram, in this issue is timely because it presents a comprehensive review of the subject, and we wish again to point out the need of authoritative data upon which the economics of rail wear may be based. There are no standards which have so far been established in approaching the various phases of a track appraisal; each engineer seems to have his own. This may or may not be detrimental to a property which is being valued. There is little question that a general fixed wear limit for rails



of each general type may be established. This may have no appreciable effect upon a total valuation of a property, but it will serve as a definite basis for the determination of depreciation. Of course, each property will be governed by local conditions, and the general limits would be applied thereto. Further, if depreciation is based, as it generally must be, upon head wear alone, there should be some rational unit which, as W. F. Graves has suggested, ought to be in terms of tons per square inch of head area worn or lost. This unit would recognize the traffic carried and account for the item of variation in car and vehicular traffic density.

It would undoubtedly be a long step in advance, if the American Electric Railway Association would give this subject the attention which it deserves. It perhaps could well be taken up by joint committee action of the Accountants' and Engineering Associations.

### When Is a Contract Not a Contract?

**I**N LAST week's issue of this paper we pointed out and commented upon a few of the high spots in the discussion of Edwin Gruhl's paper on labor contracts, read at the Cleveland meeting of the American Electric Railway Association. The subject is so big and so vital to the continuance of the electric railway business that it will be very unfortunate if this discussion does not lead to some definite progress toward the solution of this most important question.

A fundamental element of the labor problem, we believe, was summed up in the statement of Mr. Gruhl that "The complement of collective bargaining is collective responsibility." A contract should be entered into with full recognition of the rights and duties of both parties. Both should be made equally responsible and be subject to penalties for disregard of obligations. This can be best brought about through the incorporation of unions. Knowing the attitude of organized labor toward such action we cannot arouse ourselves to enthusiasm over suggestions for universal unionization of electric railway workers.

The fact that a variety of opinions was revealed in the discussion of Mr. Gruhl's paper at the mid-year meeting may be traced, we think, to despair of reaching an ideal rather than to prejudice against collective bargaining per se. Many companies already are parties to contracts negotiated by the Amalgamated Association. From sad experience most of them have learned that such agreements are held sacred only while they serve the interests of the employees. Some of these companies have found benefits in dealing with an organized body. They would not oppose Mr. Gruhl's plea for "equality and responsibility of both parties," for the right on the part of labor to a living wage and to hours which do not undermine health; nor would they object to provision for making arbitration compulsory and for penalizing the party who disregards the terms of a contract or the findings of an arbitrator. But such conditions do not now exist.

We have in mind a large railway property which holds as a souvenir of the past a contract signed by the leaders of the employees' union, fixing a certain wage scale for a term of three years. That agreement still has some six months to run. But it actually ceased "to run" some time ago. The men have since secured two increases in the wage scale, one through the influence of the War Labor Board and another through a

strike, so that the hourly rate is now 66 per cent higher than that originally agreed to. Not only that, but the employees were able to force changes in working conditions and hours of labor which added seriously to the burden of the company.

Conceding the justice of giving employees additional compensation, regardless of contracts, when cost of living advances, we can see no less equity in Mr. Gruhl's suggested provision to adjust wages downward when circumstances are the reverse. We wonder, however, how such a "give and take" proposal would appeal to employees' organizations which have been "fed up" with an exaggerated sense of their power?

"A street railway must supply service when and as demanded," said Mr. Gruhl, who referred to the railway industry as one in which the whistle never blows. This statement was made apropos of employees' demands for an eight-hour day and penalties for overtime. The unions are now pointing to the eight-hour day as an accomplished fact on at least one street railway system. It is true that the larger percentage of runs on the property in question have been placed on a straight eight-hour basis and that there is a penalty for overtime work. It is equally true that the company they refer to has found the change in hours very costly, and the revenues to pay the bills will have to come from those who use the cars.

Employees who can see no goal but the satisfaction of their extremest demands may take the attitude of "we should worry about the public," but there is a probability of their overstepping the bounds of reasonableness. In that event they may find that there is something to "worry" about in the impression made on those who make it possible to keep the cars running.

### A Friend in Need at Washington

**S**ENATOR HARDING of Ohio made an address before the mid-winter banquet of the American Electric Railway Association at Cleveland last week upon which he should be congratulated and in which the men of the industry should find reassurance. He deserved the generous applause given him for two reasons. In the first place, his thoughts were addressed to the particular audience before him, contrary to a common habit of men in public life who often make the occasion of a public dinner an opportunity to express their views on general topics rather than on those in which their audience is especially interested. In the second place, Senator Harding's address was particularly valuable because it displayed a thorough and sound understanding of the fundamental aspects of the great transportation industry and the problems with which it is wrestling.

The pronouncements of the Senator were of such significance that we have published elsewhere in this issue a large part of his address verbatim—in fact, practically all that related to electric railway matters. It is evident from what he said that the industry has at least one staunch friend in Washington. It did our hearts good to hear him openly express himself favorable to giving "big business" as well as labor a square deal. And we believe he meant whole-heartedly what he said in his address about the electric railways, and how splendidly they had responded to the nation's needs and how seriously and unjustly they had been penalized. We believe it because he spoke from a carefully prepared written speech, apologizing for so doing with the remark:



"The American public is becoming very exacting of its public officials and candidates. It is insisting on comparing what one says today with what he does tomorrow."

Then there is further reason for reassurance to the industry in the senator's remarks about the conditions and problems of the street railways. The successful man in public office is too wily to talk against the opinion prevalent among his constituents. His language may be expected rather to reflect the crystallized or crystallizing public sentiment. If this is true, then Senator Harding's address bespeaks again the gradual favorable change in public attitude toward the electric railways which we have several times recently stated was surely taking place. We cannot see other than a splendid improvement in the general conditions in the electric railway industry during the present year. Things are looking up.

### Coal-Handling Facilities of Special Importance Now

ALMOST every new power station embodies some different coal-handling scheme, depending, first, on the layout of the station, the amount of land available and its position, the topography of the ground, etc., and, second, on the judgment of the designing engineer as to what character of equipment will best serve the plant, balancing the initial cost against the ultimate usefulness. The scheme described in this week's issue, which is being installed at the Cos Cob station of the New Haven Railroad, is unique and in some respects an experiment. If it works out right, and the trials made thus far seem to indicate that it will, it will provide a means of very rapid handling of the coal and require five to seven men from barge to stoker, including firing, depending on the load being carried and whether coal is being delivered to storage or to the concrete bunkers. The speed with which coal can be unloaded from barges is due largely to an auxiliary boom conveyor on the revolving gantry, as this makes it possible to deliver coal at the point desired without any movement of any heavy structure, except at very infrequent intervals. The scheme has the advantage, also, that there is provision for receiving coal by rail as well as water and that a large part of the same coal facilities are used in either case, thus keeping the cost of the reserve system at a minimum. The rail coal is more simply handled into the station than the barge coal, but the latter has a lesser transportation charge to offset the more complicated handling, and coal by rail cannot be delivered to the storage pile with present equipment.

A recent Australian plant likewise embodies an unusual coal system, and one which provides ample duplication of handling facilities to insure continuity of supply, and yet involves an investment seemingly quite small, although actual cost figures are not available. Coal delivered by rail is dumped in a track receiving hopper, from which it passes through a crusher and is then delivered to any one of three conveyors. Two of these carry the coal up to the double row of bunkers over the firing aisle. The third carries it up onto a structure extending across a storage area and dumps it at any point along the length. This conveyor continues on to the end of the structure and down and back through a tunnel underneath the structure, to the starting point. If it is desired to take coal from storage, it is drawn by gravity through chutes along the bottom of the

storage area which discharge onto this same bucket conveyor on its return passage through the tunnel. At the power station, an arrangement dumps the coal from this conveyor so that it is delivered to the other two conveyors leading up to the overhead bunkers. Should this storage pile conveyor fail, a traveling crane and grab bucket mounted on the structure can be used to pick up coal from storage and drop it into a special hopper which discharges into the main receiving hopper. This scheme seems to be unusually simple.

Rapidity and cheapness of handling, duplication of facilities to a sufficient degree to insure against any possible shut-down, and an adequate shortage capacity, are the prime considerations in the coal-handling problem. These must be balanced, on the one hand, with the investment involved in different schemes, on the other.

Storage capacity without adequate facilities for handling the coal to the storage and from there to the boiler room is exceedingly expensive, although an adequate reserve pile would be justified in the interest of continuity of service if it had to be handled in wheelbarrows by hand. But, of course, the prime interest is in coal machinery which has to do with the continuous every-day handling from car or barge into the boiler room. Coal is by far the principal commodity a station must handle and it involves the largest labor item. In coal handling, therefore, is one of the best opportunities for reducing power plant operating costs.

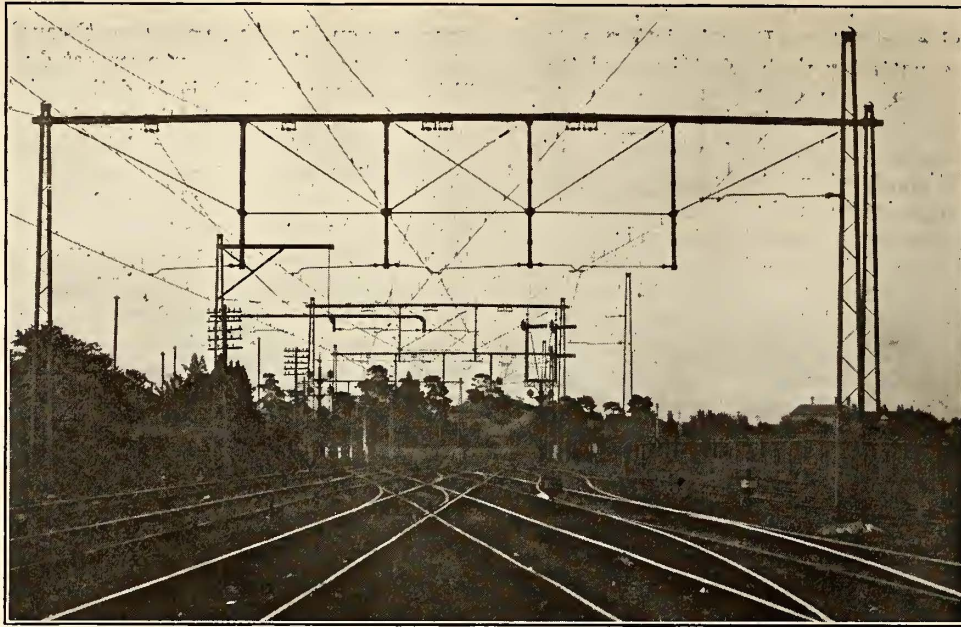
### For Some, Time Is More Than Money

THERE was a time when riding habit was held to have some fairly definite mathematical relation to the size and growth of a community, but the advent of the automobile has thrown all of the old-time riding habit formulas into the discard. The automobile has taught us that a new and improved mode of locomotion profoundly modifies this habit because, for one thing, it is possible to do more riding in less time.

If the automobile does give this saving in time and a sense of better use of time, the question of expense for this class of transportation becomes subordinate. For that reason, comparisons of street car versus private automobile transportation costs are less effective than would otherwise be expected. The automobile owner knows perfectly well that even the cheapest kind of machine on tires costs more per mile than the street car. Ask him why he prefers the automobile and it will develop that the automobile is favored because it is ready whenever he is. In other words, availability rather than cost is the controlling factor. The only way to meet this argument is to endeavor to approximate this availability of the personally-owned machine. Obviously, this means headways which must be shorter than ten or fifteen minutes and, of course, such shorter headways are obtainable financially only with light, speedy one-man cars. If automobile competition is met in this way it ceases to be a bugaboo but rather a welcome means of stimulating the riding habit.

The man who owns a machine is the same man who no longer cares to walk a fraction of a mile. This is apparent from the fact that in towns where the increasing number of automobiles had seriously cut the car riding, the introduction of short-headway street railway service has led to a return or improvement of the pre-automobile riding index although the increase in the use of automobiles has gone on unabated.





OVERHEAD SPECIAL WORK CONSTRUCTION ON MELBOURNE SUBURBAN RAILWAYS

## Melbourne Suburban Railways Electrified—II\*

Interesting Details of the Overhead Construction for This Australian System—Copper Catenary and Contact Wires and Flexible Hangers Used—Horn-Gap-Sectionalizing Switches and Many Other Unusual Features

THE 1500-volt direct-current energy employed by the Melbourne Suburban Railways is transmitted to the motor coaches through overhead contact wires arranged on the simple catenary system. Over the main suburban tracks the normal construction consists of a 0.25 sq.in. hard-drawn grooved copper contact wire supported by flexible hangers at intervals of 15 ft., from a stranded hard-drawn copper cable of 0.25 sq.in. or 0.375-sq.in. cross-section. This gives an equivalent of 0.5-sq.in. section of copper over each track, there being no feeders other than the supporting catenary wire. The contact wire is connected at intervals of about 600 ft. to the catenary by means of flexible copper cable of 0.075 sq.in. cross-section.

The contact wire is automatically tensioned through a pulley system attached to cast-iron weights. This tensioning is arranged at both ends of the wire lengths, which are about 3000 ft. long. A tension of approximately 2500 lb. is thus retained in the contact wire. Movement due to temperature changes is free to take place on either side of an anchoring connection between the contact and catenary wires which is arranged at a distance of one-third and two-thirds respectively from the tensioning structures taken in the direction of normal train movement. The flexible hanger between contact and catenary wires consists of a bronze wire  $\frac{3}{16}$ -in. in diameter terminating in a single-bolt clamp at the catenary and connected to a 6-in. flexible chain. The latter is connected to a ring surrounding a brass bar varying in length from a maximum of 26 in. near the tensioning structure to a minimum of 8 in. near the point where the contact wire is anchored to the catenary. The brass bar is connected to the contact wire by

means of two single-bolt clips. Throughout the anchoring span the flexible chain is connected direct to the contact wire.

Pull-off arms consisting of 1-in. diameter steel tubing are connected to the contact wire at each supporting structure and at the pull-off structures where such are employed. These arms are attached through double insulation brackets to the supporting and pull-off masts and retain the wire in a definite lateral position at the point of support. They are connected to the insulator brackets through joints which permit of vertical movement for flexibility and lateral movement to accommodate the travel of the contact wire due to temperature changes. Connection to the contact wire is made through a swivel clamp.

The catenary wire is carried on a bracket insulator giving double insulation to ground at each supporting structure. The center supporting insulator is of spool shape with a gun-metal collar between the catenary and the porcelain. The catenary is not clamped to the insulator but has an underloop consisting of the same cross-section running under the insulator and connected by means of two U-bolts to the catenary.

The catenary wire has a 10-ft. 9-in. sag at the center of a normal 300-ft. span at 60 deg. F., with a maximum tension of approximately 3200 lb. It is anchored at about 3000-ft. intervals.

The simple catenary system is arranged in a staggered formation between structures so as to give uniform wear on the pantograph collecting shoes. The normal contact wire height is 16 ft. 6 in. over the main suburban tracks at 70 deg. F. Over grade crossings, the wire is arranged at a minimum height of 18 ft. Under low overline bridges, which are numerous on the system, the wire is arranged at a minimum

\*For the first section of this article see issue published Dec. 13, 1919, page 902.



height of 14 ft. 6 in. from the rail level. The minimum clearance from main level to the lowest member of over-line bridges at points above the collecting surface of the pantograph is 15 ft. 6 in. This gives a vertical clearance of 12 in. between the contact wire collecting surface and the underside of the bridge. The maximum height of projecting ventilators on country rolling stock is 14 ft. 2 in. It would be possible with a rigid collecting skate or rigidly supported contact wire to retain the contact wire at an absolute minimum of 14 ft. 6 in. and at the same time retain 12 in. clearance between the grounded members of the bridge and the surface of the collecting device. The liability, however, of arcing with such rigid devices would be great and the wear

and tear on the pantograph would also be excessive at high speeds. It was therefore decided to retain the flexible contact wire beneath low bridges, and practically maintain normal construction.

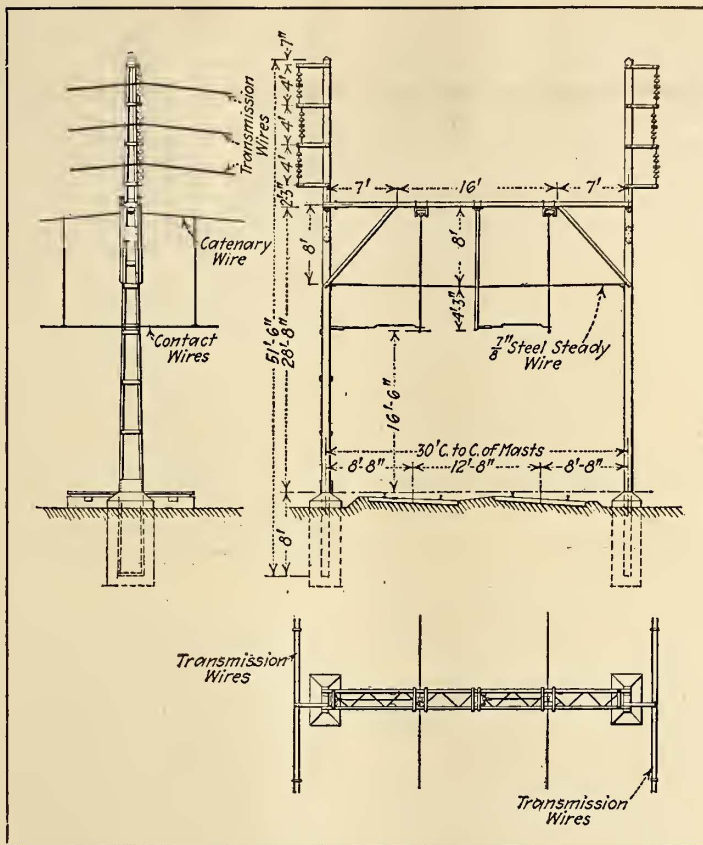
To obtain satisfactory alignment with such flexible construction and to insure that the pantograph with a normal upward pressure of between 25 and 30 lb. at a speed of 50 m.p.h. would not raise the contact wire more than 2 in., very careful grading of the contact wire to its minimum height of 14 ft. 6 in. beneath bridges was necessary. The maximum grade employed under these conditions is 1 ft. in 150 ft. Where possible this grade is increased to 1 ft. in 250 ft., and in special cases where the speed of trains is limited a grade

of 1 ft. in 100 ft. is permitted.

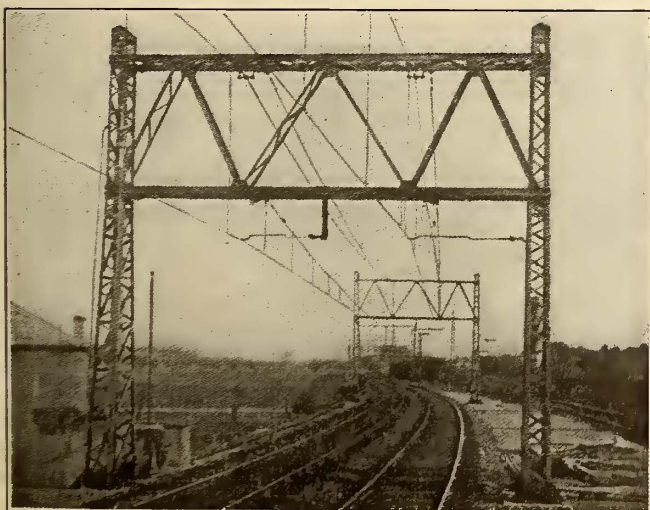
On lines on which the operation of certain steam trains is continued, the catenary supporting insulators under the low bridges are arranged so as not to come in the direct blast of the steam locomotive exhaust. The arrangement of catenary supports under these conditions provides for the attachment of two standard catenary insulators, placed symmetrically at either side of the center line of track, at 9 ft. centers. A bent T-section which supports the catenary wire is attached to these insulators. These attachments are normally placed at about 15 ft. centers along the bridge.

The hanger connections between the catenary and contact wire are cut in lengths to give a level line at 70

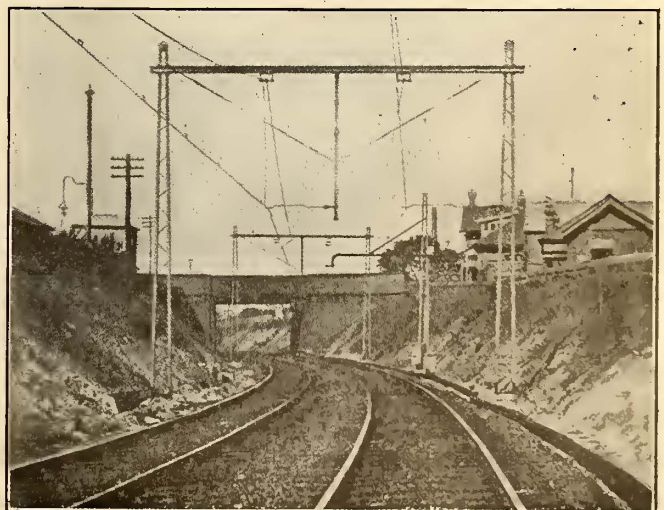
deg. F. All hangers are measured and cut according to a special table which provides the necessary adjustments to allow for grading in the line where such takes place. The cut hangers with the necessary lengths of slider bars for the various spans are made up in the contractors' stores and erected in the field practically without any adjustment. This procedure has resulted in a well-aligned line which responds uniformly in vertical movement to changes of temperature. The result is to a large extent due to the fact that the catenary supporting wire is stressed well within its elastic limit. From measurements on wire which has gone through a few seasonal changes it is found that the catenary sags in hot weather to an extent expected



OVERHEAD CONSTRUCTION FOR TWO-TRACK LINE WITH HIGH TENSION WIRES CARRIED ON BRACKETS ABOVE



TWO-TRACK ANCHOR STRUCTURES



TWO-TRACK CURVE CONSTRUCTION

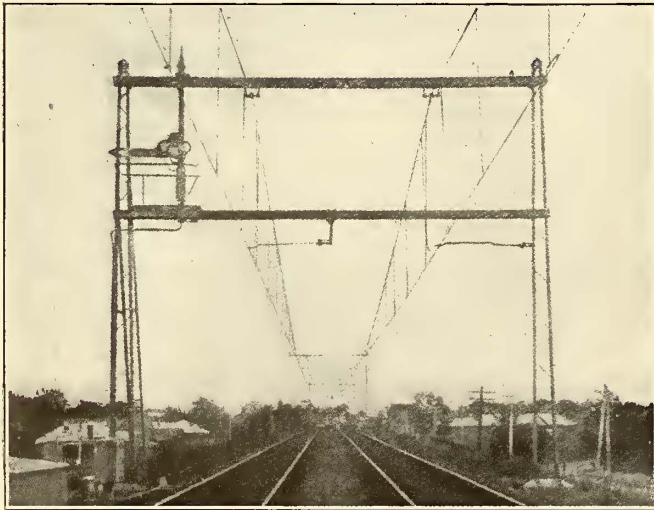


and returns to its original sag at lower temperatures. There seems to be no tendency for the wire to increase progressively in sag with the recurrence of high temperatures. The temperature limits experienced in the Melbourne district are between 27 deg. F. and 175 deg. F. sun temperature.

At tensioning points, other than at track terminal points, two terminating structures 180 ft. apart are employed. The wires in either direction overlap this 180-ft. span. The overlapping wires are arranged 15 in. apart horizontally, and for a distance of about 15 ft. on either side of the center of the overlapping span, the pantograph makes contact with both contact wires. From the center of this span each contact wire rises gradually to its automatic tensioning attachment, and the supporting catenaries are terminated on the tensioning structures at points vertically above the contact wires which they support.

#### SUPPORTING STRUCTURES

The supports for the simple catenary system consist of pairs of tensioning anchor structures situated approximately 3000 ft. apart with light intermediate



STANDARD INTERMEDIATE TWO-TRACK STRUCTURE  
ADAPTED TO CARRY SIGNALS

structures spaced at 300-ft. intervals on tangent track and at lesser intervals on curved track to suit the radius of curve. On curve work with single and two-track construction, light pull-off masts are located between the intermediate supporting structures.

One of the views on page 137 shows a pair of anchor structures at a tensioning point. These structures consist of 3½-in. x 3½-in. laced angle masts bolted to gravity-type foundations with a bridge of two 6-in. angle-braced channel booms having a light angle bracing between booms. The contact wire tensioning pulleys are attached to the bottom boom. The catenaries are rigidly anchored to the top bridge boom. These anchor structures are designed to be capable of carrying signal semaphores.

The other view on page 137 shows the supporting structure on curve construction. It consists of two 6-in. channel masts with a 6-in. channel supporting bridge. The masts are formed from two 6-in. channels tapering from 2 ft. at the base to 9 in. at the top and laced with a center strip bracing of 2-in. x ½-in. flat bar. The bottom of the masts for a length of about 7 ft. is set in concrete side-bearing foundations. The bridge

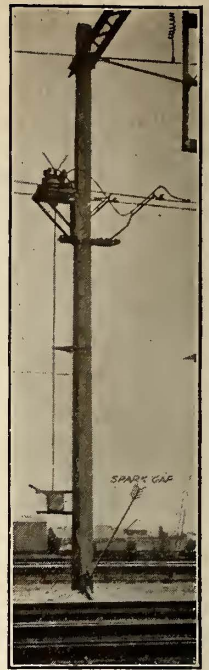
member is formed from two 6-in. channels 6 in. apart and laced with a center strip bracing of 2-in. x ½-in. flat bar. The bridge member is attached to the masts by means of clamping angles and its position on the masts is thus adjustable. A 4-in. channel vertical is placed in the center of the bridge and stayed with tie rods, which gives an independent pull-off for the inside track on curve construction.

The view last mentioned also shows a pull-off mast situated between two intermediate structures. By means of the bent angle bracket an independent pull-off is obtained for the inside track. Structures similar to the foregoing are employed with four and six-track constructions.

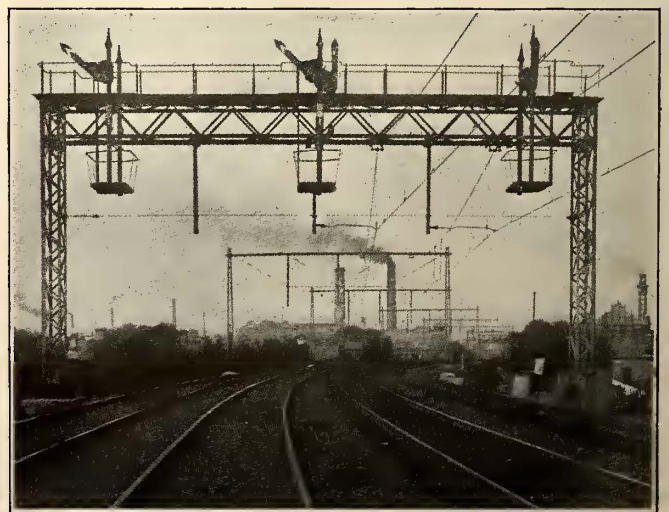
All overhead equipment structures, signal bridges and overline road bridges to which line work is attached are bonded to the track rails through a paper spark gap. This consists of a piece of thin paper, 0.001 in., between two aluminum disks, one disk being in contact with the structure and the other connected by means of flexible copper cable run in trunking to the rail. The disks and paper are incased in a bronze cap bolted to the steel work through an insulated bolt with a rubber washer between the face of the steel work and the cap.

In the illustration showing a side view of this mast, the spark gap device is shown in position near its base.

By means of this spark gap the structures are normally insulated from the rails, and the liability of unbalancing of the traction return current in the running rails due to leakage of current through imperfectly insulated structures is reduced to a minimum. This precaution is taken as it is necessary to limit the unbalancing of current through the impedance bonds connecting the track signal circuits which are operated by alternating current. If the insulation between the overhead wires and the supporting structures breaks



SIDING SECTION-  
ING SWITCH IN  
POSITION AND  
SPARK GAP  
GROUNDING  
DEVICE



FOUR-TRACK COMBINED OVERHEAD AND SIGNAL  
STRUCTURES



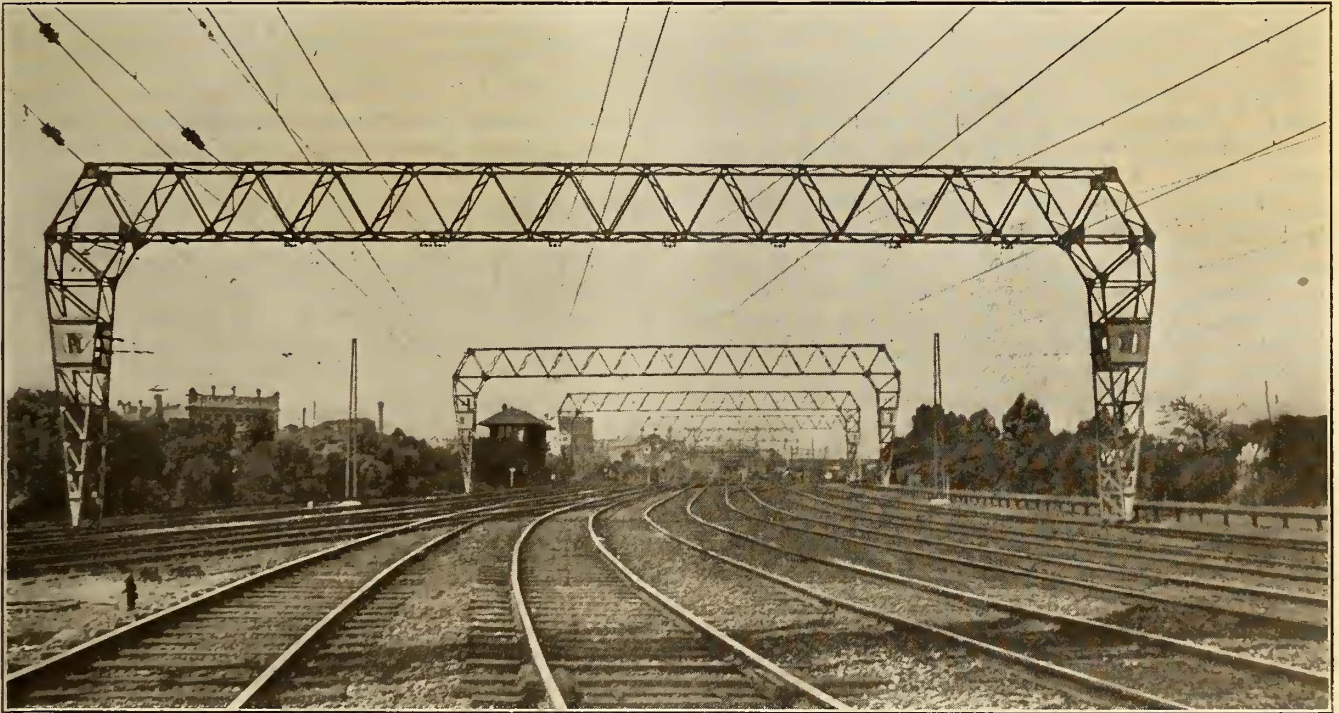
down, the spark gap is punctured and the structure is connected to the nearest rail, thus giving a comparatively low resistance return to the substation.

The standard intermediate structures have, where possible, been designed and adapted to carry single arm power operated signals. The additions to the structure consist of a second channel boom located about 8 ft. below the catenary supporting boom and a raked ladder built up from angle sections to give stiffness to the structure along the track. One of the views on page 138 shows a two-track overhead structure adapted to carry signals, another view shows a combined four-back signal and overhead equipment structure, and the view on this page shows five pin arch structures at North Melbourne junction.

These latter structures span up to 120 ft. and carry the overhead equipment load of thirteen tracks. They are also designed to carry a signal load of about 6 tons, distributed. These structures are built up of double 4-in. x 4-in. x  $\frac{1}{2}$ -in. angle members with bracing varying from 3 in. x 3 in. x  $\frac{3}{8}$

Through extended junction work such as that at North Melbourne and at the approaches to Flinders Street viaduct where the contact wire takes many sharp turns to avoid crossing at the pantograph running level, no provision is made for the accumulative movement of the contact wire, and it is rigidly anchored. The flexibility of the numerous pull-offs act as automatic tensioning devices, and from actual tests it has been found that the variation in the tension of wire through such work due to temperature change is within reasonable limits and quite compatible with the good working of the line. Under these conditions it is possible to dispense with slider bars and to a large extent with individual pull offs; cross steady wires are connected through triangular clips to the contact wire. This type of construction is shown in the view of the 120-ft. span already mentioned.

The up and down tracks of all routes are electrically insulated from each other. All routes are as far as possible separately fed, the exception being when certain tracks are common to different routes. Through ex-



PIN ARCH STRUCTURE USED FOR SUPPORTING THE OVERHEAD WHERE WIDE SPANS ARE NECESSARY

in. to 2 in. x  $2\frac{1}{2}$  in. x  $\frac{5}{16}$  in. The dimensions of these structures are 30 ft. to the underside of the boom from the rail level; bridge 7 ft. deep x 4 ft. wide; legs spread 6 ft. along the track at the rail level and 4 ft. wide at the bridge height. The 120-ft. span structures weigh 14 tons each.

The illustration at the heading of this article gives a good idea of the overhead special work construction employed. It will be noted that no contact wires are crossed at the pantograph running level. The individual pull-off arms employed at the junctions permit of the employment of air sections between the various wires. At the center of the scissors crossing shown in this illustration, the two contact wires are held together by means of an insulating distance clamp. Excluding this distance clamp, which is installed in duplicate, each wire in the special work shown is independently held and capable of individual movement or adjustment.

tended special work where trains cross through many different tracks in following their route, the overhead wires over a number of tracks are connected together and treated as one section.

Air section insulation is universally employed between track sections where the speed of trains exceeds 25 m.p.h. Over crossovers and leading-in tracks to sidings where train speed is restricted, the tracks are electrically insulated from each other by means of section insulators in the catenary and contact wires. Ordinary terminal strain insulators are employed in the catenary wire and continuous feed section insulators are inserted in the contact wire.

Porcelain continuous feed section insulators for 0.125-sq.in. contact wire are employed in siding and occasional crossover track. Side runners located on the sides of the insulator give a continuous feed to the collecting pantograph throughout the length of the insulator.



Wooden continuous feed section insulators for 0.25-sq.in. contact wire are frequently employed in cross-over track work. Copper spring wings arranged on the side of the wood section give a continuous feed to the collecting pantograph throughout the length of the insulator. The end runners at the approach to the insulator consist of light U-shaped metal pieces about 3 ft. long surrounding and attached to the contact wire which terminates in a cone pinned to the insulator end casting.

The runners are hinged to the insulator end casting and are free to rise with the contact wire. Their function is gradually to transfer the pantograph contact from the flexible contact wire to the rigid surface of the insulator with as small a rate of change of grade as possible. The grade followed by the pantographs between the contact wire and the surface of the wood section is 1 ft. in 150 ft. The wood employed in these insulators is Australian hard seasoned tuart, which possesses good mechanical and electrical properties.

The catenary system is fed through cables coming direct from the substations to tensioning structures located close to the substations. Two cable feeders are employed per track, giving separate supply in both directions from the substation.

Sectioning between substations and between substations and terminals is obtained by means of outdoor horn-break switches located on tensioning structures. Views of the horn-break switch are shown to good advantage in accompanying illustrations. It consists of a double-blade switch with a quick-acting plunger connected between spring horns. The actuating rod works through a locking box, from which the operating handle projects. Through the end locking door on this box the handle can be locked in the "in" or "out" position with a simple padlock. The switches are located on a level with the top boom but are operated from a platform attached to the bottom boom of the tensioning structure.

The standard arrangement for sectioning two-track linework consists of five switches, one switch connecting each of the two directions of each track to a common bus, which has a paralleling switch capable of separating the two tracks. Sectioning points are located with reference to traffic requirements and the position of crossovers.

At junctions where many routes lead off from a limited number of tracks, the special work is sectioned at both ends, so as to limit as far as possible the effect of trouble which may occur on any one route. Sectioning points are employed on the outlying lines from 2 to 3 miles apart. Sections of line on two-track route fed from both ends have the up and down tracks normally paralleled at one point about midway between substations. Sections fed from one end only are normally paralleled at the terminals or non-fed end.

The suburban system is divided up into sections which extend between substations. These sections are divided into subsections which extend between sectioning points. Sidings and terminal tracks leading from subsections are divided into branch sections. All substation switches feeding sections are numbered the same as the sections which they feed. Subsection and branch section switches are numbered with reference to the section which they are on, and the subsection and branch section to which they are directly connected. Section paralleling switches are numbered with reference to the sections which they parallel and the subsections through which

they are paralleled. By the foregoing system of numbering, each switch number gives particulars of the lines affected by the switch and, with a general knowledge of the location of sections, gives the approximate position of the switch.

The contact and trolley wires immediately over the crossing are all connected together but insulated beyond defined limits by air gaps in the case of the railway contact wires and section insulators in the case of the tramway trolley wires. There are two main circuit breaker type switches of the kind used in train equipment, mounted on the mast of the steel structure nearest to the signal box, one controlling the 500-volt supply for tramway operation, the other the 1500-volt supply for railway operation onto the special insulated crossing wires.

The 500-volt circuit breaker is fed through either or both tramway overhead lines and switches mounted in a box on the tramway pole nearest to the signal box. The control circuit is taken through contacts which are controlled by a relay of standard type used by the signal department, the relay being in turn controlled by the circuit breaker contact on the gate stop lever in the signal cabin which is interlocked in the usual way with the railway signal levers and the tramway signals and derails. In addition the circuit is controlled by being passed through contacts on the track relays on the signaling track circuits. All these contacts must be closed before the relay can be energized.

It will thus be seen that if any train is bridging either the up or down tracks in the immediate vicinity of the tramway crossing the track relays will be de-energized and their contacts will be in the off position. It then becomes necessary for all these tracks to be cleared, when the relays will automatically pick up, close their contacts, and, providing the gate stop lever is in the reverse position, *i.e.*, with the gates set for tramway traffic, the circuit for operating the 500-volt circuit breaker will be complete.

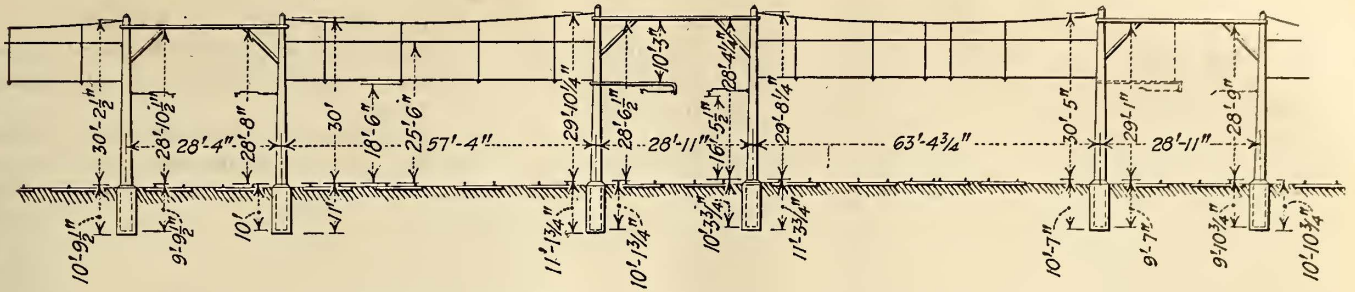
Should the gates be set for tramway traffic and a train run onto these particular track circuits before the pantograph reaches the point at which it parallels both the auxiliary and main contact wires, either one or the other of the relay contacts will drop off, and the 500-volt circuit breaker will automatically open. The power required to operate this circuit breaker is approximately 0.3 kw.

The 1500-volt circuit breaker is fed from one to the other of the main contact wires through a horn-break type manually operated switch, and is controlled by current stepped down in voltage through resistances from 1500 to 750 volts (on the train equipment this is taken care of by the dynamotor), the circuit being taken through contacts controlled by a relay. The relay is in turn controlled by the circuit breaker on the gate stop lever completed when the lever is normal to railway traffic.

In addition to the above interlocking, the circuit for controlling the 1500-volt circuit breaker is taken through an interlock on the 500-volt circuit breaker, the contacts of which are connected only when this circuit breaker is open. Similarly, the circuit controlling the 500-volt circuit breaker is completed through an interlock on the 1500-volt circuit breaker only when the latter circuit breaker is open.

Each circuit breaker is fitted with an overload device, the resetting of which is provided for by a locked-up switch. This feature will act as a protection so that,





SECTION ACROSS STORAGE YARD SHOWING OVERHEAD CROSS SPAN CONSTRUCTION

should a circuit be set up between the tramway and the railway wires, in spite of all precautions, it will be opened by these circuit breakers.

The circuit breaker overload coil operates a mechanical trip carrying the main solenoid circuit to be broken at the resetting solenoid contacts. The circuit breaker is not tripped, and therefore does not require resetting in case of no voltage, but only in case of overload or intentional tripping. However, it opens the circuit due to loss of current in the solenoid but picks up again when the supply is resumed.

Knife switches are provided in the connections between both circuit breakers and the crossing wires, so that service can be maintained on one system should the circuit breakers on the other system be under adjustment. A lamp indicator is provided in the signal cabin, so that signalmen will readily see if a circuit breaker is not responding to the operations of his levers or the gates. High-tension fuses are used in the control circuits where these enter the signal cabin, these fuses being installed in a relay box outside.

Automatic train stops are to be installed at a sufficient distance from the point at which the pantograph would parallel both auxiliary and main contact wires to stop a train if it passes a signal set against it before it reaches the point of paralleling the circuit breakers.

**SIDING AND STORAGE TRACK OVERHEAD CONSTRUCTION**

Catenary construction similar to main-line work but employing a 0.125 sq.in. hard-drawn grooved copper contact wire, and a 7/9 gage Siemens-Martin galvanized stranded steel catenary, is employed over siding tracks. The contact wire is not automatically tensioned so that the flexible hangers are connected directly to it.

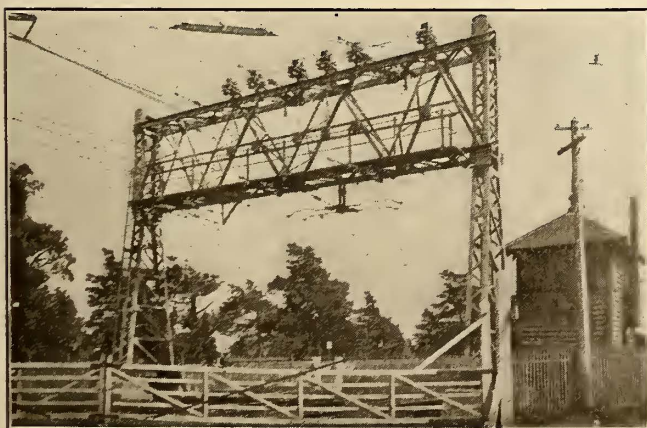
Since the pantograph upward pressure is normally adjusted to deal with the speeds and current collection experienced with the 0.25-sq.in. contact wire over the

main suburban lines, it tends to raise the smaller wire on siding work when the latter has a minimum tension at high temperatures, and in consequence a flexible chain connection is placed between the catenary and hanger wire, the latter being connected direct to the contact wire clip.

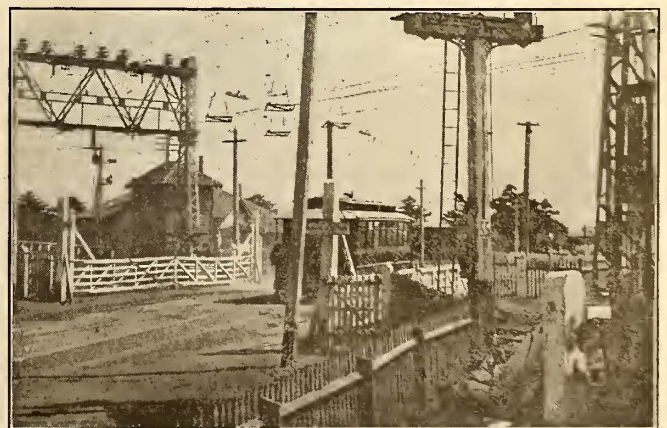
The steel catenary is arranged with a normal sag of 8 ft. 9 in. at 60 deg. F., giving a maximum tension of 1500 lb. The 0.125 sq.in. contact wire is strung to give a maximum tension of about 2400 lb. As far as possible a height of 18 ft. from rail level is maintained for the contact wire over siding tracks. This height is not always possible, due to the presence of low over-line bridges and the necessity of grading down to main-line work where the normal height is 16 ft. 6 in.

At outlying terminals where the number of siding tracks is small, common supporting structures similar to the light intermediate structures already described are employed over the siding and main suburban lines. In the Flinders Street yard, where the suburban rolling stock is stored, cleaned and inspected, the sidings comprise about 30 miles of single track. This extensive yard has six two-track main side tracks passing through it. Between these are groups of from five to twelve storage tracks. The sidings in any one group store trains for the lines on either side of it. The overhead construction used here is shown above.

The catenaries over the storage tracks are supported by cross-span cables 19/10 gage hard steel, spanning between the main side tracks, which have independent supporting structures. The cross-span cable is strained to 7000 lb., and the independent supporting structures are capable of temporarily anchoring this span, although under normal conditions the tension on either side of these structures is balanced, the cross span being anchored to the extreme outside structures by either anchor guys, or self-supporting anchor masts where



OUTDOOR HORN SECTIONING SWITCHES, MOUNTED ON TENSIONING STRUCTURE



INSULATORS AND SPECIAL CROSSING FITTINGS AT INTERSECTION WITH TRAMWAY



there is no space for guys. The intermediate cross-span supporting masts between sidings are balanced and not capable of anchoring the cross-span cables.

The independent structures consist of 8-in. channel center strip laced masts set in concrete side-bearing foundations and braced to a 6-in. channel center strip laced bridge. The intermediate supports are built up masts of 3-in. x 3-in. x  $\frac{3}{8}$ -in. angle set in concrete.

#### CARHOUSE LINE CONSTRUCTION

Nine tracks through the inspection bay of the Jolimont repair shops have overhead contact wires. Catenary construction is employed with the supporting insulators attached direct to the roof members at intervals of about 20 ft. The trolley wire is arranged at a height of 17 ft. 6 in. from the top of the rail.

Two 6-in. channels are arranged on either side of the doors and held on brackets attached to the building piers located between tracks. Bolts going through the piers connect the channels together, and this releases all tension from the piers when the tensions due to the contact wires which are anchored to these channels are equal. Wood section insulators are placed between the contact wires and the terminating channels. A small crank with two arms at 90 deg. is attached to the grounded end of one of the contact wire terminating insulators. On the second insulator, shaped jaws are arranged to receive the longer arm of the crank. Operation of the roll door through the usual chain arrangement then operates the double crank to either the "in" or "out" position by the bottom angle of the door coming in contact with the longer crank arm. This arrangement provides a smooth path for the pantograph in passing over the grounded insulator section.

#### SIDING SECTIONING

At outlying sidings, the overhead wires are insulated from the main lines by means of section insulators already referred to. Switches similar to those employed for main-line sectioning are used for feeding these sidings. They are erected on the most convenient structure and operated through a locking box situated near the base of the supporting mast. An illustration on page 138 shows such a siding switch in position.

At Flinders Street yard, where numerous sidings are used for daily inspection and cleaning purposes, special attention has been paid to the question of sectioning. At the west end of these sidings, at the approach to the Flinders Street terminus, a bridge is erected over the suburban and siding tracks with ladders leading down to the various groups of sidings. This bridge is primarily for the use of cleaners, inspectors and train crews, who are thus offered facilities for going to and from work without danger from the heavy train movement about this point. This bridge also serves as an anchoring point for numerous siding overhead equipment wires, and is conveniently situated as a sectioning point for the main-line and siding tracks passing beneath it. All switches controlling the sidings in Flinders Street yard are located on this bridge. For sectioning purposes a small section of the bridge 4 in. wide is screened off, and all operating and switch locking boxes are located in this section.

This article was abstracted from a very full account of the installation written by E. P. Grove of Merz & McLellan, consulting engineers, London, which appeared in the *Australian Commonwealth Engineer* of Nov. 1, 1918. The full installation was only recently completed.

## Status of Transportation in London

IN A LECTURE delivered recently before the Institution of Civil Engineers, of Great Britain, H. H. Gordon discussed some aspects of Metropolitan road and rail transit. An abstract of this lecture is given editorially by the *Electrical Review*, London, from which the following extracts are given. Owing to restrictions on publication by the Institution it is not practicable to abstract the paper directly.

One of the most striking points that he brings out is the enormous and never-ceasing growth of traffic on the London streets. In the decade ending in 1913 underground traffic increased by 170,000,000 passengers, and surface traffic by no less than 870,000,000! "Even where motor traffic largely predominates there has been no real decrease in road congestion, and in the central area of London it is found uneconomical to employ motor delivery vans. The carrying capacity of the highway has been, and remains, taxed to the uttermost." We may point out that in the central area of London there are no tramways; hence the tramcar is guiltless of producing congestion in this region. There are numerous underground railways serving this area, but, as the author shows, no relief to surface traffic is gained by adding tubes. Before the Central London Railway was opened, 390 horse omnibuses passed along Oxford Street per hour, while in 1913, at times when the Central London Railway was packed to repletion, 517 motor-omnibuses, with 70 per cent greater accommodation than in 1895, were unable to cope with the demand made upon them. The same phenomenon has been observed abroad. "Surface traction always grows more rapidly than any underground system," and "congestion on the highway will continue to be a problem unless the solution to it be found on the surface of the streets."

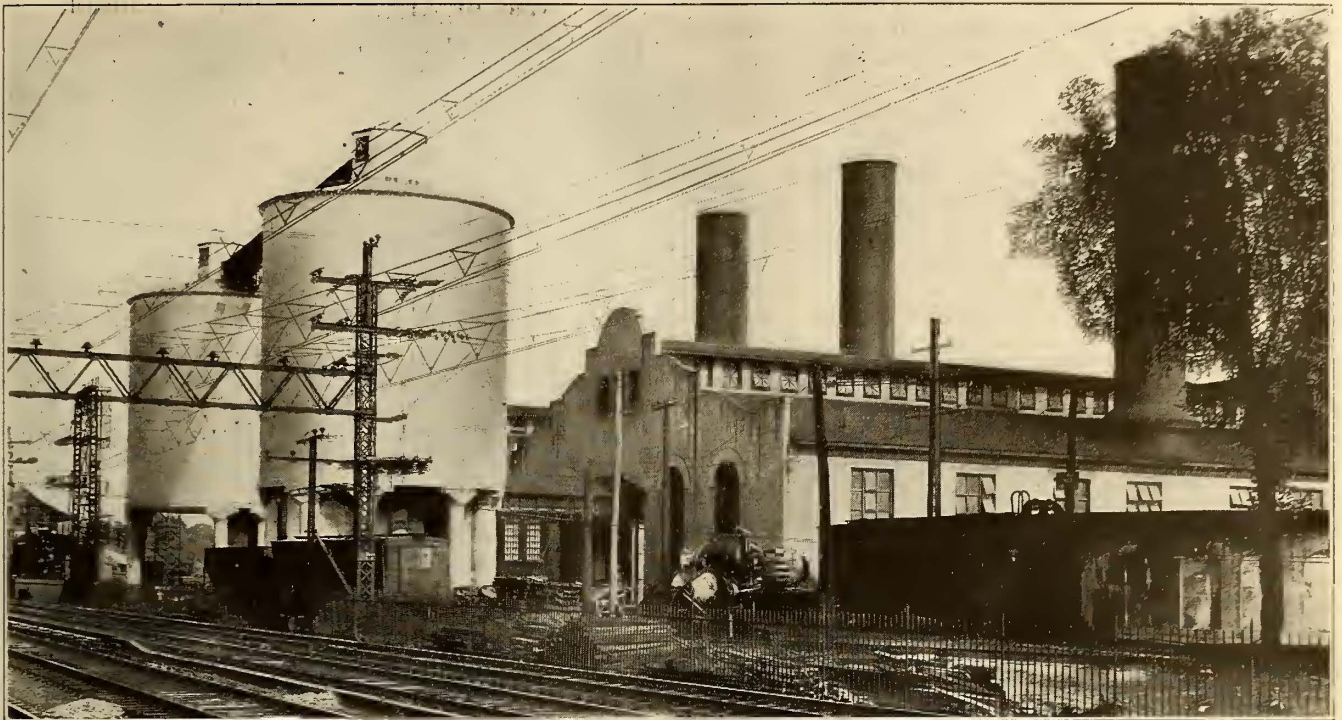
Mr. Gordon points out that the laxity of control over the traffic, by permitting many flagrant abuses, results in the inefficient utilization of the carrying capacity of the highway. On London Bridge, for example, where there are no standing vehicles to obstruct the way and no crossings, even at the hour of maximum intensity of traffic, the efficiency observed was only 41 per cent. Much could be done to ease the congestion if vehicle drivers could be induced to "keep in line."

The author discusses the question of street crossings, and shows that they should be rectangular; but he has no radical remedy for the delay due to the necessity of traffic regulation, except the drastic one of viaducts or subways, and we cannot say that his modification of the "gyratory system" ("Booth's circus") offers much hope of adoption. "In 1902 all traffic was animal driven; in 1914, 83 per cent was power driven," and it is to the power of rapid acceleration and retardation that he attributes the saving of the situation, aggravated by the doubling of the traffic in the interim.

As to the "flexibility" of motor traction, which enables traffic to deviate from congested routes, the author discusses its merits in detail, and dismisses it with the faintest praise. As he points out, when the road is free from congestion, flexibility is not required; when the road is congested, flexibility cannot be availed of, for the motor vehicles cannot maneuver. He disagrees, for stated reasons, with the estimate of the Traffic Branch of the Board of Trade as to the relative obstructiveness of the tramcar and the motor-bus, and makes the sound point that obstructiveness should be assessed on the basis of the number of passengers carried, and not that of the number of vehicles in use. On the former basis, even taking the Traffic Branch's estimate of obstructiveness, the motor-omnibus is seen to be, in the aggregate, the most obstructive passenger-carrying vehicle on the road.\* Moreover, as a lethal instrument the omnibus is easily first—partly as a result of that flexibility which enables it to appear at unexpected places. In 1918 the Metropolitan police stated that the fatal accidents numbered 2.8 per 100 tramcars and 6.75 per 100 omnibuses; on the passenger basis, the relative figures would become 2.8 for the tramcar and 15.5 for the omnibus. The very fact that omnibuses leave the fast-traffic line to load or unload at the curb, for which much is claimed by the advocates, materially adds to their obstructiveness, as was pointed out by the Advisory Board of Engineers of the Royal Commission on London Traffic.

\*The official "factors of obstruction" are, for the tramcar 9 and for the omnibus 4; as 230 buses would be required to replace 100 tramcars (in fine weather—far more in wet weather) the aggregate obstructiveness of the omnibus is  $2.3 \times 4 = 9.2$ .





TWO CYLINDRICAL CONCRETE COAL BUNKERS, ONE FOR EACH BOILER ROOM, VIEWED FROM ACROSS THE RIGHT-OF-WAY

## Improved Coal-Handling Facilities at Cos Cob

New Haven Railroad Installs "Silo" Storage Bunkers, Conveyors and Accessories at Its Well-Known Power Plant in Connecticut Which Supplies Energy to the Electrified Zone Between New York and New Haven

THE severe winter of 1918 acted as a spur to many power generating companies to enlarge their coal storage facilities as a means of insuring themselves against any possible failure of the transportation systems. During this memorable winter, not one but many an operator was on several occasions within a few hours of exhausting all available coal and there were even some shutdowns. It was this unprecedented condition which caused the officials of the New York, New Haven & Hartford R.R. to lay plans at once for amplifying the coal-handling facilities of the Cos Cob (Conn.) generating station which supplies a large portion of the energy for the New York-New Haven electrified division.

Accordingly, Gibbs & Hill, consulting engineers of New York City, were given the task of working out and installing a suitable plan, and the result includes many interesting features.

### ORIGINAL FACILITIES INADEQUATE

The Cos Cob power station is a plant of 28,000 kw. capacity, having a twenty-four-hour coal consumption rate of from 350 to 450 tons. It is laid out in a long turbine room with two boiler-room wings extending out from the north side. Normally, all coal is received by tidewater shipments from Perth Amboy. The coal used is mostly run-of-mine Pennsylvania bituminous fuel. With the original coal-handling equipment, the coal has been picked up from the barges with a grab-bucket hoist, dumped into a crusher tower, and carried in cars over an inclined railroad from the crusher to the over-

head bunkers in the two boiler rooms. These overhead bunkers furnished a storage capacity in the plant of 150 tons for each boiler room.

What little coal has been received by rail in the past has been dumped into two track hoppers, one at the end of either boiler room. These hoppers have a capacity of about 50 tons each and are equipped with a crusher from which the coal is delivered by bucket conveyor to the overhead bunkers.

With this original coal-handling arrangement, it is seen that practically the only provision for reserve coal supply was that afforded by barges held alongside the dock in the river. This served the purpose with reasonable safety until the unprecedented conditions of the 1918 winter made it impossible to receive coal by barge for many days at a time. As the supply by rail was likewise uncertain, the need for adequate storage facilities on the ground became obviously imperative.

The plans contemplate an extensive remodeling of the coal-handling and storage facilities for the future, the part of which now completed and herein described will give an addition of 2,000 tons capacity to the powerhouse storage bunkers. Later it is proposed to provide a storage and handling plant near the power house to be used in conjunction with the new bunkers.

Just beyond the end of each boiler room a cylindrical concrete storage bunker has been erected and supported on concrete columns with a clearance of 19 ft. from the boiler-room floor level to the top of the bunker. An extension of the firing aisle in each boiler room was provided to a point directly beneath the bunkers, the over-

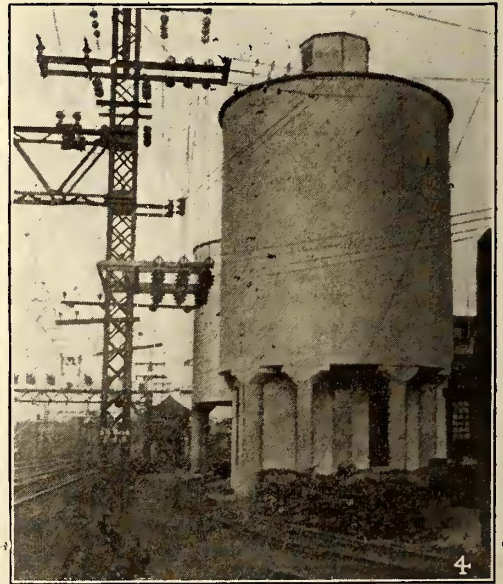
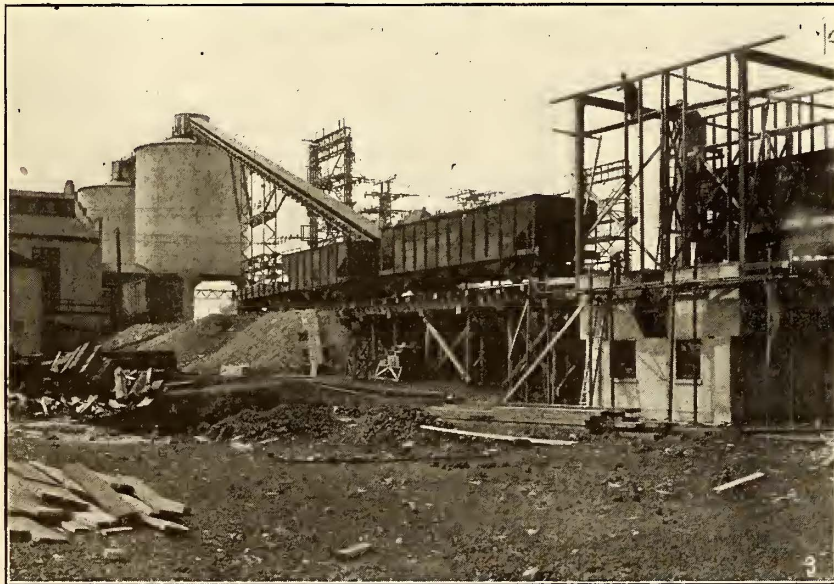
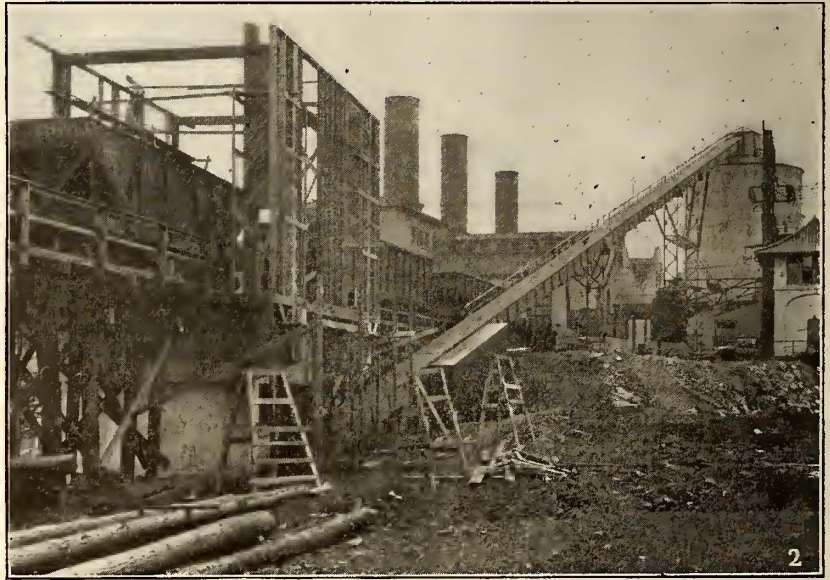
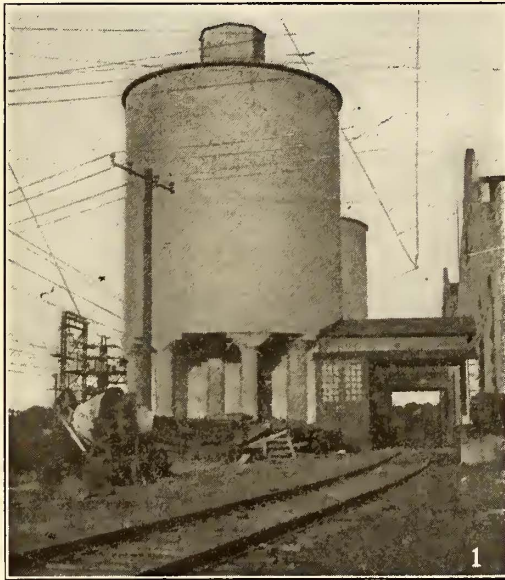


head trackway for the double weighing lorry system being extended through a doorway made in the wall of each. Thus the lorries can be run underneath the bunkers and filled by gravity through the bottom gates, then return down the firing aisle to deliver the coal in known quantity to the several stokers.

The standard-gage side track which formerly served the two auxiliary track hoppers was extended out onto a wooden trestle and over a new track hopper which discharges into a crusher of 150 tons per hour capacity. Coal dumped into this hopper passes through the crusher and is discharged onto a 24-in. belt conveyor which is

charges the coal from the main conveyor into the first bunker, and when thrown to the other position, discharges onto another conveyor running between this first bunker and the cupola of the second bunker. This conveyor between bunkers is also a 24-in. belt, which is driven by a 10-hp. squirrel-cage motor mounted with its starting box in the cupola of the second bunker. This belt between bunkers is 112 ft. long between centers, while the main belt from the crusher to the first bunker is 330 ft. long between centers.

Two of the accompanying illustrations show side views of the conveyor structure and the concrete bunk-



IMPROVED COAL-HANDLING EQUIPMENT AND STORAGE BUNKERS

No. 1. Main side track serving, originally, the auxiliary track hopper at each boiler room and now extended to serve the new hopper and crusher plant—Roof construction to protect the lorry track extends over the track to the bunkers.

No. 2. Crusher house, belt conveyor, motor house, conveyors and bunkers viewed from the northwest.

No. 3. Concrete bunkers, inclined belt conveyor, trestle and crusher plant at the foot of the conveyor viewed from the northeast.

No. 4. An auxiliary side track for shifting empties, passes underneath the first bunker—Character of bunker construction clearly shown.

driven at the rate of 400 ft. per minute by a 50-hp. squirrel-cage motor. This belt rises at an angle of 16 deg. with the horizontal, and delivers the coal at an elevation of 97 ft. into the cupola at the top of the first concrete bunker. In this first cupola a sort of butterfly valve is provided which, when set in one position dis-

ers. The concrete crusher plant is seen at the foot of the conveyor and beneath the trestle. The Mead-Morrison crusher installed here is driven by a 40-hp. wound-rotor motor, and the starting box for this motor as well as the one for the main belt conveyor is mounted in this crusher house. The motor driving the main belt con-



veyor is, however installed in a separate small housing underneath the conveyor structure, as seen to the right of the crusher house in another picture. The energy supply line to the motor in the second bunker cupola which drives the conveyor between bunkers is carried through a knife switch in the crusher house, so that this motor can be stopped at any time from the crusher plant. It cannot be started, however, except from the cupola of the second bunker. In the operation of this equipment, it is necessary to keep one man up on the conveyor structure and in the two bunker cupolas so that he is available for controlling this motor and taking care of the distribution of coal between the two bunkers.

This entire conveyor system, together with the design of the concrete bunkers in connection with the conveyor, was furnished by the Robins Conveying Belt Company, and all electrical equipment is of Westinghouse manufacture. The conveyors are supported on steel structure and are covered over the top and the north side by corrugated sheet iron, while the southern side is left open to facilitate inspection. A walkway and railing extend along this side of the conveyor.

CONSTRUCTION OF THE CONCRETE BUNKERS

While these "silo" type concrete cylindrical storage bunkers have been used in two or three instances before in connection with the coaling of locomotives by the Erie Railroad, it is believed that this is the first installation of the kind for use in conjunction with a generating station. The Cos Cob bunkers are, however, much



THE BOTTOM OF ONE OF THE CONCRETE BUNKERS SHOWING THE SIX DUPLEX GATES AND OPERATING LEVERS, AND THE LORRY RUNWAYS

room slab construction and are hopped in all directions from the openings in the bottom.

In the second bunker there are six 20-in. square openings equipped with C. W. Hunt Company duplex gates; but in the first bunker there are only four of these openings, it having been necessary to dispense with two of them in order to extend a new track underneath the bunker. This additional side track was necessary in order to facilitate the shifting of coal cars, and there was not sufficient space between the power station and the main right-of-way to build this track under the bunker. The manner in which the bunker spans this track is seen in one of the figures.

The bunkers are of monolithic construction, and through the use of movable forms the walls were poured in eight days, with two eleven-hour shifts of men a day. Both bunkers were poured simultaneously from a central tower with a spout extending to each bunker.



AT LEFT, LOOKING DOWN THE INCLINED CONVEYOR STRUCTURE—THE TRESTLE OVER THE CRUSHER IS SEEN AT THE RIGHT AND THE MAIN RIGHT-OF-WAY AT THE LEFT. AT RIGHT, THE CONVEYOR STRUCTURE BETWEEN BUNKERS, SHOWING THE MANNER IN WHICH COMMUNICATION BETWEEN CUPOLAS IS AFFORDED

larger than those constructed heretofore for the Erie. The cylindrical tanks measure inside 40 ft. in diameter and 46 ft. high. They are supported on concrete columns, of which the outer ones are 2 ft. 6 in. in diameter and the inner ones 3 ft. The cupolas in which the conveyors discharge into hoppers are octagonal in shape and 12 ft. 6 in. in diameter with walls 8 ft. high and a peak 11 ft. high. The walls of the cupolas and those of the tanks are 11 in. thick and are reinforced by steel hoops and vertical steel rods, the latter serving as vertical ties and also as supports for jacking up the forms during construction. The bottoms of the bunkers are of mush-



The use of concrete rather than steel for these bunkers was determined partly because of the extreme difficulty of getting steel during the war when they were built, and partly because the concrete structure involved a less cost as compared with steel at the war prices.

The completion of the conveyor and concrete bunker system adds 2,000 tons of storage capacity to the plant. This alone is sufficient to keep the plant operating, in case of failure of the coal supply, for about seven days. At the present time coal can be supplied to this bunker system only as received by rail, but with the completion of the entire layout the principal path of the coal will be through this conveyor and concrete bunker system. The inclined railway at the opposite end of the plant, which is now handling the coal from the barges to the overhead bunkers, will presumably be done away with. In case of failure of the conveyor system, the contents of the two bunkers can be drawn upon until exhausted, and there still remain the two track hoppers at the end of each boiler room, with the crusher and bucket conveyor system to the overhead bunkers, to fall back upon, coal being supplied by rail.

## Buses in Passenger Transportation

### Motor Bus Operation in New York and Chicago Is Outlined at the Highway Transport Conference in New York

AMONG the features of the motor truck show in New York last week were meetings of the Highway Transport Conference at which subjects pertaining to the sale and utilization of motor trucks were discussed. At one of these meetings the advantages of passenger bus operation were described by Grover A. Whalen, Commissioner of Plant and Structures, New York City, who is now superintending the operation of some hundred or more buses under private operation through the streets of the boroughs of Manhattan and Brooklyn. This operation has been referred to frequently in our news columns since its inauguration, some six months ago. Many of Mr. Whalen's conclusions, however, were attacked by Harold B. Weaver, vice-president of the Chicago Motorbus Company, in the resulting discussion.

#### MR. WHALEN THINKS BUS WILL SUPPLANT TROLLEY

In introducing his subject, Mr. Whalen stated that progress is often the legitimate issue of an emergency, and that the suspension of service by the New York Railways on its downtown storage battery routes in September, 1919, together with its "stand and deliver" policy, had created the emergency out of which issued the successful introduction of the bus system in the City of New York. The bus introduced was confessedly a makeshift, being privately owned and operated, with cars such as could be picked up on short notice, and with their operation under municipal supervision; nevertheless, they blazed the way for the publicly owned and publicly operated bus that is to solve not one but many problems of the congested metropolis. At the present time ten routes, covering 25 miles of public highways, are being operated with 170 buses, on a 5-cent fare but without transfers between connecting routes.

Commissioner Whalen said that since Sept. 21, 1919, the date the first buses were put into operation, a mass of experience had been acquired, out of which certain definite conclusions had been formulated and proved.

The outstanding fact among these is that the motor bus is more economical than the street car, the fundamental reason being that the only capital charge is for the bus and garage. The average capital charge of this kind is \$22,800 per mile of route as against \$503,374 per mile of the New York Railways. In addition, in electric railway operation, the tracks must be maintained and power must be transmitted to the cars. The bus system, therefore, has an economic advantage that makes it futile for the trolley to hope to stagger on under its heavy overhead burdens, and a system that cuts the capital required to so great an extent is bound to win. The second economic advantage is that buses can be operated solely by one man.

What the New York public is now infinitely concerned with is service rather than capital charge, and in this respect, the commissioner said, the bus not only stands up against the trolley car but it literally runs away from it, that is, it gives better and quicker service. In fact, buses have cut the running time between given points from 20 to 50 per cent so that from five to twelve minutes are saved on a twenty-five-minute ride on the trolley. Some of the apparent reasons for this are that motor buses are not blockaded when the car ahead is in trouble, for should a bus break down, the next bus can swing up alongside, take the passengers off the disabled vehicle, and go on its way. In case streets are closed to traffic due to accidents, fires, parades or otherwise, it is possible, with bus operation, to route them around such obstructions.

The operation of the street car on fixed routes, he further held, is the basic cause of rapidly increasing congestion in the highways, and the cost to the people in loss of time and in the slow movement of merchandise amounts to millions. The traffic has to accommodate itself to the trolley car, and the trolley is in turn impeded by the traffic owing to the fixity of its own course. In contrast with this rigid, unaccommodating system, motor-bus operation is flexible, as it adjusts itself to the traffic, swings around a slower vehicle, is not impeded and does not impede. Instead of hindering traffic, it speeds it up. Again, the motor bus requires no tracks. This would permit the city to keep its streets in better order at less cost and would reduce the wear and tear on other vehicles and diminish the number of accidents.

Loading and unloading at the curb instead of mid-street, he claimed, would remove another serious cause of congestion and accident, which under the trolley system has necessitated the setting aside of safety zones in the streets. With the trolley system eliminated and buses in operation, such zones would not be needed, and these spaces would be restored to the roadway for the use of vehicles.

Commissioner Whalen believed, under public ownership and operation, that motor-bus operation would be doubly profitable to the people. It would preserve to them transportation for a 5-cent fare, thus saving the extra cents charged for transfers and the nickels for longer hauls demanded by the traction interests for service over their slower and uneconomic lines. Such a bus service would, moreover, earn profit for the city and thus supply funds for needed municipal purposes which would otherwise have to be provided by taxes.

To demonstrate this point, Mr. Whalen gave estimated figures, quoted in the Jan. 3 issue, page 70, indicating that the operation of 100 buses would yield a profit of \$137,532 to the city annually. It was evident, he



stated, from these facts that the motor bus offered the answer to the higher fare propaganda and that, instead of higher fares on the trolleys, a more profitable and better service could be rendered by the motor bus at a 5-cent fare.

In concluding his remarks, Commissioner Whalen emphatically said that the trolley car can be relegated to the limbo of discarded things and that the motor bus is the vehicle best adapted to the requirements of surface transportation in cities. Further, that the solution of the transit problem in Manhattan would resolve itself into the subways and elevated lines carrying long-haul north and south-bound traffic, with the buses carrying people crosstown and limited distances north and south.

#### BUS OPERATOR GIVES OPPOSITE VIEW

In speaking of motor bus operation in Chicago, Mr. Weaver explained that at the present time double-deck buses similar to those on Fifth Avenue, New York, were being operated on one of the boulevards and were not competing with the trolley cars for traffic on the highways that they serve. It was impossible, he believed, to replace street cars with motor buses, at the investment quoted by Mr. Whalen. The estimate for operation was also wrong, inasmuch as the trolleys, prior to their suspension, had failed to earn 40 cents per mile. Then, too, the estimate for 100 miles per day per bus was too high. In general, it can be said that it costs twice as much to carry a passenger in a motor bus as in a trolley car, even though the investment called for is considerably less. Both forms of transportation competing with one another cannot live in the same city. One or the other must go to

the wall. Considering the investment now in the street cars which was made in an honest endeavor to serve the communities with the best form of transportation, Mr. Weaver believed that these investors should have the first opportunity to substitute motor buses for street cars.

He believed, also, that buses having a seating capacity of twenty-four or so passengers would not be able to do the work, and stated that at the present time his company was designing a bus capable of seating sixty passengers. To make the business profitable and to handle rush-hour traffic properly, buses must have a capacity of at least sixty passengers; otherwise it would be impossible to get enough vehicles over the streets to handle the traffic. Even at that, it is doubtful if buses can solve the rush-hour problem, and he cited conditions existing in London where the buses have only seating capacity of thirty-four passengers and it is impossible to handle the traffic offered.

Buses of this size demand two men, for one man cannot drive a bus having more than thirty seats, collect the fares and hold the schedule laid down. It is also, of course, obvious that it is impossible to hold men all day for only forty-five minutes or an hour's work during the evening rush hour. To insure a sufficient number of crews to take care of the peak load it would be necessary to guarantee the men at least a minimum day's pay.

Attention was also called by Mr. Weaver to the bus service being operated in Newark. Although this service does not pretend to take care of all the city's transportation, it simply takes the cream of the traffic, leaving the longer and expensive hauls for the trolley company to handle.

## Purchasing Track Spikes Under Specifications

The Benefit Derived from Having a Reasonable Specification on Which to Purchase Track Spikes Is Great and the Cost of Inspection to Insure Proper Compliance Is Small

By HOWARD H. GEORGE

Assistant Engineer Public Service Railway of New Jersey

**E**LECTRIC railway companies in a great many cases, especially on the smaller properties, have given only minor consideration to the question of purchasing track material under definite specifications. This is due principally to the fact that the size of many roads has not warranted their maintaining an engineering organization necessary for the drawing up of such specifications and the following up of the inspections necessary. The specifications included in the *Engineering Manual* of the A. E. R. A. are followed by most small roads, but such track materials as spikes, bolts, nut locks, etc., have not as yet been incorporated in the manual. Large steam roads and the larger electric railway companies of this country long ago realized the necessity of having their own specifications. Unfortunately, the needs of the heavy traffic found on steam roads imposes certain requirements in their specifications which are not necessary for ordinary electric railways. Should these specifications be used by the latter, the cost of manufacturing would be higher than is justified.

The benefits derived from purchasing track materials under definite and reasonable specifications are obvious to most railway officials. The small cost of inspection necessary to insure that the terms of the specifications are lived up to is more than offset by the advantages obtained. Some of the advantages to be secured are uniformity of materials and the standardization of design which results, since the specifications naturally involve design as well as the material that enters into their manufacture.

#### SPIKES SHOULD PRESERVE THE ELASTICITY OF WOOD FIBER

In connection with the design and manufacture of spikes, some recent tests made in the civil engineering testing laboratories of Columbia University and given in their bulletin No. 1, dated September, 1919, are of interest. These state that "when a spike is driven into a tie, the fibers of the wood are forced downward and press simultaneously outward. The ultimate resistance to withdrawal that is actually developed by spikes depends







smaller roads buying this class of material. In their preparation, co-operation was had with various manufacturers in order to insure against imposing unreasonable requirements. Careful study was also given to the question of our own needs, so as to eliminate as far as possible all unnecessary requirements and thus keep the expense and difficulties of manufacture down to a minimum. The specifications for track spikes are given herewith and they differ from the usual specifications in that they cover both steel and iron spikes. In order to secure reasonably prompt delivery this was found desirable, as frequently it is necessary to place orders with firms who do not manufacture steel spikes. Under previous specifications where steel only was specified, such manufacturers were barred from bidding. In order to obtain the material the company frequently found that it was absolutely necessary to purchase from manufacturers of iron spikes. Such purchases were formerly

made without the protection of specifications, and in the revised specification this condition is eliminated.

The argument has sometimes been advanced that in order to insure compliance with the terms of specification on the smaller railway properties, the cost of inspection is too great to warrant adopting this method of purchase. In the case of railway spikes we have found that actual inspection cost is not more than 10 cents per keg of 200 lb., and this service is worth a great deal more to the purchaser than its actual cost by preventing the shipment of defective work from the mill. The details of design included in the accompanying specifications are not held up as a criterion or as something recommended for general adoption as standard. They do, however, represent our best judgment as to our own requirements and their use during a period of several years has shown them to be entirely satisfactory and they should be of advantage to other companies.

## What Makes the Rails Wear Out?

The Author Gives a Résumé of the Many Agencies Which Cause Rail Wear — Car Traffic Is Not Wholly Responsible — Vehicles Take a Large Toll From the Rail Heads

By R. C. CRAM

Engineer Surface Roadway, Brooklyn Rapid Transit Company

**R**AIL wear is a subject which has a continued interest for the electric railway maintenance engineer. In view of the importance attaching to the matter it is surprising that more effort has not been directed toward obtaining accurate data upon which to base estimates as to ultimate life, wearing values, depreciation and rail economies generally. If such information has been gathered for individual cases very little has appeared in the technical press although it may be stated that the American Railway Engineering Association has paid a great amount of attention to the study of rails for steam road service and has gathered many data which are equally valuable in the study of rails used in electric railway service. The committee on way matters of the American Electric

Railway Engineering Association was unable to develop any data which had much scientific value in 1914 when it reported upon the subject of alloyed steel rails. Since that time no activity has been displayed by the committee in reference to the subject of rail wear. In view of this and because of the many appraisals and valuations now being made, it seems worth while to reassemble some of the available information.

Rail wear is a shortened term for loss of section which may be caused by many different agencies. A number of these do not act upon rails in private right-of-way, while they greatly assist wear upon rails in streets. In short, location has a very distinct influence upon the kind and rate of wear. That upon rails in private right-of-way is almost wholly due to abrasion

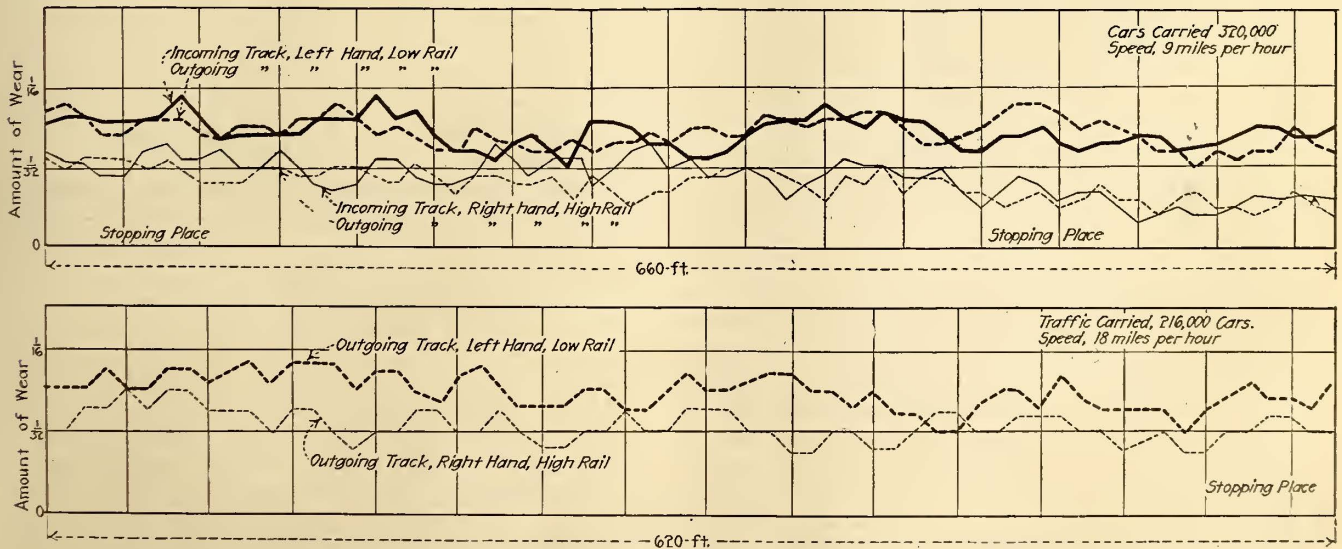


FIG. 1.—RATE OF RAIL WEAR ON COMPARATIVELY NEW TRACKS. AT TOP, IN SERVICE FOUR YEARS; AT BOTTOM, IN SERVICE THREE YEARS. (Wear is given in fractions of one inch.)



from car traffic, while in streets wear is also produced by vehicular traffic, corrosion, use of sand and corrugation. The last-named, since it requires grinding, causes a serious loss of section which must be classed as wear.

The difference in level of  $\frac{1}{4}$  to  $\frac{1}{2}$  in. between the inner and outer rails found in tracks on some roads, where an attempt is made to conform the tracks to the crown of the street, will produce an excessive wear in the lower rail. Hence this agency must be present

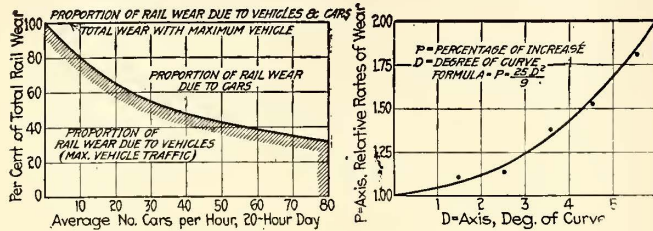


FIG. 2—AT LEFT, RAIL WEAR FROM VEHICULAR TRAFFIC. AT RIGHT, RELATION BETWEEN WEAR OF RAIL ON STRAIGHT LINE AND UPON CURVES

in any track which is seriously "out of surface," with low "centers" or "quarters." The methods of manufacture and composition of rails have a considerable effect upon their wearing qualities.

To sum up, the wear of electric railway rails in streets is dependent upon operating speed, weight of equipment, density of car traffic, amount of vehicular traffic, use of brakes, frequency of stops, grades encountered, general alignment with respect to curvature, design of rails, design of wheels, upkeep of wheels, use of sand, cleanliness of streets, and manufacture and composition of rails. Of the foregoing, it is apparent that most of the items are so variable that only those of rail design, wheel design, composition and maintenance are subject to reasonable control.

CAR SPEED AFFECTS RAIL WEAR

The only reliable data which the writer has seen, proving that speed of cars has a definite effect in increasing the rate of wear are those given by R. B. Holt, of Leeds, England, as indicated in the diagrams shown in Fig. 1, on page 149, where it is shown that a traffic of 216,000 cars at a speed of 18 m.p.h. produced substantially the same wear in three years as a traffic of 320,000 cars at a speed of 9 m.p.h. caused in four years. It is assumed that the same types of equipment and rails were used by Mr. Holt in preparing these data. Another interesting fact stated by Mr. Holt is that, as a rule, the wear on rails in a single-track line is seldom greater, and is frequently less, than that in a double-track line, notwithstanding the fact that the single track carries double traffic and generally at higher speeds. This is shown in Figs. 11 and 12, page 153.

Mr. Holt suggests that this paradox may be due to the reversal of direction of traffic, which tends to neutralize cold-rolling actions in the surface of the rail head. However, it may also be due in part to a change in location of wheel loads. A pertinent question to ask at this point is: "Has anyone found corrugation in groove or tram girder rails on single-track lines?"

That vehicular traffic plays a big part in the wear of rails is seldom realized. Measurements taken in Chicago by the Board of Supervising Engineers, Chicago Traction, showed that rails which had never had a car over them but were subjected to heavy vehicular

traffic were worn on the head to the extent of 5 per cent of their total wearing value in a period of forty months. On lines carrying a car traffic of forty cars per twenty-hour day the vehicular wear may be one-half of the total wear, thus reducing the rail life of the 129-lb. groove girder rail by that amount. On a short section of track with heavy car traffic but with no vehicular traffic, the rate of wear was no greater than upon a line having only one-half the car traffic but with heavy vehicular traffic. The heavy vehicular traffic in Chicago, as noted in the report of the Engineering Association committee on way matters for 1915, was about 300 vehicles per hour, with 38 per cent upon the track area. The committee's report is worth study in connection with the matter of wear due to vehicular traffic.

The diagram shown in Fig. 2 clearly sets forth the results of the Chicago investigation. Similar results are reported by Mr. Holt, as will be seen from Fig. 10, page 153, reproduced from his book on "Tramway Track Construction and Maintenance." The rail there shown sustained vehicular traffic for six years with no car traffic whatever.

The effect of density of car traffic is also shown in the Chicago diagram and confirms common knowledge of rails which have been in service twenty-five years or more under light service on systems where rails in other parts of the system wear out in fifteen years or less.

The effect that varying weights of cars have on rail wear has not been shown so well in any published data but it must be conceded that car weights have a definite influence upon the rate of wear. In an

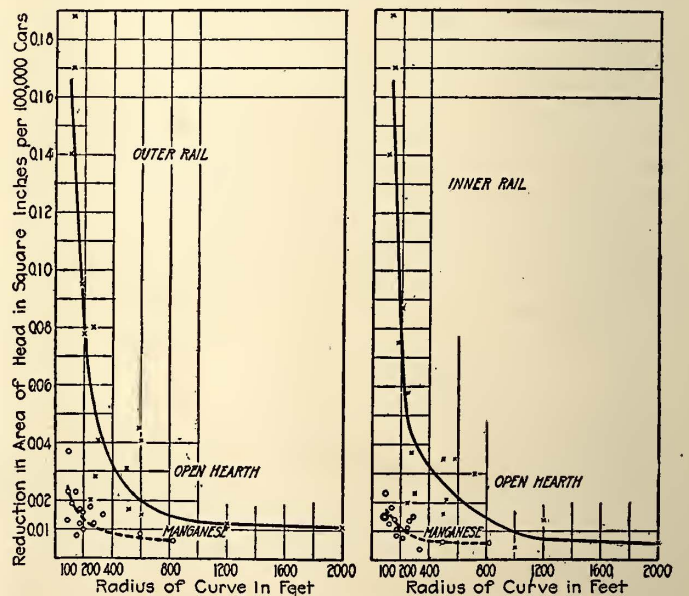


FIG. 3—GRAPHS OF COMPARATIVE WEAR OF OPEN HEARTH AND MANGANESE STEEL RAILS ON CURVES

article in the ELECTRIC RAILWAY JOURNAL for Dec. 13, 1919, upon a change from heavy to light cars recently made on the Cincinnati, Lawrenceburg & Aurora Electric Street R.R., the decrease in annual track maintenance cost is shown to be about 18 per cent, but this may have been influenced by the use, in part, of a new location away from streets and probably some new track. The data may be inconclusive but they show the tendency clearly. It is possible,



however, that a frequent service with light-weight cars may cause as much wear as a less frequent service with much heavier cars.

#### WEAR DUE TO CAR WHEELS

There is no question as to the influence of car wheels and their condition upon rail wear. Wheels which are allowed to exceed their proper wear and contour limits cause uneven bearing upon rail heads, localizing the loads, and causing extrusion of metal and side cutting of grooves. Excessively sharp or deep flanges are trouble makers. Wheels improperly paired or "out of round" contribute their share, and it is well known that flat wheels are provocative of damage in several directions. Improper mounting upon axles will cause excessive side wear of heads and grooves. Some of these wears are shown in the figures on page 153.

While there has been some discussion of the subject of comparative wear of rails due to different composition of metal in the wheels, there seem to be few data available from which to draw conclusions. There are several reasons for the belief that chilled cast-iron wheels must wear the rails in a different manner and in greater or lesser degree than rolled steel wheels. It is a subject which should have careful study at the hands of appropriate committees of the American Electric Railway Engineering Association.

The use of sand in bad weather, while it aids traction, also increases rail wear; it would hardly be effective otherwise. That sand helps to wear rails is proven by the results where on some roads it is used on the inner rail only. This rail almost invariably shows the greater wear. W. C. Willard, in his book "Maintenance of Way and Structures," states that in steam road service the use of sand about doubles the wear under a given traffic.

The general alignment of tracks with respect to curvature also has a marked influence upon rail wear. It is only necessary to point out that sharp curves will wear out in from three to six years, while adjacent tangent tracks will last for fifteen years under the same service.

The effect of curvature upon the rate of wear is clearly shown in the diagrams in Fig. 3, indicating comparative wear of open-hearth and manganese curves on the Chicago Elevated Rys. This diagram is reproduced from the *ELECTRIC RAILWAY JOURNAL* for Oct. 19, 1918.

Comparative wear of curves and tangent track is being studied by the committee on economics of railway location of the American Railway Engineering Association. The diagram on page 150 was compiled from records of a 164-mile division of a steam road and covers rail renewals on tangent and curved track for a period of thirty-one years. The report of that committee for 1919 states that the average rail wear on curves thus indicated is increased about 100 per cent over that for straight rail, for a 6-deg. curve and 25 per cent for a 3-deg. curve, or approximately as the square of the degrees of curve.

#### THE FIELD FOR ALLOY STEELS

The use of special alloy-steels has been tried by both steam and electric railways as a means of securing greater life for rails in curves with varying results but the consensus of opinion seems to be that their use is not generally warranted for ordinary street service when cost differences are taken into account.

In certain special cases, as in subways, on elevated roads or in other locations where the radius of the curves is very short and where the renewal work is difficult and of very high cost, some alloy steels may be warranted. In general a special alloy steel can only be justified on a cost basis, when the life of the alloy steel is three or more times that of ordinary open-hearth steel. An instance of justified use of manganese steel in such conditions was that of the first rail of this kind installed in the Boston subway near the Park St. Station in 1902, where an 82-ft. radius curve of ordinary bessemer rail steel lasted only forty-four days. Manganese was substituted and lasted over six years, or over fifty-two times as long.

The article by H. W. Roberts in the *ELECTRIC RAILWAY JOURNAL* for Oct. 19, 1918, on "Relative Life of Manganese and Open-Hearth Rail on Curves," describes tests on very sharp-radius curves on the Chicago Elevated Rys. It is stated that 100-ft. radius manganese curves lasted eighty-four months where open-hearth rails lasted but ten months. It is also stated that the

comparisons were based upon the amount of car traffic sustained under cars having an average weight of 25 tons.

The monograph by H. M. Steward in the report of the committee on way matters for 1908 gives some interesting data on wear of different steels in curves on the Boston Elevated Railway. An instance of unjustified use of manganese



FIG. 4.—WHAT CORROSION DOES TO RAILS

in surface track curves is at the Brooklyn end of the Brooklyn Bridge. Here a manganese curve of about 150-ft. radius lasted four years. It cost over \$1,300. A similar curve of ordinary open-hearth girder rail installed as a renewal of the manganese curve and costing only \$460 lasted five years, and in renewing this curve in 1919 a heavier guard rail was used which will undoubtedly last at least seven years.

Similar experiences and comparative costs have been developed by steam road engineers in experiments of the same nature. (See 1918 *Proceedings* of the American Railway Engineering Association.)

#### LACK OF PROPER DRAINAGE MAY CAUSE CORROSION

Corrosion causes a loss of section which is usually classed under the head of wear. It is not very prevalent upon steam roads, where it is caused mainly by brine drippings. In electric railway service in streets, corrosion may be caused by soils, proximity to salt water, lack of good bonding and even lack of good under drainage. The U. S. Bureau of Standards has made important tests which indicate that ballast conditions have a marked influence upon the form of corrosion known as electrolysis. Results of some of these tests are given by E. R. Shepard in the *ELECTRIC RAILWAY JOURNAL* for Jan. 25, 1919.

Corrosion or electrolysis often causes the serious loss of metal in the rail base known as spike cutting. The edges of rail bases on old rails which were originally 5 in. wide will be found after some years to have an effective width of but 4 in. or less. This loss of base section often renders impossible the further use of the rails. Similar weakening of webs will render tie rods



ineffective. An increase in thickness of the webs and of rail bases at the edges to provide against such losses appears necessary. Some badly corroded rails are shown in the figure on page 151. These were taken from tracks lying very close to tide water and only 2 or 3 ft. above high-tide level. R. B. Holt relates similar experiences as having occurred in England, and states that on one line the life of rails exposed to sea winds was five years less than upon other parts of the same line not so exposed. He also calls attention to corrosion resulting from dilute solutions of sulphates of iron in water flowing over rails located near coal piles. The writer agrees with Mr. Holt that more importance should attach to the question of corrosion and its effect in causing loss of section.

The effect of grades upon rail wear is clearly indicated in Fig. 5, taken from Mr. Holt's book previously referred to. He states that the rate of wear increases with the steepness of the gradient and

lines or in yards. On the other hand, in street railway service the rails are frequently unfit for further use when removed.

This is especially true of girder groove, tram girder and girder guard rails. Rails are often removed from streets before their ultimate life is reached because of the need for renewal to accommodate city street improvement projects, where it would be folly in many cases to leave rails in place for one or two more years of life where a ten- or fifteen-year pavement is to be installed. Untold losses have been caused by such conditions but the recent development of new maintenance methods has assisted maintenance engineers in keeping rails in service which, in the past, would have gone to the scrap heap.

When all the factors affecting wear are considered, there is reason to believe that the life of the joint, as a prime factor in determining the rail life, has been over-emphasized. Joint failures may have been the

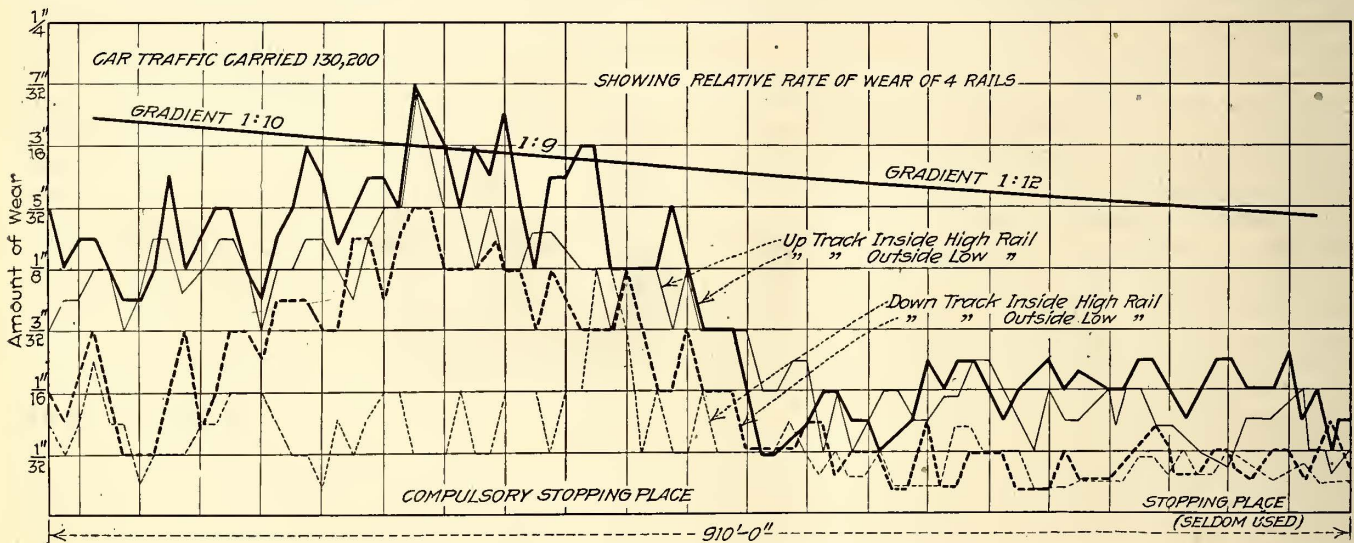


FIG. 5—EXAMPLES OF WEAR ON STEEP GRADIENTS

that wear is more pronounced at or near compulsory stopping places where the effect of the application of brakes is brought out.

#### CORRUGATION TAKES ITS TOLL

We are all more or less familiar with the peculiar form of wear known as corrugation. The greatest loss of metal due to this is caused by grinding the rails to remove the corrugated metal. That the trouble is both serious and costly may be appreciated. The Brooklyn Rapid Transit System expends about \$16,000 annually for the removal of corrugation and would have to spend more if an attempt was made to remove all traces of it and keep it down as fast as it appears. To date no adequate remedy or preventive has been found for this trouble, and a special attempt should be made to determine its cause. Once determined the remedy should be an easy matter.

Rails are removed from open tracks largely because of wear or breakage. It is believed that comparatively few electric railways have had occasion as yet to renew main-line rails except for breakage in such tracks where rails weighing 70 lb. per yard or over were used in original construction. Of course this is not true in heavy service subways and elevated lines. On steam roads, when rails are removed from tangent tracks for head wear they are usually suitable for service in branch

principal cause for rail renewals twenty years ago but modern joints, particularly of the several welded types, bid fair to outwear the rail. It is certain that the joint of today has become an item of little importance in its influence upon either wear or life of rails in streets.

The question: "What is the life of rails?" has been, and still is, a puzzle which is unsolved. It is impossible to answer it with much accuracy either on a theoretical or practical basis. All of the factors affecting wear heretofore mentioned prevent this. A rail may be worn out as far as its safe use in main lines is concerned and yet there may be plenty of wearing value left in it to permit its further use in branch lines, or in sidings and yards. It may be unsuited for continued use in a new pavement, but may still be used for repairs in other territory or for light service extensions.

The economics of rail wear, particularly in girder rails was the subject of an extended article by E. M. Haas in the *ELECTRIC RAILWAY JOURNAL* for July 31, 1915. That article gave many examples of wear, life and causes for removal of plain, tram and groove-girder rails. It also suggested a formula for testing the economy of using old rails in new or repavement work. That formula was based upon the assumption of arbitrary wear-life limits applied to head reduction. Unfortunately, as subsequent discussion showed, the



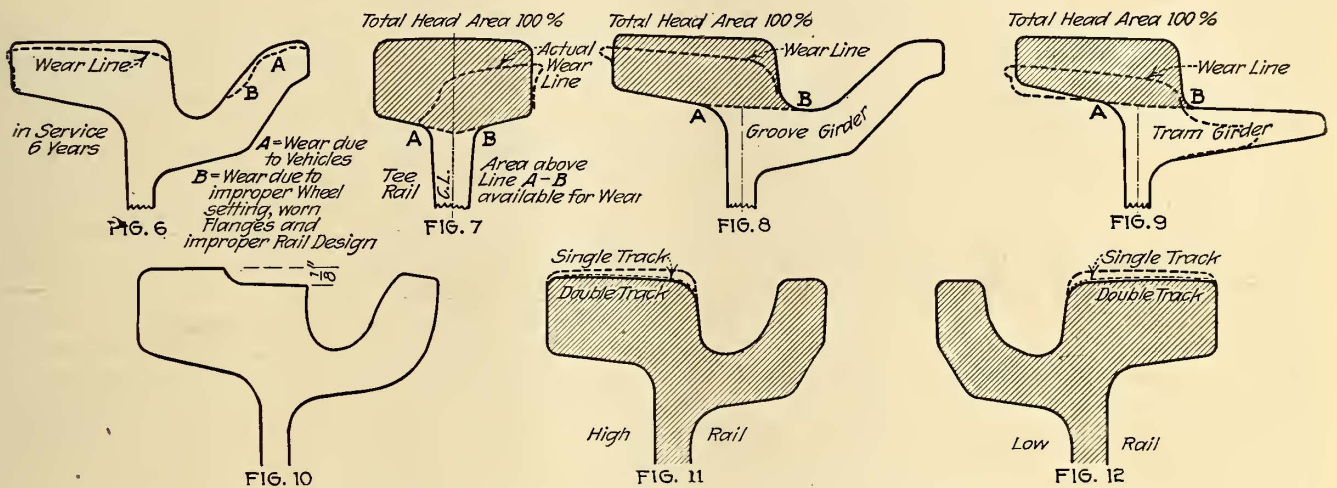
question cannot be solved solely upon an economic basis because rail renewals, particularly in streets, depend upon many influences other than rail conditions.

In certain situations, such as upon elevated roads or in subways, the provision for safety no doubt warrants the assumption and use of an arbitrary wear life or head reduction limit, based upon some percentage of the total head area. This is done on the Boston Elevated Ry., where 85-lb. A. S. C. E. rails are arbitrarily renewed when 35 to 50 per cent of the head area has disappeared. It would be interesting to know just what tonnage or wheelage produces this wear. Meanwhile, the curved rail wear of open-hearth rails on the Chicago Elevated Rys., previously mentioned, showed a reduction of head area of 38 per cent for rails of 80-lb. A. S. C. E. section at the time of maximum wear or removal, while the rate of wear under equipment averaging 50,000 lb. per car varied from about 0.01 sq.in. per 100,000 cars on a 2,000-ft. radius curve to

is necessary. These rails were of bessemer steel with carbon ranging from 0.28 to 0.59 per cent.

Mr. Holt's diagrams, shown in Fig. 1, indicate a vertical wear rate of about  $\frac{1}{4}$  in. per year as an average, although they show in addition a somewhat increased rate of wear due to car speeds. The writer has also observed rates as high as  $\frac{1}{2}$  in. per year on heavy-traffic low-speed lines in very congested territory, where the car traffic practically excludes vehicular traffic. In connection with such data it is almost impossible to measure the influence of the combination of deep-worn wheel flanges riding upon the trams or upon the floors or sides of narrow grooves. Such conditions must save considerable head wear at the expense of wheels, trams and grooves.

It is somewhat difficult to set what may be termed the total or available head area. It will vary with each rail section and a maximum percentage of reduction which may be safe for tracks in pavements might be



COMPARISON OF WEAR ON DOUBLE AND SINGLE-TRACK RAILS

Fig. 6—Wears due to car traffic, rail design, wheel wear, and vehicular traffic.

Fig. 7—Method of indicating total railhead areas available for wear.

Fig. 8—Wear on groove girder rail.

Fig. 9—Wear on tram girder rail.

Fig. 10—Head of rail worn by street traffic alone.

Fig. 11—Comparison of wear on double and single-track high rail, total number of cars, 430,000.

Fig. 12—Comparison of wear on single and double-track low rail, total number of cars, 430,000.

about 0.165 sq.in. per 100,000 cars on a 100-ft. radius curve. (See diagram, Fig. 3.)

In street work, especially for tangent tracks, we have very little published data available. W. F. Graves, in discussing Mr. Haas' article, said in the ELECTRIC RAILWAY JOURNAL for Oct. 23, 1915, that measurements he had observed indicated that a tonnage of 1,760,000 had been moved for each  $\frac{1}{4}$  in. vertical wear. The particular section and chemical composition were not given. From this wear he suggested that under the same conditions the ultimate economical life of the rail in question might be reached when 70,000,000 tons had been carried, or an equivalent of  $\frac{3}{8}$  in. vertical wear and a 40 per cent head area reduction. Mr. Graves expressed the opinion that 35 per cent reduction in head area might be set as a fair average wear limit.

The writer, in reporting upon Mr. Moxham's experiments, in the ELECTRIC RAILWAY JOURNAL for Jan. 26, 1918, gave a wear table showing an average vertical wear per year of  $\frac{1}{4}$  in. in tram-girder rails for a service of twenty-two years. The average reduction in area was 28 per cent. The estimated tonnage which produced a wear of  $\frac{1}{4}$  in. was 2,217,000. Present observations indicate that the rail will carry a total of from 70,000,000 to 80,000,000 tons before renewal

unsafe for open tracks. It will also depend upon the manner in which the rail is worn, since the wear produced in curves is considerably different in contour and position from that found in straight track.

The area reduced by wear was found by the Lorain Steel Co. to vary from 11 to 69 per cent of the total head area in rails removed from streets in forty different locations and covering each of the three types of girder rail now in use. The ages varied from fourteen to twenty-one years. The average reduction was 32.98 per cent of the total head area.

As a step toward more careful study of the wear problem, some standard method should be settled upon for determining what area is available for reduction by wear. This should be established by each general type of rail and called the total head area or 100 per cent. Figs. 7, 8 and 9 indicate what the writer believes to be the generally prevailing method. Briefly, for plain girders the entire area above lines connecting the undersides of the head with the center line of the web may be used for the total head area. For tram girders the area above a line connecting the underside of the head with the top of the tram may be used. Similarly for groove girders the area above a line connecting the underside of the head with the bottom of the groove



may be taken. It will be noted that the areas in trams or grooves are ignored. In actual service, the entire trams have disappeared without causing trouble and rails have remained in service in good pavement for some time thereafter.

The following conclusions were reached by Mr. Graves in discussing this subject in the *ELECTRIC RAILWAY JOURNAL* for Oct. 23, 1915:

To determine a fixed percentage of head area to be used generally as the ultimate rail wear limit is impossible, as it is bound to vary with the head area, the weight and type of rail and the manner in which it is worn.

Each section of rail and in fact each local situation will have a wear value of its own which should be determined accordingly from the observed rate and manner of wear.

The rate of rail wear and the ultimate wear limit should be known or considered in terms of wheel or tonnage movements, and the future wear value in years determined from this.

As a basis to determine rail depreciation it seems quite reasonable that a general fixed wear limit might be established, even though it may not have any appreciable effect on total valuation. The average of depreciated rail is a comparatively small item in the appraisal of track construction; the substructure presents a much more expensive and complicated problem.

It seems scarcely logical that track depreciation should be considered in an assumed basis of a certain percentage per annum. The more scientific way, it seems to me, would be to consider it in recognition of traffic carried, or in terms of ton or wheel movements per square inch of area worn, thus securing a common base or standard which may be applied generally to all properties notwithstanding their wide variation in traffic density.

These conclusions are important and the last two are very pertinent in these times of numberless valuations of electric railway tracks.

The methods of determining the rail wear vary considerably. A common, but not very accurate, way is to cut out a piece of the rail and compare it with the template drawing or a new piece, of the rail section. Several devices, called scribing machines are available, such as those described and shown in the *ELECTRIC*

tracks are wanting. There is a need for carefully prepared data of this character. Meanwhile, through experiments being conducted with silicon steel in Great Britain we have some very definite information, proving that composition does influence wear. Mr. Moxham endeavored to prove this in his Brooklyn experiments and his early conclusions tended to show a vast difference in rate of wear upon "hard" and "soft" steel but the writer's recent discussion of that experiment tended to show that it was somewhat inconclusive.

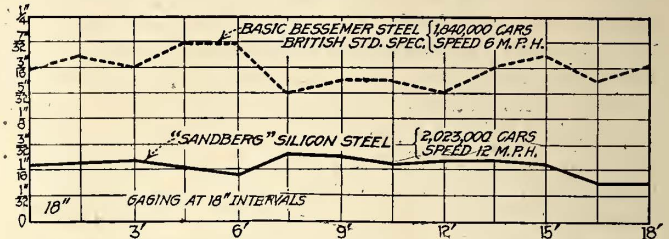


FIG. 14—COMPARATIVE WEAR OF RAILS

The diagram in Fig. 14, taken from Mr. Holt's book, gives conclusive evidence of the fact that chemical composition of rail steel has an appreciable effect in controlling the rate of wear. He states that the use of silicon steel, in place of bessemer steel, for rails has the effect of increasing the rail-life by fully 33 per cent. It should be noted that silicon steel is tougher and more dense than basic bessemer and that Moxham's experiments long ago proved that what is needed is a steel of greater density.

In this country, open-hearth steel has practically replaced bessemer steel for use in rails, while silicon steel has had very little use. The committee on rail of the American Railway Engineering Association in its 1918 report stated that, as a result of various tests, the abrasion of high rails per million tons of traffic on curves of 8 or 9 deg. or less could roughly be taken as follows: Manganese, 0.004 sq.in.; open-hearth, 0.012 sq.in.; bessemer 0.02 sq.in. In other words, the abrasion of open-hearth is about three times that of manganese, while that of bessemer is about five times. Conditions varied greatly and the nature of rolling equipment had an influence upon the results obtained in the tests.

INFLUENCE OF DESIGN UPON WEAR

Two important details of design have had a large influence upon rail wear. These are the flat or plane head and the position of the gage line with respect to the center line of the web. Recent designs have increased the distance of the gage line from the center of the web so that the wheel load may be more nearly central over the web, thus reducing distortion of the head due to eccentric load. The plane head has been changed to a curved one with beneficial results, in that the extrusion of metal at the gage line fillet with consequent loss of metal has been eliminated and a much wider range of contact between wheel and rail has been secured, thus decreasing wear from concentration of load. The curved head design has not prevented corrugation, although it has greatly delayed the time of its first appearance. Where corrugation would appear in five days on plane head rails, it takes two or more years for it to appear on curved head rails. There are a number of other details of design and several details of manufacture which have an influence upon rail wear but space will not permit an extended discussion of them.

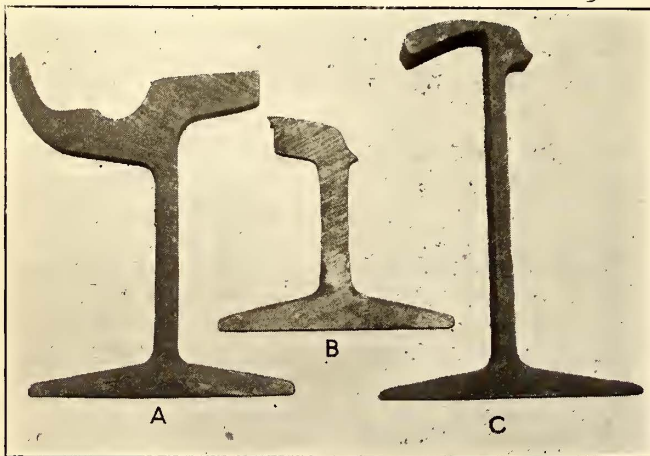


FIG. 13—EXAMPLES OF CURVED RAILS REMOVED FOR WEAR

A—7-in. girder guard rail, B—80-lb. A. S. C. E. outer rail, C—9-in. tram girder rail

*RAILWAY JOURNAL* for Nov. 20, 1915, page 1042, May 12, 1917, page 876, March 22, 1919, page 592, and Dec. 20, 1919, page 1006.

While much has been written upon the subject of the influence of different steels used in rail manufacture, upon the rate of wear, we have very little published data covering this matter as it affects street railway rails. Comparisons of manganese, bessemer, nickel and open-hearth steels in curves have occasionally appeared but similar comparisons affecting tangent



# The Plight of the Electric Railways

No Industry Has Been Worse Penalized by the War Than the Electric Railways, in Spite of the Value of Their Services and Their Loyal Devotion — Problems of Capital and Labor Also Analyzed

BY WARREN G. HARDING  
United States Senator from Ohio

THERE were great compensations in the world war. Finding ourselves as an American people was one. Discovering the American soul was another, and I tell you, my countrymen, no matter how inestimable the cost, no matter how extensive the sacrifice, it was worth everything it cost to find the soul and spirit\* of the American Republic. There were rewards of service, quite varied, some inadequate and some excessive. And I have no hesitancy in saying that America has not yet extended the reward it ought to extend to the men who offered their all on the altar of American patriotism. There were also some very severe and wholly undeserved penalties on patriotic service during the war period, and which are still applied in its feverish aftermath. But I know of none worse penalized than the electric railway lines of the country. We know they served with splendid zeal and sacrificing devotion. They were as necessary to the stupendous tasks of preparation for war as powder is to the loaded shell.

Transportation of workers was the key to intensified endeavor. We drew on their transportation energies and taxed their capacities, and criticised their insufficiencies, though no one foresaw, and none foreseeing could have prepared for, the strain which came upon them. I encountered some of the reflected anxieties of the varied branches of government concerned in war preparation. The country little noted it, but the transportation of the workmen at home was no less important than transportation of our men across the sea and on the field of conflict.

Let it be recorded that the electric railways responded with every ounce of energy and played the big part of a big factor in doing big things for the nation. The natural inference was that they shared in the award for service. They sustained the heavy burden, and not only have they had no reward, as was given so generously in many instances to big and little business, but were penalized worse than aliens suspected of aiding the enemy.

Perhaps the sentiment of the country against the

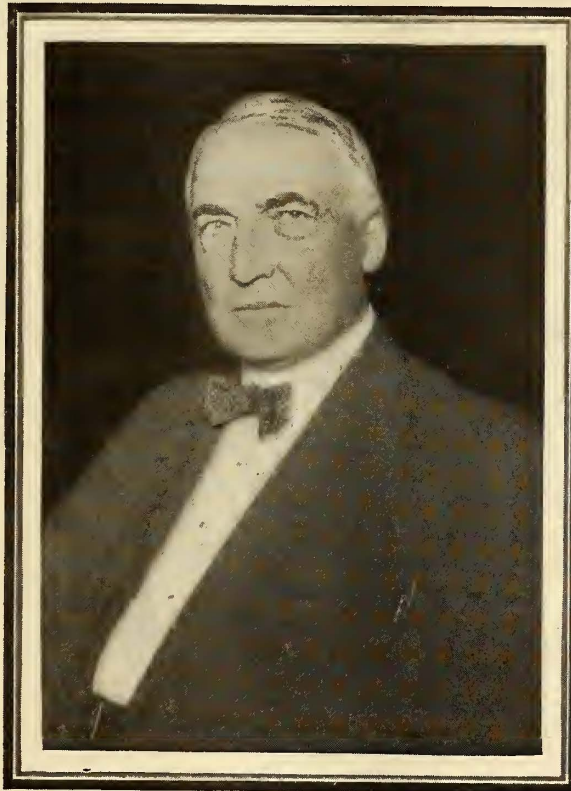
\*Abstract of address at banquet of American Electric Railway Association, Cleveland, Jan. 8, 1920.

street railways and the electric railway service was not intended. I rather think it was unmindfulness. Maybe there was political play, local if not federal, inspired by selfish aims. It is a curious phase of human nature that the people in the populous centers hail transportation lines as the supreme blessing, encourage their construction and celebrate their completion, and then growl about them ever after. Rarely does anybody utter appreciation, though genius and efficiency are nowhere more marked in good service, and no one seems to think of their essential character until traffic is suspended. Then watch the change in the atmospheric conditions.

It was this demand for uninterrupted service in spite of wage disputes that led the federal government to impose the supreme outrage of the war on those who struggled in the highest fidelity. Let us assume it was unintentional; we know it was brutally inconsiderate. Let us not direct our criticism at the awards of the War Labor Board. That body yielded to the flood-tide of war demands which was irresistible. The shocking thing was that the federal government, with limitless assumption of power, should command doubled expense accounts and remain deaf to

all appeals for the means of meeting them absolutely. It is all right to cry out against Bolshevik seizures in contempt for all property rights, but they had justifying example in the ruin of electric railway property by the war administration in this country, which thought rightfully of the human forces employed in their operation but ignored the rights of solvent existence of the properties they operated. Statutes may have been deficient, but the power to command expenditure implied the power to permit to earn, else it ought not to have been exercised, and it is the shame of the republic that one was ordered and the other ignored.

Let us not go back to the crimes of exploitation and frenzied finance. All that has been established and properly criticised and fully condemned. Here was a five-billion dollar public service enterprise, accommodating fifteen billions of passengers a year. Its continued operation was a necessity in peace or war but vitally necessary to war production. Congress itself



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WARREN G. HARDING  
United States Senator from Ohio



called for much expenditure for additional construction involving millions, notably in the congested centers of productivity in the East. The government fixed the cost of operation, fixed the price of supplies and maintenance and prescribed the service to be performed. It exercised the power to increase burdens, but had no power, or having had it, no inclination to help in meeting these burdens.

Sixty-two companies with 6,000 miles of railway surrendered to receiverships before the conscience of municipal authority awakened to the ruin wrought in neglected federal fairness. A thousand miles more were utterly abandoned, dismantled and junked. Perhaps some were the lines of dreams, for there are such promoted for the profit of building, rather than builded for a profit in operation. Some were poor streaks over the right-of-way of hope. I know whereof I speak. In our newspaper office, in fancied expansion of the city we were always boosting, we used to project an electric highway of commerce every winter, and now and then one or two of them took to the ties in the good old summertime. Nevertheless, one-sixth of all the lines in the country are abandoned or imperiled, and what greater proportion is hanging on with more courage than faith has not been revealed.

The blight was of federal origin, while municipality or community looked on in indifference, and that is scant tribute to its most intimate public service. Let us believe it to be a public sentiment resentful of abuses or blunted by war-time prejudices. Surely it was not the conscience of square dealing in America. In effecting the restoration, we must wipe out the contributing causes and make sure from this time on that honest investment in honest public service shall receive an honest return for that public service. The capital which seeks to render a necessary public service merits a square deal and it must have it.

#### MUNICIPAL OWNERSHIP NOT THE SOLUTION

I doubt the solution that lies in public ownership. It is well established that public ownership merely ignores the pennies in the pocket of the people to draw the dollar from an impersonal public treasury. We are not yet ready for the Deficits Lines, Consolidated. Surely the American people will make—and is making—the coming readjustment. The government which tolerates its own ruin of business will soon come to paralysis for itself.

Old-time values are out of harmony in a new era of money's changed measurements. Stable financing, righteous earnings and just returns must be based on a proper charge for a service rendered. A reference has been made to the 3-cent standard of fare. The nickel is no longer the standard of riding value, because it passed as maximum when it ceased to be minimum, and lost its relationship when custom recut the luncheon pie.

I believe in strictest regulation without conflicting authority because all public utilities must yield to the voice of public interest. But the same power that protects the public must protect the public servant, whether that servant is capital or the workman who operates the utility.

Destroyed credits must be restored, and flexible scales of charges must be provided, so that a public may pay justly for that which it demands. The exploitation of ten or twenty years ago justifies no failure in good faith today. The public which is served has an obligation no less than that of those who serve it.

If I have read aright, full 75 per cent of the cost of

operation goes to wages. The men deserve to be well paid. I think it is fair to say that most of the increased awards the public has approved. But the public ought to pay precisely as it approves, because justice is not a favor to one, it is the right of all involved. Electric railway service is first of all essential to the great body of workers and the one great agency of relieving congested centers. There may come supersession to the enterprises in which you are engaged, but transportation in some form must ever be provided.

That leads me to a digression from the line of thought I have been following. I venture to offer it here.

#### HOW LABOR COULD GET THE OWNERS' VIEWPOINT

I have wondered sometimes that labor leadership, possessing unquestioned capacity and very great power, has not turned to a really constructive plan of labor's very own capitalistic control of some of our most essential enterprises. It ought to be reasonably possible without turning to the public treasury and without invoking class privilege. If it did nothing more than give to our labor forces the owner's viewpoint, it would at least contribute that much toward better understanding.

Let us assume that the working forces in any particular industry believe in their control and wish for ownership. It is logically possible, by a perfectly lawful and very practical method. For example, there are approximately 300,000 electric railway employees in the United States. I will assume that they are organized and have the machinery for collective undertakings. Suppose they contributed \$100 each in one year to a purchase fund. The first year they could put \$30,000,000 cash into any system selected. In ten years, not counting a profit, they could invest \$300,000,000 cash, and, under normal conditions, they could double the purchase through legitimate bonding, and thus own one-ninth of all the lines in the United States. A very considerable acquirement for ten years, would it not be?

But we may venture into another field of service. The desire already has been expressed to operate and profit in operating the steam railroad lines. Two millions of men are banded together in federated railway unions. Let them assess themselves \$100 per annum and \$200,000,000 in cash are available the first year. In ten years of continued investment the sum reaches \$2,000,000,000, enough to own one-eighth of the railway transportation of the whole country. No small achievement for ten years, when capital has been three-quarters of a century developing and constructing the entire American system.

#### SAVING IS SAFER AND SURER THAN SEIZURE

These things are very possible. Labor has not reckoned its financial power, because it has concentrated on collective bargaining and has overlooked collective ownership. I know it will be answered that the assessment proposed is impossible; that the pay envelope will not stand the strain. Very well, cut it in half, and the figures are still colossal. However, the \$100 does not equal the tithing of olden or modern times when applied to any group, and, barring illness or adversity—which have proved the possibility—it can be met with only moderate sacrifice and denial. These things, sacrifice and denial, mark the pathway of all great acquirement in this world. Thrift points the way, denial strengthens resolution, and possession is the reward.

I do not know that such a constructive plan will always be successful. I doubt if it will be accepted, but



the means are available in the fullness of employment; and if always successful, I do not know that it will abolish all conflict. But it will transform the so-called laboring classes to the capitalistic class, and the very processes of attainment will add to the sturdiness of citizenship. In collective power it is as easy to own mines or railways as it is to buy "flivvers," if only capable leadership is turned to constructive endeavor. But in any event, my countrymen, let us have the gospel preached that saving is safer and surer than seizure.

#### INDUSTRIAL PROBLEMS DEMAND A PEACEFUL SETTLEMENT

This problem of labor's participation must have that riveted thought which will bring solution. It has the world on the anxious seat today. I do not fear a Russianized republic because this is intelligent, law-abiding America, where government is still too virile to be either cruel or craven, and if it is corrupt it ought to fail, and if craven will speedily fail.

A new order has dawned, and it is folly to ignore it. Its problems are pressing and they must be solved. If any portion of American citizens want to commune with its co-operation, let them have it under the law. If any body of men covet capitalistic possession, let them acquire it under the law. I have indicated the possibility. If there must be industrial conflict, we must find a means of settlement under the law. It is a poor civilization which finds itself menaced by disputes and contrives no way of peaceful adjustment. What avails it to seek a compact among nations to end international conflict, if we cannot make a league of citizenship to end industrial warfare at our very doors.

The swinging pendulum marks reversed conditions, and the cycles of changed relationships are ever recurring, but it matters not what influence is temporarily potent, it is as harmful to destroy capital as it is hateful to enslave labor. Both factors are necessary to the people's good fortune, and both must be safeguarded to maintain American eminence. Let me say in passing, neither of them alone ever achieved a thing, and both of them together never wrought a success without calling in the third party whom you men here tonight represent: namely, genius and management, working with labor and capital in any given pursuit.

#### ANTI-STRIKE LEGISLATION DESIRABLE

The Senate recently voted to prohibit the strike in the public transportation service, holding that the service of the people transcended any interest engaged therein. In the very same act, in highest consideration for every workman engaged in the service, it provided a responsible governmental tribunal to adjust all labor grievances and award full justice. The lower House has not agreed, but it ought, and every American might well urge that agreement, because it safeguards the public and guarantees the workman the fullness of his due, with a government seal on every sacred pledge, and if the government itself cannot bestow justice, there is not any human agency that will.

Let no man believe this to be an abridgement of his Constitutional liberty. No citizen will be denied the privilege of quitting his employment while freedom endures. It does not interfere with collective bargaining in the railway service but provides a tribunal of adjustment where collective negotiation fails. It is one thing to quit a public service and quite another to combine to paralyze that service at measureless cost, discomfort, and suffering to the public.

And let no other man construe this as an assault on unionism or collective bargaining in private enterprise and competitive pursuits. Unionism has proved its benefits, and unionism will abide. It is a logical and necessary agency to rend the human selfishness which dates from old enslavement days, the same selfishness which yields to necessity where it ought to bestow for justice's sake.

Labor unionism, however, has a higher goal than mere swelling of pay envelopes. Pyramided wages mean mounting cost of living, and nothing then avails from the increase of pay. The value of the medium of pay is lessened and there is bulk without abundance. The balance between the sum earned and the sum paid out to live is still the index of prosperity, and a competence is and always will be rated by the purchasing power which it possesses.

#### SIMPLE LIVING THE WAY TO RESTORATION

Confessedly, it is difficult to get normal when the whole social and economic system is out of plumb, due to war's anxieties and excesses. The fever and fervor of the war time have impaired our capacity for consistency. We grieve about profiteering, yet we invite it by our extravagance. We solemnly protest the high cost of living and then cheerfully boost it higher by the indulgence of high living—much the highest of the high tides of inconsiderate expenditure. We protest about taxes and then heedlessly demand new governmental functions which send the high cost of government soaring still higher. In these days, pennies are punk, nickles a nuisance, and fifty dollar bills have dropped into the contempt of familiarity, when a ten once reigned in supreme exclusiveness.

We make necessities of luxuries in the busy world, and, mark you, spend more for movies than we do for education. We expended a billion dollars last year for our amusements, and drank seven million dollars worth of pop, nut sundaes, pineapple temptations, and other lawful and sugared concoctions; yet we complain that the sugar grower doesn't raise more cane. We are exceeding the speed limit in this country in forty ways and ought to slow down to safety. It would be fine to get normal and sane without the pinch of necessity to restore dulled senses.

This is not pessimism. The heart of the American people is right, but we need to do some sober thinking. No extravagant nation ever maintained its health, strength or conscience. No extravagant nation ever endured since the world began. Extravagance of the people and extravagance of the government go hand in hand, until the burdens of taxes become a hindrance and oppression. It was simple living which made possible the miracle of American development and accomplishment, and simple living will lead to restoration out of war's ruin. There is no other way.

America has matters of vastly greater concern than its foreign relations. It little matters what we propose to covenant. The American conscience must be our guide and we shall discharge a great nation's obligations to humanity and civilization without meddling abroad or neglecting vital affairs at home. We seek no isolation, we avoid no responsibility, we dodge no duty. But with a fluxed civilization, our first concern is crystallization in conformity to American ideals and the supremacy of law, the reign of justice, and continued progress in our republic, whose greatest influence in the world comes from the worth of a real American example.



# Shop, Track and Line

These Articles and Ideas Are From Men on the Job Who Find Special Applications and New Methods an Incentive for Greater Effort. If You Have Something Good Pass It Along

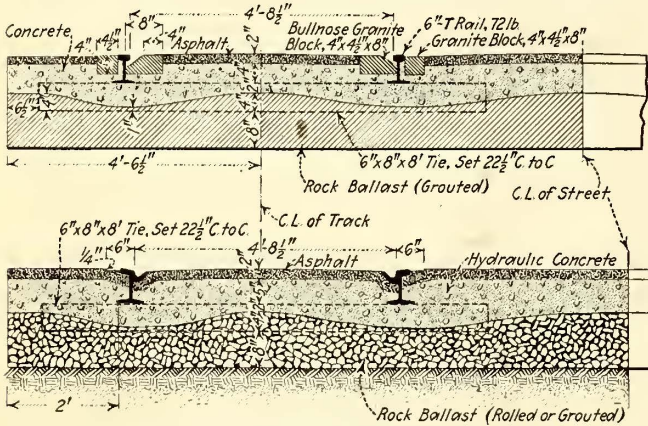
## Asphalt Paving Laid Without Granite Blocks Alongside Rails

Pacific Electric Railway Is Omitting Granite Paving Blocks from Alongside Its Girder and T-Rails in Paved-Street Construction

BY CLIFFORD A. ELLIOTT

Cost Engineer Pacific Electric Railway, Los Angeles, Cal.

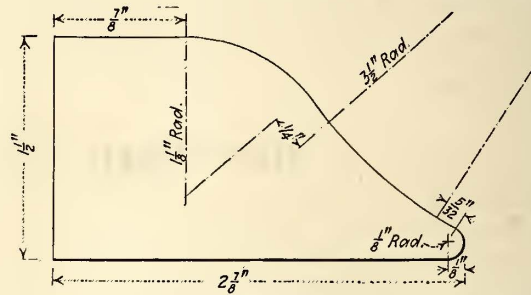
FOR the past seven years the Pacific Electric Railway has been omitting granite paving blocks from alongside the rails of its tracks laid with 7-in. 127-lb. grooved girder rails in paved streets. Street paving along tracks in Los Angeles is governed by ordinance requirements. The Board of Public Works, however, granted permission to omit the granite blocks on some streets where there was no heavy truck travel. In granting this permission the board required a guarantee from the company to use diligence and care in placing the asphalt wearing surface securely beneath and about the grooved sections of the rails. It also specified that the pavement be thoroughly tamped, rolled and ironed in place to



PAVING GIRDER AND T-RAIL TRACK WITH AN ASPHALT SURFACE WITHOUT PAVING BLOCKS ALONG THE EDGE OF RAILS

guard against the working of the surface away from the rail.

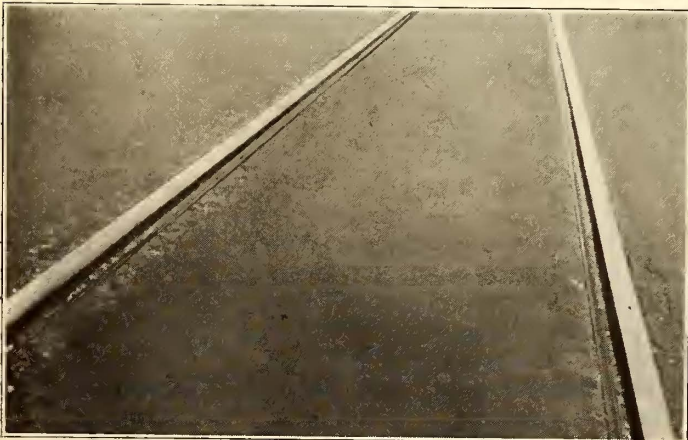
This type of construction has proved very satisfactory and the omission of the blocks apparently results in a better construction than that previously used. There is also a material reduction in the cost of repairing. The use of this continuous type pavement gives a rigid construction which adheres firmly to the rail, whereas pavement constructed with units of asphalt and blocks soon shows signs of disintegration and unevenness from



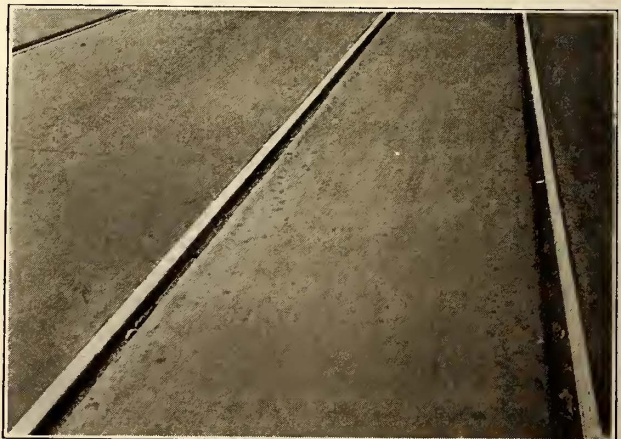
SECTION OF TEMPLATE USED TO GIVE GROOVE FOR WHEEL FLANGES

the tendency to buckle or sag. These conditions require frequent repaving, and the cost for such maintenance easily exceeds the cost of maintaining pavement of the continuous type by at least 50 per cent. With the advent of the automobile there is less necessity for placing blocks along the edge of rails which previously were considered necessary to aid the vehicular travel across the tracks.

The Peninsular R.R. of San José, Cal., which is one of the lines associated with the Pacific Electric system, undertook the construction of its tracks on two of the most heavily traveled thoroughfares in San José. In 1916 and 1918 6-in., 72-lb. T-rail was installed with a concrete face and Topeka wearing surface on one street, while on the other street a sheet asphalt surface was laid on the concrete. In both cases, the



SECTION OF ROADBED IN PAVED STREET WITH GIRDER RAIL



SECTION OF ROADBED IN PAVED STREET WITH T-RAIL AND BLOCKS



paving blocks alongside of the rails were omitted. The construction proved entirely satisfactory and at present the surfaces are still quite even.

With this type of construction, in order to obtain a uniform groove in the pavement surface for the tread of car wheels a special template is used. A cross-section of this is shown herewith. The templates are made of the hardest timber which it is possible to obtain, and the usual length employed is 14 ft. to 16 ft. After the hot paving compound is spread in and around the rails, and crowned approximately  $\frac{1}{4}$  in., the template is put in place. As the steam roller passes over this the excess asphalt is forced away, thus giving the desired groove in the pavement next to the inside edge of the rail. Due to the heavy action of the roller on the template, and the effect of heat and moisture from the hot asphalt, the unprotected template has a tendency to warp and the rounded edges wear away quickly. This trouble was overcome by grooving out the two side surfaces and screwing an angle-iron shield on them to strengthen the weak points. This construction of the template is protected by patent rights and is used by the company on a royalty basis.

## Home-Made Armature-Bearing Press

### Hydro-Pneumatic Press Built in the Shops of the Newport News Company Has Proved a Labor and Time Saver

BY N. E. DREXLER

Chief Engineer, Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

THE bearing press shown in the accompanying illustration was constructed in the shops of the Newport News & Hampton Railway, Gas & Electric Company for pressing armature bearings in and out of their housings. This press is of the hydro-pneumatic type. Water was used in conjunction with air for two reasons: first, because air alone at our shop pressure of 100 lb. per square inch did not furnish sufficient pressure to start all bearings, and second, when the bearings were once started, they shot out with such speed as to endanger the workmen. When the pressure obtained by using the shop air pressure is not sufficient to start a bearing, the necessary additional pressure is obtained by use of a hand pump which is shown at *C* in the illustration. A maximum force of 15 tons on the ram can be obtained when the hand pump is used.

#### PRESS CONSISTS OF FIVE ESSENTIAL PARTS

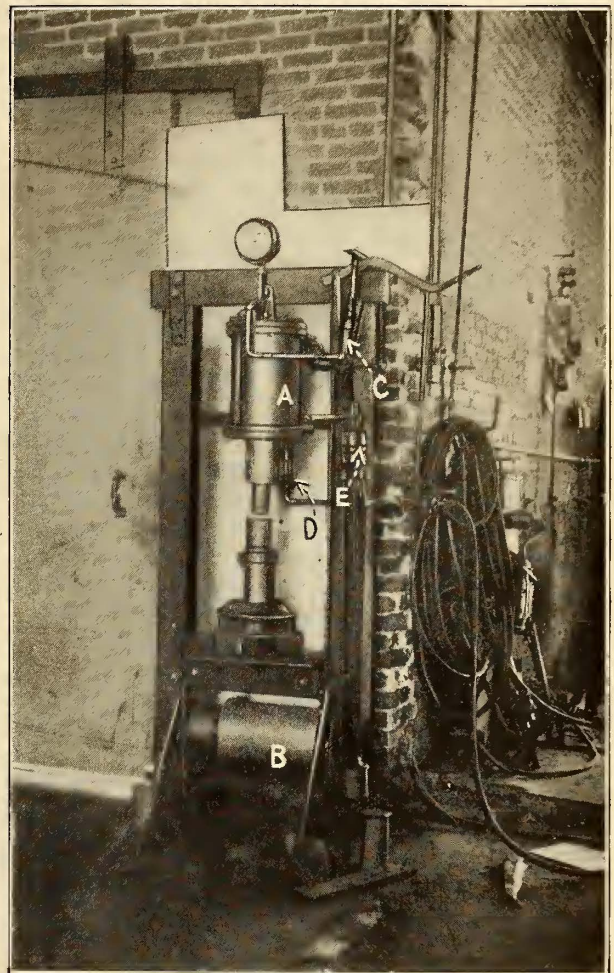
There are five essential parts to the apparatus as constructed: (1) An 8-in. brake cylinder fitted with a cast-iron piston 3 in. thick, and a piston rod  $2\frac{1}{2}$  in. in diameter. This is shown at *A* in the illustration. (2) A water reservoir, consisting of an old 8-in. brake cylinder with pistons removed and the open end capped over, shown at *B*. (3) A motorman's valve for applying the shop air pressure, shown at *E*. (4) The hand pump mentioned above, shown at *C*. (5) A cutoff cock and release valve indicated at *D*.

The cast-iron piston is supplied with packing leathers on both sides on account of the pressure being applied at both top and bottom in the course of a complete operation. Any tank of sufficient strength to stand the pressure is suitable for the water reservoir.

To press out a bearing, air pressure is applied to the water in the reservoir by means of the motorman's

valve. The air pressure drives the water through a pipe into the top of the cylinder, putting pressure on the top of the piston. If the pressure applied to the ram is not sufficient to move the bearing, the motorman's valve is set on lap position, and the hand pump is used to furnish additional pressure.

To force the piston back to its original position the motorman's valve is placed in release position, thus releasing the air pressure in the reservoir. The cutoff cock shown at *D* in the illustration is then opened, permitting air to enter the cylinder under the piston, thus pushing it up and forcing the water back into the



HOME-MADE ARMATURE-BEARING PRESS

reservoir. A release valve set at 5 lb. is placed between the cutoff cock and the cylinder to release the air pressure on the bottom of the piston when the next bearing is being pressed out. To prevent freezing during cold weather alcohol is added to the water.

## 2,000-Kva. Spot-Welding Machine

THE General Electric Company, Schenectady, N. Y., recently built and tested one of the largest spot-welding machines ever constructed. The capacity of this machine is 100,000 amp. at 20 volts and it is capable of exerting a hydraulic pressure aggregating 36 tons at the electrodes. The engineers working on the welder conducted a series of experiments using plates from  $\frac{1}{4}$  in. to 3 in. thick and demonstrated that satisfactory spot welds can be produced within this range.



# Solutions of Compound Curve Problems

The Author Describes Some Methods Used by the Engineering Corps of the New York State Railways Taken from Their Book of Instruction

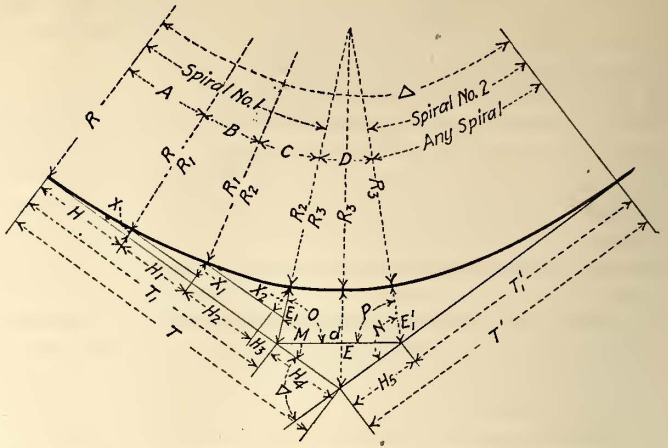
BY L. R. BROWN

Office and Field Engineer, New York State Railways, Rochester, N. Y.

SOME solutions of problems relating to the laying out of compound curves for track work have been given in several of the previous issues of the ELECTRIC RAILWAY JOURNAL. One of the problems most frequently met is that involving spirals made up of many radii. Of course, anyone with a knowledge of trigonometry can solve these problems, but there are often simple methods that save much time. In order to provide a systematic arrangement of these solutions, a book of instructions has been arranged by the writer for use of the engineering corps. The use of these has shown a big saving in time when working out these problems.

The first solution shown is for finding the tangents and external of any compound curve when the radii and angles are given. In appearance this method seems rather long and somewhat laborious, but in the arrangement of the various formulas particular attention has been paid to the selection and arrangement of the equations so that they may be easily solved by logarithms. This solution gives co-ordinates for staking out the curves and can be used with any combination of standard spiral when the total angle and the distances  $T$  and  $E$  of the spirals are known.

The second illustration shows the solution of the same problems, but gives a much easier and



METHOD OF FINDING TANGENTS AND EXTERNAL WITH RADII AND ANGLES OF ANY COMPOUND CURVE GIVEN

$$X = R \text{ vers } A, \text{ or } = 2R \sin^2 \frac{A}{2}, \text{ or}$$

$$= R \tan \frac{A}{2} \sin A$$

$$H = R \sin A$$

$$X_1 = 2R_1 \sin \frac{B}{2} \sin \left( A + \frac{B}{2} \right)$$

$$H_1 = 2R_1 \sin \frac{B}{2} \cos \left( A + \frac{B}{2} \right)$$

$$X_2 = 2R_2 \sin \frac{C}{2} \sin \left( A + B + \frac{C}{2} \right)$$

$$H_2 = 2R_2 \sin \frac{C}{2} \cos \left( A + B + \frac{C}{2} \right)$$

$$E_1 = (X + X_1 + X_2) \div \cos (A + B + C)$$

$$H_3 = (X + X_1 + X_2) \tan (A + B + C)$$

$$T_1 = H + H_1 + H_2 + H_3$$

Then use same solution for Spiral No. 2

$$\frac{1}{2}(O + P) = 90^\circ - \frac{1}{2}D$$

$$\tan \frac{1}{2}(P - O) = \frac{(R_3 + F_1) - (R_3 + E'_1)}{(R_3 + E_1) + (R_3 + E'_1)} \tan \frac{1}{2}(P + O)$$

$$P = \frac{1}{2}(P + O) + \frac{1}{2}(P - O)$$

$$O = \frac{1}{2}(P + O) - \frac{1}{2}(P - O)$$

$$d = \frac{(R_3 + F_1) \sin D}{\sin P}$$

$$N = 90^\circ + \text{angle of Spiral No. 2}$$

$$M = 90^\circ + A + B + C$$

$$H_4 = \frac{d \sin (N - P)}{\sin \Delta}$$

$$H_5 = \frac{d \sin (M - O)}{\sin \Delta}$$

$$R_3 + E = \sqrt{(R_3 + E_1)^2 + H_4^2 - 2(R_3 + E_1)H_4 \cos M^*}$$

$$T = T_1 + H_4$$

$$T' = T'_1 + H_5$$

$$E = (R_3 + E) - R_3$$

If Spiral No. 1 is the same as Spiral No. 2

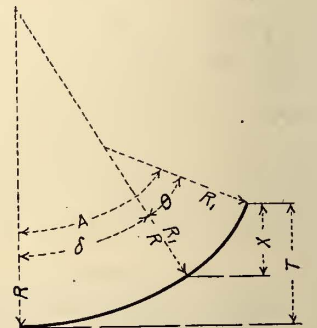
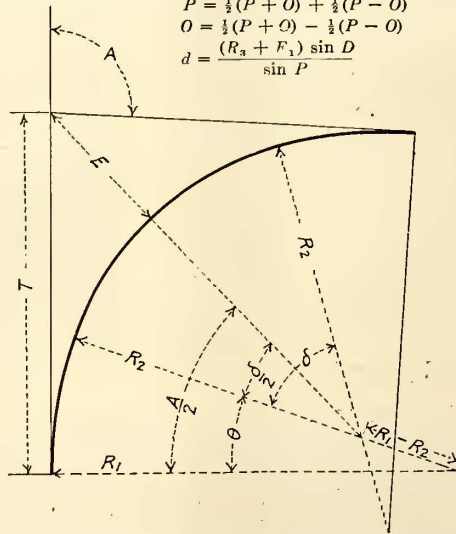
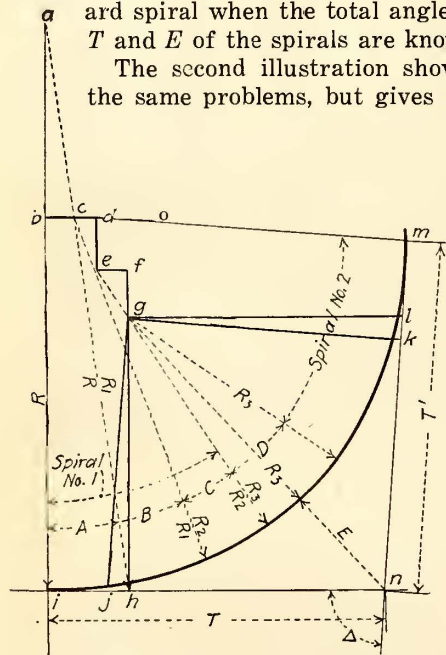
Then

$$H_4 = \frac{\sin \frac{D}{2} (R_3 + E_1)}{\cos \left( A + B + C + \frac{D}{2} \right)}$$

$$R_3 + E = \frac{\cos (A + B + C) (R_3 + E_1)}{\cos \left( A + B + C + \frac{D}{2} \right)}$$

And  $H_5 = H_4$

\*Note that this is a continuation of the expression under the radical sign above.



Given radii and angles of any compound curve. Find tangents and external.

Draw  $bc, cd, ef$  and  $gl$  parallel to  $T$ ,  $de, fg$  and  $gh$  parallel to  $R$ ,  $gj$  parallel to  $T_1$  and  $gk$  parallel to  $mo$

$$bc = (R - R_1) \sin A, cd = (R_1 - R_2) \sin (A + B),$$

$$ef = (R_2 - R_3) \sin (A + B + C)$$

$$ab = (R - R_1) \cos A, de = (R_1 - R_2) \cos (A + B),$$

$$fg = (R_2 - R_3) \cos (A + B + C)$$

$$gh = R - (ab + de + fg), ih = bd + ef$$

$$jh = gh \tan (90^\circ - \Delta)$$

Similarly from Spiral No. 2 find  $gk$  and  $kl$

$$T = gl + ih - jh$$

$$T' = jg + km - kl$$

$$E = \sqrt{gh^2 + hn^2} - R_3$$

Given  $R_1, R_2, A, \delta$  and  $\theta$ . Find tangent and external

$$T = R_1 \tan \frac{A}{2} - \frac{\sin \frac{\delta}{2} (R_1 - R_2)}{\cos \frac{A}{2}} \quad (1)$$

$$E = \left( \frac{T - (R_1 - R_2) \sin \theta}{\sin \frac{A}{2}} \right) - R_2 \quad (2)$$

Given  $R, R_1, \delta, X$ . Find  $\theta$

$$\cos (\delta + \theta) = \cos \delta - \frac{X}{R_1}$$

$$\theta = (\delta + \theta) - \delta \quad (1)$$

Given  $T, R, R_1$  and  $A$ , find  $\delta$  and  $\theta$

$$A = \delta + \theta$$

$$\sin \frac{\delta}{2} = \sqrt{\frac{T - 2R_1 \sin^2 \frac{A}{2}}{2R - 2R_1}} \quad (2)$$

Given  $T, R, A, \delta$  and  $\theta$ , find  $R_1$

$$R_1 = \frac{T - 2R \sin^2 \frac{\delta}{2}}{2 \sin^2 \frac{A}{2} - 2 \sin^2 \frac{\delta}{2}} \quad (3)$$

SOLUTION OF SEVERAL COMPOUND CURVE PROBLEMS. LEFT—FIND TANGENTS AND EXTERNAL OF ANY COMPOUND CURVE WITH RADII AND ANGLES GIVEN. CENTER—GIVEN  $R_1, R_2, A, \delta$  AND  $\theta$ . FIND TANGENT AND EXTERNAL. RIGHT—GIVEN  $R, R_1, \delta, X$ . FIND  $\theta$



quicker method of computing the tangent distances and external of a compound curve made up of several radii.

In a symmetrical compound curve of three radii the solution is much simplified. This is shown in the third illustration.

Another problem that frequently occurs is that illustrated in the fourth solution. This problem arises when the devil strip is changed at a branch-off, or when a switch and mate are changed for a pair of another radius.

The trigonometric derivations of the various formulas shown will be gladly furnished to anyone desiring them.

## Wheel Pressing Made a One-Man Operation

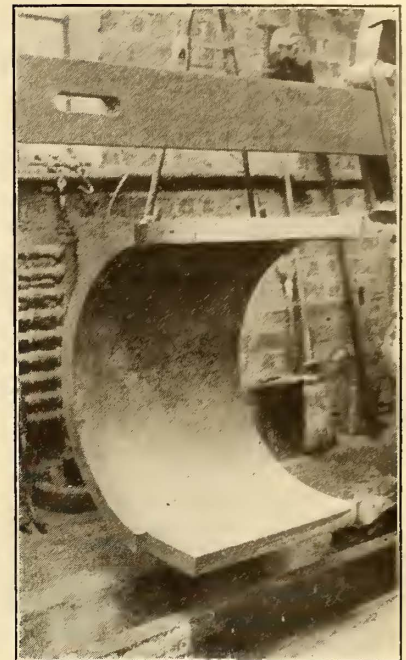
**Development of Several Mechanical Devices in Tri-City Railway Shop Permits Work to Be Easily Accomplished by Single Operator**

**I**N THE Rock Island shops of the Tri-City Railway, Davenport, Iowa, the process of pressing wheels on and off the axle has been so simplified that the entire work can be quickly and easily accomplished by one man with practically no lifting and with little skill. The secret of this is the development of several mechanical devices which virtually perform the work of the operator. One end of the inspection shop, devoted entirely to this purpose, is equipped with every form of labor-saving device which would seem advantageous to the operation. These devices were designed and built by Master Mechanic John Sutherland and his staff.

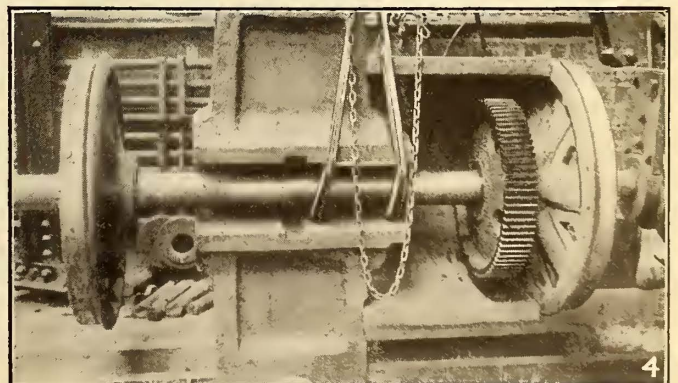
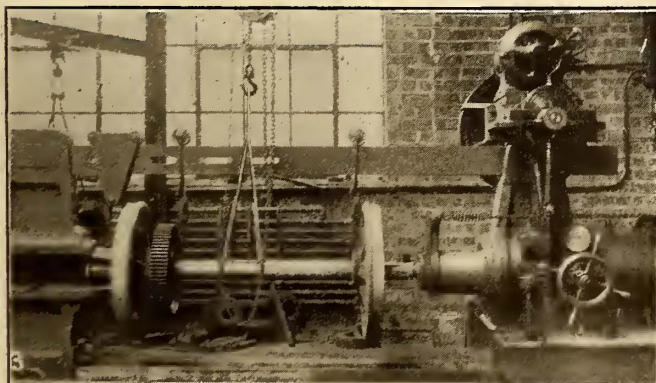
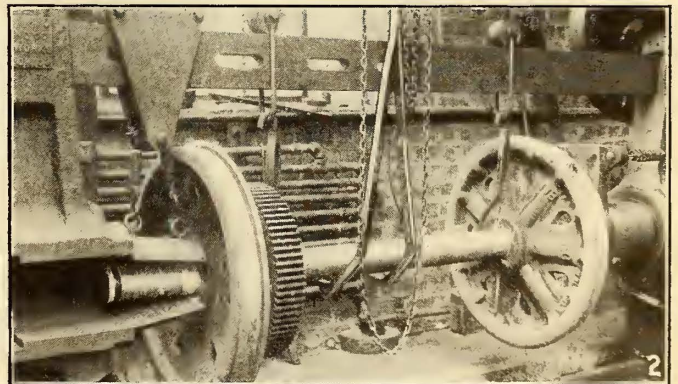
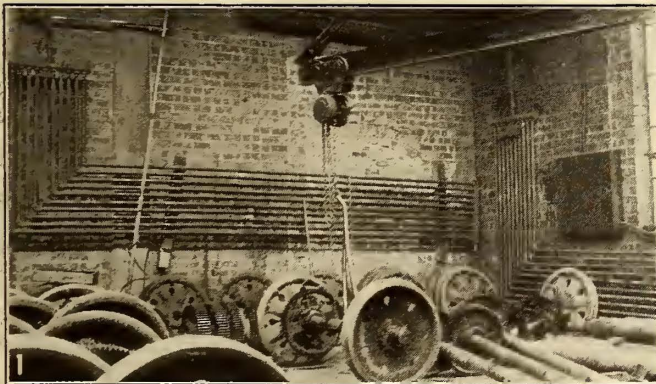
The old wheels to be pressed off are brought in on a track along one side of the room and those ready for reinstallation are placed on any adjoining track. These

two tracks and the 300-ton Niles-Bement wheel press are served by a 3-ton crane. This was made by the company with the exception of a Triplex 2-ton chain block. The horizontal arm is an 8-in. I-beam 11 ft. long, and the vertical support which extends from floor to ceiling is a built-up I-beam constructed from four 3½-in. x 3-in. angles and an 8½-in. plate. The arm is trussed to the support by tie rods and the support revolves freely on a ball-and-socket foundation. A four-wheel carriage travels on the horizontal arm and supports the chain block as shown in one of the accompanying illustrations.

The double-arm hook which is used in picking up a pair of wheels is constructed of ½-in. x 1½-in. material. As first constructed each arm was a single bar but this was later reinforced by welding on an additional bar. This hook holds a pair of wheels steady without danger



THE COLLAR FOR PRESSING THE WHEEL OFF OVER THE GEAR IS A LARGE SEMI-CIRCULAR CASTING



METHODS AND DEVICES FOR PRESSING WHEELS BY ONE-MAN OPERATION

No. 1—Wheels are lifted from tracks to press by 300-ton crane and special arm hook.  
No. 2—The small collar block automatically adjusts itself.

No. 3—When everything is ready the big wheel press quickly does the rest.  
No. 4—The large collar fits over the gear and snugly against the sliding head.

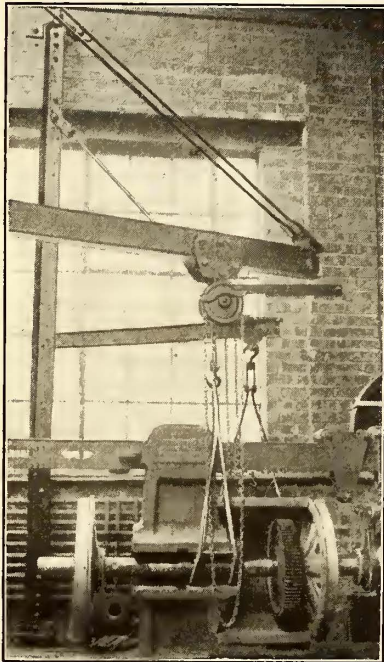


of slipping as often occurs if two separate hooks are used. The shape of the bend also greatly facilitates placing the axle in the sliding head of the press when a wheel is to be pressed off and does not necessitate the removal of the hook.

When a pair of wheels is to be pressed on the axle, the latter with the wheels is swung into position in the press. The original axle hooks have been removed from the beam and have been replaced by two rollers as shown in the illustrations. These are cut from the end of an old axle and prove more flexible in operation than the original hooks as they can be rolled out of the way when not in use. A pair of hooks with turnbuckles for vertical adjustment suspend the axle from the rollers.

A collar block is used between the sliding head and the wheel. This block is a truncated-cone-shaped shell casting

with an outside diameter of 12 in. at one end and 9½ in. at the other end. The metal is 2 in. thick and the block is 10 in. long. By means of large screweyes the block is suspended from hooks and springs attached to a rolling carriage on the beam. The bolt in the lower corner of the rolling carriage passes through a square segment free to revolve. The springs are attached to a flat bar which rests on this segment. By this means the collar block automatically adjusts itself horizontally. The collar block weighs approxi-



BOTH CRANES WORK TOGETHER AND OFF COMES THE WHEEL WITH THE GEAR UNDISTURBED

mately 75 lb. When all adjustments have been made, which really takes less time than the explanation, the press is started up and from 40 to 50 tons will usually press a wheel into position. Some interurban wheels require as much as 75 and 80 tons pressure to seat them. When one wheel is in place the axle is raised by the chain block, swung to one side, revolved end for end, dropped back into the axle hooks and the same operation is repeated.

If wheels are to be pressed off the axle, the axle hook rollers and the small collar-block roller carriage are moved up on the beam and the sliding head is brought up into position. The axle is swung into the opening in the sliding head with the lifting hook still in position. It would be a simple matter to press off the wheel opposite the gear end with the same collar block described but something different is needed to press off the wheel on the gear end without disturbing the gear.

For pressing off wheels a different collar is used. This also is a casting and is made for use with either 36-in. or 33-in. wheels. The casting is 2 in. thick on the edge and 8 in. back from the edge this thickness is reduced to ¾ in. The outside diameter is 34 in. and the collar forms approximately a half cylinder. It is suggested

that an improvement in design would be to increase the bearing surface against the wheel by continuing the circle on that side about 9 in. on each end tapering back to the present end at a point about half the width.

The side of the collar which bears against the sliding head is cut out to fit snugly and the sliding head is also grooved out to give a true vertical bearing. The width of the collar block is 24½ in. and 23 in. where cut out at top and bottom respectively and the collar weighs 450 lb.

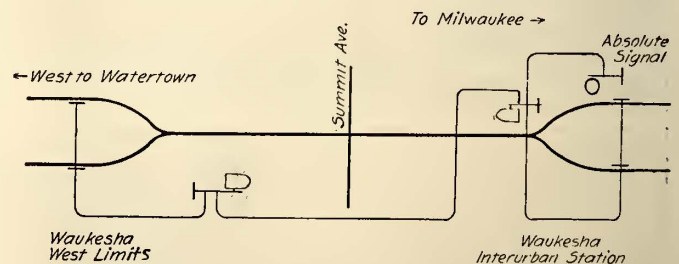
The large collar block is suspended by hooks with turn-buckles for vertical adjustment from a small crane constructed for that purpose only. The horizontal arm is a 6-in. I-beam 6 ft. long attached to a vertical support consisting of two 6-in. x 3½-in. angles bolted back to back. The arm is also trussed to the support by a tie rod. The horizontal support is free to revolve and the collar is suspended from a four-wheel carriage on the arm. When the collar is not in use it can be moved back out of the way. Careful figuring was necessary to keep the large and small cranes from interfering with each other when the wheels were being pressed off.

When the collar block is in position between the sliding head and the wheel the press is started up and from 80 to 100 tons pressure will usually unseat a wheel. With some interurban wheels as high as 300 tons pressure is necessary. This collar block, although designed to press wheels off over the gear, is used on both ends and not over 2 per cent wheel breakages result. With the devices described above pressing wheels on and off easily becomes a one-man job, the heaviest lifting which is ever necessary being the 75-lb. collar block used in pressing the wheels on.

## Milwaukee Company Installs Signals

Installation Permits Through Traffic in Summer and Traffic Half-way in the Block and then Back in Winter

A PIECE of single track approximately one mile long extending between double track ends from Waukesha interurban station to Waukesha west limits has recently been equipped with Nachod type C D signals by the Milwaukee Electric Railway and Light Co. As



RECTIFIED LAYOUT OF SIGNAL BLOCKS

a summer resort is located somewhat further west, the traffic through this block during the summer season is quite heavy. In winter, however, the traffic is much lighter and, while hourly cars continue west to Watertown, the half-hourly cars proceed only to Summit avenue, about midway in the block. They then reverse and return to Milwaukee.

An accompanying illustration shows one of the signals on this line, mounted on a pole near the switch point and facing toward the double track. The two



overhead trolley contactors shown are of the directional type and are placed about two spans ahead of each signal, so that the motorman after passing the trolley contactor will be able to see the change in signal indication that the passage of his car has caused.

The signal indications are normally dark or neutral. In taking the block a car passing under the trolley contactor throws the signal at the far end to "stop". This is indicated by a red disc and a red light, and blocks opposing movement. The motorman of the passing car is advised of the result of this operation by the "permissive" signal, a white light and a white disc, which appears in front of him. A following car coming to the signal at "permissive" may pass into the block under control. When the first car leaves the block at the other end the signal will still indicate that the block is occupied and also which way the car is moving therein and will not return to the "neutral" or "clear" indication until the second car has also left the block.



SIGNAL INSTALLATION AT WAUKESHA WEST LIMITS

The signal control is both car-counting and directional. As many as fifteen cars could follow through the block if necessary, all under signal protection. The control is such that each car movement into the block causes a positive rotation of the step-by-step switch and each movement out of the block a negative rotation. The signal shows "clear" only when the same number of cars have left the block as have entered it. This permissive operation at both ends of the block is that required for the summer schedule.

In winter, when alternate cars reverse in the middle of the block, it is necessary that the signal at the Milwaukee end should not give a "permissive" but an "absolute" indication in order to prevent a following movement. This is accomplished by an auxiliary hooded-light signal at that end of the block only. It is connected to show a red light whenever the block is taken from either end. This signal is mounted on a cast iron bracket located at the contactors, so that the outbound car in setting the block does not have to pass its own red signal. The permissive signal appears ahead of it as usual. This arrangement causes one end of the block to be changed to "absolute" while the other remains "permissive" and prevents following movements through the block in the direction of Watertown. **In summer this extra signal is removed.**

## Using Old Rail for Ties

BY A. G. DRURY  
Cincinnati, Ohio

A COMPANY owning a bridge crossing the Ohio River found it necessary to make certain repairs of its iron work, and at the same time to renew one street railway track on the abutments at each end, that is to say, a total of about 600 ft. of track had to be replaced. The old rail was so badly worn that it was out of the question ever to consider its further use for track.

The walls of the abutments were built of large blocks of stone, and the approach was of the usual comparatively easy grade prevalent in such work. The construction of the original track on these abutments was of the standard type rail, spiked to wood ties, supported by a concrete bed to the top of the ties, a sand cushion, and then granite paving.

In connection with the repair of the iron work on the bridge it was necessary to employ an oxy-acetylene flame for cutting such strips, girders, etc., as were removed. Inasmuch as wood ties were at that time rather hard to get and fairly expensive, it was decided to cut the old rail by means of the flame, drill the necessary holes and use it for ties.

The rail was cut in 7½-ft. lengths. Through the bottom flange of the rail and on both sides of the web, two pairs of ¾-inch holes were drilled. These holes were so spaced as to be flush with the sides of the bottom flange of the new rail, when it was laid on these ties at the gage used by the street railway.

The old wood ties were removed, and the holes left by them cleaned out, the old concrete between the wood ties being left intact. The new ties made of the rail were placed in these holes and clamped to the new rail by means of blocks of flat iron ½ in. thick by 2½ in. wide by 2½ in. long, with a ¾-in. hole in the center and with a rabbet cut in one end to lap over and clamp the bottom flanges of the new rail. These clamps were held to the ties and rails by ¾-in. bolts placed with their heads under the flange of the "tie rail," the stem reaching up through the ¾-in. holes in the "tie rail" and the clamp. The nut was then screwed on from the top. After each nut was screwed down as tight as possible it was spot welded to the bolt stem, to hold it fast.

The whole track work was then concreted in the regular manner up to the proper level for the granite paving.

Upon inquiry as to the cost of the job as compared to regular construction, the bridge superintendent replied that he had gotten off considerably cheaper. All the material, including the oxy-acetylene torch, was right there on the job. The flame cut the rails in a very few minutes and, disregarding the technical advantages of specially built steel ties, this was considerably cheaper.

As to the comparative cost of wood tie construction, when the superintendent balanced the cost of this procedure with the cost of new wood ties bought in small quantities, hauled to the bridge (which incidentally was not a steam railroad bridge) and the labor of moving the old rail to some place until it could be sold at scrap-iron prices, the method used was seen to have cost less.

This is a specific case where special advantages prevailed and is therefore not offered as an invariable method of cutting reconstruction costs. However, certainly many street railway companies sometimes have cases where the conditions are such that the old rail can be used to advantage in this manner.



## Letter to the Editors

### Seated Load versus Standing Load in Car Weight Computation

NEW YORK, N. Y., Jan. 14, 1920.

To the Editors:

I was much interested in W. S. Adams' communication published in the *ELECTRIC RAILWAY JOURNAL* of Jan. 10, regarding a proper basis for comparing car weights. Mr. Adams suggested that a most satisfactory method would be to compute the pounds of car weight necessary to carry 1 lb. of passenger weight with the car carrying its maximum load.

Any basis used for comparing car weights should bear some definite relation to the load carried. A method of comparing the weight per passenger with the car carrying its maximum load would be very fine if the several car builders and others interested could agree on what should constitute the proper space per standing passenger. Human beings are highly compressible, and on many occasions the number of people who crowd into a car is far beyond the limits of safety, sanitation and decency.

The chief advantage of comparing car weights by the number of passenger seats which the car contains lies in the fact that this gives a definite quantity as a basis for comparison. In car design, maximum over-all capacity is not the basic object but rather the obtaining of maximum seating capacity during the hours of normal traffic and maximum standing room plus a reasonable proportion of seating capacity during rush hours.

Without in any manner wishing to belittle the usefulness of the safety car or to discredit the value for maximum loads carried let us consider what load would be necessary in order to carry 1 lb. of passenger for each pound of car weight as stated by Mr. Adams. If we consider the average weight of a person as 140 lb. and take Mr. Adams' figure of 15,000 lb. for a safety car it would require a load of 107 passengers to provide 1 lb. of passenger for each pound of car weight. If we consider the standard double-end Birney car with seats for thirty-two passengers this load would leave seventy-five passengers standing. The space available for standing in such a car is  $64\frac{1}{2}$  sq. ft., this would give 0.8 sq. ft. per passenger if there are seventy-five standing, or only one-half the space that is usually considered necessary.

In reviewing several studies that have been made of other car designs to determine a value for the standing load, I find the figures of  $1\frac{1}{2}$  sq. ft. per passenger with an allowance of 9 in. at longitudinal seats for knee room to be the one most generally used. If we use this basis for figuring the maximum load of a Birney car, we will obtain forty-three standing passengers and thirty-two seated passengers, or a total of seventy-five passengers as the maximum load.

Apparently even this number of passengers is greater than is desirable to handle on a safety car, as at the annual meeting of the Westinghouse electric railway representatives which was held in St. Louis, Mo., in June, 1919, the consensus of opinion was that sixty passengers represent a full practical passenger load for a safety car as at present constructed. In Kansas City

the number of sixty passengers has been adopted as a maximum load and when this capacity is reached a "car full" sign is displayed.

Among considerations which have led to the popularity of the safety car with the public is its ability to provide quick and safe transportation with a great degree of comfort. While it may prove a forceful talking point, especially when comparing this type of car with automobile transportation, to say that the car will carry 1 lb. of load for each pound weight of the car, still, if car weights are to be compared on a basis of the maximum number of people carried, a certain definite load should be decided on for each type of car which will prove the most efficient for operation and not lead to criticism by the traveling public. C. W. SQUIER.

### Manufacturers Entertain New England Street Railway Club

**M**ORE than five hundred men attended the meeting of the New England Street Railway Club held at the Hotel Somerset, Boston, on Thursday, Jan. 15. The occasion that called for so large an attendance was the fifth annual manufacturers' night, as well as the burial of dear old "John Barleycorn" who has been a life-long member of the club.

An excellent vaudeville entertainment under the direction of Charles Record, Galena Signal Oil Company, was provided. George Denevan, Boston, was master of ceremonies, with William Fields chairman of the committee on arrangements. Among those who provided entertainment were J. Garfield Stone, Boston Elevated Railway, and Sailor Reilly, a Boston favorite now on Keith's circuit. Other professional talent furnished songs and dances.

The next manufacturers' entertainment, it was announced, would be held aboard an ocean-going steamship outside the three-mile limit.

### A Story About Pay-Leave Fare Collection

**T**IS an old saying that it makes a difference whose ox is gored. An example of this proverb will be found in the following conversation which took place not long ago in a pay-leave zone-fare town between a quick-lunch restaurant man and a railway employee.

"Say," said the restaurateur, "you fellows certainly have got a nerve to make people accept a zone-number ticket and hold on to it until they give it up with the cash to the conductor on leaving the car. That scheme makes me sore, believe me!"

"Too bad, too bad," murmured the railway man, "But look what I'm up against here. When I came in a fellow at the door made me take a luncheon check marked '10' to '\$2.00.' Then every time I got another item on the bill of fare, I had to hand out my ticket to be punched for the purchases. And, of course, you're not going to let me out of your place before I pay as I leave, are you? Who's got the nerve now?"

"Well I'll be d—d," chortled the food purveyor, "if there were any drinks left in this burg they'd be on me. As there ain't, just take your pick of the cabbage patch," he added, as he pointed to the cigar case. With a grin, our railroad friend made a dive for the kind marked "Now 25 cents—we would not lower the quality so we had to raise the price," and disappeared into the rush hour.



# Bulletin News Page

Summary of the Principal Happenings of the Industry of Current Interest Since the Last Issue of This Paper Was Published

PRINTED JANUARY 16, 1920

Another suspension of railway service has resulted in a city seeing the railway situation from the standpoint of walking to work. One day of this effected a cure.

The International Ry., Buffalo, N. Y., with the co-operation of the Buffalo, Lockport & Rochester Ry., has established through freight service between Buffalo and Syracuse.

Thirty Birney safety cars will be installed in Racine, Wis., by the Wisconsin Gas & Electric Co. at a cost of \$300,000.

Electric railways can build up their traffic by capitalizing the riding-habit developed by jitney competition, according to an editorial in the Pittsburgh (Pa.) *Gazette-Times*.

The Eastern Massachusetts Street Ry. cut off service in Salem, Mass., on Jan. 14 owing to unrestricted jitney competition. The Quincy (Mass.) City Council has revoked the licenses of 111 jitney drivers.

In an eleventh-hour effort to supply itself with cash to meet its obligations the Interborough Rapid Transit Co. plans to dispose of real estate which it owns not absolutely necessary for the conduct of the road.

The Dallas (Tex.) Ry. has installed a bonus system under which employees with good records will receive 2 cents an hour extra for every hour worked. The system will be given a ninety-day trial and, if it proves successful, will be made permanent.

The New York State Rys. must have higher fares on its Rochester lines if it is to continue to operate in Rochester, according to a statement by James F. Hamilton, president of the company. Mr. Hamilton advocates the adoption of a service-at-cost plan on the lines.

The Northampton (Mass.) Street Ry. has raised its fares.

The New York Assembly has passed a resolution calling upon the Public Service Commissioner for the First District to submit to it recommendations for the solution of the traction situation in New York City.

The Port Jervis (N. Y.) Traction Co. has applied to the Port Jervis municipal authorities for an extension of the 7-cent fare now charged on its lines.

The city of Buffalo, N. Y., has applied to the Public Service Commission for the Second District for a rehearing on the commission's order permitting the International Ry. to charge 7-cent fares.

The Lincoln (Neb.) Traction Co. has raised its fare from 6 cents to 7 cents under authority of the State Railway Commission. The 7-cent fare will continue for a period of six months pending the fixing of a permanent rate.

The Board of Estimate of New York City has begun an investigation of the city's transit situation and will undertake to devise a plan for the companies' relief.

The prospects appear to be good for carrying out the San Francisco readjustment under the plan as recently modified.

Electric railway service was restored in Hastings, N. Y., on Jan. 9, after a lapse of many months, when the Hastings Ry. began operating the line from the Yonkers city line to the south end of the Hastings bridge.

The Middlesex Omnibus Co. has been incorporated at Trenton with an authorized capital of \$2,000,000 to operate buses throughout the State of New Jersey.

The San Antonio (Tex.) Public Service Co. has raised the fare from the center of San Antonio to the city limits from 5 cents to 8 cents.

The cars of the Washington Water Power Co., Spokane, Wash., were involved in 25 per cent fewer accidents in 1919 than in 1918.

A committee of citizens of Glen Cove, N. Y., has voted to allow the Glen Cove R.R. to raise its fare from 5 cents to 7 cents.

Jay E. Mason has been appointed sales manager of the ELECTRIC RAILWAY JOURNAL.

The trend of the legislation in Massachusetts at the recent special session was toward the extension of direct financial aid to the electric railways.

The Council of Detroit has approved the plan of Mayor Couzens for the construction of a municipal railway at an immediate cost of \$15,000,000.

Five million dollars is the sum suggested to be expended in building an initial subway for street cars in Cincinnati.

The jitneys of Massachusetts are making a fight for legislation in their behalf.

Jan. 15 was expected to be a very important day at Toledo, for it was on that date that the original time limit expired within which the two branches of the railway commission were to present street railway franchise plans.

A bill has been sent to Congress to permit the Capital Traction Co. and the Washington Railway & Electric Co. to consolidate. The sponsors of the measure look upon consolidation as a possible means to lower fares.

A merger of the Chicago City Ry. and the Chicago Rys. now operated as the Chicago Surface Lines, is said to be in prospect for the near future. In the event that this is not carried out it is said that changes will likely be made in the operating personnel.

The railway employees in Atlanta, Ga., are agitating for an increase in their wages. In this case another labor contract would appear to be a mere scrap of paper.

The plan of reorganization of the Fort Wayne & Northern Indiana Traction Co., Fort Wayne, Ind., recently sold under foreclosure, has been modified, as noted elsewhere in this issue.

A decision is expected very shortly from the Public Service Commission of Pennsylvania in the case involving the valuation of the property of the Pittsburgh Rys.

One hundred and fifty steam omnibuses have been removed from London, England. All the buses in that city are now operated by petrol (gasoline).

The Washington Railway & Electric Co., and the Capital Traction Co., Washington, D. C., have appealed from the finding of the Public Service Commission of the District of Columbia fixing the value of their properties for rate-making purposes.

The board has reported which was appointed to arbitrate the San Francisco-Oakland Terminal Ry. wage matter. The high points of the finding are a denial by the arbitrators of an eight-hour day, refusal to make retroactive the wage increase allowed because the men violated the agreement in striking last October, and comment as to the irresponsibility of labor.



## Recent Happenings in Great Britain

### Plan to Co-ordinate London Traffic Taking Definite Shape— All London Buses Gasoline Driven

(From Our Regular Correspondent)

There is at last a prospect of something definite being done to improve and co-ordinate means of local transit in London. In spite of numerous official inquiries and reports in the past, nothing in the way of a comprehensive scheme has ever been set on foot. It does not appear likely that meantime at least the proposal which experts have favored—namely the constitution of a London Traffic Board—will be carried out, because this year the Ministry of Transport, a fullfledged government department, has come into existence, and it is to have a general controlling influence over transportation in London as well as in the rest of the country.

#### STUDY OF METROPOLITAN TRAFFIC

As I mentioned in the last instalment of these notes, the new minister recently appointed an advisory committee to consider and advise on metropolitan traffic problems. This committee has now appointed a technical sub-committee of eighteen members, consisting of experts. This body will act as three sub-committees of six members each. The first is devoted to traffic regulations in general and definition of new powers required. The second deals with the improvement of existing street facilities and the provision of new facilities. The third considers passenger traffic in its technical and co-ordinated aspect. The relations of railways, tramways and omnibuses come within its view, as do the working out of development and unification schemes. The members of the sub-committees include expert officers belonging to the various classes of undertakings, both company and municipal. Probably it will not be until after the Minister of Transport has had before him full reports from these advisory bodies that the question will be decided whether it is now desirable to set up a special Traffic Board for London.

#### PRELIMINARY PROPOSALS READY

The first report of this advisory committee was published on Dec. 6, along with an announcement that the Minister of Transport was about to put its proposals into force at once. These proposals can only be regarded as preliminary. They make numerous changes in the fixed stopping places for tramcars and omnibuses with the object of facilitating the flow of street traffic. Experiments are to be carried out on certain routes in the way of reducing the stopping places for cars and omnibuses to four per mile.

Meanwhile the London County Council has been pushing matters in connection with its proposals for large extensions of the tramway system. Some little time ago the Council sent a deputation to interview the Parlia-

mentary Secretary to the Ministry of Transport, and to ask the government to set up an independent *ad hoc* body to consider a full scheme of tramway development projected by the Council and to urge the suspension of Parliamentary standing orders so as to remove the veto of London borough councils on tramway proposals and thus allow such proposals to be considered on their merits by Parliamentary committees.

A report as to the deputation proceedings was issued in the middle of November. From this it appeared that the action of the ministry in appointing an advisory committee on London traffic largely met the Council's claim for an *ad hoc* authority. The deputation, however, strongly urged the removal of the borough councils' power of veto.

Sir Rhys Williams, the Parliamentary Secretary to the ministry, in his reply said the advisory committee would have before it the County Council's project for a comprehensive metropolitan tramway system. As to the suspension of Parliamentary standing orders, the ministry would feel considerable difficulty in intervening in view of the jealousy with which Parliament looked on any attempt to interfere with its procedure. He promised to lay the whole matter before the Minister of Transport. I may mention, in case any of your readers are not aware of the fact, that the power of veto by local authorities on tramway proposals has for many years been a leading cause of stagnation in development.

#### ELECTRIC SUPPLY BILL BEFORE HOUSE

In the latter part of October some important matters came before the House of Commons for decision in connection with the electricity (supply) bill, which seeks to make provision for a national electric power supply. In the past all government supervision (as far as it went) of electrical undertakings has been in the hands of the Board of Trade. The present bill confers further extensive powers on the board, but at the end of the measure was a clause transferring the powers of the board under the bill and under all other acts relating to electricity supply to the Ministry of Transport. The committee of the House of Commons which considered the bill deleted the clause in question. When the bill came back to the House on Nov. 20 the government moved the reinstatement of the clause, and though there was a good deal of opposition the motion was carried without a division. It was pointed out by members of the government that the Board of Trade was unfitted for and indeed incapable of the work of developing a great national power scheme, that the Ministry

of Transport was fitted and was capable, and that it was necessary to have the scheme under the department, which was to develop transport so that the whole business would be co-ordinated and worked together.

In the end of November it was announced that the Ministry of Transport had appointed another expert committee. This one is to consider and report to the minister on the taxation of and regulations affecting road vehicles. This matter is of importance in the light of the competition of omnibuses with tramways.

#### STEAM OMNIBUS GONE

A good deal of interest to the owners of tramways centers in the question whether all road vehicles should be permanently obliged to carry rear lights. During the war and the time of darkened streets there was a temporary regulation of the sort, but some months ago as street lighting improved the requirement was withdrawn. At the time of the recent railway strike, when streets and highways were overloaded with traffic, the regulation was again imposed. There has been much opposition to the regulation, particularly on the part of cyclists, so the Ministry of Transport has appointed a committee to consider and report on all questions relating to lights to be carried on vehicles and as to lighting-up time.

The steam omnibus has disappeared from the streets of London after a long and gallant struggle. Working expenses have gone up, so that the company owning the vehicles, some 150 in number, was working at a serious loss. The directors accordingly decided to remove the buses to some other part of England where prospects seem more favorable. Probably that means lower expenses and higher fares than are associated with London street traffic. All London omnibuses are now of the petrol (gasoline) type, though some of them have an electric drive.

Arthur Neal, member of Parliament for the Hillsborough division of Sheffield, has been appointed Parliamentary Secretary to the Ministry of Transport in succession to Sir Rhys Williams, resigned. Mr. Neal has been in Parliament for only a year, but he has shown great ability. He took a prominent and useful part in the discussion of the transport and electricity bills, in the administration of which he will now have a part.

Some new appointments have recently been made to the London railways. J. P. Thomas has become assistant operating manager of the railways and the omnibuses; Captain A. Rozier has been appointed general superintendent of the omnibus company; J. Thornton has been appointed superintendent of the line for the railways. These gentlemen have hitherto held other positions in connection with the undertakings. It is estimated that the addition to the working expenses of the underground group caused by the adoption of an eight-hour day will amount to £700,000 per annum.



# News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

## Subway Suggested

Plans Discussed to Relieve Downtown Congestion in Cincinnati—\$5,000,000 Expenditure Proposed

An open meeting was held on Jan. 3 at the City Club of Cincinnati, Ohio, to discuss the projected plan of a street car subway under Fourth and Sixth Streets to relieve the downtown traffic congestion which has reached such a stage that some form of permanent relief must be worked out. S. Gale Lowrie, recently elected president of the club, presided. The speakers at the meeting were Reamy E. Field, originator of the subway plan; former Judge William A. Geoghegan, of the Rapid Transit Commission, and Walter A. Draper, vice-president of the Cincinnati Traction Company.

### SUBWAY PLAN PRESENTED

Mr. Field presented his views of the building of a subway, based in part on information obtained in a conference with George G. Blackmore, Cincinnati engineer, who formerly was with the New York municipal engineering department, in which capacity he superintended the construction of a long section of the New York subway system. Mr. Field stated the main points of the plan as follows:

The subway plan from Broadway to Central Avenue is an auxiliary to the rapid transit loop, and is not designed to take away any convenience of the general public, but to add to them. It is not to be a rapid transit plan, in the sense rapid transit is ordinarily used, because it contemplates simply the taking of the street cars from the surface and placing them underground, leaving the streets entirely free for other traffic.

The primary object is to help all people. It is entirely possible that the loop can be built for \$5,000,000. The enhancement of the value of the property in the district covered by the loop would be sufficient to pay the interest at 5 per cent and provide a 2 per cent sinking fund on this. It would make a permanent business area and would permit the present area to be enlarged. The present tax value of \$40,000,000 in four blocks would be increased tremendously by this plan.

The traction company would use its present equipment, as it is being done in Boston and New York. Freight could be handled for the bigger stores after midnight in this subway, when traffic is slack. There would be ample room for two tracks and possibly four.

The plan is feasible, practical, is not excessive in cost, would permit large improvements and certainly should be considered as plans for large corporations are considered. The automobile drivers, the pedestrians and the street car riders say that something must be done, and it has come to a point where everything should be boiled down to a concrete form and a definite start given to some kind of subway. The people are demanding it and it should devolve upon all clubs of the city to get behind it and give it a start.

Judge Geoghegan said that he personally thought the plan an excellent one, but that the Rapid Transit Commission had no authority to handle it,

unless authority would be granted by the Legislature.

Mr. Draper proceeded to point out that according to the records of the traction company the congestion is continually growing worse, is adding to the cost of rides under the service-at-cost franchise held by the company, and is interfering to such an extent with running schedules on a few lines that the running schedules must repeatedly be lengthened. This will add to the operating costs. Elimination of the congestion will mean a clear saving of \$350,000 a year to railway patrons, by making it possible to limit the number of cars now used. As temporary measures to help the conditions, Mr. Draper suggested the elimination of parking, keeping everything moving, and the use of skip stops.

Mr. Draper could not commit himself to a subway plan, since he had not had time to study the particular plan offered by Mr. Field, but he urged that the plan be given careful study to determine its possibilities. In addition, Mr. Draper expressed the willingness of the traction company to confer or advise in the making of any plan or criticize any completed plan that may be offered.

The developments of the meeting will be taken up by the board of governors of the club. It is expected that a special committee will be appointed to develop the ideas proposed by the various speakers.

## A Disguised Jitney Bill

A bill authorizing towns and cities of the State of Massachusetts to operate street railways or motor vehicles for the transportation of passengers or freight has been filed in the House of Representatives. The terms of this bill provide that two or more adjacent cities or towns may combine for such a purpose, a transportation manager shall be elected jointly and extensions of the service shall reach to other municipalities if so desired.

The pith of this bill is a proposal to resume jitney service in areas where such service is now prohibited by local ordinances. The sponsor for the bill represents a district where the jitneys were recently disbarred, only after a stubborn contest. That efforts to continue service are under way is apparent from the introduction of such a measure. Whether it will receive approval is another question. It seems hardly probable that the reversal of the policy of permissible jitney competition will result.

## Mr. Doherty Fights Delay

Makes Determined Stand for Presentation of Franchise Plan Within Court's Time Limit

The time limit set by the court for the presentation of the plans for the settlement ordinances for the Toledo Railways & Light Company was Jan. 15. For some time now evidence has been accumulating that neither the municipal ownership section of the commission nor the service-at-cost section will be ready to present tentative plans within the original time limit. Accordingly there has been considerable talk of an extension of time. The traction election was set for Feb. 17. Now it is advocated that the vote on the franchise proposals be put off until April 27, the date of the Presidential primaries.

### MR. DOHERTY TIRED OF IT ALL

Mr. Doherty, operating the Toledo property, has reacted unfavorably to this. He is tired. Up to Jan. 8 he had not been convinced that an extension of time was necessary to complete the drafting of the settlement plans. He is reported to have said that he was forty-three years old when the negotiations were begun and that he was now forty-nine years old. He said he might reverse the figures and be ninety-four years old before an agreement was reached if the negotiators kept on extending the time. Mr. Doherty refused to say what course of action he would follow on Jan. 15, but he agreed to attend a meeting on that day with Federal Judge Killits, Mayor Schreiber, Law Director Martin, a subcommittee of the Council committee on railroads and telegraphs and members of the both branches of the franchise settlement commission.

### M. O. BILL'S PROGRESS SLOW

The municipal ownership section of the commission seems to be up against a stone wall. It is dependent apparently upon passage by the Legislature of the Broch bill, to confer upon cities the authority to issue general credit bonds to acquire transportation systems. If the Broch bill is not passed by the Legislature, the municipal ownership branch of the commission will try to put through an amendment to the rapid transit law to permit issuing municipal bonds for acquiring the system.

Aside from the work of phrasing parts of the ordinance, the service-at-cost section of the commission has worked through the main phases of the draft except the points of agreeing with Mr. Doherty on the valuation and rate of return and the question of maximum fare.



## Relief for Massachusetts Companies

### The Special Legislative Session Recently Concluded Enacted Several Measures Aiding Electric Railways

The special session of the Legislature of Massachusetts of 1919 was notable for the adoption of policies for the control and regulation of the electric railways and the passage of acts giving direct financial assistance to such companies. In another way, the session stands out in striking contrast. That is, with reference to the policy recommended by the special commission of recognition of the tri-partnership of control, operation and service. Expressed in another way it means recognition of the division of control, the division of labor and the public service.

#### MUCH VALUABLE LEGISLATION

In spite of the fact that certain bills of importance failed to pass the special session, it is doubtful if any other legislative body has succeeded in enacting measures of greater benefit to the railways or has devoted quite the intensive study to means for solving the problems confronted by the railway managers. All told, sixteen recommendations or bills were presented. Of these seven related to the Boston Elevated Railway, four to the Eastern Massachusetts Street Railway and five to all other railways. Of these, there were passed an act providing for the purchase of the Cambridge subway by the Commonwealth of Massachusetts; an act to provide for annual instead of quarterly changes in rate of fare by the Boston Elevated Railway; an act to provide for annual instead of semi-annual payments of deficits in cost of operation of the Boston Elevated Railway; an act authorizing cities and towns served by the Eastern Massachusetts Street Railway to contribute to the cost of service; an act to relieve street railways of the payment of certain taxes and assessments and other obligations; and an act to provide for the further regulation of so-called jitneys and motor-buses.

Briefly, the trend of legislative action was in the direction of direct financial relief, while bills for the fulfillment of labor obligations were lost.

#### ANTI-STRIKE EFFORT AGAIN

The anti-strike bill occupied the attention of the public in no small degree. Similar to the Cummins bill in certain respects, it emphasized the importance of establishing a plan for the maintenance of continuity of service by contract agreement and, moreover, brought to the attention of all the necessity of unity in action for labor as well as directorship in order that communities may be well served by the electric railways. The foothold gained in the public mind, that economic operation depends on co-operation and the fulfillment of labor obligations, will, it is believed, result in the enactment of some form of measure or contract agreement providing for the co-ordination vital under the present conditions of industrial unrest.

The passage of the relief measures provides an example of the willingness of the public to meet its obligations. One of the most important of these measures sanctions the purchase of the Cambridge subway by the State. The price to be paid for this structure is the actual cost to the Boston Elevated Railway under whose direction the tunnel was built. This cost is about \$8,000,000, and with this amount obtained through sale, the Boston Elevated Railway will be able to develop its present system and meet emergency requirements.

It is of interest to state here that all tunnels and subways in the city of Boston are owned by the city with the single exception of the Cambridge subway, now the property of the Commonwealth. The lease of the latter to the Boston Elevated Railway at a rental of 4½ per cent will bring the total rental cost for subways up to about \$1,875,000.

#### BILLS AFFECT BOSTON ELEVATED

Two other acts affecting the Boston Elevated Railway relate to the adjustment of fare schedules and the disbursements by the Commonwealth of deficits incurred in operation. The former act stabilizes the rate of fare by providing for tariff revisions yearly instead of quarterly. The latter act provides for the payment of deficits in annual installments instead of semi-annual and places these disbursements for the elevated railway on a procedure of handling similar to that for other State accounts.

Of extreme importance to the railways is the act providing for the increase of assessments for aid in meeting cost of operation from \$1 per \$1,000 of valuation to \$2. The present deficit of the railways can only be met by such a measure. For the year 1918, this deficit for all companies amounted to \$2,512,105 and the excise tax added approximately \$280,000, bringing the total up to a considerable figure. The increase in assessment rate will provide an additional \$2,322,384 revenue, a welcome relief from a hitherto perplexing problem.

Similar in its application as a relief measure is another act releasing the railways from the commutation tax and other obligations which have proved too heavy a burden in the past.

The passage of the jitney bill results in invaluable aid in the operation of electric transportation. This bill is in reality an indirect means of benefit. The bill requires the operators of jitneys or motor-buses to conform to the regulations of the governing boards of the municipalities, and thus puts the decision up to the community whether jitney or the electric railway shall prevail. In the light of the events of the last few months it is doubtful if any local authorities, now provided with the power, will deem it expedient to grant

licenses or invite competition which will prove disastrous to the electric railways.

A survey of the legislative work accomplished cannot fail to evoke commendation for the special session of 1919. True, the measure to establish the obligation of labor failed of passage, but the issue of responsibility will undoubtedly be raised again.

## Franchise Modified

### Small Company in Vermont Secures Relief From Conditions Which Had Become Unduly Burdensome

Electric railway service has been restored in St. Albans, Vt., by the St. Albans & Swanton Traction Company. This was noted briefly in the *ELECTRIC RAILWAY JOURNAL* for Jan. 3. The circumstances of the suspension, which lasted a day, deserve more attention than it was possible to give to them in the previous item.

The company at St. Albans operates 13 miles of track. Its existence was never any too rosy, but with the coming of the war, attended by the general increase in prices, the conditions under which the railway was required to render service by its franchise from the city became so onerous that the company had to appeal to the city for relief. The tendency of municipalities to procrastinate asserted itself, with the company fast slipping toward ruin. Then came the shut down. This convinced the city that the case was a serious one and it promptly lessened the burdens of the company by modifying the terms of the franchise with respect to the service and paving requirements.

The original grant called for service every hour from 6:30 a.m. to 6:30 p.m. This was changed to service every hour and one-half. The original paving requirement was that the company pave and maintain the street between its tracks and 2 ft. on either side of them. Under the revision of this provision the company is relieved of its paving obligation until such time as the net earnings of the company equal or exceed 5 per cent of the value of the property arrived at by the Public Service Commission of the State except when the company itself digs up the street to repair its tracks, when a bond must be given to the city to cover the expense to the city. The section of the ordinance as modified covering this matter is as follows:

That the said St. Albans & Swanton Traction Company shall not hereafter be compelled to do any street work in the city of St. Albans, nor pay for any street work in the city, except in case the St. Albans & Swanton Traction Company digs up a street to repair its tracks, in which case said St. Albans & Swanton Traction Company is to give a bond to pay back to the city of St. Albans, what the city expends in replacing the part of the street which it dug up, in as good condition as it was previous to digging it up; with this further provision, however, that when it shall be shown that the net earnings of the company equal or exceed 5 per cent of the value of the property, as arrived at by the Public Service Commission, the St. Albans & Swanton Traction Company shall bear that portion of the expense of the street work in said city of St. Albans as is provided for in Sec. 5 of the original franchise.



## Enabling Legislation Needed

New York Commission in Annual Report, Makes Plea for Fair Play for Public Utilities

The need for enabling legislation which will endow the Public Service Commission for the First District of New York with powers sufficient to act effectively in the traction emergency in New York City is emphasized in the thirteenth annual report of the commission to the Legislature for the year ended Dec. 31, 1919.

The report reviews the reconstitution of the commission under chapters 520 and 263 of the laws of 1919, which substituted one commissioner, at a salary of \$15,000 a year, for the five commissioners whose appointment was authorized by the original public service commission law. The commissioner is authorized to appoint three deputy commissioners at salaries of \$7,500 a year each. The new laws divided the work of the commission and provided for the appointment by the Governor of a transit construction commissioner who was empowered to take over the rapid transit construction work of the old commission.

### WANTS CONTROL OF FARES

On May 26, 1919, the Governor appointed John H. Delaney, then Commissioner of Plant and Structures of the City of New York, as transit construction commissioner. Since that time the regulatory and rapid transit work has proceeded under two separate and distinct organizations.

The report says:

For years the street-car fare in New York City has been constant at 5 cents. The people have been educated to a flat fare, irrespective of distance. Since 1914, cost of operating has considerably advanced. The companies pay more—in many instances 100 per cent more—for materials, labor and all other elements. A subway motor car, which cost \$12,500 five years ago, costs \$25,000. A double-truck trolley car, which could then be bought for \$6,000, costs \$14,000. The ordinary laborer, who formerly received 20 cents an hour, is now getting upwards of 40 cents, and skilled labor receives a corresponding increase.

There is no question that street railroads of the city need relief. It should come from such rates as would meet cost of service, provided the companies make corresponding concessions to the public. Measure of relief can be determined only by detailed investigation of each case.

An advance in fare should be avoided if adequate service at present rates could be secured. A permanent increased rate should not be established, but a flexible rate adjusted automatically to cost of service, with such safeguards as will secure savings and reductions in cost as opportunity offers.

The commission has been unable to provide for adequate relief, and adds that the inevitable has happened in appointment of receivers for some lines and cessation of service on several smaller lines. Disintegration of large railway systems has begun, as a result of inability to obtain relief. On this point the commission says:

If disintegration goes on to the end, New York City, in place of having these two large systems, will find itself indifferently served by dozens of smaller companies, each independent and operating within its restricted area for a 5-cent fare. This will increase cost of transportation to citizens, many of whom will be compelled to pay two and three fares.

With respect to the bus services established by the city to replace some of the railway lines that have suspended, the commission says that such services have been established without the consent of the commission. The commission is now inquiring into the legality of this move. Of the buses the commission says:

In general there may be certain routes where bus lines would be of advantage, but the great problem is to lessen congestion rather than increase it. To establish bus lines as a matter of penalizing existing companies, simply penalizes the people.

The report says that if public service commissions are to continue they must at least have power to take steps to avoid the destruction of utilities regulated by them. On this point the commission says:

Fuller and more definite powers should either be given the commission or regulatory powers be exercised by the municipality. At present, credit conditions, enabling legislation and long-term leases all forbid early adoption of municipal ownership and operation.

Needs of the present and changes needed in future could best be secured if all transportation facilities could be placed under one management. While this may be difficult at present, it should be the solution to be sought.

This commission has not wished to see fares increased in the interest of watered securities or excessive valuations. It does believe honest investments should be secured and such fares paid as will provide interest on investments—brought into full light of publicity—and cost of operation and full maintenance. Such cost-of-service fare should also pay interest on city bonds issued for rapid transit construction, so that such bonds may be freed from the debt limit.

## Amended Terminal Ordinance Defeated

An amended ordinance giving the Cleveland (Ohio) Union Terminals Co. the right to proceed with the construction of its proposed depot facing the Public Square, without the participation of the Pennsylvania R.R., was defeated in City Council on Dec. 29. As the question was brought up as an emergency measure a two-thirds vote was required. This ordinance was to take the place of one which expires on Jan. 6.

Only recently the Pennsylvania R.R. informed the company that it would not agree to use the new station, while all the other roads entering the city had approved the plan.

Mayor Harry L. Davis has called another meeting of the Council when it is believed the vote will be reconsidered. It is said that two of the members who voted against the measure have changed their minds and one of them will move a reconsideration. The newspapers are supporting the plan for a station facing the square and other influences are working, although several organizations of one kind or another are opposed to it. O. P. Van Sweringen, head of the Cleveland Union Terminals Co., has announced that the plan will be dropped unless an ordinance is passed at once.

The proposed depot is of interest to the interurban roads entering the city, as plans had been made to bring most of them in on private rights-of-way and they would also use the station. The interurban lines would use one level, while the steam roads would occupy another.

## New System Approved

Council of Detroit Approves Mayor's Scheme—New Ford Cars May Be Used

The City Council of Detroit, Mich., meeting as a committee of the whole, has agreed unanimously to approve the \$15,000,000 municipal railway plan presented by Mayor James Couzens. Final action will be taken immediately on the ordinance introduced by Councilman Castator, which provides for an election on April 5 on a bond issue to finance the program.

### 100 MILES OF NEW LINE PLANNED

The plan as outlined by the Mayor in a letter to the Council, includes building 100.75 miles of new track, purchasing 55.5 miles of existing track and obtaining cars and equipment to operate on the city lines, thus providing for an independent system. Immediate construction is aimed, of a unified independent system, self-sustaining and laid out on permanent lines, yet capable of being linked up with remaining privately-owned lines in part or in whole, if conditions warrant such an undertaking.

The Mayor's so-called formula for smoothing out the long standing snarls in Detroit's traffic system and affording the citizens their desired freedom from congestion at the heart of the city, is based upon the idea of raising the center of traffic from the unnatural position near the southern boundary of the city to the Grand Boulevard, and affording the long-suffering industrial population an opportunity to travel on frequent north, south, east and west crosstown lines rather than the antiquated "around the City Hall service." In order to move the hub of Detroit's traffic wheel, five big east and west crosstown lines will be provided.

The proposed lines have been grouped into three classes, A, B and C. If a favorable vote is cast by the people, the Mayor promises to have work started on class A the day after election. The lines included in this class should be completed within one year. The class A system provides for taking over 34.25 miles of lines built under the so-called day-to-day agreement in which the city has the right to purchase the lines at cost to the railway, less depreciation. This is estimated at about \$40,000 per mile.

### \$7,000,000 FOR TRACK

In addition the Mayor would take over 21.25 miles on Woodward Avenue and that comprising the Fort Wayne & Belle Isle Ry., on which franchises have expired. Estimating the cost of these lines at \$40,000 per mile aggregates a total of \$2,220,000 for lines already built, while the 100.75 miles of proposed new track estimated at \$70,000 per mile amounts to \$7,052,500.

The remainder of the \$15,000,000 estimate is divided between cars, trailers and carhouses, providing for 400 motor cars, 150 trailers, and carhouses and miscellaneous equipment at an estimated cost of \$1,000,000.



The Mayor states that after investigating Henry Ford's street-car plans, he is hopeful of using the Ford gas-line-driven street cars on the city lines, making it unnecessary to install electrical equipment.

It is held that the city would not have to build the lines in their order named in the ordinance as classes A, B and C, in rotation. In case it is found advisable to change the program and build some class C lines before class A and B lines are completed, it can be done according to the opinions of the Corporation Counsel.

The several proposed crosstown lines will, it is believed, greatly relieve the congested downtown district and obviate the necessity for subway dips for some years to come, in as much as the crosstown lines will make it unnecessary for so many people to go down to the center of the city to get to either the east or west side.

Under the city charter the money to retire the proposed bonds and pay the interest will have to come out the fares, as will all other expenses incidental to the operation of the system, since the charter expressly forbids the placing on the tax roll of any expense for the operation of a transportation system.

The bond issue will bear interest at the rate of 4½ per cent. The plan calls for a sinking fund to retire the bonds at the rate of \$500,000 annually, making the issue a thirty-year serial one.

The plan will have to receive a majority vote of three-fifths in its favor to be adopted.

### Atlanta Men Ask Increase

The 1920 contract of the union carmen of the Atlanta system has been presented to the Georgia Railway & Power Co. While officials of the company will give out no information relative to the details of the contract, it has been learned that the men demand a 50 per cent increase in pay and a "closed shop."

An official of the company interviewed by the correspondent for the ELECTRIC RAILWAY JOURNAL would neither confirm nor deny the truth of the carmen's reported demands. One of the local daily papers published a statement, supposed to have emanated from an official source, to the effect that the company would refuse to grant a 50 per cent increase in pay and would not create the "closed shop."

When asked to make a statement with reference to the alleged failure of the men to keep the 1919 contract fully, officials of the company also declined to comment on this matter. The company is reported to have declared that the members of the union had failed to aid the company in its endeavors to promote public safety, and as a result damage claims against the company have increased during the past year.

Under the present contract the men are receiving 40 cents an hour. They are asking, it is said, 60 cents under the terms of the 1920 contract. The demands for higher pay are based on the increased cost of living.

### Recommends Terminal Electrification at Atlanta

B. B. Turner, superintendent of electrical affairs of Atlanta, Ga., in his annual report for 1919, recommends to the City Council that when the railroads are returned by the government to the original owners steps be taken to force the railroads to use electricity in the operation of all their trains within the city limits. The report states:

This can be brought about by the railroads themselves forming a terminal railway to operate all trains within the city limits, the nine railroads that are here in the city owning the stock of the new terminal railway. While the first cost will be considerable, it will prove a splendid investment by reason of the low operating cost. Some of the railroads that have been changed over to electrical drive show a saving of more than 35 per cent in cost of operation.

## News Notes

### Calls Conference on Denver Wages.—

The State Industrial Commission has taken jurisdiction over the controversy between Denver Tramway and its employees and ordered both company and union representatives to appear before it for a hearing on Jan. 12. This step is said to have been taken in an effort to avoid the threatened strike of the men over the question of wages. The holding of the hearing on Jan. 12 was dependent of course on the matter of the ability of the two parties to conclude an agreement before that date.

### Damages Asked for Electrolysis.—

The Greensboro Gas Co., Charleroi, Pa., has instituted proceedings against the Pittsburgh Rys. before the Public Service Commission of Pennsylvania, charging that for two years its gas mains have been damaged by electric current which reached the mains from the rails of the railway. The complaint asserts that the railway has not taken the proper steps to prevent such damage. An order from the commission forcing the railway to make the proper provisions is asked.

### Increase at Lexington Accepted.—

The trainmen in the employ of the Kentucky Traction & Terminal Co., Lexington, Ky., on Jan. 2, accepted an increase of 4 cents an hour in their pay, under the terms of the contract with the company signed some time ago. The union took up with the company about six weeks ago the matter of an increase to meet the advance in the cost of living and after full consideration on both sides the company agreed to increase pay of the men 4 cents an hour. The increase is retroactive to Dec. 25.

**Effort to Avert Strike.**—In an effort to conciliate differences between the management of the Columbia Railway, Gas & Electric Co., Columbia, S. C., and its motormen and conductors,

the City Federation of Trade has appointed a committee to approach Governor Cooper and Mayor R. J. Blalock, of Columbia, and ask them to arbitrate a new contract with Edwin Robertson, president of the corporation. The motormen and conductors, their spokesmen declare, have asked Mr. Robertson to agree to an approximate increase of 15 cents an hour in the rate of pay and improvement in certain working conditions. They state that so far they have failed to get a satisfactory agreement.

**New York Commission Protests Cummings Bill.**—The Public Service Commission for the First District of New York has made strong representations to the conference committee of Congress against certain provisions of the Cummings bill for the restoration of the railroads to private ownership. These provisions seriously affect the rights of state commissions in the exercise of their regulatory powers over railroads. They provide for an appeal to the Interstate Commerce Commission from the decisions of state commissions directing the making of improvements which demand an expenditure of funds. Such provisions, if enacted into law, the commission feels would greatly delay the making of needed local improvements.

**Indianapolis Asks Fair Play.**—The Indianapolis (Ind.) Street Ry. has addressed an open letter to the people of that city, asking the pertinent question "What does the future hold for Indianapolis?" The company cites the fact that Indianapolis is destined to become a city of at least 500,000 people. It notes the many manufacturing establishments and the growing bank clearances and asks the people of the city if the railway will be assured fair and equitable treatment in its effort to give the public adequate local transportation service. The appeal is unusually well written. It occupied a full page space in a recent edition of the Indianapolis News. The appeal is written in the spirit of an honest corporation striving to give the best service possible to a rapidly growing population.

**St. Catharines Would Take Over Its Railways.**—In a meeting during which the whole question of the proposed extension of franchise of the Niagara-St. Catharines & Toronto Ry., St. Catharines, Ont., was again debated, the City Council on Jan. 9, one week after the visit of Sir Adam Beck, effectually disposed of the whole railway problem. The Council finally voted that the Hydro-Electric Power Commission and the Minister of Railways & Canals be requested to continue and complete without delay the negotiations for the acquisition of the railway by the hydro-radial systems, as requested by Sir Adam Beck. The Council also passed a by-law for the issuance of debentures to the amount of \$668,539, which is the proportion of cost allotted to the city of St. Catharines in the hydro-radial scheme.



# Financial and Corporate

## Fort Wayne Plan Modified

Committees Representing the Security Holders Agree Upon Changes in Reorganization Plan

At meetings of the committee appointed under the Fort Wayne & Wabash Valley Traction Co. bondholders' protective agreement dated Sept. 12, 1917, and the committee appointed under the Fort Wayne & Northern Indiana Traction Co. bondholders' protective agreement dated Oct. 31, 1917, arrangements were made for the carrying out of the plan and agreement of re-organization declared operative by the committee headed by P. M. Chandler under date of Sept. 2, 1919, subject to the following revisions:

1. A settlement has been made with the protective committee of the Lafayette & Logansport Traction Co. bonds whereby the holders of \$849,000 of these bonds will be entitled to receive the following allotment, when, if and as issued, of the securities of the new company, namely: 40 per cent in first mortgage bonds, 40 per cent in adjustment bonds and 20 per cent in preferred stock, this being in lieu of 25 per cent in first mortgage bonds, 25 per cent in adjustment bonds, 25 per cent in preferred stock and 25 per cent in common stock, provided in the plan.

### AGREEMENT BEING NEGOTIATED

2. An agreement is being negotiated with the protective committee of the \$275,000. Wabash River Traction Co. bonds by which the members will recommend to their depositors and bondholders the even exchange, par for par, of their bonds for first mortgage bonds of the new company, in lieu of 50 per cent in first mortgage bonds and 50 per cent in adjustment bonds provided in the plan.

3. Under the plan and agreement there were reserved \$320,550 of first mortgage bonds for expenses, adjustments and contingencies. The settlement above referred to required the appropriation of \$264,850 reserve bonds for these adjustments, leaving only \$55,700 of said reserve bonds. In order to replace the bonds thus applied to these settlements and to make adequate provisions for expenses, contingencies or other adjustments, after careful estimate the committee determined that the new company shall have authority, with the approval of the Public Service Commission of Indiana, to issue \$350,000 additional first mortgage bonds: any balance not so appropriated to remain in the treasury of the company.

4. The committee has also determined that in the organization of the new company there shall be reserved to it the right to create, under approval of the Public Service Commission of Indiana, at any future time, a preferred stock or other security, subordinate to the first mortgage bonds, but which shall be entitled to the payment of dividends or interest prior to the adjustment bonds and junior securities, as well as to priority over them in payment of the principal upon liquidation.

The adjustments just mentioned when fully carried out, will give the new company a continuous line of operation from Lafayette to Fort Wayne, will eliminate any opposition by these bondholders and will obviate a severance of the operating line between Wabash and Peru, and make the first mortgage of the new company a first lien on the entire line from Lafayette to Fort Wayne. The committee re-

serves the right to abandon any of these revisions in its discretion and proceed with the plan and agreement.

As explained in the ELECTRIC RAILWAY JOURNAL for Jan. 3, page 72, the property of the Fort Wayne & Northern Indiana Traction Co. was sold under foreclosure on Jan. 29 to the committee of security holders of the company headed by Mr. Chandler.

## Plan to Rehabilitate Cincinnati & Columbus Line

At a meeting of business men of Cincinnati, Ohio, on Jan. 7, W. B. Sullivan, Dayton, Ohio, speaking for himself, and L. A. Petit and Rush E. Evans, all engineers, proposed a plan for financing the old Cincinnati & Columbus Traction Co., known as the Swing line, and save it from being junked.

He proposed that a company to be known as the Cincinnati & Eastern Ry. be organized with an authorized capital stock of \$1,000,000, all common stock, and an authorized 6 per cent bond issue of the same amount. Only \$450,000 of the bonds are to be issued just now, with a like amount of stock, \$100 of the stock to go as a bonus with each \$100 of the bonds. The engineers would receive \$225,000 of the common stock as their compensation for handling the proposition.

Of the \$450,000 received from the sale of bonds \$300,000 would be used in purchasing the property from the Union Savings Bank & Trust Co., Cincinnati, which now owns it, and \$150,000 would be used in rehabilitating the road and making necessary improvements for profitable operation under the direction of the Dayton engineers. Mr. Sullivan said an understanding had been reached with the bank. Mr. Petit wired from Columbus that the Public Utilities Commission had approved the plan.

The work of securing subscriptions is in the hands of committees of twenty appointed by the Cincinnati Chamber of Commerce, the Business Men's Club, the Merchants' & Manufacturers' Association and the Retail Merchants' Association. They will cover Cincinnati and Norwood, while Hillsboro men will endeavor to have the patrons along the line between Hillsboro and Owensville, who subscribed \$100,000 to the original Kroger proposition, re-subscribe to the bonds under the new plan.

It is said that many business men in Cincinnati favor the plan and will aid in putting it through. If successful, the plan will save the whole line between Norwood, a suburb of Cincinnati, and Hillsboro.

## Final Valuation Hearing

City States Its Position With Respect to Value of Pittsburgh Railways for Rate-Making Purposes.

In the final argument of the city of Pittsburgh before the Pennsylvania Public Service Commission in support of the contention that the physical valuation of the Pittsburgh Rys, is only \$48,000,000, C. K. Robinson, special city solicitor, declared that the railway earned from 7 to 12 per cent on its properties for a period of fifteen years beginning in 1902. The argument was intended to support the city's claim that superseded property items should not be included in the valuation. The engineers for the company have placed the property value at \$70,000,000, in opposition to the city's claim of \$48,000,000. The matter is of importance, for the valuation is to be made the basis of the future fares.

The city's argument ran in part as follows:

They (the exhibits) start with the formation of the Pittsburgh Rys. system on Jan. 1, 1902, and run to April 1, 1918. One exhibit shows (calculated on a 6 per cent return) on Jan. 1, 1902, a plant account of \$27,239,348, an allowance for working capital of \$1,441,400. This exhibit also shows that, at the end of 1902, the plant account was \$29,369,697, the allowance for working capital \$1,517,500, and the allowance for organization costs of companies having no physical properties, \$390,945, making a total plant account of \$30,170,917. The net corporate income for the year, deducting discarded property during the year, was \$3,558,703, which left a surplus on a basis of 6 per cent return of \$1,778,448.

The net receipts for the year 1902, were, therefore, sufficient to retire all superseded property in the year, and in addition thereto, amounted to a return of slightly less than 12 per cent upon the total investment.

For the year 1903, the net corporate income, after deducting superseded property, amounted to approximately 11 per cent upon the plant account for that year; for 1904, 10 per cent; for 1905, 10½ per cent; 1906, 11 per cent; 1907, 10 per cent; 1908, 9 per cent; 1909, 8½ per cent; from 1910 to 1914, the company shows earnings of less than 7 per cent; in 1915, 8½ per cent; and in 1916, about 8 per cent, on total investment in each of these years, including working capital and allowances for organization costs.

The exhibit shows that, on a 6 per cent non-compounded basis, there would be on April 1, 1918 (all superseded property having been written off out of earnings) a surplus of \$13,372,080, and on a 6 per cent compounded basis there would have been a surplus of \$31,166,047.

On a 7 per cent return on the investment, which has been agreed upon as the equitable return on whatever valuation the Public Service Commission may recognize in the traction system, the railway would now have a surplus of \$4,052,739 on non-compounded interest, or \$12,659,936 on compounded, had that rate of return been followed since the formation of the company, according to Mr. Robinson, who continues:

Instead of applying this surplus to depreciation, we find that the company not only paid out all of its earnings in dividends upon inflated securities, but actually attempted to make book payments on account of dividends in excess of earnings. This policy ultimately resulted in the readjustment and reorganization of 1913, and the writing off by the Philadelphia Co. of accumulated unearned and unpaid dividends of approximately \$10,000,000, which item constitutes the principal element of alleged value in the \$10,000,000 debenture bonds now held by the Philadelphia Co.

A decision from the commission is expected shortly.



## Change in Control

Operating Agreement Between Chicago Surface Companies May Be Superseded by Complete Merger

A rumor persists that a change in the control of the Chicago (Ill.) Surface Lines will take place shortly after Feb. 1, the time of election of the directors of the board of operation. Under the present operating agreement between the several surface line companies, the directors of the Chicago Railways elect four of the members of the board of operation and the Chicago City Railway elect three.

### MR. BLAIR MAY ASSUME CONTROL

This arrangement of things gives the Chicago Railways a majority of one. The directors of the board of operation and the officers are elected for a period of three years. Two three-year periods have passed under the agreement, during which time the City Railway interests have had charge of the operation of the properties under President L. A. Busby. The majority interests have been represented by Henry A. Blair, who has been the chairman of the board, but has had little to say about the conduct of the properties, since the operating responsibility has rested with the president, Mr. Busby.

The matter of a change in control is being generally discussed in La Salle Street, and it is understood it has been officially considered by the Chicago City Railway interests in their board meeting. The trend of discussion is that the majority interests will now take a turn at directing the affairs of the surface companies. Having had control of the properties since the organization of the Chicago Surface Lines six years ago, it is considered that the City Railway interests have had a fair opportunity to demonstrate the character of management which they have believed to be the most efficient and successful.

### NEWSPAPERS PRESUME TO KNOW

The Chicago *Tribune* states that it has ceased to be a secret that it is proposed to bring to Chicago as president and head of the operating department, under new policies to be dominated by Henry A. Blair, one of the biggest electric railway operators in the country. It is also hinted that a complete merger of the two surface companies may result from the change in control and it is probable that a general plan will be presented to the city looking toward improvement in relations between the companies and the municipality. There will undoubtedly follow a complete reorganization of the operating department.

### Valdosta Road Sold

Following a meeting of the directors of the Valdosta (Ga.) Street Railway, the sale of the railway to C. M. Killian, Valdosta, was announced. Transfer of the properties has been made to the new owner.

Mr. Killian has purchased all of the stock of the company, which was formerly owned by the estates of the late Eugene West, Jacksonville, Fla., and the late United States Senator William S. West, Valdosta. Owing to the fact that the estates of the former owners are located in different states the task of managing the property was an onerous one, and an offer to sell was made in order to permit the people of Valdosta to buy the property. No action was taken and finally Mr. Killian personally bought the stock himself. The original cost of the property was \$90,000. The price paid by the new owner was not announced.

Mr. Killian said that he has made no plans regarding the property. The line has never proved a paying proposition. The physical properties include about 5 miles of track, wire and poles, together with about ten cars. The company's franchise still has about fifty years to run. It is thought that a local company will be organized to continue the operation of the line.

The Valdosta Street Railway has elected new officers as follows: C. M. Killian, president; Mrs. C. M. Killian, vice-president; C. E. Boswell, secretary and treasurer. W. E. French, secretary of the Valdosta Chamber of Commerce, has been appointed temporary superintendent. The directors of the company include C. M. Killian, Mrs. C. M. Killian, J. G. Crawford, O. H. Dykes and C. E. Boswell. The system will probably be improved during the coming year.

### Deposit of Oakland Bonds Urged

An appeal to bondholders of the San Francisco-Oakland Terminal Ry., Oakland, Cal., to deposit their bonds immediately to expedite reorganization was issued on Dec. 23 by the committee in charge. The communication says:

It is vital both to the public and to the company to settle once for all the status of this company.

Either the company, as a public utility operating under private ownership, should be placed in a position to obtain new capital to serve the growing needs of the East Bay communities, or those communities should absorb the company by present purchase and municipal ownership of ultimately through adoption of a resettlement franchise.

The committee is planning to strengthen the company by creating a financial structure "that will enable the company to obtain new money from time to time by sale of new securities."

About \$4,816,000 in matured bonds and bond sinking fund payments amounting to \$1,806,384 are now in default. Bond interest amounting to \$1,221,765 is in arrears, and the stockholders have received no dividends since 1912.

The members of the reorganization committee are: John S. Drum, George A. Batchelder, P. E. Bowles, Paul A. Sinsheimer, George Tourny, Herbert Fleishacker, W. W. Garthwaite, J. F. Cariston, Gavin McNab and A. Crawford Greene.

## Interborough's Heroic Resort

As an emergency measure to save the company going into the hands of a receiver, the Interborough Rapid Transit Company, New York, N. Y., has announced that all the unused real estate in New York City held by the company, valued at several million dollars, will be sold at public auction to the highest bidder in April. This real estate consists of both vacant and improved property covering all classes of realty, from buildings in the Grand Central Terminal zone to vacant lots in the Bronx, and valuable holdings in Long Island City.

Frank Hedley, president of the company, is quoted as follows:

Speculation, which has been rife as to exactly how the Interborough Rapid Transit Company managed to meet the Jan. 1 payment on its outstanding bonds, is answered in the announcement made that this obligation was met in part by pledging the real estate holdings of the company in the Boroughs of Manhattan, Bronx, and Queens not necessary for the operation of the road.

The forthcoming sale of this property is a forced sale in the strictest sense of the term. The situation brought on by the war has compelled the Interborough to continue supplying rapid transit service at a fare established on pre-war conditions, and this has forced the company to dispose of these real estate assets in order that it may do all in its power to protect the interests of investors in its securities.

But this does not settle the main problem. In the future we will have no such assets to pledge, to borrow on or to sell and there will be interest payments to be met next July; either that or receivership.

The traction problem is so big that it will take time, study and probably legislation. But there is the existing emergency to meet. And that can be met only by an increased fare.

The fact that we are going to sacrifice these valuable assets is sufficient answer to those who dodge the necessity behind our appeal for a higher fare. We certainly would not sell unless we deemed it our duty to protect the interests of people whose savings have been invested in good faith.

We shall continue, to the best of our ability, and to the last trench, to protect these interests and the lives of our passengers.

### Brooklyn City Stockholders Organize

The annual meeting of the stockholders of the Brooklyn (N. Y.) City Railroad was held on Jan. 12. The meeting was the first held by the stockholders since the Brooklyn City Lines were separated from the Brooklyn Rapid Transit on Oct. 19 last by order of the Federal Court.

Directors of the company to serve for the ensuing year were elected as follows: Frederick L. Allen, William H. Dykman, Richard L. Edwards, Crowell Hadden, Alfred R. Horr, Frank Lyman, Edwin P. Maynard, Henry F. Noyes, H. Hobart Porter, Dick S. Ramsay, Hiram R. Steele, James Timpson and Harold T. White.

There was a general discussion of the company's position and prospects. Particularly, there was an exchange of views as to bus operation by the city of New York and the steps which should be taken to protect the property of the Brooklyn City Railroad against the losses it was suffering in consequence of this competition.



### San Francisco Reorganization Making Progress

More than 91 per cent of the holders of underlying bonds of the United Railroads, San Francisco, Cal., including The Market Street Cable 6s, Ferry & Cliffs 6s, Omnibus Cable 6s, and Sutter Street 5s, have agreed to exchange their underlying bonds for the new Market Street Railway five-year 6 per cent notes.

The last one of the financial institutions holding any of these underlying bonds has joined in the reorganization, and there remain outstanding but a few private holders, at least 50 per cent of whom are expected to deposit within the next ten days. This will bring more than \$5,000,000 of the \$5,200,000 of underlying bonds into the agreement which is an unusually high percentage considering that some of the underlying bonds are held abroad and about \$28,000 of them have not been located.

Enough of the bonds having joined for the plan to become operative, steps will be taken to bring about the foreclosure of the mortgages.

In commenting on the situation, George A. Batchelder, who has been acting for the reorganization committee in the matter of securing deposit of securities, made a statement as follows:

The committee of five bankers who created the plan performed an exceptional piece of work and deserve the hearty thanks of the security holders, and if the Oakland reorganization produces anywhere near as sound a plan there will be a second lot of very fortunate bondholders.

I am permitted to say this, having had little or nothing to do with the United Railroads-Market Street Railways plan except to provide the security for the new 5-year notes, but I am on the Oakland Key Route reorganization committee.

With this successful refinancing of the street car system on the very conservative basis of a funded debt on which the road is earning two and one-half times its fixed charges, San Francisco will have in the Market Street Railways a street car system which will compare more than favorably with any other in the United States.

### Bill to Permit Washington Companies to Merge

The Commissioners of the District of Columbia, Jan. 9, 1920, sent to Congress a bill authorizing the merger of the Capital Traction Company and the Washington Railway & Electric Company, operating in Washington.

The bill as it was sent to Congress carries with it no power other than providing for the removal of the legal barriers to a merger of the systems. The bill also calls for a change in taxation of the railways, providing for a tax on the operating income of the road rather than on the gross receipts. It further provides that public utilities may finance extensions by additional stock issue, now taken care of by bond issues.

The measure provides that the present tax of 4 per cent on the gross receipts shall be repealed and a graduated tax upon the operating income in excess of 6 per cent on the fair value

of the company's property be substituted.

The commissioners are of the opinion that a consolidation of the two lines would make it possible to establish a lower rate of fare.

Previous rumors of plans to consolidate the lines have been denied.

### Common Stock Dividend Passed

The comparative consolidated earnings statement of the United Light & Railways Company, Grand Rapids, Mich., and subsidiary companies for the twelve months ended Oct. 31, follows:

	1919	1918
Gross earnings, all sources	\$10,056,109	\$9,024,302
Operating expenses, including maintenance, general, income and excess profits taxes	7,142,287	6,376,693
Net earnings	\$2,913,822	\$2,647,609
Interest on bonds and notes, subsidiary companies, due public	\$721,911	\$716,782
Dividends and earnings on preferred stocks, subsidiary companies, due public	170,762	170,864
Profit due minority stockholders	8,454	6,836
Balance	\$2,012,694	\$1,753,126
Interest on first and refunding 5% bonds, United Light & Railways Company	445,460	434,700
Balance	\$1,567,234	\$1,318,425
Interest on 6% five-year bond secured gold notes, United Light & Railways Company	90,000	96,947
Interest on 6% two and one-half-year bond secured gold notes, United Lt. & Rys. Co., Series "A"	90,000	78,769
Interest on 7% five-year bond secured gold notes, United Lt. & Rys. Co., Series "B"	102,656	9,247
Interest on ten-year 6% convertible gold debentures, United Light & Railways Co.	120,000	120,000
Interest on commercial loans, United Light & Railways Co.	40,366	47,027
Balance	\$1,124,211	\$966,433
Dividends on first preferred stock 6%	\$605,619	\$607,884
Surplus earnings	\$518,592	\$358,548

It was the sense of the board of directors of the company that pending (a) the working out of many questions involved in international commerce and finance, (b) the settlement of the financial and industrial problems of the United States, (c) the return of cheaper and more reasonable conditions, (d) the solution of and return to normal conditions of the coal supply, it was the part of wisdom to defer for the present, the declaration of dividends on the common stock of the company. The regular dividend of 1½ per cent on the preferred stock of the company was declared out of the surplus earnings of the company, payable on Jan. 2, 1920, to all preferred stockholders of record at the close of business on Dec. 15, 1919.

## Financial News Notes

**Service Resumed in Part.**—The Berkshire Street Railway, Pittsfield, Mass., has resumed partial service to Hinsdale from Dalton.

**Receiver for Rhode Island Suburban Railway.**—Col. Harold J. Gross and B. J. Jackson have been appointed temporary receivers for the Rhode Island Suburban Railway, Providence, R. I., upon application of the Union Trust Company, Providence, R. I.

**Appraisal of Shore Line Started.**—Shepard B. Palmer, Norwick, and W. R. Dunham, Jr., New Haven, appointed by the court as appraisers of the Shore Line Electric Railway, Norwich, Conn., now in the hands of a receiver, have begun the work of appraisal of the property of the company.

**Sues Boston Suburban Electric Companies.**—James E. Clinton has brought suit in the Superior Court against James W. Smith et al, trustees of the Boston Suburban Electric Companies, Newtonville, Mass., to recover \$1,000,000, representing principal and interest on 623 promissory notes for \$1,000 each, which were due on Dec. 1, 1919.

**Will Consolidate Subsidiaries.**—The Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., which owns all except directors' qualifying shares of the common stock of the Michigan Light Company and Consumers' Power Company, which operate in Michigan, is making arrangements for consolidation of interest of the two latter companies.

**Republic Notes Refunded.**—The Republic Railway & Light Company, New York, N. Y., has sold to the First National Bank, Cleveland, Ohio, \$1,444,000 of three-year 7 per cent guaranteed gold notes, the funds from which will be used to meet an equal amount of Republic Railway & Light Company two-year notes due on Jan. 15, 1920.

**All Staten Island Will Walk.**—The period of grace extended to the people of Staten Island by the electric railways operating there has expired and, there being no prospects of immediate relief for the lines from the public authorities, the Richmond Light & Railroad Co., and the Staten Island Midland R.R. announced on Jan. 16 that they would cease to operate on Jan. 20. The roads are owned largely by the estate of the late H. H. Rogers.

**Receiver Authorized to Pay State.**—An order was made in the United States District Court at Pittsburgh, Pa., on Jan. 5, authorizing the receivers of the Pittsburgh Rys. to pay \$130,788. due the State of Pennsylvania for capital stock and corporate loan taxes of the railway and its underlying companies.



The order followed the filing of a petition by the receivers, informing the court that the Commonwealth had assessed the companies for taxes for 1918.

**Abandonment Denied.**—The Public Service Commission for the Second District Service Commission for the Second District of New York on Jan. 6 denied the petition of the Orange County Traction Company for approval of a declaration of abandonment of the Eagle Street line in Newburgh running from Liberty and Renwick Streets, through Renwick and Bridge Streets to the terminus of the line near Quassaic bridge, about 2,900 feet.

**Local Service in Reno Is Discontinued.**—The petition of the Reno, (Nev.) Traction Company asking permission of the Public Service Commission of Nevada to abandon its local service in Reno has been granted. It was planned to discontinue service on Jan. 15. Rails on the 4 miles of track in the local system will be torn up at once. The interurban service between Reno and Sparks will be continued. Several individuals seeking franchises for jitney operation have submitted propositions to the city.

**Service Suspended in Saugus.**—The Eastern Massachusetts Street Ry. has ceased operation on the Saugus-Lynn branch. To meet this emergency, jitney licenses have been granted and a bus line has been started between Saugus and the city of Lynn. The proposed fare will be 5 cents as compared with the former railway fare of 10 cents. The curtailment of service by the railway became necessary on account of the refusal of the municipalities served to contribute their proportionate share to the cost of expense in maintaining the roadbed.

**Effort to Restore Buffalo Road to Local Control.**—Efforts are being made by Chairman McDougal of the bondholders' committee of the International Railway, Buffalo, N. Y., to organize a corporation of Buffalo bankers and businessmen to purchase the railway and retain control of the property in Buffalo. It is believed this eventually will be done. The bondholders' committee is now making an inventory of the company's property and has asked the Mayor and other municipal authorities to join in the appraisal. This offer was rejected.

**Monorail Financing Disapproved.**—The Michigan Securities Commission, which examines very carefully into all security issues intended to be offered for subscription by the public, has refused to give unqualified approval to the request of the Monorail Company of America to issue \$75,000 of securities. The money is wanted to hire engineers to investigate and report. The State Commission may, however, approve the issue after the company files a statement signed by those who have subscribed indicating that they know the money is to be used for securing engineering data and that the proposed

system cannot be installed until an elevated or a subway is built for Detroit.

**Against Municipal Ownership.**—A committee comprising E. B. Bacon, Jersey City; Russell H. Nulty and S. B. Swan, Ocean City, N. J., met with the Ocean City Board of Trade and urged that the city not purchase the line of the Ocean City (N. J.) Electric Railroad. The committee did recommend, however, that the city make sure that the line is in operation next summer, asserting that the municipality had plenty of power to effect this, even though it be compelled to pay any deficit that might be incurred by the operation of the road. The road was conducted under an arrangement similar to this last summer. The committee recommended the employment of an expert, such as Peter Witt. No action was taken on the report.

**Extra Dividend on Bankers' Share.**—In addition to the regular distribution on Feb. 2, 1920, of Cities Service Co. bankers' shares, which amounts to 45.8 cents, there will be an additional amount paid to bankers' shareholders on Feb. 2 by reason of the increase in the stock dividends on Cities Service common stock from 12 per cent to 15 per cent per annum. This additional amount will be calculated on the market price of Cities Service common stock as it will be on Jan. 16, 1920, so that the exact amount thereof cannot be stated at the present time. At the price at which the last dividend stock was sold, it would amount to \$40,800 or 10.2 cents per banker's share, making the total distribution on Feb. 2, 1920, approximately 56 cents per bankers' share. The exact figure will be announced shortly after Jan. 16, 1920.

**Notice of Interest Payment.**—Notice has been sent by Lee, Higginson & Co., Boston, Mass., to holders of certificates of deposit representing Boston & Northern Street Railway first mortgage refunding 4 per cent bonds, and old Colony Street Railway first mortgage refunding 4 per cent bonds, that the Jan. 1, 1920 installment of interest on the 4½ per cent refunding bonds and Oct. 1, 1919, installment of interest on 6 per cent refunding bonds of the Eastern Massachusetts Street Railway will be paid at the Boston Safe Deposit & Trust Company on or after Jan. 2, upon presentation of certificates of deposit. Certificates of deposits will be stamped as assenting to the plan of reorganization, if not already so stamped. It is expected that the new securities will be ready for delivery before the end of January. To avoid sending in certificates of deposit holders may, if they prefer, refrain from presenting certificates until the new bonds are ready for distribution.

**Hearing in Chattanooga Case.**—An order has been handed down in Federal Court at Knoxville, Tenn., in the case of the Commercial Trust Company, Philadelphia, Pa., vs. the Chattanooga Railway & Light Company et al. and the Maryland Trust Company vs. the Chattanooga Railway & Light Company

fixing March 8 as the date for hearing arguments to sustain the bills in these consolidated causes as general creditor's proceedings. It has also been ordered by the court that authority be conferred upon and vested in the receivers to take such steps as may be necessary to ascertain what has been done with the stock and property of the Lookout Mountain Railway, which stock, it is alleged in the original bill, and in cross bills of the Commercial Trust Company, to have been converted as security for the bonds secured by the mortgage executed by the defendant railways company, to the Trust Company of North America, dated May 1, 1906.

**Protests Washington Valuation.**—Following the lead of the Capital Traction Company, Washington, D. C., the Washington Railway & Electric Company has filed in the District Supreme Court an appeal from the decision of the Public Utilities Commission fixing the value of the property. An injunction is also prayed to prevent the commission from using its valuation as a basis for fixing rates of fare or otherwise. Similar petitions and appeals were filed by the City & Suburban Railway and the Georgetown & Tenleytown Railway. Twenty-five grounds of dissatisfaction with the award of the commission are set forth in the petition of the Washington Railway & Electric Company. Among the complaints made by the company is that the findings were based on evidence never introduced into the record, but received by the commission in other proceedings. The commission made no effort to ascertain, it is charged, the fair value of the company's property at the time the award was made, as required by the utilities act.

**Car Trust Certificates Offered.**—Subject to prior sale or change in price Edward B. Smith & Company, Philadelphia, Pa., are offering for subscription on a 6½ per cent income basis \$208,000 of J. G. Brill Company Birney safety equipment 6 per cent gold trust certificates, Trust No. 4, Series "A," issued under the "Philadelphia Plan." These Series "A" Certificates will be issued by the Fidelity Trust Company, trustee, and will be secured by assignment of a lease covering seventy-three Birney one-man safety cars, for which purchase money notes aggregating \$372,925.73 of Lindley M. Garrison, federal receiver of the Nassau Electric Railroad, Brooklyn (N. Y.) Rapid Transit System have been deposited. These cars were acquired under lease by the receiver, on order of the court, and with the approval of the Public Service Commission of the State of New York. This issue of certificates represents approximately 50 per cent of the selling prices of these cars. The balance having been paid in cash (20 per cent) and by an issue of \$129,000 Series "B" certificates which are deferred in lien. The safety cars for Brooklyn have now been in operation for some time. They have been described in detail previously in the *ELECTRIC RAILWAY JOURNAL*.



# Traffic and Transportation

## New York Inquiry Opens

Board of Estimate Plans Comprehensive Investigation of Companies' Condition—May Last Three Months

The Board of Estimate of New York City on Jan. 13 began an investigation of the city's traction situation with a view to arriving at a final settlement of the companies' problems. The board contemplates a thorough study of the companies' affairs, both past and present, and, owing to the great mass of data to be examined, the inquiry may last three months or longer.

The board's session on Jan. 13 was devoted to the preliminaries of organizing for the investigation. Charles L. Craig, City Comptroller, outlined its scope. It was announced that Corporation Counsel William P. Burr would conduct the inquiry. It had been the opinion of some of the members of the board that it would be better to have independent counsel in order to give a non-partisan aspect to the inquiry and to avoid any criticism of a "ready-made" decision, but at a meeting held on Jan. 13 in the Comptroller's office the majority decided in favor of Mr. Burr.

The board will begin the examination of witnesses at the next session, which will be held on Jan. 21. It is endowed with full powers to make a complete inquiry into all the records and books of the various companies, and subpoenas will be issued for witnesses who do not readily heed the board's request. As far as the traction lines in the hands of receivers are concerned, the representatives have already assured Mr. Craig that it will not be necessary to issue subpoenas; they are willing, they say, to show the investigators "all they have."

The inquiry will start at the beginning of the project to dig the old Fourth Avenue-Broadway subway and an effort will be made to ascertain exactly the amount of money invested in the road, and how much of the bond issues of the Interborough were actually used in the equipment and maintenance of the line. August Belmont, who was actively interested in the old subway, and who remained a director in the Interborough for many years, will be, it is believed, among the first witnesses to be called.

The board hopes eventually to fix a valuation on the companies' properties. For this purpose it will first examine their books with the object of obtaining the following information:

(a) The actual monetary investment for the equipment of the first subway under contract No. 1 by the contractor, John B. MacDonald, or by him and his assignees, and the Interborough Rapid Transit Company; that is, to ascertain the extent to

which funds of the investing public supplemented moneys supplied by the City of New York for the construction and equipment of original subway under contract No. 1.

(b) The actual monetary investment of funds other than those supplied by the City of New York in the construction and equipment of the Brooklyn extension of the original subway under what is known as contract No. 2.

(c) The facts and circumstances in relation to the lease of the lines of the Manhattan Elevated Railroad Company by the Interborough Rapid Transit Company.

(d) The actual monetary investment in the existing surface lines in the Borough of Manhattan.

## Bay State Jitneys Unchecked

The Eastern Massachusetts Street Ry. on Jan. 14 discontinued service on all its lines in Salem, Mass., owing to continued jitney competition in the Salem district. The City Council had previously passed an ordinance revoking jitney licenses, but, pending a referendum on Jan. 27 on the question, but no active steps were taken to enforce it. An appeal was taken to Governor Coolidge, who refused to intervene to stop the cutting-off of the service. The Salem City Council on Jan. 12 ordered the Mayor and the City Solicitor to apply to the courts for an injunction to restrain the trustees from cutting off the service. The city was unable to stay the trustees' action. The company took action in accordance with its policy of refusing to operate in the face of jitney competition.

Conforming to the request of the trustees of the Eastern Massachusetts Street Ry. that jitney competition be eliminated in the Quincy district, the city council has revoked the licenses of 111 jitney drivers. These jitneys have been operated in direct competition to the company lines and were subject to the new ordinance eliminating these conditions. Five other jitneys, run on the common hackney order, have been allowed to operate as they do not violate the terms of the ordinance.

The Quincy Chamber of Commerce has appointed a committee representing the various business interests of the city to co-operate with Manager McCormick in directing the Quincy division of the Eastern Massachusetts Street Ry. The appointment was made at the instance of the Public Trustees of the company in accordance with the "home-rule" policy which has been in effect for several months.

The company has announced reduced fares on several of its lines. The changes are as follows: Salem and Peabody districts, sixteen tickets for \$1; Danvers and Marblehead districts, fourteen tickets for \$1. Reduced rates are also established between Danvers and Peabody, Danvers and Beverly, and Salem and Danvers. Transfers are given with the payment of cash fares.

## Rochester's Need Great

Company Lacks Funds for Replacement of Equipment—President Hamilton Urges Service-at-Cost

James F. Hamilton, president of the New York State Rys., in a statement issued recently, urged that the company be granted an immediate increase in fares on its Rochester lines. Mr. Hamilton declared that the company must secure additional revenue if it is to continue operation in Rochester. In his opinion, adoption of a service-at-cost plan offers the best solution of the company's difficulties.

Unless fares are raised the company can do nothing to improve service, said Mr. Hamilton. Complaints against the quality of the service are justified, in his opinion, but, at a 5-cent fare, the company is furnishing the best service of which it is capable. It has no funds available for replacements of track and renewing of equipment. In regard to the company's plight, Mr. Hamilton said:

Complaints are gaining in volume against the service given by our company in this city. I can only state that no one regrets more than does the company that the service is not satisfactory. At the present time we are furnishing service at less than cost.

It is only by means of extreme sacrifices and conservation that we have been able to continue operation. We have no money for replacements of track and renewing of equipment. Daily our position grows worse and will continue to do so unless we are allowed additional revenue.

Patrons have the right to complain against the waits they suffer, the crowded cars and other ills of curtailed service, but we are powerless to remedy these conditions, as the service is positively the best we can give under present financial conditions. The dollar of today purchases only 47 cents' worth in material and labor. The nickel was worth 5 cents but now its value is less than 2.5 cents.

If the nickel is enough now, it was too much five years ago, yet the company was able at that time to earn only a small return—about half of the legal interest rate—upon its investment. We have courted a fair investigation. We want only justice. Street railways in many cities are in a perilous condition. Relief has come to those in a great number of municipalities and I believe the extent of this relief is little realized in Rochester.

The statement then calls the attention of car-riders to the fact that relief has been granted to the traction lines in many other cities. It continues:

Four hundred cities all over the United States and Canada have realized the necessity of allowing their traction companies adequate fares. Some cities have not granted relief enough. \* \* \*

Something must be done by municipalities to meet the serious conditions confronting traction companies. Only two courses are open—municipal ownership and operation, or granting private operators the right to fares which will provide good service at cost plus a reasonable return upon the investment. \* \* \*

No objection is being placed by street railway companies to the institution of city regulation. A city commission is exercising regulation over traction companies operating under private ownership with a service-at-cost plan would insure the public a square deal.

Time for decision is at hand. The present status cannot continue. The future welfare of the city is imperilled. No one can fairly deny a public utility a just return upon its investment. The more the tracks and equipment of the company deteriorate, the more it will cost to restore the property to the basis Rochester needs and is entitled to.

Rochester will never be Toledo-ized. Here it is service first which the public is demanding. I believe that the people of Rochester are willing to pay what good service costs in this day of high prices.



## Seven Cents in Lincoln

Commission Allows Company Increase As Emergency Measure Pending Fixing of Permanent Rate

Seven-cent cash fares became effective on the lines of the Lincoln (Neb.) Traction Co. on Jan. 1. The advance from a 6-cent basis was made under authority of a recent order of the State Railway Commission, which sanctioned the increase in rates as an emergency measure. The new schedule will continue for a period of six months, pending the fixing of a permanent rate.

The commission ordered the company to sell four tokens for 25 cents. The fare between the suburban towns and the city of Lincoln was raised from 7 cents to 8 cents, or one token plus 1 cent. The company was also ordered to sell seven children's tickets for 25 cents and to continue the sale of these tickets in the suburban towns for use within the city of Lincoln.

### PERMANENT RATE TO BE FIXED

This is the second fare increase on the company's system since Aug. 1, 1919. Following the refusal of the commission to permit the company to establish 6-cent fares in December, 1918, the latter applied to the federal court for an injunction to restrain the commission from enforcing rates which, it contended, were confiscatory. The court granted the petition for an injunction and authorized the company to install 6-cent fares pending final determination of the case.

The company, in asking the commission for a further increase, alleged that the maximum rates provided by the federal court, were insufficient for its requirements. During the months of January to July, 1919, inclusive the operating revenues failed to meet necessary expenditures by \$34,425, and for the months of August, September and October, 1919, there was a similar shortage of \$6,091, making a total deficit in the railway department of \$40,516 for ten months.

### NO DIVIDEND PAYMENTS

In allowing the increase in fares to 7 cents, the commission stipulated that, during the operation of the order, the company should pay no dividends on its common stock. It also decreed that no revenues earned during the life of the order should be used for the payment of such dividends. In explanation of this feature of its order, the commission said:

The present application is for emergency fares, it being alleged by the company that the maximum fares provided in the order of the federal court are not sufficient to meet its requirements. It is apparent that the present proceedings do not involve the question of any stock issue, nor of dividends paid in the past. It is conceded by every one interested that it will take some time—perhaps as much as six months—to check the inventory and valuation and to hear and determine the issues in the case involving permanent fares, so the question immediately before the commission is whether or not there is an emergency requiring relief for the company during the time that will lapse before proper permanent fares can be determined. Nothing herein will be a precedent for determining the other causes. This is an emergency fare case and is wholly separate and distinct from the cause involving permanent fares.

The commission estimated that, under the most favorable circumstances, the 7-cent fare would add from \$40,000 to \$45,000 to the company's revenues. It is believed that with this added revenue, the company will be able to pay operating expenses and possibly have a small surplus for the settlement of its outstanding obligations. In dealing with the effect upon the company of increases in wages and other costs, the commission's order said:

The commission finds from the evidence that on August 1, 1919, there was a general advance in the wages of the entire operating force of the company amounting to about \$50,000 per year, and on Nov. 1, 1919, there was another increase amounting to about \$8,000 per year. There has been a very heavy advance in the cost of fuel and fuel oil, the former having risen on an average of considerably more than \$1 per ton, and the latter having gone from about \$1.80 per barrel to \$3.22 per barrel. Due to the general shortage of coal, made still more acute by the strike, the company has been compelled to install oil burners under more than one-half of its boilers, the coal consumption having been reduced from 125 tons to 50 tons per day.

In order to safeguard its fuel supply the company entered into a contract while the strike was in progress, for oil for a six months period beginning Jan. 1, 1920, under which oil will cost \$3.22 per barrel for the month of January, about \$2.50 for February and March, with a gradual reduction during the months of April and May, and falling to \$2.22 for the month of June. The secretary of the company, Mr. Shaw, testified that from his observations as to the relative costs of oil and coal he considered oil at \$3.22 per barrel about equal to coal, such as the company customarily uses, at about \$9 per ton. The actual increase in the cost of fuel for November, 1919, over its cost for November, 1918, is (partly estimated) \$7,628.77.

The estimated increase for January, 1920, over December, 1919, is upwards of \$9,000, and over December, 1918, nearly \$17,000. Since the hearing in this case, the coal strike has been settled and doubtless the estimated expenses will be somewhat lessened, but there is no indication that there will be a radical reduction in fuel cost. What has been said of fuel is true of almost all other materials and supplies used by the company; there is nothing pointing to reduction in their prices.

## New York Assembly for Fare Inquiry

The New York Assembly has passed a resolution calling on the Public Service Commissioner of the First District to report to the Legislature with recommendations relating to the solution of the traction fare problem. The resolution was adopted by the Assembly at its opening session on Jan. 7. It follows:

Whereas, Governor Smith recommended the abolition of the five-headed public service commission of the first district and the appointment of a single regulatory commissioner assuring the Legislature of 1919 that this action would produce beneficial results to the acute transportation situation in New York City, and

Whereas, The Legislature acquiesced into his recommendation, and

Whereas, Such problem is becoming daily more acute and its speedy solution is of vital importance to the residents of the city of New York,

Resolved, (if the Senate concur), that such commissioner is hereby requested to report to the Legislature the result of his investigation, whether it is possible for the traction company to render adequate service at the present fare, and any recommendations for the solution of the problem that he may deem proper and appropriate.

It is evident that the Assembly intends to go into the subject of increased fares for traction companies thoroughly with the idea of affording such necessary relief as will promote proper service and protect the interests of the operators. The resolution was passed unanimously in the Assembly.

## Bonus System for Dallas

Experiment Extending Over Three Months in Rewards to Trainmen for Efficient Operation

The Dallas (Tex.) Ry. has started a bonus system for its employees as a means of encouraging efficiency. This announcement was made by Richard Meriwether, vice-president and general manager. The new plan provides for a bonus of 2 cents an hour for every hour worked during the month to be paid to those trainmen whose records during that period show no accidents charged against them or other charges of carelessness, inefficiency or negligence in performance of duty.

### TRAINMEN MAY APPEAL

Mr. Meriwether said the efficiency bonus plan would be continued for a trial period of ninety days. If at the close of the ninety-day test period the plan is found to work successfully in encouraging carefulness and reducing accidents, it will be continued through the rest of the year and will become a feature of the company's permanent policy.

The superintendent of transportation is to determine if carelessness or inefficiency should be charged against any trainman in case of an accident. He is empowered to penalize trainmen by making them ineligible for bonus if he sees fit to do so. The superintendent of transportation will report the names of all trainmen who are entitled to the bonus pay, which will be distributed on the fifteenth of each succeeding month.

Appeals from the decision of the superintendent of transportation regarding those entitled to bonus allowance will be made to an efficiency board of five members. Of the five members three will be trainmen, elected by ballot from the trainmen at large; the claim agent of the company and one other company official to be selected by the president of the company. The trainmen will also elect three alternates as the members of the board are elected, and these alternates will serve whenever the regularly chosen members are unable to do so.

The efficiency board on the fifth of each month will hear and consider appeals from the decisions of the superintendent of transportation during the preceding month.

### CHARGES AGAINST TRAINMEN

Charges that may be made against motormen include careless accidents, running ahead of time, talking to passengers while running, the use of tobacco while on duty, discourtesy to passengers, continual failure to make schedules without good reason, reporting late for duty, and failure to have proper route signs.

Charges that may be made against conductors include: careless step accidents and accidents to passengers inside the car, signaling to motorman to pass up passengers when there is still standing room in the car, and careless collection of fares.



## Can Develop Traffic

Railways Should Capitalize Riding Habit Developed by Jitneys, Says Pittsburgh "Gazette-Times"

Electric railroads operating in communities where the competition of motor vehicles is keen, can benefit by capitalizing the riding habit developed by the jitneys. This is the view expressed by the Pittsburgh (Pa.) *Gazette Times* in an editorial commenting upon the annual report of E. K. Morse, city transit commissioner. The report, in which Commissioner Morse urged that the Pittsburgh Railways return to a 5-cent fare within the city limits, was discussed at length in the issue of the *ELECTRIC RAILWAY JOURNAL* for Nov. 15, page 950.

The *Gazette-Times* points out that the jitneys, by charging a 5-cent fare, have popularized the idea of riding for short distances. It holds that the trolleys, by giving improved service at reasonable rates, can secure much of this short-haul traffic for themselves. In part the editorial says:

The central thought in Transit Commissioner Morse's third annual report is that, through failure to provide adequately for the public need, the people of Pittsburgh are turning away from the facilities placed at their disposal, to the great hurt of the city. Chiefly he blames the transit system for changing the course of logical development and charges that the fare increases have given the people the walking habit, whereas the primary concern of the trolley managers should be to develop the riding habit. There can be no question that a combination of convenient service and reasonable rate of fare will encourage riding. Data furnished by the Pittsburgh Railways give proof of that. \* \* \*

But it is to be observed that the habit of riding short distances on motor cars for 5 cents leads to the people also making short journeys on the trolley cars. The "riding habit" is becoming fixed. We may be sure it would grow amazingly wherever it was encouraged.

How to promote it in Pittsburgh is a problem of first importance. Mr. Morse's suggestions to this end are worthy of careful consideration. Certainly, if it is too late to change the plans that have been made for public improvements on a large scale it ought not to be impossible, in conjunction with them, to devise a fair system for correcting housing conditions and encouraging the people to make greater use of the trolleys.

## Wants Seven-Cent Fare Continued

The Public Service Commission for the Second District of New York on Jan. 6 ratified a 7-cent fare by the Port Jervis Traction Co. for the first six days in January, pending local action on the company's request for an extension of a franchise amendment to permit further charge of 7 cents on the company's line.

The commission authorized a 7-cent fare on April 15 last until Dec. 31, the local authorities having waived a 5-cent fare provision during 1919. The traction company asked that the increased fare be permitted for a longer period and the outgoing Port Jervis administration continued the franchise amendment until Jan. 6 to permit the 7-cent fare question to be considered by the new Port Jervis administration, the town of Deer Park having extended the 7-cent fare period until March 10, 1920. It was shown on a recent hearing before Commissioner Thomas F.

Fennell that the traction company had a net operating loss of \$62.71 from May 1 until Dec. 17 last. The commission's order provides that all earnings from operation above operating expenses and taxes shall be expended on the railroad and equipment.

Further application will be made to the commission following action by Port Jervis authorities to whom the company has made application for a continuance of the 7-cent fare.

## City Asks Rehearing of Buffalo Case

Mayor Buck of Buffalo, N. Y., has petitioned the Public Service Commission for the Second District, for a rehearing on the commission's order in the International Railway rate case, decided Nov. 20, 1919.

It is claimed by Mayor Buck that in 1898 the city, the Buffalo Traction Company, the Buffalo Railway and the Crosstown Street Railroad, predecessors of the International Railway, made an agreement for a 5-cent fare, with transfers over all roads treated as one and that the commission cannot change this agreement; that the franchise granted the Buffalo Traction Company in 1895 and amended in 1899, provides for a 5-cent fare with transfers to any other street surface road in Buffalo and that this franchise is not affected by the Milburn agreement.

It is also claimed the 1898 agreement and the Buffalo Traction Company's franchise of 1895 as amended, constitute contracts under the State and federal constitutions which the commission cannot change.

After the election at Buffalo on Aug. 20, 1918, when the action of the Mayor and Council in granting an increase in fare to the company was repudiated, the company appealed to the courts as the last source of relief. A favorable decision was handed down by the Court of Appeals on July 15, 1919, giving the Public Service Commission jurisdiction. The rate case was immediately presented to the commission, and on Nov. 20, 1919, an order was made increasing the rate of fare in Buffalo to 7 cents.

## Six Cents in Worcester Zones

The Worcester (Mass.) Consolidated Street Ry. has raised fares in each of the two zones into which the city of Worcester is divided from 5 cents, to 6 cents.

The increase was authorized by the State Department of Public Utilities after the company had shown that it was losing money under the 5-cent zone system which went into effect on Dec. 1. The 6-cent rate is temporary, the commission declining to establish a permanent rate pending labor hearings. No increase was granted to the company on its lines outside the city.

Prior to Dec. 1 last the fare was 7 cents with free transfers. Under the zone system the Worcester City Hall is the first point from which fares are computed.

# Transportation News Notes

**Two-Cent Transfer Charge Effective.**—The Union Street Ry., New Bedford, Mass., has installed the fare schedule recently approved by the State Public Service Commission. The new rates provide for an initial 5-cent fare with a 2-cent charge for transfers.

**Safety Cars for Racine.**—The Wisconsin Gas & Electric Co. is planning to put thirty-three Birney cars in service in Racine, Wis., in conjunction with the present cars. The new equipment will represent an investment of \$300,000, taking into consideration the necessary auxiliaries.

**Higher Fares on Northampton Line.**—The Northampton (Mass.) Street Ry. has installed a schedule of rates under which the cash fare between Northampton and Florence becomes 14 cents, and the ticket rate 10 cents. The fare between other points on the company's lines is increased proportionately.

**Buffalo Paper Discontinued.**—The International Ry., Buffalo, N. Y., has suspended the publication of the *Service Spot Light*. The little publication was issued weekly. Copies of it were placed in the "Take One" boxes installed in all of the company's cars. The editor of a local newspaper was editor of the publication.

**One-Man Cars Authorized in Fort Smith.**—The Fort Smith Light & Traction Co., Fort Smith, Ark., has been authorized by the State Corporation Commission to operate one-man cars on its lines. The commission has under advisement the company's petition for an increase in fare from 5 cents to 6 cents.

**Through Buffalo-Syracuse Freight Service.**—Through freight and express service between Buffalo and Syracuse for the convenience of shippers has been established by the International Ry., Buffalo, N. Y., with the co-operation of the Buffalo, Lockport & Rochester Ry. and connecting lines. Through cars are operated between the two cities.

**Seven-Cent Fares in Glen Cove.**—A citizens' committee appointed by the Mayor of Glen Cove, N. Y., to consider measures for the relief of the Glen Cove R.R., has decided to permit the company to raise its fare from 5 cents to 7 cents. The committee has voted against relinquishing control of the company's franchise to the Public Service Commission.

**Wants Fare Hearing Postponed.**—The city attorney of Augusta, Ga., has asked the State Railway Commission to postpone for sixty days the hearing on increased fares and light and power rates asked by the Augusta-Aiken Rail-



way & Electric Corporation. A voluminous report was submitted by the company setting forth the reasons for increased rates. The city attorney asks sixty days in which to examine this report.

**Favors Eight-Cent Fare.**—The Public Utilities Commission of Illinois has continued until March 1 the present 7-cent fare of the Alton, Granite & St. Louis Traction Co. At a recent hearing before the commission the manager of the Alton Board of Trade urged that the company's petition for an 8-cent fare be granted. Speaking on behalf of the Board of Trade he declared an advance in fare to be preferable to a possible abandonment of service.

**Fewer Accidents in Spokane.**—The number of accidents in which the cars of the Washington Water-Power Co., Spokane, Wash., were involved, was 25 per cent in 1919 than in 1918, according to a recent statement by David L. Huntington, president of the company. The amount paid on damage claims was also considerably less in 1919 than in the previous year. Mr. Huntington attributes the decrease in accidents to the use of one-man safety cars on the company's lines.

**Zone Plan Abandoned Temporarily.**—The New York & Stamford Ry., Port Chester, N. Y., has temporarily abandoned the zone system under which it has been operating for several months. The company installed the zone plan, involving increases in fares, without the consent of the city of Greenwich, Conn. The Greenwich Chamber of Commerce declared the new system illegal, with the result that the company has reverted to the former 5-cent fare pending action by the Connecticut Public Utilities Commission.

**Safety Cars for Reading.**—The Reading Transit & Light Company, Reading, Pa., has added to its service in Reading three of the latest type one-man safety cars. The cars are being operated on the company's Sixth and Smith Streets line which extends through the thickly populated northwestern section of the city. Before putting the cars into regular service the operators were given a week's instruction. The company has been favored by the fullest co-operation on the part of patrons in obtaining from the new cars the fullest measure of service.

**Asks Support of Car Riders.**—The Indianapolis (Ind.) Street Ry. has addressed an open letter to the people of that city, asking the question, "What does the future hold for Indianapolis?" The company cites the fact that Indianapolis is destined to become a city of at least 500,000 people. It notes the many heavy manufacturing establishments and the growing bank clearances and asks the people of the city if the electric railway will be assured a fair and equitable treatment in its effort to give the public adequate transportation service. The appeal occupied a full page space in a recent edition of the *Indianapolis News*.

**Heavy Travel on Texas Interurban.**—Passenger travel on cars operated by the Texas Electric Ry., Dallas, Tex., during 1919 was the greatest in the history of the company, according to data compiled by the accounting department at Dallas. During the first eleven months of 1919, which period is covered in the accountant's report, 12,790,321 passengers were transported over the 250 miles of interurban lines maintained by the company touching seven cities of Texas. The total of car-miles for the period was 5,410,370. In addition to the passenger travel, the express traffic on the company's lines was unusually heavy.

**Second Zone on San Antonio Lines.**—Owing to the need of further increasing its revenue, the San Antonio (Tex.) Public Service Co. has established a second zone on several of its lines and has raised the fare for a ride from the center of the city to the city limits to 8 cents. The length of the inner zone is approximately 2.8 miles, beyond which an extra fare of 3 cents is collected. The company on Nov. 30, adopted a plan under which San Antonio was divided into two zones, with a 5-cent fare from the city limits to the center of the city, and a 10-cent fare for one across the city. In installing the extra 3-cent charge, the company stated that during the month of December its gross revenue had increased only 5 per cent.

**New \$2,000,000 Bus Company for Jersey.**—The Middlesex Omnibus Co. has been chartered at Trenton with a capital of \$2,000,000 to operate buses in all parts of the State of New Jersey. The concern is a consolidation of bus owners of New Brunswick, backed by New York interests, and will charge a flat rate of 5 cents. The stock of the corporation is divided into 200,000 shares, half of which are preferred stock and the remaining common. The shares have a par value of \$10 each. The company will begin business with \$1,000,000 actually paid in. The officers are: A. L. Allen, of New York, president; John Parker, vice-president; William G. Hovey, secretary; George S. Busch, treasurer.

**Five-Cent Service in Hastings.**—The Hastings (N. Y.) Railway, Inc., under its first tariff filed with the Public Service Commission, Second District, on Jan. 9 began operation of its road from the Yonkers city line through Warburton Ave. to the south end of the Hastings bridge. A 5-cent fare is provided. Hastings has been without street railroad facilities since early last year when the Yonkers Railroad abandoned its Hastings line following its inability to get local authorization for an increased fare. It maintained that a part of the Hastings system caused operation at a loss. After the line was abandoned the Hastings Ry. was formed and it is operating under a new franchise granted by the local authorities. A feature of the new franchise is that there are no restrictions as to the fare rate to be charged.

## New Publications

### Transactions of the American Society of Mechanical Engineers

Vol. 40, 1,207 pages. Published by the Society, 29 West Thirty-ninth St., New York City.

This volume contains the proceedings of the Worcester and New York meetings held during 1918. Among the papers of particular interest in the electric railway field are the following: Economical use of fuel; report on standardization of flanges and pipe sections; conservation of heat losses from pipes and boilers; chemical and physical control of boiler operation; factors in fuel economy in boiler plants; the large steam turbine, and the advantages of pressure and high superheat as affecting steam plant efficiency.

### Advertising: Its Principles and Practice

By Tipper, Hotchkiss, Hollingworth and Parsons. Second Edition. Published by Ronald Press Co. Flexible leather binding. 579 pages.

A working manual for the advertising man and a textbook for the student, showing the economic relation of advertising to marketing. An effort has been made in this extensive and practical volume to combine all the separate arts and sciences that enter into the problems of advertising and marketing by considering the fundamentals of each with reference to all the others. It includes the economic, psychologic, technical and physical factors, together with the essential principles of artistic arrangement and English composition as applied to the construction of advertisements. All these features are summed up in the actual operation of an advertising campaign which is discussed in the last two chapters of the text.

### War-Time Changes in Wages, September 1914—March 1919

Research Report No. 20, September, 1919, published by the National Industrial Conference Board, Boston, Mass. 128 pages.

This is a study of the increase in wages, both for piece workers and time workers, in eight manufacturing industries; namely, metal, cotton, wool, silk, boot and shoe, paper, rubber, and chemicals. The pamphlet is illustrated by diagrams and carries many tables. The figures indicate that with very few exceptions hourly earnings of male workers increased well over 80 per cent for the entire period covered. In the case of female workers, the percentage increases were on an average lower than those for men, but in the four industries which included a majority of all women reported upon they were frequently greater. The highest hourly rate for the male workers quoted are for stitchers in the boot and shoe trade, who on piecework earned 36.5 cents in September 1914 and 68.7 cents in March 1919.



## Personal Mention

### Sales Manager for This Paper

Jay E. Mason has been appointed sales manager of the *ELECTRIC RAILWAY JOURNAL*. He is a graduate of Purdue University, in civil engineering, class of 1914. In May, 1915, Mr. Mason joined the McGraw organization and served as head of the advertising copy service in Chicago until January, 1917. He then became assistant to the western manager of *Engineering News-Record*, a few months later succeeding to the managership. He left the *News-Record* in April, 1919, to become assistant sales manager and manager of field sales for the Blaw-Knox Company, Pittsburgh, Pa.

Ralph Newman has been appointed purchasing agent of the Eighth Avenue R.R., New York, N. Y., and will have full charge of inquiries and orders.

O. J. Shaw, secretary of the Lincoln (Neb.) Traction Co., has been appointed general manager of the company. Mr. Shaw will continue to act as secretary.

L. J. Noble has been appointed general superintendent of the electric, gas, and railway departments of the Fort Smith Light & Traction Co., Fort Smith, Ark.

George W. Geer, auditor of the Shore Line Electric Railway, Norwich, Conn., has resigned to take a position with the New York, Westchester & Boston Railroad, New York, N. Y.

Clarence K. Reed, general auditor of the Boston (Mass.) Elevated Railway, has tendered his resignation to take effect on Feb. 1. Mr. Reed plans to enter the employ of the People's Trust Company, Boston, Mass.

Arthur Kolste has been appointed superintendent of railways of the Eastern Wisconsin Electric Co., Sheboygan, Wis., succeeding Charles E. Warwick, resigned. Mr. Kolste was chief inspector for the company prior to his new appointment.

George W. Camp, superintendent of the Waterbury lines of the Connecticut Co., New Haven, Conn., has resigned. Mr. Camp joined the company twelve years ago as a conductor. No successor will be appointed, the position of superintendent of the company's Waterbury lines being abolished.

Bernard F. Weadock, attorney for the Detroit (Mich.) United Ry., resigned his connection with the company on Jan. 1 to take up the private practice of law. Mr. Weadock became attorney for the company in 1912. He was formerly on the staff of the corporation counsel of Detroit.

Charles E. Warwick, superintendent of railways of the Eastern Wisconsin Electric Co., Sheboygan, Wis., has re-

signed. Mr. Warwick, who has been in the public utility business for twenty-four years, was formerly superintendent of the Vicksburg Light & Traction Co., Vicksburg, Miss.

B. J. Megginson, superintendent of the Newport News & Hampton Railway, Gas & Electric Co., has resigned to become manager of the Frederick Road Park, Baltimore, Md., which is to be opened to the public about May 1. Mr. Megginson has been connected with the electric railway industry for fifteen years.

H. O. Allison, safety engineer of the Beaver Valley Traction Co., New Brighton, Pa., has been appointed chairman of the bulletin committee of the Electric Railway Section of the National Safety Council. The National Safety Council combines a bulletin service with its service going to members, the material for which will be assembled by Mr. Allison and the members of his committee.

Herbert A. Faulkner, formerly well-known in electric railway circles of the East as general passenger and advertising agent of the Bay State Street Ry., and secretary of the New England Street Railway Club, has been appointed advertising manager of the Moreland Motor Truck Company, Los Angeles, Cal. Mr. Faulkner will also have charge of the promotion of sales, and public relations work for the company.

L. D. Hall has been appointed superintendent of railways of the Northwestern Ohio Ry. & Power Co., Toledo, Ohio, succeeding F. M. Ames, resigned. Mr. Hall joined the company in June, 1919, soon after his return to the United States after serving for eighteen months in France as a first lieutenant in the 605th Engineers. He was formerly connected with the traffic department of the Toledo & Western Railway.

Melvin W. Bridges has been appointed safety engineer of the Chicago (Ill.) Elevated R.R. Mr. Bridges entered the employ of the company as an assistant in the master mechanic's office of the South Side Elevated Ry. in 1909. At the time of the consolidation in 1911 he became clerk in the master mechanic's office of the present system. From March, 1917, until April, 1919, Mr. Bridges was in military service, acting as captain of Company F, 131st Infantry. He was wounded at Amiens in July, 1918.

Thomas H. Otley, superintendent of signals of the Brooklyn (N. Y.) Rapid Transit Co., has resigned. Mr. Otley obtained a leave of absence last May to visit his former home in England, and his resignation followed his decision to remain abroad for an indefinite

period. He entered the employ of the company in 1905 as an electrical repair man, later being made foreman in the repair department. In 1906 he was advanced to the position of signal supervisor and was placed in direct charge of signal maintenance. In 1916 his title was changed to that of superintendent of signals.

George A. Deibert has been appointed to the newly-created position of superintendent of safety of the Georgia Railway & Power Co., Atlanta, Ga. While safety work is by no means a new inception on the part of the company, the creation of a department to carry on that work exclusively is a new departure. Mr. Deibert brings with him to the company many years of experience in railroad safety work. He was with the Atlantic Coast Lines for about twelve years and was appointed assistant supervisor of safety with the United States Railroad Administration in the Southern Region, shortly after the Government assumed control of the roads. Under Charles M. Anderson, regional director of safety, Mr. Deibert has gained wide experience in safety work that especially qualified him for his new duties.

## Obituary

Albert Schmid, for many years chief engineer and later manager of the French Westinghouse Co., died in New York City recently. Born in Switzerland sixty-two years ago, he came to the United States in 1882 and became a citizen shortly afterward. Mr. Schmid associated himself with the Westinghouse Co. at the instance of the late George Westinghouse and was its first chief engineer and later became general superintendent. His skill in designing electrical apparatus contributed very largely to the early success of the alternating current electric system, and to railway apparatus.

J. E. Derrick, formerly general manager of the Oneonta, Cooperstown & Richfield Springs Ry., Oneonta, N. Y., died on Jan. 1 at Plainfield, N. J. Mr. Derrick entered railway work in 1893 as assistant superintendent of the Rutland (Vt.) Street Ry. Two years later he became superintendent of transportation of the Glens Falls, Sandy Hill & Fort Edward Street Ry., Glens Falls, N. Y. In 1899 he was appointed general manager of a railway and light company in Missouri. In the following year he returned to Glens Falls as general manager of the Hudson Valley Traction Co., becoming general manager of the Oneonta, Cooperstown & Richfield Springs Ry. four years later. He subsequently opened an office in New York City, as an expert public accountant.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

## Brass Market Now in a Flourishing Condition

Manufactures Absorbing Large Output—Prices Lower than Last Summer—Deliveries Fair

The influence of the cost of copper upon the price of brass is well illustrated by the course of the latter since midsummer, when advances in the cost of labor in the Naugatuck Valley of Connecticut failed to produce any considerable change in quotations to electrical manufacturers compared with the increases which accompanied the upward movement in copper. In a review of the conditions prevailing in the brass market published in the *ELECTRIC RAILWAY JOURNAL*, Sept. 6, 1919, page 506, it was pointed out that labor cost was a much less important factor in the price of brass than material cost. The following comparison of base prices of brass and brass products bears out this contention:

	Aug., 1919	Dec., 1919
Sheet metal:		
High brass.....	27½	24½
Low brass.....	30½	26½
Wire:		
High brass.....	27½	24½
Low brass.....	31½	26½
Commercial bronze..	33½	28
Rods:		
High brass.....	26½	22½
Low brass.....	31½	27
Commercial bronze..	33½	29
Brazed tubes:		
Brass.....	39	36
Copper and commercial bronze.....	44½	40½
Copper:		
Sheets.....	33½	28½
In rolls.....	31½	26½
Drawn-copper shapes.	30½	25½
Copper wire, bare,		
f.o.b. mill.....	26½	22

These prices include delivery from the mills up to 50 cents per 100 lb. freight rates. They show that the reduction in the price of copper which has taken place since summer has been directly reflected in lower quotations by the brass manufacturers, while the wage scales, established in the Naugatuck Valley remain generally the same. Throughout the electrical industry there is a widespread opinion that copper is not likely to go lower in price for some time, and if advances occur at a rate which indicates a rising market, there will doubtless be a flood of new orders which will overtax the facilities of the brass mills and seriously extend deliveries.

At the present, however, the needs of electrical manufacturers appear to be well cared for; *i.e.*, in the case of those who have pursued a far-sighted policy with regard to orders. The brass mills carry few stocks of material suited to electrical manufacturing requirements.

Brass mills are running about ten hours per day now and in some cases

at night. Raw copper is plentiful, and the base price in the ingot of about 19½ cents at this writing may be contrasted with 24 cents last summer. Labor is not up to normal efficiency as yet. One of the larger mills is working about 50 per cent of its departments at night and has a total of 66,000,000 lb. of brass in process in its establishments. Europe has not as yet begun to purchase copper on a large scale from this country and cannot afford to do so at the current low rates of exchange.

Among the different brass mills deliveries vary considerably, but in gen-

eral seamless tubing is quoted around thirty-five days; sheet metal, forty-five days; brass wire, thirty to fifty days; copper wire, thirty to forty days; screw shells and socket shells, sixty days. Price guarantees are being given for the first quarter of 1920. In sum, there appears no reason for disquiet as to the supply of brass unless a heavy increase in demand should suddenly arise. Considering scarcities in many other fields, the brass market is more favorably situated than is supposed to be the case, but there seems little prospect of lower prices or quicker deliveries for months to come.

## South and Southwest Expected to Buy Heavily During 1920

Large Appropriations Being Set Aside for Year's Equipment and Supplies—Many Inquiries Out but Few Salesmen Approach This Territory

Heavy buying of rails, power equipment and supplies will be made shortly through the southeast, the south and southwest territory. Many inquiries are coming into the market for electric railway equipment on a large scale. For some time manufacturers and sales organizations, however, have not been very active in this territory, but now that large sums are being spent and very large appropriations are being arranged for 1920 expenditures, it is reasonable to expect that manufacturers and supply companies will be more active in the South, with the result that more business will undoubtedly be dug up than is now apparent.

Conditions are very encouraging all through these sections of the country. And those roads which have been progressive enough to install modern economies are doing very well. Also, the attitude of the public is improving to such an extent that it appears very hopeful in almost all communities that fare increases will be granted in the near future.

Many properties in the South prospered materially as a result of war business, and then as their business began to decline the oil boom and enormous crop of cotton and tobacco, with unheard of prices, have continued and increased the prosperity during the war so that it is reported it is practically unusual for a company not to be able to show at the present time 30 to 60 per cent increase in the number of car riders over a corresponding period last year. All through Texas especially conditions are very good. There is much activity and many extensions and connecting lines are

planned, a fair percentage of which will be completed during the year.

In Birmingham and in New Orleans, two notable properties which are now in the hands of receivers, business conditions are good and are improving steadily. A great deal of money is being spent in building these properties up and both of them are in such condition that it will require a large amount of money to bring these properties back to their former physical condition.

### POWER EQUIPMENT ACTIVE

Many of the properties in the South have already placed orders for power equipment or are in the market at the present time. The Jackson (Tenn.) Railway & Light Company has contracted with the Babcock & Wilcox Company for a 505 hp. Stirling boiler to be installed in February. The Savannah (Ga.) Electric Company will equip nine boilers, aggregating 4,300 hp., for burning oil. In addition to the above the New Orleans Railway & Light Company expects to be in the market shortly for a 15,000 kw. turbine with condenser auxiliaries, one 30,000 gal. fuel oil storage tank with pumps, piping, etc., and one 1,500 kw. 125-250 volt rotary for Edison d.c. system. Numerous changes in station cables, new cable to be installed in conduit and many miscellaneous repairs also will be made during the year. The United Railways of St. Louis have planned to build two automatic substations. Rome (Ga.) Railway & Light Company will add ten to fifteen thousand dollars to its transmission line, which represents a normal growth of the business. Capital Trac-



tion Company and Washington Maryland Railway Company, Washington, D. C., will be in the market for one 7,500-kw. turbine generator with accessories and one 2,000-kw. rotary converter and transformer now under order. These are to be installed in 1920. Northern Texas Traction Company and Tarrant County Traction Company, Fort Worth, Tex., will be in the market shortly for one automatic sub-station.

In addition to the above, many companies throughout Southern territory have made inquiries or are in the market for trolley wire, lead covered cable, hard-drawn wire, in addition to shop tools, machinery and track and roadway supplies of all kinds.

## Generating and Distribution Equipment Far Behind

**Automatic Substation Demand Heavy**  
—Turbine Deliveries Ten to Twelve Months

Demands from all directions for railway substations and transformers, and especially for automatic substations, are the outstanding features of the new year in the generation and distribution market of the railway field.

Power equipment is far behind in production and deliveries are from several months to a year. Generators, rotaries and kindred machinery are not coming through in such volume as to lengthen appreciably their ordinary shipping dates. The lowest limit given is twelve weeks, and for larger and more special machines the time of filling an order goes up to ten months.

Since summer steam-turbine shipping dates have nearly doubled for one manufacturer. His summer date was rather below normal. However, it is taking from five to seven months to finish turbines in capacities under, say, 1,000 kw., and from ten to twelve months for the larger sizes. These dates are little above normal. The absence of capable labor is contributing factor with one producer. One manufacturer believes his average production is behind about 25 per cent. This would not seem far from a pretty fair estimate of all electrical machinery production.

## Railway Motor Demands Improving

**Deliveries Range from Three Months on Safety Car Type to Four Months on Heavier Motors**

Probably the most important feature of the railway motor market at the present time is deliveries. While for some types shipments are virtually normal, for others such as the heavier motors shipping dates have lengthened considerably.

Railway motors, the demand for which has been extremely light, can be delivered in good quantity in from three to four months. Most of the business received has been on motors

for safety cars which although fair in number of orders and amount of cars per order, in the aggregate does not compare favorably with the business of pre-war years. Heavier buying of motors is expected within the next few months based on reports from various companies who are going into the market for cars. United Railways of St. Louis are expecting to place an order for 100 large cars and for twenty safety cars within the near future. Long Island Railroad is expected to place an order for 100 cars and a number of large cities will be in the market for a considerable number of cars as soon as questions of increased fares are decided.

Manufacturers who have had to carry large technical staffs at considerable expense when the amount of business transacted in the past two years did not seem to warrant it are again taking hope and are looking forward to a greatly improved season in railway motors for the coming year.

## Rolling Stock

**Mobile Light & R.R. Co., Mobile, Ala.,** is in the market for a number of safety cars.

## Franchises

**Montgomery Light & Traction Co., Montgomery, Ala.**—The Montgomery Light & Traction Co. has received from the Montgomery City Commission a new franchise under which it will abandon the present direct system of trackage and establish a loop system. The work is to be completed within six months.

**Lake Shore Electric Ry., Cleveland, Ohio.**—The Lake Shore Electric Ry. has received a twenty-five year franchise from the city of Norwalk, Ohio. The company will pave its right right of way and pay a rental of \$150 a year for the use of the streets. It will also pay \$300 for the use of streets for the two years since its franchise expired.

## Power Houses, Shops and Buildings

**Birmingham Railway, Light & Power Co., Birmingham, Ala.**—This company plans during the year to purchase one wheel grinder and one wheel boring mill.

**Denver & Interurban R.R., Denver, Col.**—Through its receiver W. H. Edmunds, this company is contemplating the purchase during the coming year of some shop and woodworking machinery.

**Savannah (Ga.) Electric Co.**—This company will equip during the year five 665-hp. boilers and two 493-hp.; also two 460-hp. boilers for burning oil.

**Chicago, North Shore & Milwaukee R.R., Highwood, Ill.**—This company proposes to purchase during 1920, two

1,000-kw. rotary converters and automatic substation equipment.

**Metropolitan West Side Elevated Ry., Chicago, Ill.**—This company expects to purchase during 1920 one 42-in. vertical boring mill and one 24-in. crank shaper.

**Northwestern Elevated Ry, Chicago, Ill.**—This company expects during the year to purchase one 36-in. heavy duty engine lathe and one 36-in. radial drill press.

**Interstate Public Service Co., Indianapolis, Ind.**—The Interstate Public Service Co. will build new central shops at Scottsburg, Ind. The company will also change forty-three miles of 1,200-volt transmission line to 600 volts and will discard the present 1,200-volt power-house.

**Monroe (La.) Street Ry.**—The construction of a new carhouse by the Monroe Street Ry. will begin shortly. The cost is estimated at upwards of \$50,000.

**New Orleans Railway & Light Co., New Orleans, La.**—This company proposes to purchase during the coming year a 15,000 kw. turbine with condenser auxiliaries, a 30,000 gal. fuel oil storage tank with pumps, piping, etc., a 1,500 k.w. 125-250 volt rotary. Changes will be made in the station cables, and new cables will be installed.

**Ironwood & Bessemer Railway & Light Co., Ironwood, Mich.**—The Ironwood & Bessemer Railway & Light Co. and the Ashland Light, Power & Street Ry., Ashland, Wis., will build at Ironwood a car house of steel and brick to accommodate twenty cars.

## Track and Roadway

**Calgary Municipal Ry., Calgary, Alta., Canada.**—The Calgary Municipal Ry. plans the purchase of 5 tons of No. 00 trolley wire, fifteen sectionalizing switches and sundry trolley hardware.

**Chicago, South Bend & Northern Indiana Ry. and the Southern Michigan Ry., South Bend, Ind.**—These companies plan during the coming year to purchase poles and high-tension insulators.

**Indianapolis & Louisville Traction Ry., Scottsburg, Ind.**—This company is contemplating a 30-mile extension of its transmission line and the installing of two rotary substations.

**Interstate Public Service Co., Indianapolis, Ind.**—This company proposes to change 43 miles of 1,200-volt line to 600 volts, discard the 1,200-volt power house and install three substations.

**Peoria (Ill.) Ry.**—The Peoria (Ill.) Railway will probably begin its \$100,000 program of construction and rehabilitation early in March. The major portion of the building fund will be expended on the Monroe Street line and on roadway work. The original plans for the rehabilitation called for the completion of the work by Dec. 31, 1919, but the Public Utilities Commission has extended the time to May 15, 1920.



**New Orleans Railway & Light Co., New Orleans, La.**—This company expects to purchase trolley wire, 6600 volt, No. 0000 lead covered cable and some hard drawn trolley wire.

**Boston (Mass.) Elevated Ry.**—The Boston Elevated Ry. has been ordered by the Mayor of Boston to relay tracks on improved streets in the Roxbury District of Boston, Mass. The new location will be on Center Street and Belgrade Avenue, from Washington Street to Lagrange Street.

**Toronto (Ont.) Civic Ry.**—The City Council of Toronto, Ont., has instructed the Commissioner of Public Works to proceed with the construction of a double track on Bloor Street West.

**Nashville Railway & Light Co., Nashville, Tenn.**—The Nashville Railway & Power Co. proposes to lay additional tracks in the central part of the city of Nashville to relieve congested conditions. The plans call for the running of tracks through Fifth and Sixth Streets and Seventh Avenue. The company will eventually reroute its entire system.

### Trade Notes

**Tubular Woven Fabric Co., Pawtucket, R. I.**, proposes the erection of a new two- and four-story plant, which will cost about \$200,000 equipped.

**Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.**, will make an addition to its East Springfield factory at an estimated outlay of \$150,000.

**King Coil Manufacturing Co., Cleveland, Ohio**, announces the removal of its offices from the factory at 1011 Power Ave. to 328 Schofield Building, Cleveland.

**E. W. Clark & Co., Philadelphia, Pa.**, announce that effective Jan. 1, George L. Estabrook and Edward W. Clark, 3rd, have been admitted to partnership in the firm.

**Stanley Insulating Co., Greenfield, Mass.**, has prepared plans for the construction of a new addition to its plant, for increased capacity. The structure is estimated to cost \$30,000.

**Sprague Electric Works of the General Electric Co., Bloomfield, N. J.**, has broken ground for the construction of a new two-story addition to its plant, estimated to cost about \$40,000.

**Chicago (Ill.) Pneumatic Tool Co.**, announces the appointment of Edward A. Woodworth as the company's special railroad representative with headquarters at Fisher Building. Mr. Woodworth has been for several years secretary of the Committee on Standards, United States Railroad Administration, Washington, D. C.

**W. D. Ward** has been transferred from the San Francisco office of the Pelton Water Wheel Co. to the New York Office as manager of the Atlantic department, which includes the territory east of the Mississippi, Europe and South America. Mr. Ward has been with the Pelton company for twenty-five years, of late as contract

and sales engineer. In New York he succeeds F. W. Gay.

**Doehler Die Casting Co., Brooklyn, N. Y.**, with its main office and Eastern plant at Brooklyn, N. Y., and a branch-plant at Toledo, Ohio, manufacturer of die castings in white metal, aluminum and brass alloys and bronze-back and aluminum-back babbitt-lined bearings, has just purchased a seven-acre tract in Chicago, on which the company will erect a modern one-story concrete steel and brick structure for the manufacture of die castings and bearings. The building is to be ready for occupation on or about Jan. 1, 1920.

**Macomber & West, Boston, Mass.**, has been organized with offices at 261 Franklin Street to conduct a general consulting engineering business, including designs, supervision of construction and appraisals. George P. Carver, Alexander Macomber and John West are the partners in the new establishment. Mr. Carver for the past twelve years has conducted a general engineering practice in Boston, specializing in coal-handling and fuel problems, while Mr. Macomber and Mr. West have been associated with Charles H. Tenney & Co., the former as electrical engineer and later assistant engineering manager, and the latter as new-business manager of all the Tenney properties.

**Roller-Smith Co., New York, N. Y.**, announces the appointment of Walter W. Gaskill, 141 Milk Street, Boston, Mass., effective Jan. 1, 1920, as its agent for Boston and New England territory, superseding the P. I. Perkins Company. He will also handle the products of the Ward-Leonard Electric Co., Mt. Vernon, N. Y. and those of the Brown Instrument Co., Philadelphia, Pa. After graduating from Harvard in 1908 and taking a post graduate course in 1909, Mr. Gaskill spent about a year and one-half on the General Electric test course at Schenectady, later becoming connected with the Boston office of the company where he remained until June, 1918, as a specialist on electrical apparatus for pulp and paper mill work. During the war he was with the Bureau of Aircraft Production.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.**, announces the appointment of Arthur Elliott Allen as district manager at New York succeeding Edward D. Kilburn, who was recently elected vice-president and general manager of the International Company. In 1902 Mr. Allen entered the employ of the Electric company at its Newark works, later being placed in charge of the test department where he remained until 1910. In 1911 Mr. Allen was assigned to the supply division of the New York sales office of which he became manager on December 1, 1915, retaining this position until he joined the Canadian Overseas Forces in October, 1917. After more than two years services overseas as a technical officer, in the Royal Flying Corps, he was honorably

discharged and returned to the New York office of the company as executive assistant to the manager.

**Underwriters' Laboratories, Inc., New York, N. Y.**, have now listed as standard a line of cartridge fuses, renewable type, as manufactured in certain sizes by the Economy Fuse & Manufacturing Co., the Trico Fuse Manufacturing Co., the Federal Electric Company and the Chicago Fuse Manufacturing Co., as follows: Economy fuses in both 250 and 600-volt types up to 600 amperes; Trico fuses in both 250 and 650-volt types up to 600 amp. Federal fuses in the 250-volt type up to 400 amp. and in the 600-volt type up to 100 amp.; and the Chicago fuses in the 250-volt type, up to 600 amp. All of the renewable fuses above specified have been found by the Underwriters' Laboratories, Inc., to conform to the specifications of the recently adopted standard for renewable cartridge inclosed fuses. Several lines of renewable fuses of other manufacturers are at present before the Underwriters' Laboratories, Inc., and it is expected that further standard listings will be given in the near future if the fuses are found to conform to specifications. Already the "Atlas Four-in-One" fuse, made by the Multiple Electric Products Co., has been approved in sizes of 0 amp. to 200 amp. for 250-volt ratings and 0 amp. to 30 amp. for 600-volt ratings.

### New Advertising Literature

**Roller-Smith Co., New York, N. Y.:** Bulletin No. 420 describing ammeters and voltmeters for small switchboards.

**Wheeler Condenser & Engineering Co., Carteret, N. J.:** Bulletin No. 112 E on condensers, pumps, cooling towers, etc., illustrating the latest developments in condenser practice and showing photographs of a number of actual installations of turbo air pumps, jet condensers and surface condensers.

**Nelson Valve Co., Philadelphia, Pa.:** Catalog and price list No. 10 on bronze, iron and steel valves, including gate, globe, check and non-return valves. A 156-page book containing 135 halftones, numerous drawings, and including a ten-page preface on valve service, giving design and construction features, inspection and tests, guarantees, recommendations for use of valves and valve service. A large number of pages of data are scattered throughout the book.

**Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.**—An illustrated pamphlet "Westinghouse Opportunities for Technical Graduates" which explains in considerable detail the plan developed for training technical graduates at its various works. It contains a list of prominent Westinghouse men who originally entered the company as graduate students, as well as a complete list of schools from which over 5,000 students have entered the employ of the company. Copies of the booklet will be sent to anyone interested on application to the educational department of the company at East Pittsburgh, Pa.