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## The San Francisco Strike

An interesting sidelight upon the conduct and causes of an extensive street railway strike is presented in this issue in an article relating to the strike on the electric railway lines of the United Railroads of San Francisco. The author was one of the strike-breakers, and describes, in graphic terms, the conditions under which he and his associates worked in what has undoubtedly been the most important labor conflict of its kind in this country, when both length and extent are considered. The reasons for this are difficult to determine when the conditions under which the men worked are considered, except for the unfortunate labor situation in San Francisco in which the reckless domination of agitators prevailed over the sober councils of the more conservative element. It is this condition, in fact, which constitutes one of the chief dangers of unionism—more destructive to the men than to anyone else—and we have no doubt that if the history of many a similar event were written it would appear that tactics were followed very like those described by Mr. Brent.

Of the conditions now existing in San Francisco very little need be said, except that they now seem to be returning to a normal state of affairs. Law and order are gradually replacing the chaotic political situation which existed subsequent and, indeed, prior to the fire. When this is accomplished the street railway situation will naturally improve. We do not believe, however, with the author of the article that peace will be followed by a return of unionism. That name must now be so discredited in San Francisco it seems hardly possible that it could be used as a rallying cry for a long time to come. The experience there has shown that no organization ought to be conducted among a large body of men which in any way countenances violence or in which the rights of the conservative element are not safeguarded in any decision which may be made.

## Moderate Speed Through Service Vs. High Speed Local Facilities

The value of through car service as contrasted with facilities requiring several changes between terminals is realized in a general way by electric railway men in relation to the convenience of the public, though it is something of a problem to know when it is profitable to operate rolling stock on foreign tracks and when not. Given about the same maximum speeds on the cars, few would question the ability of the through cars to cover a given distance in a quicker time. The comparison of a through service moved at moderate speeds with a broken or local service at much higher speeds, involving changes en route, however, has not been generally considered. It is surprising how well the through car will often show up in such cases.

Recently a trip was made between two points about twenty miles apart, going by a route which required two changes of electric cars and returning by a through trolley car which covered the entire route. The first line included a trip by steam at about double the maximum speed of the through car on the return trip, and the connections were reasonably close, with maximum waits of ten minutes. In

spite of the advantage of the steam road's private right of way, the sustained schedule speed of the slower through car without waits for connections enabled the journey to be covered a few minutes more quickly by the through car. The convenience of not being obliged to change at crowded squares and transfer points was a strong point with the public, and the resulting better schedule time is well worth considering in cases where very high-speed service cannot be afforded in competition with fast-running rival lines on private rights of way extending over only a part of the total distance between terminals.

## Motor Driven Tools in Track Construction

Considering the ease with which power can be obtained from a trolley wire at all parts of an operating system it is singular that so few companies have made general use of motor-driven tools in track construction. Construction work is very generally lighted by trolley current in these days, and in some of the most common track operations, like grinding down joints, pumping out manholes and pits, and drilling holes in rails, there is a useful field for the small motor in preference to hand labor.

Thus, in a recent case it was found that by using an electric drill on a piece of track which was being relaid, a hole in the rail could be drilled in 35 seconds, against 25 minutes by hand. The power for the motor was taken from the trolley wire and ten 1¼-in. holes were drilled in 16 minutes, against nearly half a day per man by the slow and laborious hand method generally in use. The motor did not consume over 1/3 hp, and although it was operated in series with a resistance to cut down the trolley voltage from 600 to 220, the cost of power was insignificant in comparison with the saving in wages per hole or per mile of track. The first cost of the drill, about $150, created fixed charges too small to consider in relation to its economy. Maintenance figures were not given but they would have to be pretty high to make much impression on the saving in labor—so high, in fact, that the drill would scarcely be an operative device. The case is entirely different from that of the depreciation of electric percussion drills in service, which are obliged to withstand severe reciprocating shocks instead of the smooth torsional strains of the track drilling process. In using electric drills on street railway track with power taken from the trolley by a pole, a fuse block is a desirable feature near the top of the pole, since it is then necessary for the operator to remove the pole from the line in replacing the fuse. Insulated cables are, of course, necessary features of all motor-driven track outfits. Drills wound directly for 550 or 600 volts are obviously preferable to those with which a special resistance must be used, on account of simplicity rather than economy of operation.

Small portable grinders driven by motors of ¼-hp rating or thereabouts are now available for a variety of work, and experience has shown that with one of these a man can grind down a joint in five minutes against four or five hours with three men in some cases of hand work. These outfits seldom cost over $50 or $75 each, and do not weigh much in excess of a dozen pounds. Blowers driven by ¼-hp motors and costing about the same as the grinders are especially adapted to the removal of chips and shavings in connection with rail drilling. We hold no brief for the manufacturers of labor-saving appliances, but there is certain to be a wider use of such devices in the interests of intensified construction work as their advantages become more generally realized by practical trials. Defects not now foreseen will doubtless develop in service, but with power so readily available at the trolley a distinct reduction of hand labor in the field of track work is only a matter of time.

## The Case of Copper

The break in the price of copper which is now well under way will be a cause of rejoicing to many a harassed street railway manager, and those whom necessity has compelled to buy at the extortionate prices of the past year have our sincere commiseration. The truth is now out and it is, as we have more than once hinted, that the high copper prices have been based neither on real scarcity of the red metal nor upon a great and genuine increase in demand, but upon a fictitious scarcity and a temporarily abnormal demand. During the last year or two of general prosperity and rapidly increasing business a great many plants have undertaken extensive rehabilitation, many copper-using industries have been booming and speculation has been active among those who have had no control of the market. All these causes have co-operated to produce not a healthy and normal growth of demand, but a demand hardly more than ephemeral, which has been adroitly exploited and encouraged by those who had copper to sell. What they could not force upon the public they have stored here and there, and finally when the bluff could be kept up no longer they have been compelled tc show their hands.

Now it behooves the great army of copper users to see to it that the price of this enormously important metal is not again allowed to soar skyward. The same acute speculators who sent the base price to 26 cents are still on hand to work the same old game over again if they have the opportunity. The consumer will suffer again unless he takes full advantage of the situation. To a certain extent the enormous increase in the price of copper has defeated itself. The public has learned that certain things for which copper was once considered necessary can be made as well of steel or of some other cheap substance, and having learned this will keep the lesson in mind. There are few things for which copper is so necessary as to justify paying a doubled price for it. Those things for which copper admits no substitute are not of so great aggregate magnitude as to form a suitable basis for another squeeze, like the one of the past year. Even in purely electrical uses copper no longer is fully dominant. Not only has aluminum come into very great use for line construction, but it has been found well adapted for winding magnets, the oxide forming ample insulation for the small potential differences between coil and coil. Recently a composite cable of steel and aluminum wire has been put into service having a tensile strength fully up to that of the best hand-drawn copper and amply able to compete with it at equal conductivity. It seems to be well settled that

the white metal can stay under its rival's price considerably below any figures quoted of late.

It will, therefore, be increasingly difficult for copper to be boomed unless its exploiters also corner the aluminum market. This is not without the bounds of possibility and should be guarded against if possible. Of course ere long some of the fundamental aluminum patents will expire and there will then be a good chance for such competition as will at least check charging "what the traffic will bear" when a copper corner is again deftly engineered. Such competition in aluminum will be a good thing eventually for those who make it, since it will inevitably bring aluminum into use on a scale hitherto unimagined. It is capable of many minor structural uses for which it would have been employed ere this save for the fact that the sole producers have been behind the demand. Now, with copper fallen and aluminum edging cautiously down just below it, is the time to experiment with such things, thereby still further lessening the normal demand upon the world's store of copper. The copper manipulators deserve to stew in their own juice for a while after the recent violent ebullition. Seriously, the situation is not a pleasant one when all the copper-using industries can be held up and plundered on the strength of a scarcity for the most part fictitious. It is high time to sort out thoroughly the necessary from the merely conventional uses of copper and to act upon the information.

## Automatic Signaling on Electric Railways

The importance of controlling the movements of electric cars on single-track roads by signals of some sort is no longer open to debate. The question is to-day one of methods. Operating experience shows more and more the need of reliable automatic signals, and it is gratifying to note that good progress is being made by the manufacturers in the construction of electric railway signals which can be depended upon because of their rugged design and positive action. The importance of designing signals so that all breakages and defects lead to the danger indication is much better appreciated now than it was a few years ago, and it is certain that within the next four or five years the trolley signal question will be greatly simplified.

The first point to insure in the trolley signal is positive action under the given conditions. Proper mechanical and electrical design are the means whereby this can be secured, and absence of complication is greatly to be desired. It is doubtful, however, if the varied requirements of a first-class automatic electric railway signal can be met without a considerable number of inter-related magnets, switches and small wheel gearing. We must know to-day whether the block is clear or occupied, and in which direction the car or cars are moving, if the traffic is to be handled without delay and with safety. To take care of these conditions, which lead to the counting in and out of each car that enters and leaves the block, requires a certain amount of intricacy in the connections and apparatus; but this complication is a small matter when compared with that of the average car wiring diagram with quadruple motors and multiple unit control. If each moving piece of an automatic signal system is designed for positive action under all normal operating conditions, much has been gained. Direct strokes of lightning, cyclones, earthquakes and derailments cannot of course be withstood by any signal system under present conditions, and a deliberate disobedience of instructions will overthrow the most carefully planned indications of the track condition. No signal can be expected to take the place of executive authority.

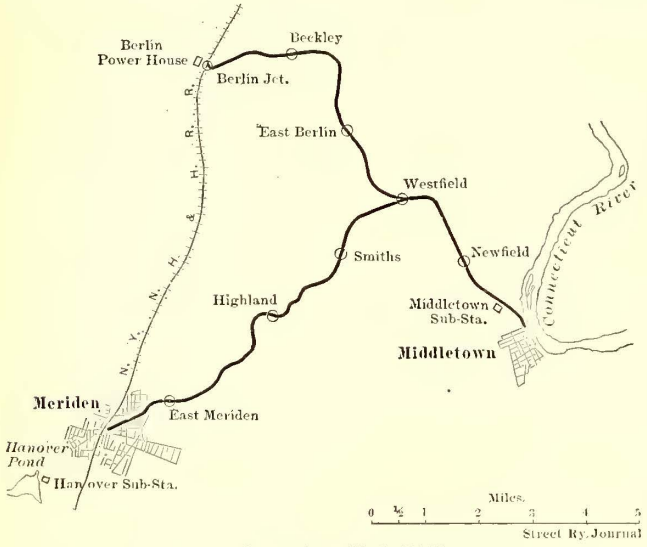
The use of short stroke solenoid magnets wound with many times of wire of high resistance is a step toward increased efficiency and effectiveness of action in some of the later signal equipment. Effort has been made to reduce the arcing at small knife switch contacts by diminishing the current required to actuate the mechanism, by proportioning levers for quick breaks and the danger of contacts "sticking" has been largely overcome in certain instances by the use of side-wiping makes and breaks in the more delicate parts of the mechanism. The tendency is also toward double action in the signal cases at each end of the block; that is, a clear indication is not given at one end until the circuits at the other end indicate that the signal has gone to the position required.

The question of counting cars in and out is one where opinions vary widely. Some managers believe it to be unsafe to run through a block on close headway unless each car keeps its predecessor strictly in sight. On the other hand, other managers consider it a great advantage to know when the last car of a series has passed out of the block, for the operating conditions often preclude running on sufficiently close headway to keep in sight of each car directly ahead. At any rate, signal manufacturers have given long thought to the recording of cars in and out of blocks, and have done their best to build reliable equipment designed to take care of this condition. It will not be long before sufficient experience with counting signals will clearly indicate whether this most difficult and complicated feature of the signal problem warrants the effort made in its solution.

Thus far little has been accomplished in the design of automatic trolley signals for single-phase roads. Just how this will work out cannot well be stated at present, but some sort of signal will surely become desirable as the headway of cars shortens. In subways and on right of way, where the conditions warrant it, double-track roads using direct current are employing alternating current signals with success, leaving the running rail formerly required for signal return current free for conducting purposes. The high voltage in use on some of the later catenary trolley wires is a serious bar to the design of successful signal mechanisms dependent upon the action of the wheel or the bow trolley. The indications are that block signaling will conquer a large part of the 600-volt direct current trolley field before it gains much of a hold in the interurban single-phase field. It will be a help to the operating man and the manufacturer alike if experience with automatic and semi-automatic signals, with repair records and maintenance costs, can be more generally interchanged. Unless one has kept in close touch with recent signal development, he will be surprised at the progress made when he examines the latest apparatus available.

## MIDDLETOWN-BERLIN ELECTRIFICATION OF THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY

The New York, New Haven & Hartford Railroad Company, realizing the importance of electric traction as a feeder for its main lines and also as a factor in building up




MAP SHOWING LINES EQUIPPED

the smaller towns, has converted several of its branch lines from steam to electric operation. The most recent of these are the two lines running from Middletown, Conn., to Berlin, Conn., and from Middletown, Conn., to Meriden, Conn., and the Middletown-Meriden line branches from the former at Westfield, Conn., and connects Middletown with Meriden, also on the Hartford division, 7.21 miles from Westfield, as shown in the map. These roads are to be utilized as part of the system of the Consolidated Railway Company,

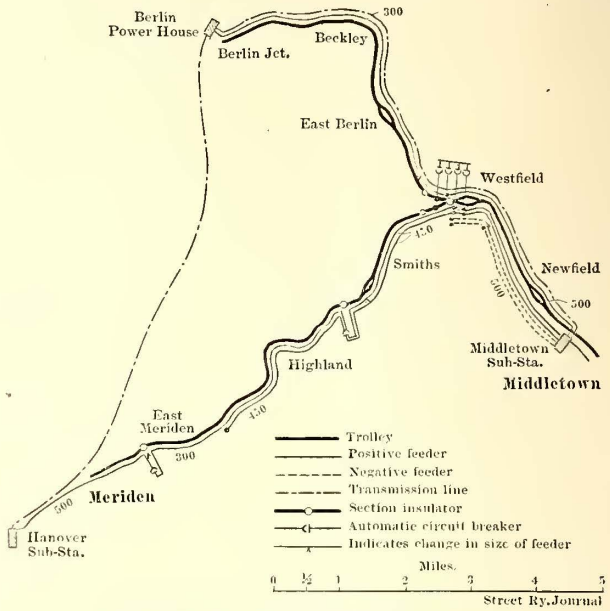
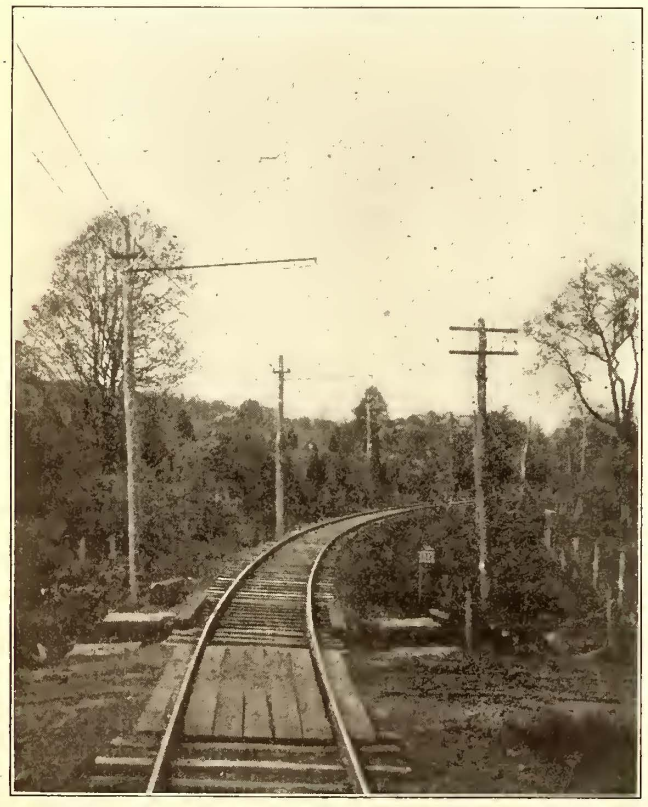



DIAGRAM OF TRANSMISSION CIRCUITS

the power to operate them being obtained from its power and sub-stations. Connections will also be made at each terminal with the local street car line.



CURVE CONSTRUCTION

SMALL TOWER CAR

just completed by Latey & Slater, engineers, of New York City, under the direction of E. H. McHenry, vice-president of the New Haven company.

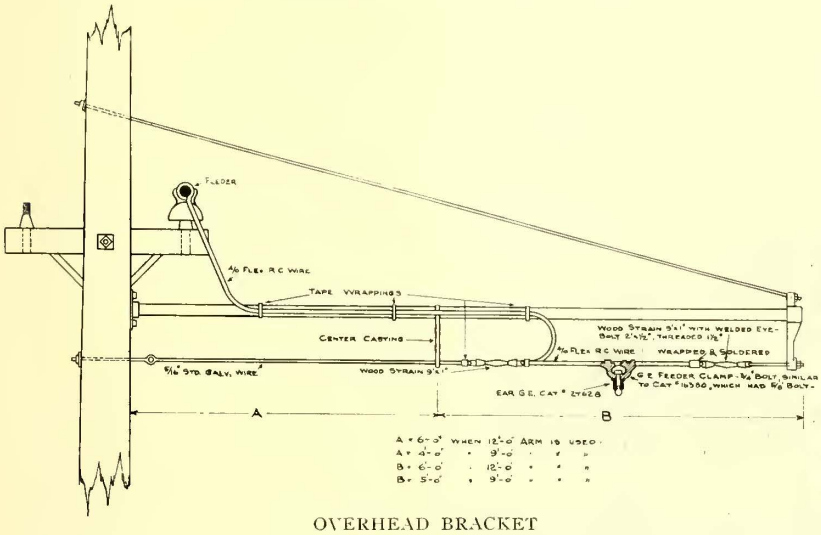
The Middletown-Berlin branch, 9.53 miles in length, connects Middletown with Berlin Junction on the Hartford division of the main line between New York and Boston,

In pushing this work, which was done during the winter months, a much greater use was made of a work train as a factor in the construction work than is usually done.

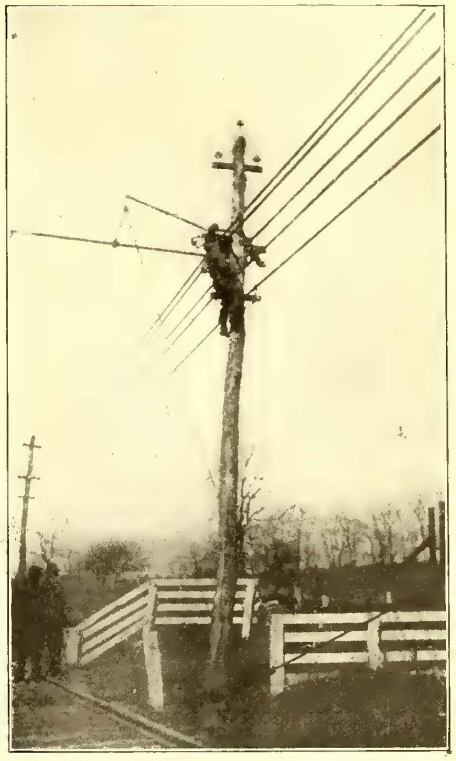
A bracket construction for the trolley wire is used on the tangents and on all curves where the tension of the trolley and feed wires is against the rake of the poles,

12 ft. 6 in. brackets being used on the tangents and 14 ft. brackets on the curves. All other curves, double track and turnouts are of span construction. The poles are of chestnut, having tops 8 ins. in diameter and are spaced approximately 110 ft. apart, with the face of the pole at top of rail 10 ft. from the center line of the track.

The poles were distributed by train and after being framed, graded and armed on the ground were erected in place by the use of a steam derrick mounted on a flat car, as illustrated. This method of setting poles proved quite a satisfactory one and on a line where the work would not be interrupted by trains would be extremely economical, because under the operating conditions on these lines with frequent train interruptions it was possible with twelve men to set and tamp forty-six 35-ft. poles in a nine-hour day.

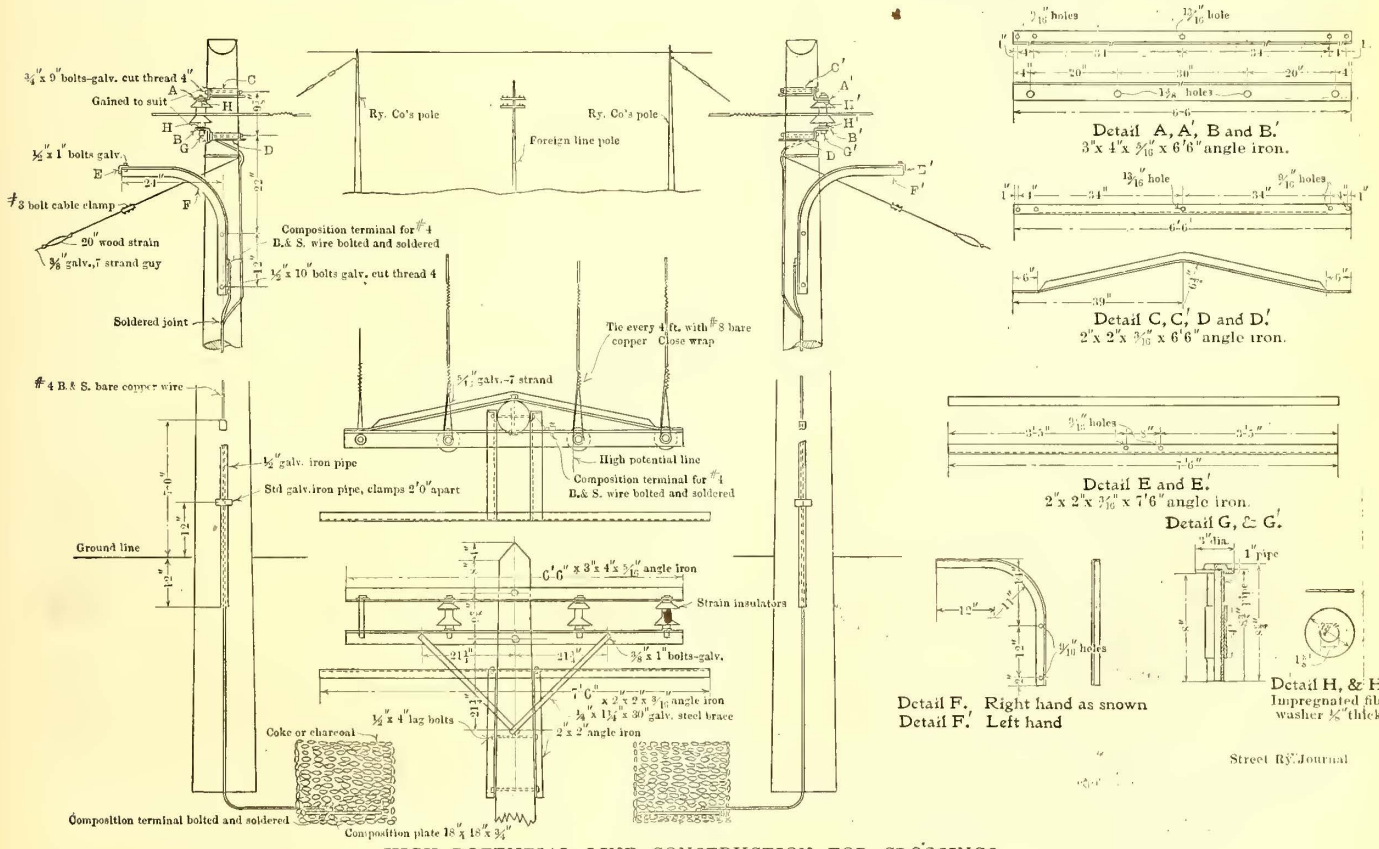



OVERHEAD BRACKET



ERECTING BRACKETS

of brackets, a novel and very economical device was used. This consisted in an arm having a wire head guy on one end the noose of which slipped over the top of the pole, and a curve yoke on its other end which fitted around the pole. At the outer end of this arm was fastened a single block and fall by means of which a man on the ground could hoist the brackets into place for two men up the poles to fasten and adjust them. With this rig it was possible for




HIGH POTENTIAL LINE CONSTRUCTION FOR CROSSINGS

two men on the poles and one man on the ground to erect and adjust thirty-six brackets in one nine-hour day.

The poles are very generously guyed both head and back, 21-inch wood strain insulators being used on the guys on all poles carrying the transmission line, and 9½-inch wood strains on all other poles. The anchors consist of ¾ in. x 6 ft. galvanized iron eye rods run through one-half of a

TOWER CAR TRAIN

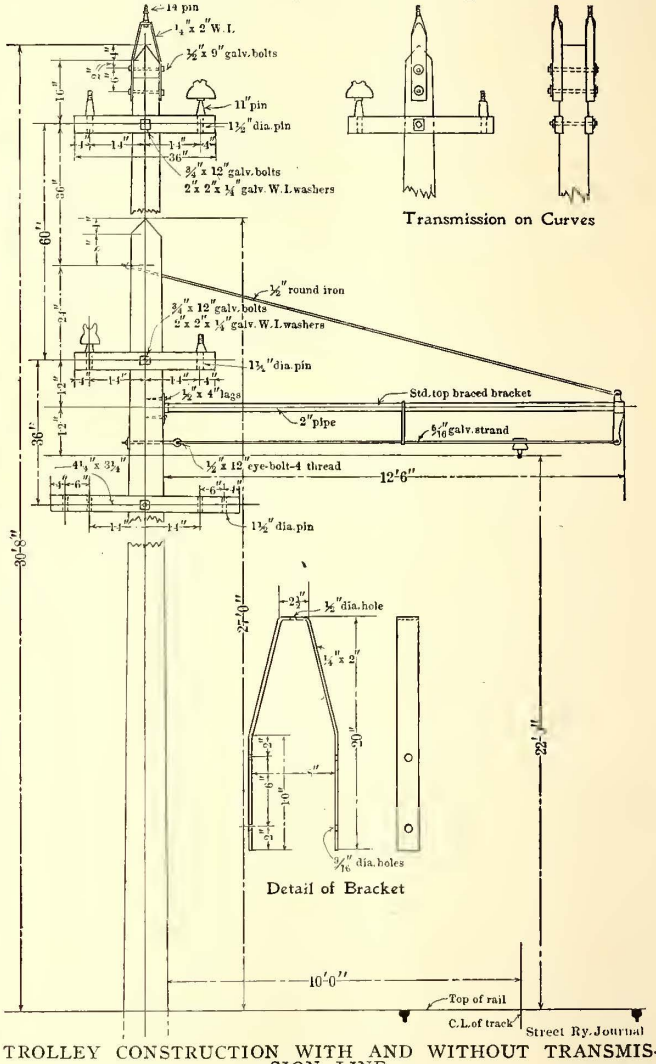
5 in. x 8 in. x 8 ft. tie, as a dead man buried 5 ft. underground. The cross-arms are of two lengths for two and four insulators, and all poles on curves are double-armed for both feeder and transmission.

The trolley wire is No. 0000 hard drawn, grooved copper wire, and is erected 22 ft. above the top of rail. The

SETTING POLES BY CONSTRUCTION TRAIN

trolley wire is anchored by means of anchor ears and strain plates in two ways; on bracket construction, head guys are run to the tops of the poles adjacent to the anchor strain plate and the anchor pole is held in alignment by means of a brace pole. On the span construction the strain plates are guyed to the two adjacent poles on each side of the anchor span.

The work of stringing and building the trolley wire in place and obtaining its proper alignment was very greatly expedited by means of two kinds of tower construction. On the portions of the tracks with the least traffic, two box cars were fitted up with collapsible platforms. These were drawn by a locomotive and by having two flat cars placed between them they were spaced so that two poles could be worked upon at a time. On the portions of the roads where the traffic was heaviest a light skeleton tower with a collapsable top was mounted on four wheels. This was of such weight that four men could lift it clear of the track very easily, so that by the use of flagmen both before




TROLLEY CONSTRUCTION WITH AND WITHOUT TRANSMISSION LINE

and behind it was possible to use this tower to the greatest advantage. All the trolley wire was strung with the locomotive and tower cars, the clipping in and building of curves being done by the smaller tower.

At all switches in the trolley wire the end of the switch trolley wire is guyed through a 9½-inch wood strain insulator to the next pole ahead, so that the switches are under no strain from the trolley wire.

On all curves of 2000 ft. radius or under a bridle construction is used with pull-offs, varying in number with the degree of curvature.

The power to operate these lines is obtained from the Berlin power station in the shape of three-phase alternating current at 11,000 volts, in which form it is transmitted aerially to the sub-stations at Middletown and Meriden.

At these sub-stations it is transformed and converted

into 600-volt direct current, in which shape it is delivered to the trolley wire. There is also a rotary converter in the Berlin power station, so that the line is really supplied from its three termini.

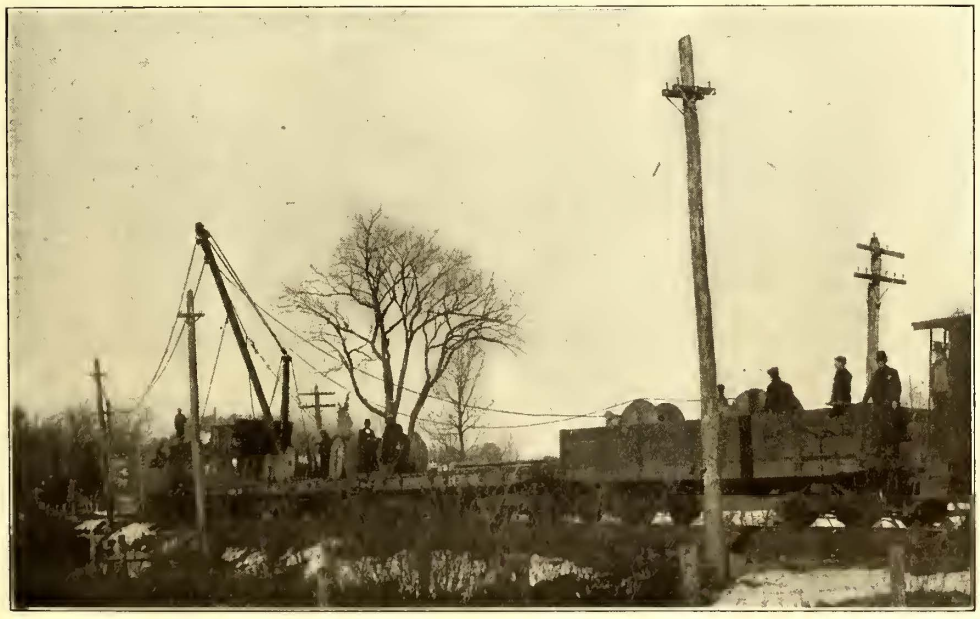
The transmission line from Berlin to Middletown is carried on the trolley poles along the right of way and the line to Meriden is carried on poles along the right of way of the Hartford division.

The three conductors, each of No. 4 B & S gage, semi-hard drawn solid copper wire, are supported on and tie to double petticoat porcelain insulators. There are three transpositions of the conductors, making one complete revolution between terminal points. At all transposition points two poles with the standard cross arm construction are placed 25 feet apart and thoroughly head guyed. The conductors are each rotated through an angle of 120 degrees between these poles, are drawn tight and thoroughly tied, so that there will be no sag in them at these points, due to expansion and contraction.

At all points where the transmission line crosses foreign wires and steam railways a special construction was used. The poles on each side of the crossing are securely head guyed and equipped with angle iron cross arms between which are held, on iron pins, porcelaine high tension insulators. Five-sixteenth-inch galvanized iron steel span wires are drawn tight between these insulators and the transmission conductors are brought from the triangular position to a horizontal plane and tied to the span wires at 61 ft. intervals. This makes a very safe construction because both span and transmission wires must break before either can fall to the roadway and only the former is under any particular strain. To provide for the possibility of breakage of these wires, galvanized iron arms are carried below the transmission wires, so that if they slacken they will come in contact with the arms. These arms as well as the arm supporting the strain insulators are grounded through a piece of No. 4 wire attached to them and carried down the pole to a copper plate buried in charcoal in moist earth.

The direct current feeders are carried on the trolley poles on both branches and are of weatherproof stranded wire of various sizes. The positive direct current feeders are tapped into the trolley approximately every 1000 ft. Lightning arresters are cut into the positive feeder taps approximately every 2000 ft., the ground being made by means of a coil of trolley wire buried in charcoal in moist earth.

VIEW OF COMPLETED TRACK



STRINGING FEEDERS

The negative direct current feeders are tapped into the track rails approximately every 1200 ft. Both the transmission and direct current feed wires were dropped in place on their cross arms by means of the derrick used for erecting poles, and pulled up to their desired tension by means of the train. This is about the simplest way in which wires can be handled, and that it is very economical can be judged from the fact that it was possible to string and pull up three lengths of 500,000 circ. mils, about 2600 ft. each, of weatherproof cable, two lengths on one side of the pole and one on the other, in 8¼ minutes, with seven men besides the train crew. If the hoisting engine on the derrick had been equipped with a double drum and the derrick boom with revolving hopp, four of these men could be dispensed with.

The track is double bonded at each joint of each rail

with No. 0000 stranded cable bonds around the fish plates, painted to prevent corrosion and make them less conspicuous. These bonds are of the solid compressed terminal type, compressed into holes drilled in the rail, by means of 5-ton, double-screw compressors.

## THE STRIKE SITUATION IN SAN FRANCISCO

BY HENRY K. BRENT.

It seems advisable at the outset to call attention to the fact, in explanation of the errors which the article doubtlessly contains, that the writer's knowledge of the practical operation and management of street railroads is only superficial, such knowledge as he possesses having been acquired merely from reading, and by his experience of six weeks as a motorman in the services of the company. Therefore, through lack of competency, no opinion is herein expressed as to the merits, pro or con, of the origin of the strike, viz., as to the questions of wages, hours, arbitration and official recognition by the company of the Carmen's Union. Such opinions as are expressed are founded upon general theories as to the relations of employers and employees, adapted to the special character of the industry involved, and modified by actual observations of existing conditions.

For convenience, the opinions and observations are classified under four general divisions:

1. The final means adopted in the Carmen's Union for inaugurating the strike.

2. The present attitude of the striking carmen towards the union.

3. The probabilities, upon termination of the strike, of the organization of a new union upon the principles of the present union.

4. The adoption by the company of means tending to offset the influence of the union organizers, and tending to create among its employees a loyalty to the company.

It must here be pointed out, as regards the subject matter contained in this article, that the writer's information was derived from conversations with more than thirty of the present striking carmen, and several of the old carmen who went out with the union, but who have since returned to the service of the company. In so far as he knows, none of these individuals was an officer of the union, and therefore, in justice to the union, this lack of information from an authoritative source should be borne in mind.

In securing a position as a platform employee of the United Railroads Company it was the desire of the writer both to have the experiences attendant upon the duties of a motorman during a strike, and, also, to ascertain the general character of the strikebreaking employees. Generalizations in this latter respect are somewhat difficult, since the men are a heterogeneous aggregation. Among them are representatives from every section of the United States; Canada and Mexico are also represented, and practically from every country in Europe a strikebreaker is to be found. At the outset of the strike a large number of men were brought to San Francisco by the professional strikebreaker-organizers, Farley & Field. The new men, so imported, about 400 in all, were principally from Chicago, St. Louis and Milwaukee, and were old hands in the business of breaking strikes, occupying regular places upon the list of the organizers, under whose leadership they go from city to city as the emergencies arise. Since the first few weeks of the strike the present force of employees has been collected individually, but without solicitation by the company, from various cities, including San Francisco.

The heterogeneous make-up of the men is further shown by their occupations prior to coming to San Francisco. Although a large percentage, possibly 40 per cent, have railroaded before, only a small portion of that 40 per cent railroad as their regular business. These irregular railroaders are men who railroad only during strikes. Some of them are cowboys, farmers, sailors and clerks, who are induced to quit their regular jobs for the comparative high pay received during strikes, and for the perquisites of strikebreaking conductors and motormen. All other callings seem to be represented, a dentist, a jockey, a minister, a fruit vendor, a German student, a curb broker from New York, a broken miner from Goldfield, etc. A surprisingly large number of trained artisans are also included, and surprise is still further increased by hearing that these carpenters, plumbers and masons have turned railroad men not from choice but from necessity. They are drawn to San Francisco by the prospects of regular work and high pay, which they have not secured on account of the iron rules of unionism. Either they are flatly turned down by the foreman to whom they apply for work, or else they are told they must join the local union of their craft. The fee for joining a union ranges from thirty to fifty dollars, the Carpenters' Union is forty dollars, and the regular monthly dues from one to two dollars. In addition to this they would be compelled to contribute a portion of their wages to the General Strike Committee in support of the carmen's strike. This is why the company now has in its ranks many unusually capable men. Unfortunately for the company they do not intend to remain, but will return to their homes at the first favorable opportunity.

Another class from which the ranks of the company are being augmented is that of the discharged soldiers returning from the Philippines. Every transport which arrives at San Francisco lands a large number of these men who are literally dead broke. Although they may have had money upon embarkation at Manila they have either dissipated it at intermediate ports in Japan, such being the regular route of the transports, or gambled it away on board the vessel. These men make excellent employees, and, as they now have no permanent occupations, they afford the company a nucleus for forming a first-class operating force.

As the work at the beginning of the strike is usually of a dangerous character it is needless to say that there exists some incentive for the men in addition to the wages which they receive from the company. It is true that the employees of this early stage of the strike receive per day about one dollar more than the wages received by men coming on later, and also, free transportation coming and returning to the city in which they were engaged. But, none the less, this increased pay and free transportation are not the real motive. That motive, which is concealed neither by the men themselves nor by the company, is simply that during the first few weeks of the strike it is tacitly understood that the conductors shall be allowed to reimburse themselves liberally from the fares collected, which additional income is shared by them with the motormen. During the first three weeks of the present strike, on those lines where traffic is heaviest, the conductors appropriated from ten to twenty dollars per day, five dollars of which was shared by them with their motormen; upon the less crowded lines, the amounts were smaller, and after the third week they were gradually reduced until now a fair average may be considered as two dollars per day per conductor. As soon as this reduction began to take effect, due to pressure by the company through its inspectors and spotters, many of the old strikebreakers re-

turned home, and of those who remained many of the conductors, their source of income thus being reduced, secured transfers to the front platform, which position, though not so lucrative, is generally considered more desirable.

But though of a heterogeneous class as regards their origin, the men are most homogeneous in one respect, viz, as to their dishonesty and low standard of morals. So general is their practice of knocking down fares, in other words, stealing from the company, and so callous are they relative to their conduct, that the question forces itself upon the observer as to whether their acts really constitute dishonesty. Do their non-concealment and frankness in discussing among themselves the extent of their peculations show that the ordinary principles of business ethics do not apply to this class of employment, or that inherently there is something fundamentally wrong in the mental and moral qualities of the men themselves? This question is definitely answered in two ways. First, by the relations of the men to one another, and, secondly, by their relations to the general laboring public.

That dishonesty is recognized among themselves as existing is demonstrated by their mutual lack of trust, respect and friendship. Every man is considered prima facie a rogue, and is treated accordingly by his associates. In their conversations accusations of theft are made without the least resentment upon the part of the person accused. Dishonesty is a recognized condition of the position and calls for no discussion among them. Furthermore, this recognition of platform dishonesty is so general that a well-defined ostracism against conductors and motormen exists among other laboring classes, and also, even among other company employees, such as linemen and shopmen. From this recognition of their conduct as constituting dishonesty both by themselves and by the public it would appear that no special allowance should be made for them for special ethical standards, and consequently, that the company should have no hesitation in adopting any means, however radical, which will put a stop to it.

This callousness to conventional standards is further exhibited by their conduct after they have been discharged for misappropriation of fares. Instead of being chagrined, upon their return to the car house from the office they at once announce to their acquaintances the fact of and the reason for their dismissal; "canned for short arm work," as they express it. Upon one occasion a man mounted a convenient wood pile in the yard, and in his speech upon the subject explained that he was just about ready to quit anyhow, since during his five weeks of service he had succeeded in pilfering the company to the amount of $300. Upon another occasion two men who had been discharged for this cause announced the fact by attaching to their coats by means of strings each a large sugar tin, with which they paraded around the yard, as evidence that they had been "canned."

Not only do these knights of the road levy tribute upon the company; the public is also made their victim through the often-practiced art of "short changing." To short change a passenger who presents a quarter requires hurry upon the part of the passenger, or a crowded car. The conditions are similar for a fifty-cent piece or a dollar, but the trick is easier. Where the conductor really reaps his harvest from the public is in those cases where the passenger offers a silver dollar. In his left hand the conductor has palmed a fifty-cent piece. With his right hand he accepts the dollar and makes the change, but change only to the amount of forty-five cents. Upon remonstrance by the passenger he is shown the half dollar which the conductor asserts was the amount handed to him. So neatly and quickly is the trick turned that 75 per cent of such passengers are gulled by the assertion of the conductor that the coin was only a half dollar.

There is also a humorous side to platform life, and, in one aspect of it, many a person has missed a car for want of knowledge. Although a motorman may see a person running for his car down a side street, he will apparently take no notice of such person by looking in that direction and nodding his head. To do so would cause the person to stop running, and thus delay the car. Should the person stop running of his own accord, the motorman generally goes on by as if the passenger had not been seen. Though one such event in the course of a trip would be trivial, a large number of wait-stops would consume sufficient time to put the car off its schedule, and necessitate an explanation by the motorman to an inspector as to his dragging the road.

In San Francisco it is the practice for cars to stop with their front steps at the near crossing instead of continuing past the intersecting street to the far crossing. The regulation frequently results in overcrowding the front platform. Consequently, when a motorman observes waiting for his car Chinamen with large laundry bundles, worthy housewives ladened with market-baskets, milliners' boys with their enormous boxes, etc., he not unnaturally risks a violation of the stop-regulation, and only stops when the rear platform has come abreast such persons. To do so is considered an excellent joke on the conductor, since all such passengers require much assistance in getting on and off the car.

As in the consideration of most people, however, there is a bright side to their character, so with platform men. They are far above the average intelligence of unskilled labor, and the majority of them are men of good school education. They are pleasant to talk to, ready to do a favor, and brave to a degree of recklessness. But such recklessness seldom assumes the form of carelessness in running their cars, or in attending to the ordinary comfort of their passengers. They apply to the management of their cars the same keen intelligence which they manifest for their own benefit in mulcting the company and public, and it will probably be found, when the company compiles and examines the accidents which have occurred during the strike, that neither in their causes, character, nor number are they very different from those which occur under normal conditions.

The experiences of a platform man during a strike are both instructive and interesting; instructive in that he soon learns the value of self control and good humor. At the California Street barn, where the writer was quartered for five weeks, lodged and fed, horse play was the spirit of the men at all hours of the day and night, and good humored forbearance was the only way to secure peace. The rooms in which the men sleep at the California Street barns were formerly part of the old steam road station, and are long, narrow and high. The cots are ranged in line and closely together; so closely, in fact, that the fleas have no difficulty in jumping from one bunk to another until they find a victim suited to their taste. But whether it be from charity, or from the fact that many fleas have many tastes and require many victims, no one man can claim to have a monopoly of their attentions. Sleeping under such conditions is difficult enough, but the trouble is further increased by the presence of electric lights burning all night. The

lights may be necessary because of the coming and going of the night crews. Or they may be necessary to prevent human marauders from examining the pockets of sleeping men, or to assist insect marauders in their ceaseless search for a new victim, or a new spot upon an old victim.

In the dining-room, a long shed containing two long tables, covered with white linoleum, the uninitiated is startled to hear from the members of a hungry crew just arrived the demand for slush. Thereupon a large galvanized pitcher of soup is produced, sooner or later, according to your favor with the waiter. Then comes in rapid succession demands for grease (butter), horse (meat), cow (milk), the gravel wagon (sugar bowl), and paste (pudding), with the request for information as to how in hell the waiter expects a man to eat without tools (knife, spoon and fork). But when fully equipped for operations no reasonable man has a kick, for the food is clean, wholesome and plentiful. Life in the barns is by no means a hard one, and many a sportsman upon hunting trips fares worse in his own camps. Then, too, is the important consideration that all during the strike both food and lodging have been provided gratis, and in addition to the wages.

Experiences while operating a car during a strike can only be called pleasant by making the word pleasant synonymous with exciting, which, to some natures, it really is. In any event, a new sensation is experienced by the lately initiated motorman when, on the third day he is in charge of a car, he finds it going at a tremendous rate down a steep hill at the bottom of which is a sharp curve. Greased rails are the explanation, and brakes are of no avail. In this case fortune favored the innocent and inexperienced, and the car kept the tracks, the only injury being to one lady who jumped from the car while racing down the hill. The new strike-breaker is also occasionally introduced to a new kind of music. Not musical glasses, as are sometimes heard at vaudeville performances, but musical car windows, the instruments being stones, and the musicians being striking carmen or their sympathizers. Shooting the Chutes, and other sources of pleasure where abrupt stoppage of progress is the object, dwindle into insignificance compared with the delightful jolt on a dark night caused by striking a bag of sand on the track. The acme of delight for a motorman, however, pleasure and excitement being synonymous terms, is when his head-light is shot out, and when the next succeeding night a bullet plows its way through the back of his coat collar.

But it is not only aboard his own car that a motorman or conductor may receive stimulating sensations. If of an inquisitive disposition he may desire to know at close range the people who favor him with verbal pyrotechnics, stones and bullets. He goes down town, without his uniform, and hobnobs with the striking carmen who, as pickets, are found upon every prominent corner which a street car passes. Then, to get the real sensation of being in the enemies' country, he boards a Union 'bus, in which he has the pleasure of hearing his acquaintances upon passing street cars called scabs and other choice names. But woe betide the man whose identity is discovered while on a 'bus. A few years ago when the teamsters' strike was in progress in San Francisco, strike-breaking teamsters were pulled from their seats, their arms placed between the wheels of the wagons and broken. No such brutality as that has occurred during the present strike, but more than one non-union carman has been beaten to death by sluggers, a fate he would probably meet if recognized by the occupants of the 'bus. On the way back to the barn from this expedition is performed the great *coup* of the afternoon—that is, securing from one of the striking carmen the large white picket badge which he wears. Sometimes this may be secured by stealth, but more often the Union man must first be knocked down. From the difficulty of the proceedings it follows that such trophies are rare, and correspondingly highly valued.

All you gentle denizens of little old New York, who are accustomed to recreate yourselves with Coney Island sensations, take heed, and for true heart-stirring, soul-inspiring, nerve-wrecking pleasures go to San Francisco, and prove your right as an American citizen to labor in any legitimate occupation you may desire, even if it be to perform the simple duties of a strike-breaking motorman.

### CAUSES OF THE STRIKE AND SUGGESTIONS AS TO THE FUTURE

1. The direct and final causes which produced the carmen's strike were the influence and authority of the president of the union and his associate officers, their authority over the affairs and management of the union having attained such magnitude as practically to destroy all individual opinion and initiative among its members.

Within the union there are two circles—one composed of the officials, as above described, and the other composed of a set of "plug ugly" members, who for certain favors and benefits bestowed upon them from time to time by the officers, have passed under the immediate control of the officers to be used as they desire.

After the agitation was well under way these plug uglies were sent among the latest employees of the company, among the men who were receiving the lowest wages, and whose consent to vote for shorter hours and increased pay might be most easily secured. From this point, events moved rapidly to the conclusion. Information was disseminated that, at the approaching meeting for a final vote, should there be any dissenters from the known wishes of the executive circle, such dissenters would be looked after by the plug uglies.

The result of prevailing conditions in the union was that the final meeting was not well attended, many members opposed to the strike not being present. By prearrangement the names of a number of known adherents, plug uglies and new men were first called; then the name of a known opponent to the strike. The vote of this last member was met with hoots and hisses, and he was interviewed then and there by several plug uglies. The result of this demonstration was that there were few opposing votes, and the motion to strike was carried.

2. The attitude of many members of the union is that they were intimidated and imposed upon. The final vote as an expression of individual will and majority sentiment was a farce. Under the open vote system members felt compelled in many instances to vote contrary to their opinions, or else subject themselves, in case the strike should be declared, to the odium attaching to disloyalty to the cause of labor.

3. In spite, however, of existing conditions within the union, and the hardships which those conditions have entailed upon the men, organization as such is still considered desirable. But, owing to their lack of training in considering such matters, the men have no definite idea as to the means to be adopted for reorganization, and for securing the benefits which they imagine will spring from reorganization. Though at sea as regards the means, they are in a fertile frame of mind, and reorganization of the old employees would undoubtedly again occur under efficient leadership.

In view of the fact that the spirit of organization in-

fuses itself to-day in all branches of industry, especially in labor, and especially in San Francisco; and, also, in view of the fact that the desirability of organization and its derivative benefits are in the minds of all working-men, in different degrees of vagueness and activity, it is only reasonable to assume that, although the present unorganized employees of the United Railroads may remain in its service to the exclusion of its old employees, they will themselves eventually be organized. There is, however, the strongest possible evidence, deduced from the general character of the men now employed, as well as from their definite statements, to believe that a very small percentage of them intend to remain permanently. In any event, whether the number which remains be large or small, they will become residents of this community, and, harboring as they do, in common with other working-men, the idea of organization, it will be a matter of comparatively short time before the acute environment and labor influence of the community have their natural effect upon them. That is, upon the advent of a suitable leader, the new men also will be organized.

It would appear, then, in anticipation of future conditions that the company may expect, should its force consist of old employees, reorganization; or if, of new employees, organization. An admixture of old and new employees will result in an organization conflict, the final nature of the organization and its relation to the company depending upon the characteristics of the leader by whom it is molded. On account of local conditions, the new organization will undoubtedly take the form of a union. The vital question is, whether the new union shall operate under its old system of suppressing the individual within the union itself, and also, of suppressing the individual in his relations to the company, thus placing in control a small body of officials with whom the company must negotiate instead of with its individual employees; or, whether relations can be established between the company and its employees, which, while not dispensing with the union, will create among its employees a loyalty to the company equivalent to, or possibly greater than their loyalty to the union.

4. Without doubt, unless the company adopts some means to counteract existing influences, the new union will be formed along the lines of its present expiring predecessor, such being the most probable attitude among the men from whom it may reasonably be supposed the new leader will come. These men, individuals without other duties to distract their attention, have become expert in organization, and to meet them fairly and squarely and efficiently in the conflict for the good will of its employees, the company should appoint some officer with assistants, or a committee with a chairman, to guard carefully the welfare of its employees, and to instill them with an interest in their work which will make them feel they are a component part of the railroad instead of merely its employees. That is, create among them an esprit de corps, founded upon interest in, and enjoyment of their work.

From results secured in other industries where large numbers of men are employed, it would seem that the best means of infusing an esprit de corps is to inaugurate a system by which there is created a vigorous but healthful rivalry within the company; between the men individually, between the inspectors, between barn superintendents, and between division superintendents. To create rivalry, there must be a basis of comparison, and such basis of comparison can only be secured in an instance of this nature by keeping an exact record, this record resting upon a system of merits and demerits. This system of merits and demerits should supersede the present system of seniority by which is determined the assignment of desirable and undesirable runs, and by which other interests of the men are affected.

As regards the application of the system to platform men, switchmen, barn men, etc., their records would depend upon promptness in reporting for work, regularity, adherence to schedule running time, care of cars, number of accidents, honesty and general efficiency.

Among inspectors and other minor officials should be a similar record system based upon merits and demerits.

At the car barns the same system, with proper modifications, should be maintained, based upon the condition in which the cars are kept and sent out. This would require a careful record of the condition of the cars when turned in by the motormen, and consequently would involve an investigation and assignment of definite responsibility for car-accidents; either that the car was not in proper condition when it left the barn, or was not properly cared for by the motorman or conductor when on the road. The records thus kept should be compiled according to the different divisions of the road, and the division superintendent held responsible, thus securing between the division superintendents the rivalry desired.

One step further, however, is needed before this general spirit of rivalry and competition, based upon comparative records, can be created, viz., publicity of the records. To effect this publicity the company should establish a first-class company magazine, not a mere pamphlet, under a competent editor. A magazine such as is published by each of the larger insurance companies and by some of the steam railroads, the magazine of the Erie Railroad being especially noteworthy and especially efficacious towards the desired end. The divisional records should be so compiled and published as to facilitate ready comparison between individuals of the same division, and also between different superintendents, and general conditions between the different divisions. But the magazine should not be simply a compilation of statistics. Within its pages should be noted the transfer of men from one division to another, from one run to another; meritorious mention should be made for meritorious services, accompanied by the individual's photograph; and all other matters of immediate interest to the men should be given space. It should, moreover, contain articles on and illustrations of new cars, new motors, etc.; also descriptions of third-rail systems, single-rail inventions, overhead trolley improvements, and other similar subjects.

It is possible that the interest and rivalry thus put into operation might in themselves be sufficient to hold the men to the company and make them feel themselves a component part of it, and in this manner offset the ever agitating influence of the union leaders. But recognition must be given to the fact that it is a far cry to that desirable condition. Crown, however, this spirit of interest and rivalry with its legitimate reward and loyalty will follow. As the men dealt with are professionals the prize awarded them for superior excellence in this game of records must be a pecuniary one. Therefore, at the end of every third month there should be a recapitulation of records by divisions, and to that division of the road having the best record should be awarded the prize of increased pay for all, from the division superintendent down. To retain this increased pay the division must maintain its position in the lead, otherwise at the expiration of three months it passes to some other division.

Another very important part to be played by the com-

pany's labor organizer in encountering upon an equal footing the union leaders is the establishment of forms of amusement for the men, since one of the strongest holds a union has upon its members is its use as a medium for social intercourse at its meetings. Rivalry is excellent not only in work, but also in play, and in this latter respect it should likewise be established between the different divisions. There should be at the disposal of the employees a field for outdoor sports, billiard tables and bowling alleys. The contests between selected teams of the different divisions would both stimulate the desired rivalry and also give to the men of the different divisions opportunities to become acquainted with one another under auspices and in an atmosphere different from their union meetings. Needless to say the men would not of their own initiative enter into these athletic and social contests. Equally true is it that they do not of their own accord form unions. In both instances there must be leaders, by whom the men are drawn in the desired direction almost unconsciously. Such leaders being in the one case the company's organizer, and in the other the union's organizer.

To summarize the situation. There is every reason to believe that upon the termination of the present strike either the old union will be reorganized or a new union formed. There will undoubtedly be another union of some nature. Unions are not the result of individual initiative of all the employees of an industry, nor the result of spontaneous action by them. They are formed by the strength and personality of some one man, or set of men, trained in the art of organization and versed in the platitudes of labor argument. To mitigate their undue and often unjust influence, but not to prevent the formation of a union, there should likewise be a company organizer, or organizers, who, step by step, meet every move by the labor organizers for influence over and favor with the rank and file of the employees. Let there be a live wire among the executives of the company, which, under harmonious and just conditions, will be strong enough to draw together all concerned for their common benefit; but which, when confronted by unjust conditions, will be able, on account of its established location among the company's employees, to generate force enough to dislodge such outsiders as may endeavor to secure too firm a hold upon the feed wire of the system, viz.: upon the company's employees.

## CAR BRAKING IN QUEBEC

Much has been written about the effectiveness of different types of emergency brakes, but perhaps the human factor in the braking problem has not been given the deserved attention. This view is supported by the experience of at least one company which has never had a car run away despite the fact that it operates on very severe grades with only the ordinary braking equipment.

The fortunate railway in question is the Quebec Railway, Light & Power Company, operating the lines of a city which has aptly been termed the American Gibraltar. In fact, the difference in height between the lower and upper portions of Quebec is so great that an elevator and winding trestle are necessary portions of the local transportation system. There are numerous grades over 10 per cent with a maximum of 14.15 per cent on Crown Street. The cars are all of the single truck type, weighing 7½ to 8 tons and furnished with regular hand brakes. No cars are allowed to travel more than eight miles an hour under any circumstances.

In view of the success which the company has had for many years in avoiding all braking accidents, a study of the rules relating to braking may prove helpful to other companies operating under similar conditions.

COOPERATION BETWEEN MOTORMAN AND CONDUCTOR

Before ascending or descending a steep grade and during the ascent or descent, conductors must remain stationed at the brake on the rear platform; and if the motorman finds that his brake shows weakness or want of grip, signal the conductor by two sharp rings of the bell, which will be a signal for the conductor to apply the brakes on the rear end. Do not shout or unnecessarily alarm the passengers. Motormen must see that conductors are on the rear platform before commencing the ascent or descent of any steep grades, and must in all cases come to a dead stop and wait the signal of the conductor to proceed wherever the "stop boards" are placed.

BRAKING REGULATIONS FOR THE MOTORMAN.

Except in cases of emergency, brakes must be applied gradually, so as not to throw standing passengers. When stopping, release the brake a little so as to make an easy stop. Never slide the wheels if it is possible to avoid it, and never apply the brake when the current is on. The practice of keeping brakes applied, when running on a bad rail, is absolutely without benefit and has many bad effects, among which are: Considerable waste of power, wear of brake shoes and heating of motors.

Release brakes before starting car.

It is better not to stop on very heavy grades or in curves, if it can be avoided.

In descending a grade do not let the car run even as fast as it would on a level, because you might want to stop suddenly and your brakes might fail you. In running down grades always have trolley on wire, for should your brake fail it might be necessary to reverse the motors.

If the car wheels slip in wet weather while going up a grade, it may be necessary to cut the current off until the wheels get a grip, and then go ahead. If the wheels continue to slip apply sand.

If brakes fail to operate, the car may be stopped by the motors in two ways: First, by reversing the current in motors as follows:

(1) See that controlling handle is at "off."

(2) Reverse the reversing switch.

(3) Throw the controlling handle around to the first notch, and then to second and third notches if necessary, never beyond third notch. If wheels "skid" on rails throw controller handle off and then on again to first notch. Repeat throwing on and off if necessary. As soon as reverse is applied, take up all slack in brake rigging so that brakes may be set on hard as soon as car has stopped.

(4) If fuse blows while reversing current, throw controller handle to last notch and leave it there. If wheels "skid" on rails, throw controller handle off and on again to last notch. Repeat throwing on and off if necessary to get the wheels rolling.

(5) Always move reverser handle of controller with the left hand, and do not take the right hand off the brake handle for one instant.

Second, to stop car when the trolley is on or off the wire. Means of short-circuiting motors.

(This method must be used only after all other methods have failed.)

1. See that the controlling handle is at "off."
2. Throw the platform switch at "off."
3. Throw the reverse switch in opposite direction to way car is running.
4. Throw the controlling handle around to last notch and leave it there if car slows up. If wheels "skid" on rails, throw controlling handle off and on again to last notch, and repeat if necessary to get wheels rolling.
5. If on a grade, the car will run slowly to the bottom before coming to a standstill.

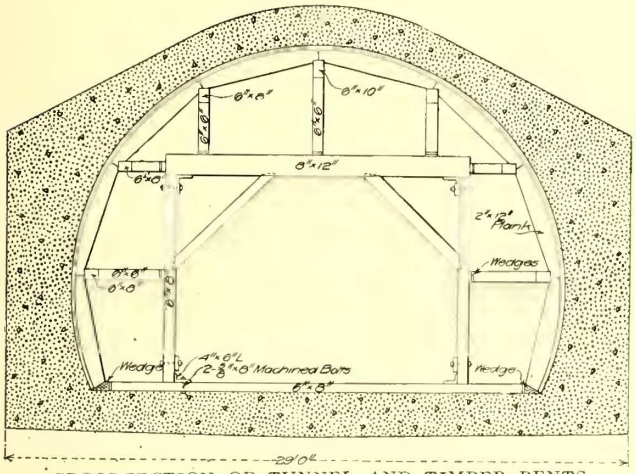
Always ease off the brakes when applying either of these emergency methods of stopping car, but be prepared to apply them hard just as soon as car is under control.

To stop a car when running away on a down grade, use the second method, but do not resort to either except in cases of extreme necessity or sudden emergency.

Reversing is a very severe strain on the apparatus, especially when the car is under high speed, and any abuse of the practice is strictly prohibited.

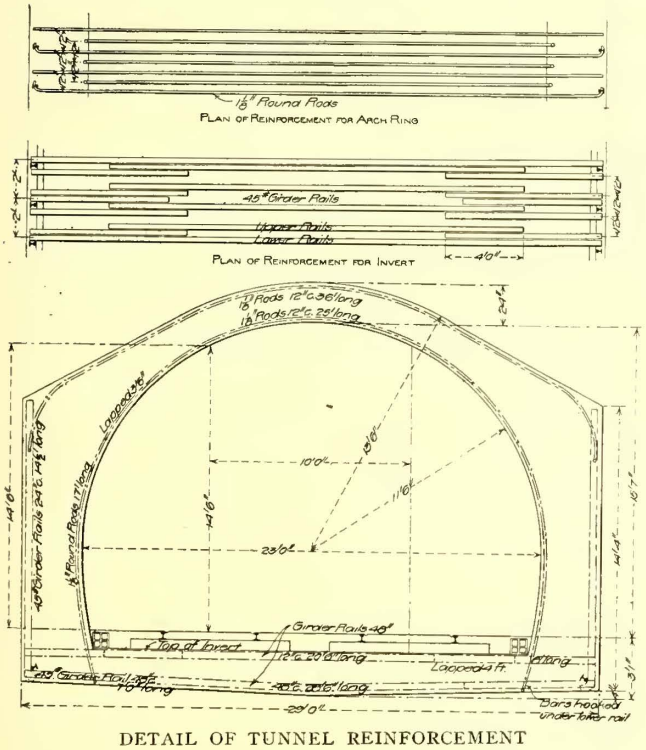
## THE SELBY HILL STREET RAILWAY TUNNEL, ST. PAUL MINN.

The Twin City Rapid Transit Company of St. Paul and Minneapolis has recently placed in service a subway which greatly reduces a steep grade on one of the most important street railway lines in St. Paul, and eliminates the necessity of a counterweight formerly used to handle cars




CROSS-SECTION OF TUNNEL AND TIMBER BENTS

up and down this grade. The new tunnel is on Selby Avenue, a short distance from the business district of the city. At the location of the tunnel the grade of the street was 16.5 per cent for several hundred feet, the business district being 125 ft. to 150 ft. lower than the residence sections at the top of this hill. The cars of one of the three interurban lines between Minneapolis and St. Paul, as well as local cars, were operated over this steep grade, on

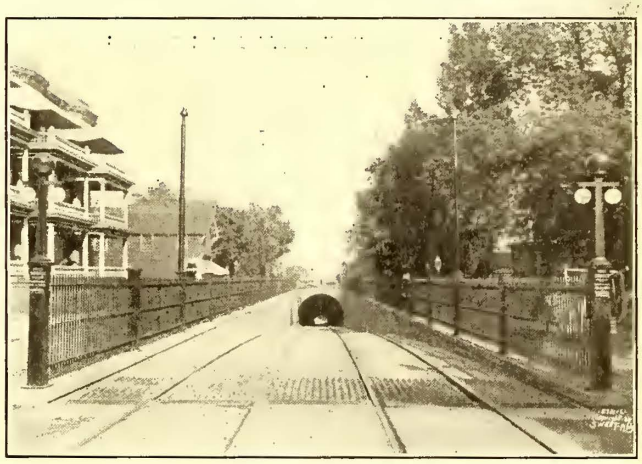



DETAIL OF TUNNEL REINFORCEMENT

which the counterweight device had been used since electric traction was substituted in 1898 for the existing cable line on this street. The counterweight device consisted essentially of a traveling cable and a counterweight in a conduit below the street surface, and two grip cars, which were used to haul the street railway cars up and down the steep grade. The number of cars passing over this line became so great that the counterweight could not handle them fast enough to avoid delays. To eliminate the delays due to the auxiliary apparatus, and to obtain other operating advantages, the decision was made to build a double-track tunnel from the base of the hill to a point far enough back on Selby Avenue at the high level to obtain a satisfactory grade.

The total length of the improvement required in the grade reduction is 1700 ft., including the tunnel and the approaches. An approach, 230 ft. long, leads up to the portal of the tunnel at the bottom of the hill. The tunnel is 920 ft. long between portals and has an approach 320 ft. in length at the upper end. The lower approach is on a curve with a 500-ft. radius, but otherwise the alignment of the improvement is straight. The grade of the new track is uniformly 7 per cent, as compared with 16.5 per cent on the old track. The approaches are so arranged that after the backfilling has all been placed, the street will again be opened for traffic at practically the original grades.

The approaches are between reinforced-concrete retaining walls, which vary from 3 ft. to a maximum of 20.5 ft. in height. Where these walls are less than 6 ft. high they are built as gravity-section structures. Above that height



ENTRANCE TO TUNNEL

they are vertical, reinforced-concrete slabs, having a horizontal slab footing, and buttresses, 2 ft. wide and 6 ft. apart on centers, on the rear side. The approach to the lower portal of the tunnel is at one side of the street, a roadway parallel with it connecting with the street over the tunnel. The approach to the other end of the tunnel is at the middle of the street, but a 13-ft. drive was obtained on each side of it, so, on the whole, the street is much improved for highway traffic as compared with the old arrangement. The tops of the walls of the approaches and the portals of the tunnel are 0.5 ft. above the street grade, and are surmounted by a 6-ft. ornamental-iron picket fence, to prevent accidents.

The tunnel has a double-centered arch, with a span of 23 ft. at the springing line and a rise of 11.5 ft. The clearance at the center line of both tracks is 14.5 ft., while the center height is 16 ft. 10 in. The arch is 24 in. thick at the crown, and the bench walls are 4 ft. thick. Unlike most tunnels of this type that have been built the invert is perfectly flat, having a thickness of 2 ft., exclusive of the concrete in which the track structure is imbedded. The tunnel section proper required 9.782 cu. yds. of concrete per linear foot.

The details of the reinforcement of the tunnel section are shown in an accompanying illustration. The arch has

two sets of 1⅛-in. round rods, alternating with girder rails, all of which are spaced as shown. The rods in the side walls have their lower ends imbedded in the invert, and extend up into the arch, overlapping those in the latter to produce continuous reinforcement. The invert is reinforced with two layers of old rails, placed transversely. The rails in the lower layer are 28.5 ft. long and are placed 4 ft. apart on centers; those in the upper layer are 28 ft.

VIEW SHOWING THE RETAINING WALLS

long and are 12 in. apart on centers, their tops being 1 in. below the surface of the invert section.

The tracks in the tunnel have 80-lb. T-rails attached to creosoted ties with screw spikes. The ties and rails are imbedded in concrete to within 1¼ in. of the top of the ball of the rail, the concrete being finished to a smooth surface to form the floor of the tunnel. The floor between the rails of each track is practically flat, transversely with the tunnel, and between the tracks is depressed only slightly toward the center line. Connections to a drain are made at intervals of 200 ft. in the tunnel so the floor can readily be flushed clean, thus avoiding any difficulty from dust, or odors from refuse that would collect in stone ballast. At the same time the track structure is believed to be of such design that the concrete in which it is embedded will not have to be disturbed for a long period.

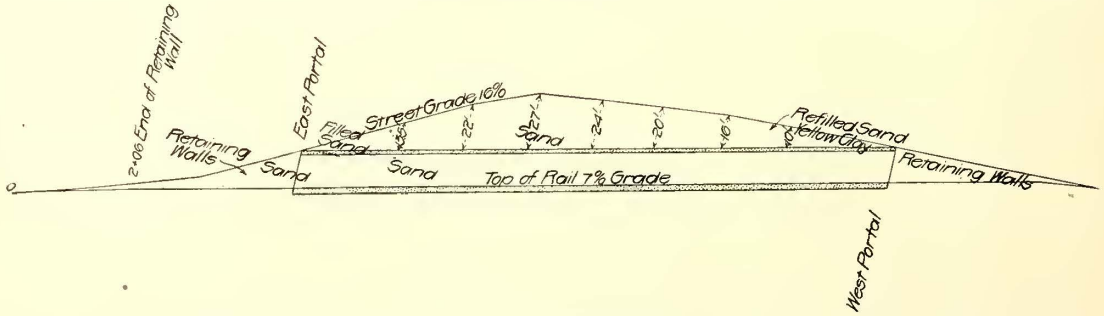
A 15-in. sewer pipe was laid under the invert, along the center line of the tunnel, from the entrance of the upper approach to the lower end of the improvement. An opening covered with a grating is placed across the end of the upper approach to intercept storm water and divert it into this sewer. Similar openings at other points in the approaches and the tunnel provide inlets to the sewer for storm water and for water used in flushing. The ground water back of the tunnel and retaining walls is also drained into this sewer through 4-in. laterals, which are placed 20 ft. apart on both sides of the main drain.

A four-way duct for cables is imbedded in the concrete along each side of the tracks, manholes being provided on these ducts at both ends and at the middle of the tunnel. Connections between the trolley wires and the cables in the ducts are made through conduits imbedded in the tunnel arch. The tunnel is lighted by 32-candle power incandescent lamps, spaced 10 ft. apart along the center line of the arch. These lamps are also connected to the cables in the ducts through conduits buried in the tunnel arch.

The construction of the tunnel was handled entirely in an open cut, 34 ft. in width, the maximum depth of the cut being 52 ft., and the average about 30 ft. The hill through which the cut was made consists almost entirely of a coarse glacial sand, containing some boulders and small stone. As the sand was practically free from clay, it would flow easily when dry. When the street was originally graded it was cut down 15 ft. to 25 ft. below the natural surface on one side for 250 ft. toward the lower portal of the tunnel. A heavy masonry retaining wall had been built along that side of the street to hold back the ground, which continues to rise until a surcharge of from 10 ft. to 30 ft. over the wall is produced within a short distance back from the street.

The cut had to be closely sheeted and heavily shored from end to end, owing to the nature of the sand through which it was made, and the necessity of protecting the adjacent property. The sheeting consisted of 4-in- x 6-in. timbers in 22-ft. and 26-ft. lengths. Against this sheeting were placed horizontally 12-in. x 12-in. waling, or ledger timbers, spaced 6 ft. apart on centers. The waling timbers in the corresponding rows were braced across the cut by poles, 10 in to 14 in. in diameter, and 35 ft. long. The cross braces were spaced 6 ft. apart along the waling timbers, thus making a brace at each corner of every 6-ft. square on the side of the cut. The sheeting was driven by hand in advance of the excavation to a depth of from 8 ft. to 26 ft., and when the excavation had reached that depth, a second set of sheeting was started inside the lowest waling timber for the first set, and was driven to the bottom of the cut. The bracing timbers were wedged in place as the excavation was made, light vertical braces being nailed to them near the middle to prevent sagging.

The 6-in. x 6-in. sheeting was replaced for 250 ft. along the base of the high retaining wall by heavy round piles, 26 ft. to 46 ft. long, which were driven closely together. Since the edge of the cut had to be made close to the base of the wall these piles were driven within 18 in. of the




SECTION ILLUSTRATING THE NATURE OF THE SOIL AND WORK DONE

latter. As the excavation was made in this section of the trench the row of piles were braced against the sheeting on the opposite side with the regular heavy poles. Inclined braces, with one end against the sheeting on the opposite side of the trench, were also placed against the wall at various points. After the sheeting and bracing had been built up in this manner, the braces being placed as the excavation was made, the tunnel was built and the backfilling

placed on it without injuring the high retaining wall or adjacent property in any way.

The great pressures brought on the sides of the cut by the loose sand precluded any possibility of removing the bracing or sheeting as the concrete work progressed, without the load on each brace being transferred to another support capable of carrying this load. A system for building the tunnel section was developed, however, which not only provided for the transfer of the loading on the temporary braces, but also greatly simplified the centering for the tunnel arch. As soon as a section of the excavation was made ready for the concrete, the invert of the tunnel was laid nearly to the tops of the upper layer of reinforcement rails in it. Heavy concrete posts 4 ft. x 4 ft. in cross-section, and reinforced with old steel rails, were built against the sheeting on both sides of the trench at the same time the concrete was placed in the invert. These posts were placed between the vertical rows of temporary braces and were 6 ft. apart on centers, a section of the two lower 12-in. x 12-in. waling timbers, 4 ft. long, being embedded in each of the posts. The posts were cast in rough plank forms, and were built enough in advance of the first work on the side walls of the tunnel to permit them to set for several days. They were held at the bottom by the invert and at the top by a temporary timber cross brace between the two corresponding posts on opposite sides of the trench.

Timber bents were then erected on the invert in such position as to form a center for the forms of the walls and the arch of the tunnel. These bents were 12 ft. wide and 11 ft. high. They were built with a 6-in. x 8-in. sill, two 6-in. x 8-in. plumb posts and an 8-in. x 12-in. cross brace at the top. The bents were spaced 6 ft. apart on centers, being directly opposite the vertical 4-ft. x 4-ft. concrete posts. When they had been erected as far as the side walls were to be built at that operation, the lowest row of temporary sheeting cross braces between them were removed one at a time, transferring the load on the bottom of the sheeting to the concrete posts. The inside forms for the walls up to the springing lines of the arch, 5 ft. above the invert, could then be set and braced at the top and bottom against the bents of the centering, the sheeting of the trench forming the outside forms. After these wall forms had been filled, enclosing the lower ends of the concrete posts, the concrete in them was allowed to set for a few days. The cross braces between the second row of walings from the bottom were then removed, the load on the sheeting carried by these braces being transferred to the concrete posts. The arch forms were next erected on the bents of the centering up to a height of 11 ft., or just under the third row of temporary cross braces, and the walls built up to that height. When this concrete had set, the third row from the bottom of the temporary cross braces between the sides of the sheeting, and also the temporary braces between the tops of the concrete posts, could be removed and the balance of the arch built.

In all this sequence of operations no part of the sheeting was at any time unsupported. At the same time the centering and forms for the concrete were erected practically without interference and the concrete could readily be placed. The temporary braces were also all saved, although the waling timbers and sheeting had to be left in place, which would have been required in any case. On the other comparatively little extra work, or extra concrete was required by extending the limits of the walls to permit the construction of the 4-ft. x 4-ft. concrete posts which temporarily carried the load against the sheeting.

The forms for the tunnel had ribs made of 2-in. x 12-in. plank cut to a template to conform with the curve of the arch. These ribs were each in six sections, a section on each side extending up to the 5-ft. level of the walls, a second section on each side extending to the 11-ft. height, and two top sections in the closing part of the arch. They were spaced 2 ft. apart on centers and were lagged with 2-in. x 4-in. timbers. Ordinarily the forms were permitted to remain in place at least 14 days before the centering was removed. The exposed surface of the concrete was all spaded carefully in the forms, with the result that a very uniformly good finish was secured.

The concrete work on the tunnel was carried forward in sections of various lengths, depending on the manner in which the excavation could be prepared. Backfilling was not placed on the arch until the concrete was at least 10 days old. The material from the unfinished sections of the trench was generally piled on the finished concrete work by cableways. The excavation was planned so very little of the material had to be handled twice, the back-filling being carried forward from both ends toward the middle of the tunnel.

The tunnel was designed by the engineering department of the Twin City Rapid Transit Company, of which George L. Wilson is engineer, and was built under the direction of that department by George J. Grant, general contractor of St. Paul. Charles R. Shepley was engineer in charge of the design and construction for the company. Prof. F. H. Constant, professor of structural engineering, University of Minnesota, assisted in the design.

## EXTENSION OF TIME IN CHICAGO

The judges of the United States Court of Appeals have denied the motion of the Union Traction interests that the decision of Saturday be so amended as to permit the Chicago Railways Company to take over the property and accept the ordinance allowing it to operate them. The court went further and said nothing could be done legally to relieve the situation.

In view of this the company applied to the Council for an extension of time in the matter of accepting the new franchise grant to the Chicago Railways Company, and the Council consented to fix the date at Feb. 1. Before doing so, however, the condition was imposed that all revenue of the company, after operating expenses had been deducted, should be spent in bettering the service. Interests familiar with the company's affairs say that a judgment will be defaulted and the property sold. In this event the bidders would be the Chicago Railways Company and the Chicago City Railway Company. This is considered a somewhat drastic way of proceeding, but it is agreed that it would terminate the long series of distressing circumstances attending the company's operation and its effort to secure the new grants.

## NEW ORLEANS RAILWAY CLOSES SUCCESSFUL PARK SEASON AT LAKE PONTCHARTRAIN

The season at West End, the summer resort on Lake Pontchartrain, operated by the New Orleans Railway & Light Company as an amusement park and general resort, closed Sunday, Sept. 14, and was pronounced by the management as one of the most successful in the history of the place. Nothing definite has been decided on the plans for next season, the matter of the lease being still in abeyance.

## MEETING OF THE STANDARDIZATION COMMITTEE OF THE ENGINEERING ASSOCIATION

A meeting was held Sept. 12, 13 and 14, in New York, of the committee on standards of the American Street & Interurban Railway Engineering Association to confer upon the report to be presented at the Atlantic City convention. The committee met at the headquarters of the association, 29 West Thirty-Ninth Street, New York, and the following members were present:

W. H. Evans, Buffalo, chairman.
H. H. Adams, Baltimore (president of the Engineering Association).
H. D. Benedict, Albany.
J. M. Larned, Pittsburg.
H. W. Blake, New York.
C. B. Fairchild, Jr., Cleveland.

The following other representatives of street railway companies were present:

H. C. Page, Springfield, Mass. (chairman of the committee on standards of the parent body).
Charles H. Clark, Buffalo.
W. T. Dougan, New York.
Martin Schreiber, Newark, N. J.

Others in attendance were:

Walter S. Adams, J. G. Brill Company, Philadelphia; Warren Thorpe, Baldwin Locomotive Works, Philadelphia; G. L. Schermerhorn, General Electric Company, Schenectady, N. Y.; J. E. Webster, Westinghouse Electric & Manufacturing Company, Pittsburg; E. S. Lewis, Standard Steel Works, Philadelphia; William Wampler, American Locomotive Company, New York; H. A. Fritz, American Locomotive Company, Schenectady, N. Y.; J. M. Wakeman, STREET RAILWAY JOURNAL, New York; L. F. Gould, "Electric Railway Review," Chicago; A. H. Weston, the T. H. Symington Company, Baltimore; E. B. Entwisle, the Lorain Steel Company, Johnstown, Pa.; G. S. Vickery, Pennsylvania Steel Company, Steelton, Pa.; William C. Cuntz, the Pennsylvania Steel Company, Steelton, Pa.; F. W. Sargent, American Brake Shoe & Foundry Company, Mahwah, N. J.; F. W. Roth, Streeter Journal Bearing Company, Chicago, Ill.; W. L. Boyer, the New York Car & Truck Company, Kingston, N. Y.; J. R. Dickey, Baldwin Locomotive Works, Philadelphia; George M. Hoadley, Keystone Brake Shoe Company, New York; V. B. Lamb, Keystone Brake & Shoe Company, New York; E. L. Jones, American Brake Shoe & Foundry Company, New York; H. S. Bradfield, American Brake Shoe & Foundry Company, New York; Charles R. Ellicott, Westinghouse Traction Brake Company, New York; Victor Angerer, Wm. Wharton, Jr., & Company, Inc., Philadelphia; J. D. Rhodes, National Car Wheel Company, Pittsburg; J. H. Yardley, National Car Wheel Company, Philadelphia; N. B. Trist, Schoen Steel Wheel Company, Pittsburg; P. H. Griffin, New York Car Wheel Works, Buffalo.

At the opening of the session on Thursday morning Mr. Evans discussed the basis upon which the report should be made. He explained that there was such a wide variety in practice that it would be impossible to suit everybody in any set of standards which might be recommended. He was very anxious that the report of the committee should result in definite action at the convention. This could only be done if the subject was considered in a broad way by all, and he believed that the committee should recommend what it considered to be the best practice and should not attempt to try to suit everybody, as that would be impossible. President Adams said that the report is now scheduled on the program for consideration on Tuesday afternoon, Oct. 15, and if it should be approved by the Engineering Association it could then be presented to the committee on standards of the American Street & Interurban Railway Association for submission to the members of that body at its convention. He thought that it would be an excellent idea to notify the members of the latter association of the meeting on Tuesday afternoon of the Engineering Association, so that they could listen to the discussion of the subject at that time and present any points which they might desire.

Mr. Evans then announced that the first subject to be considered by the committee was standard axles, journals, journal bearings and journal boxes, and asked whether there was any discussion on the subject of the four standard journals decided upon at the Cleveland meeting, viz., 3¾ ins. x 7 ins., 4¼ ins. x 8 ins., 5 ins. x 9 ins. and 5½ ins. x 10 ins., and whether there were any remarks on the loading fixed for these journals at that time. Mr. Thorpe said that it was not uncommon to have railway companies specify greater loads than those mentioned, but he approved of the load given by the committee. In answer to a question Mr. Evans stated that the loading included the portion of the weight of the motor on the journals—in fact, all the load carried outside of the wheels.

The question of number of axles was then considered and the discussion developed that it would be desirable to have six axles measuring in the motor fit diameter respectively 4½ ins., 5 ins., 5½ ins., 6 ins., 6½ ins. and 7 ins. The desirability of omitting certain of these axles was considered, but it developed that for each a number of motors were built which could not be employed on any other axle. The manufacturers believed, moreover, that half-inch sizes were about as close as would be required, but if they were not provided many companies would be liable to turn them down and go into quarter-inch and eighth-inch sizes.

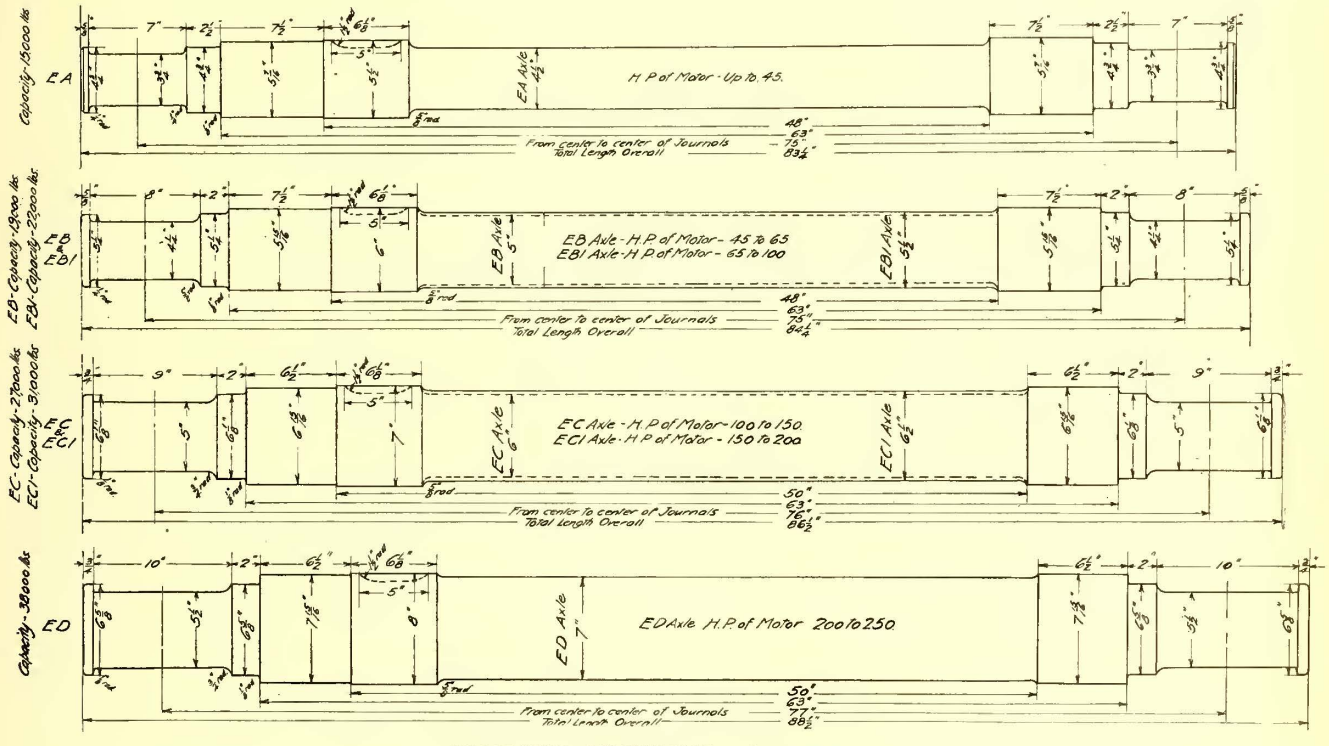
The question of gear fit diameter was then considered and it seemed to be the opinion of all that it would be very desirable to reduce the number of diameters of gear fit to as few as possible. Mr. Webster suggested that the 4½-in. and 5-in. axle could take the same gear fit. Mr. Thorpe stated that his company had been employing for some time a gear fit 1 in. larger than the motor fit, and a wheel fit 1-16 in. smaller than the gear fit.

Mr. Webster then presented a series of suggestions from Mr. Storer, of the Westinghouse Company, in which 51-in. length of motor fit was requested for the large sized axles. It seemed to be the general consensus of opinion, however, that 50 ins. was all that could be allowed on these axles. It was suggested that 51 ins. might be obtained by shortening the length of the wheel fit, but Mr. Lewis, representing the steel wheel manufacturers, said that it would be impossible to allow less than 6¼ ins. on the axle with 5½ in. x 10 in. journals. The electrical manufacturers said that 50 ins. would accommodate all the d. c. motors and all the single-phase except those of one company. The large single-phase motors of this company are 51¾ ins. wide. Mr. Evans appointed a sub-committee consisting of Messrs. Adams, Benedict, Schermerhorn and Webster to see what could be done in the matter. He then took up the question of key way, which it was decided at Cleveland should be 1 in. square for all sizes and 6 ins. long with milled ends. He referred to the fact that Mr. Storer preferred a key way cut with a key seating machine, and asked to what extent that form of key way had proved satisfactory. Mr. Webster said that there was difficulty with a milled key way in preventing the key from riding up when a pinion is put on the shaft and thought the same reason would hold in pressing a gear on an axle. President Adams said that this could be overcome by the use of a sleeve, and that he preferred the key way with the milled ends. There was a discussion on the best fillet to use on the axle, and one ⅝ in. in diameter was finally settled upon as the most desirable.

The next subject considered was journal bearings, on

which Mr. Weston had been requested to report. Mr. Weston stated that since the meeting at Cleveland he had taken up the subject with a number of truck manufacturers and presented some drawings as suggestions to the committee. The dimensions shown on these drawings differed from those considered at the Cleveland meeting, principally in the distance between pedestal guides. The recommendations of Mr. Weston were referred to a committee consisting of Messrs. Blake, representing the committee, and W. S. Adams, Weston, Thorpe, Boyer and Fritz, representing the truck manufacturers present.

The subject of brake shoes was then considered and the




SUGGESTED DIMENSIONS FOR AXLES

would be unwilling to agree to anything the committee might adopt, but he thought the question should be determined by committee as a whole rather than by the sub-committee. His reason was that in the smaller sizes of trucks made by his company these dimensions would add some weight to the trucks. On the other hand, the committee in its majority report had been able to agree on dimensions for the sides and the tops for all four journals. That was a very desirable thing.

In answer to an inquiry as to what the increase would amount to Mr. Thorpe said that he could not tell exactly, because it had not been decided whether it would be better

discussion hinged mainly upon whether one or more standards should be employed. Mr. Evans explained that the opinion has been gaining ground very rapidly in the West that companies are using wheels with too narrow a tread. He believed that the committee would do well to recommend a brake shoe which would care for a tread of 3 ins. and over, and if a brake shoe and tread for a narrower tread should be adopted it ought to be only for temporary use. Mr. Sargent and Mr. Page discussed this subject at length, the latter stating that on many of his properties a 2½-in. tread was being used where formerly a 2¼-in. tread had been employed. He believed that it would be desirable to use a 3-in. tread where possible, but it would not be possible for a long time to come by the majority of the roads in Massachusetts and elsewhere in New England.

### FRIDAY'S SESSION

Upon the opening of the session on Friday morning Mr. Evans called for the report of the sub-committee on journal boxes. This report showed that all of the members were agreed upon the dimensions for the boxes designed for the 5 in. x 9 in. and the 5½ in. x 10 in. journals. The journal boxes suggested can be furnished so as to take either a journal box spring or a bar equalizer. For the smaller sizes, or boxes for 3¾ in. x 7 in. and 4¼ in. x 8 in. journals, one member of the committee, Mr. Thorpe, took exceptions to the distance allowed between pedestal guides. Mr. Thorpe explained that this was not because his company to widen out the pedestal jaw only, or widen out the spreader bar to the pedestal. The increase in weight would probably amount to about 50 lbs. a side, or about 100 lbs. a truck, possibly a little less. His objection was based more on engineering than on commercial objections, as he thought anything looking to the increase of the weight of a truck was a movement in the wrong direction for the small sizes of trucks.

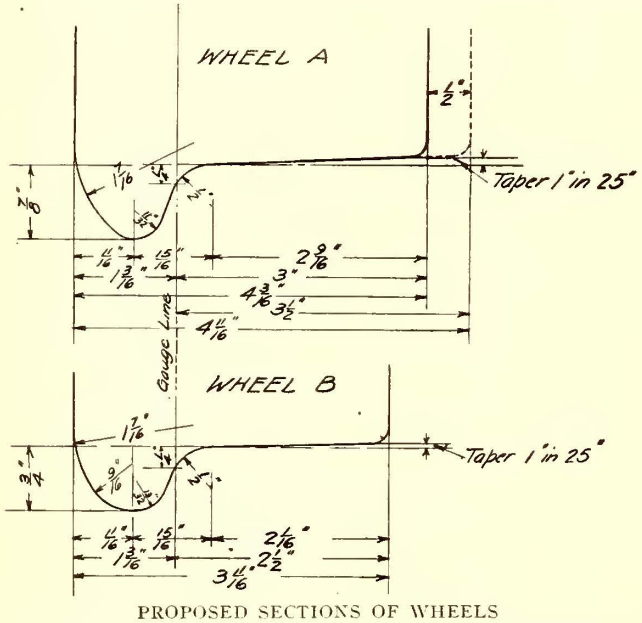
Mr. Weston explained that this increase in weight would not apply to other makes of trucks.

Mr. Evans then called for the report of the sub-committee on the length of gear seats.

Mr. H. H. Adams reported that the dimensions determined on was 6⅛ ins. instead of 6¼ ins. The motor builders claim that this is sufficient length to meet the requirements of their gears, and by adopting 6⅛ ins. for all axles it is possible to meet their requirements for the a. c. motor, with 50 ins. between hubs in the axles with 5 in. x 9 in. and 5½ in. x 10 in. journals.

Mr. Webster further explained that Mr. Schermerhorn and he had gone over the subject quite thoroughly since the meeting Thursday afternoon. Some motors have a pinion head extending outside of the face of the pinion and it is necessary to have a bulge in the gear case to clear that. With the dimensions considered Thursday the gear case was very close to the axle, within ⅝ ins. in some cases, and that of course would be too close. It had been found

after going over the outline drawings of the different motors that if there was a gear hub on both sides of the gear —on the axles having 48 ins. between wheel hubs—there could be a gear hub of 1 in. on the wheel side and ⅛ in. on the motor side. On the gears with the larger axles having 50 ins. between wheel hubs and with a 5¼-in. gear face, there could be a ¾-in. gear hub on the motor side and ⅛-in. gear hub on the wheel side. That would allow a clearance of ¾ in. between the wheel flange and the gear case, which the General Electric Company is using now on some of its motors and considers satisfactory. With the Westinghouse motors it is almost the universal practice to have the pinion nut recessed in the opening, so that there is no bulge in the gear case, and this gives ⅜ in. more clearance. The adoption of the 6⅛-in. gear-fit for all motors would make it possible to put any motor on any axle, provided the bore of the gear is changed in diameter to fit the gear-fit on the axle, which, of course, can easily be done. There would then be a universal clearance between the gear case and the wheel flange. It would be different on the two sides of a motor; but on the larger axles taking 50 ins. between gear hubs, with the Westinghouse motors it would be 1 in. and with the General Electric motors with an extended pinion nut it would be ¾ in. On the smaller motors going on the axles with 48 ins. between wheel hubs, there would be a still larger clearance. The ⅛-in. wheel hub on the motor side of the car will still leave ⅜ in. that




PROPOSED SECTIONS OF WHEELS

the motor bearing flange would extend into the gear case. The sub-committee also thought it would be advisable to standardize the dimensions of the gear hub. That is, group them so that all motors which go on the 4-in., 4½-in., 5-in. and 5½-in. axles would take a standard gear case; that is, have a standard hub bore. That would give a depth of bearing flange against the gear hub from the fit of the motor bearing, that is the dimension of the motor bearing to the outer dimension of the flange, it being understood that the flange of the axle bearing is of the same size as the wheel hub. This would give a wearing depth of 1¾ ins. on the A axle, of 1¼ ins. on the 5-in. axle and 1¼ ins. on the 5½-in. axle. Deducting the fillet it would be on the A axle 1¼ ins. straight, the regular depth of the flange, and on the A, B and B-1 axles 1 in. Then on the C and C-1 axles—that is, the 6-in. and 6½-in. axles—the gear hub could be 9½ ins. That would give a minimum straight wearing surface of 1¼ ins. above the fillet. For the 7-in. axle the companies would like 10 ins. on the wheel hub and bearing flange.

The following table of dimensions was then submitted by the sub-committee:

AXLE DIMENSIONS

| Type. | Journals. | Motor Fit. | Gear Fit. | Wheel Fit. | Distance Between Hubs. | Centers of Journals. | Capacity, Lbs. | Length of Gear Seat. |
|---|---|---|---|---|---|---|---|---|
| E A | 3¾"x 7" | 4½" | 5½" | 5 7/16" | 48" | 75" | 15,000 | 6⅛" |
| E B | 4¼"x 8" | 5" | 6" | 5 15/16" | 48" | 75" | 19,000 | 6⅛" |
| E B-1 | 4¼"x 8" | 5½" | 6" | 5 15/16" | 48" | 75" | 22,000 | 6⅛" |
| E C | 5" x 9" | 6" | 7" | 6 15/16" | 50" | 76" | 27,000 | 6⅛" |
| E C-1 | 5" x 9" | 6½" | 7" | 6 15/16" | 50" | 76" | 31,000 | 6⅛" |
| E D | 5½"x10" | 7" | 8" | 7 15/16" | 50" | 77" | 38,000 | 6⅛" |

HORSE-POWER FOR AXLES

A—45 horse-power.
B—45 to 65 horse-power.
B-1—65 to 100 horse-power.
C—100 to 150 horse-power.
C-1—150 to 200 horse-power.
D—200 to 250 horse-power.

STANDARD GEAR DATA

| Axle. | Gear Pitch. | Gear Face. | Diameter of Gear Hub Bearing Flange. | Finished with Gear Hubs. |
|---|---|---|---|---|
| E A | 3 | 5" | 8" | 1" wheel side<br>⅛" motor side |
| E B | 3 | 5" | 8" | 1" wheel side<br>⅛" motor side |
| E B-1 | 3 | 5" | 8" | 1" wheel side<br>⅜" motor side |
| E C | 2½ | 5¼" | 9½" | ⅛" wheel side<br>¾" motor side |
| E C-1 | 2½ | 5¼" | 9½" | ⅛" wheel side<br>¾" motor side |
| E D | 2½ | 5¼" | 10½" | ⅛" wheel side<br>¾" motor side |

Gear key to be 1 in. square and key to be 5 ins. long.

H. H. Adams asked Mr. Sargent if ¾ in. outside of the back of the wheel flange be clearance enough for any brake shoe. Mr. Sargent replied that it would be plenty; that many do not have 1-16 in. It was very desirable to have at least ⅜ in. lift to the flange.

WHEEL TREAD AND FLANGES

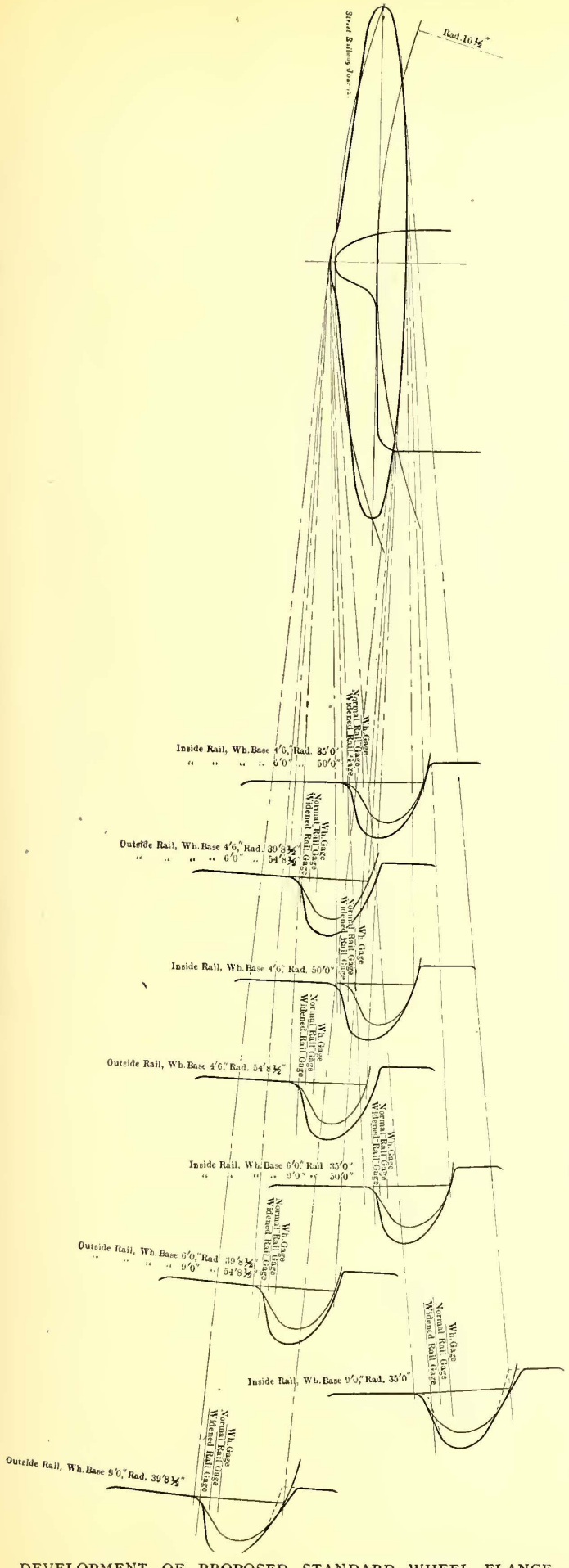
Mr. Evans then announced that the committee would pass to the regular subject for the morning, that is the subject of wheel tread and flanges, standard section of tread and flange of wheel. As Mr. Griffin had not arrived he asked Mr. Angerer, of the Wharton Company, chairman of the committee of special work manufacturers, for his report on the subject. Mr. Angerer read his report, which was as follows:

REPORT OF MR. ANGERER

From the plan of action decided on at the meeting held at Cleveland in July, the writer had expected that a conference of the sub-committee on the subject of wheel treads and flanges with the wheel manufacturers and special work manufacturers would precede this meeting, so that a complete report would be submitted at this time. No such conference having come about, the writer, on the suggestion of the chairman, W. H. Evans, acted upon his own initiative and addressed a letter to various special work manufacturers with the idea of getting at least their opinion and submit the same in condensed form to this meeting. The letter was sent to the Lorain Steel Company, the Pennsylvania Steel Company, the Cleveland Frog & Crossing Company, the Paige Iron Works, the Barbour-Stockwell Company and later also to the New York Switch & Crossing Company, and read as follows:

PHILADELPHIA, Aug. 23, 1907.

At a meeting of the standardization committee of the American Street & Interurban Railway Association, which was held at Cleveland, last month, the matter of the establishment of a standard section of wheel tread and flange for electric railways was discussed and finally referred to a sub-committee, to formulate recommendations and report at a further meeting




DEVELOPMENT OF PROPOSED STANDARD WHEEL FLANGE FOR VARIOUS WHEEL BASES AND RADII AND ITS POSITION IN PROPOSED STANDARD GROOVE FOR GUARD RAIL, PRESENTED BY MR. AUGERER.

to be held by the general committee in New York on Sept. 12 and 13 at the Engineering Societies Building, 29 West Thirty-Ninth Street. As this question affects wheel manufacturers as well as manufacturers of special track work, their opinions on the subject are desired, and so as to facilitate the work, it was suggested that one of each group of manufacturers act in an advisory capacity to the committee. Mr. Griffin, of the Griffin Wheel Company, was appointed as the representative of the chilled wheel manufacturers and the writer was appointed as the representative of the special work manufacturers, by the members of the committee and representatives of the manufacturers present.

I would thank you if you would co-operate with me on this subject by giving me your opinion and answering the following questions, which I am sending you on suggestion of the chairman of the general committee, W. H. Evans:

(a) Do you consider it feasible and proper to recommend one common standard for both city and interurban railways? Please give your views on the subject.

(b) If the first question is answered in the affirmative, would you consider the proposed standard wheel as per blue print herewith as the proper compromise wheel? Or, if not, what modifications from this proposed outline would you recommend?

(c) If question (a) is answered by you negatively, please let me have your suggestions as to separate standards for city and for interurban railways.

(d) Do you consider the ⅛ in. difference between wheel gage and track gage on each side, making ¼ in. total difference, a correct standard? If not, what would you recommend?

(e) What do you consider the proper point from which to measure the wheel gage? On the enclosed blue print the point is fixed where a horizontal line ¼ in. below the tread line intersects the fillet at the root of the flange. Would you consider this proper?

(f) Do you consider that an allowable variation in the setting of the wheels of ⅛ in. above normal width of wheel gauge and ⅛ in. below the normal width of wheel gage, making a total variation of ¼ in., is proper? Or what, in your opinion, should be the limits?

To assist you in the consideration of these questions, I further beg to enclose you herewith blue print showing the development of the proposed standard flange in a minimum radius curve of 35 ft. center-line, and also in a 50 ft. center-line radius curve, in combination with a minimum wheel base of 4 ft. 6 ins., a medium wheel base of 6 ft. 0 ins., and a maximum wheel base of 9 ft. 0 ins., and the relation of these developed flanges to the proposed groove of a guard rail; at the same time also indicating how much the gage of such curves would have to be widened in each case to make the guard of the inside rail effective. The groove of the guard rail is drawn to a width of 1⅝ ins., measured on a level with the top of the tread, and, as you will observe, would answer without planing out for all except the combination of the maximum wheel base with the minimum radius.

An early answer, so as to enable me to formulate a résumé of the various answers received, will be very much appreciated. The meetings of the committee in New York will be open, the same as they were at Cleveland, and if you are interested in the subject, the committee will undoubtedly be pleased to have your representative at the meeting.

What few answers were received to these questions, adding thereto the writer's own answers on behalf of Wm. Wharton, Jr., & Company, were as follows:

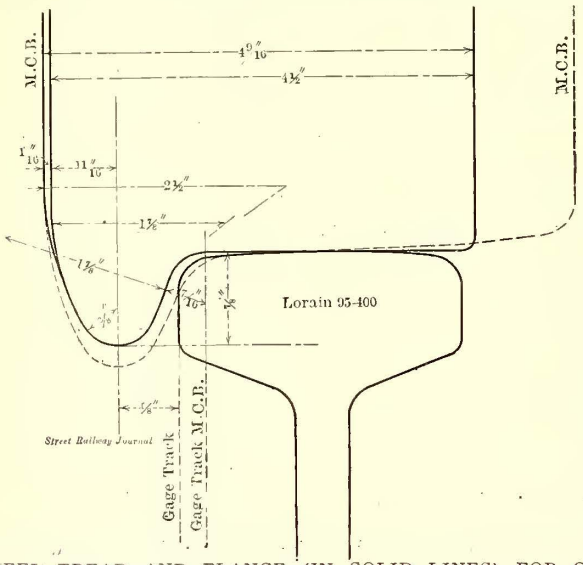
Question A. Do you consider it feasible and proper to recommend one common standard for both city and interurban railways?

Answer from Lorain Steel Company. Mr. Entwisle considers that one standard tread for city and interurban railways should be recommended, but is doubtful of the city flange which it will be necessary to use on account of existing work, will not be too small for the high speed which is the rule on some interurban railways. The width of tread apparently recommended by Mr. Entwisle by drawing referred to in the answer is 3¼ ins.

Answer from Pennsylvania Steel Company, as per interpretation of drawing submitted with the answer, recommends a wheel with 3½-in. tread and flange very similar to the standard ⅞-in. deep flange recommended by the standardization committee of the Central Electric Railway Association for rail-

ways with partly city and partly interurban railway conditions, but it appears to consider the tread too wide and the flange too deep, although not too thick, for railways operating entirely under city conditions.

Answer from Wm. Wharton, Jr., & Company recommends the adoption of a common standard for both city and interurban railways, as per blue print herewith, being practically the Central Electric Railway's standard with such modifications in the flange as discussed at the Cleveland meeting, and with the tread widened out 3½ ins.




WHEEL TREAD AND FLANGE (IN SOLID LINES) FOR CITY AND SUBURBAN TRAFFIC SUGGESTED BY LORAIN STEEL COMPANY

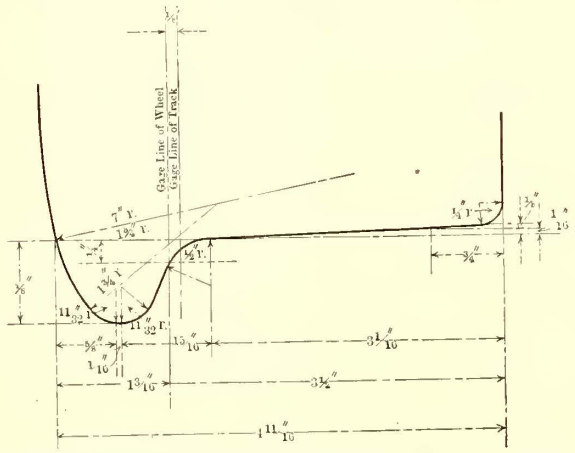
Cleveland Frog & Crossing Company.—Nothing.

Paige Iron Works.—Yes, as far as flange is concerned, the tread being subject to variations without affecting the special work, but should be at least 3½ ins. wide.

Barbour-Stockwell Company.—Yes. The reasons for our answering in the affirmative are many, but the principal reason, in our opinion, is the fact that there are so many city and interurban roads that have cars which fulfil service in both cases that the standards should be the same for both roads.

New York Switch & Crossing Company.—Nothing.

Question B. If the first question is answered in the affirmative, would you consider the proposed standard wheel as per blue print (referring to the blue print submitted by Wm. Wharton, Jr., & Company) as a proper compromise wheel?




WHEEL SUGGESTED BY WM. WHARTON, JR., & COMPANY

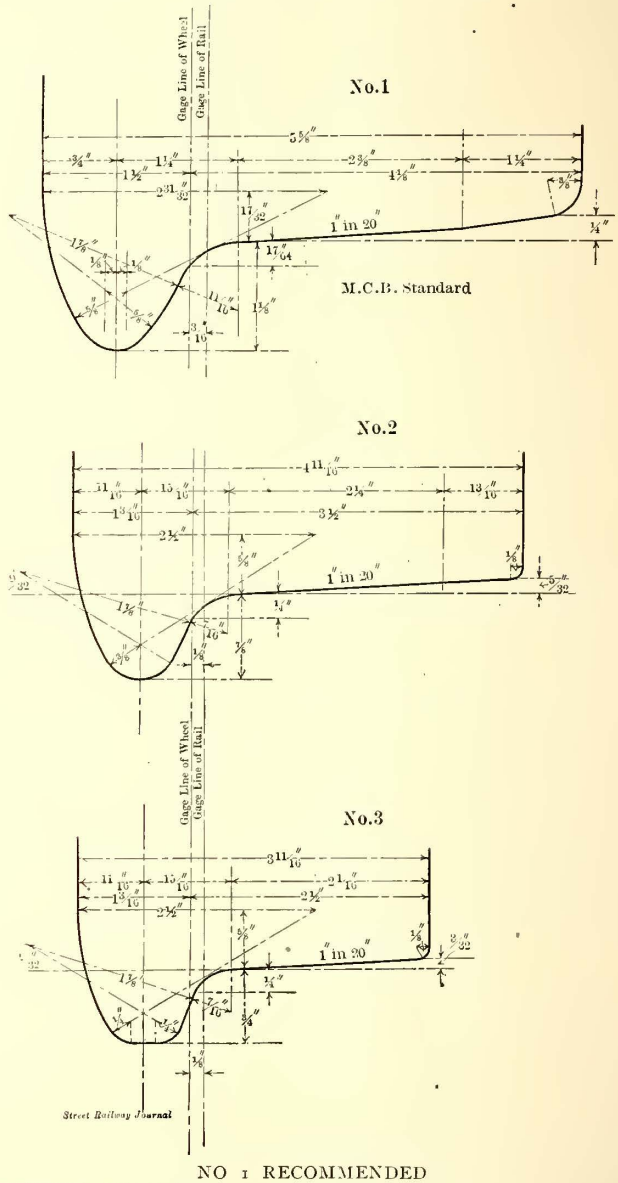
Answer from Lorain Steel Works, Mr. Entwisle.—The flange should not be less than 1 in. deep and about midway between the lines of the M. C. B. flange and a ⅞-in. flange shown on blue print submitted by Lorain Steel Company herewith.

The opinion of the other companies is covered by their answer to Question A.

Question C. If Question A is answered by you negatively, please let me have your suggestions as to separate standards for city and for interurban railways.

Answer from Lorain Steel Company, by inference, that the wheel tread should be the same on all wheels, but that a possible wheel for combined city and interurban traffic should have a 1-in. deep flange, as above mentioned, while for city traffic a smaller flange should be used to suit present conditions in the various cities.

Answer from Pennsylvania Steel Company is represented by three standards, as per blue print submitted, as follows: (1) The regular M. C. B. standard for railways operating under steam railroad conditions; (2) a compromise wheel with 3½-in. tread and ⅞-in. deep flange, as mentioned in answer to Question A for railways with both city and interurban conditions; (3) a wheel with a 2½-in. wheel tread and a flange on wheel No. 2, but stubbed off to ¾ in. deep for railways operating wholly under city conditions.




NO 1 RECOMMENDED
WHEELS SUGGESTED BY PENNSYLVANIA STEEL COMPANY

Flange 1.—Recommended wheel for railways operated over systems in all parts under steam railroad conditions.

Flange 2.—Recommended wheel for railways over systems partly under city conditions and partly under steam railroad conditions, but over which no M. C. B. flanges are used.

Flange 3.—Recommended wheel for railways operated over systems wholly under city conditions. This wheel will require flange-bearing frogs.

Answer from Wm. Wharton, Jr., & Company covered by Question A.

Cleveland Frog & Crossing Company.—Nothing.

Paige Iron Works.—Covered by Question A.

Barbour-Stockwell Company.—Covered by Question A.

New York Switch & Crossing Company.—No answer.

Question D. Do you consider the ⅛ in. difference between wheel gage and track gage on each side, making ¼ in. total difference, a correct standard?

Answer from Lorain Steel Company.—Yes.

Answer from Pennsylvania Steel Company.—Yes, except for M. C. B. standard wheels, where the difference should be 3⅛ ins. on the side.

Answer from Wm. Wharton, Jr., & Company, Inc.—Yes.

Answer from Paige Iron Works.—Does not consider ⅛ in. sufficient, wants to make it 3⅛ ins. on the side, making the distance from back to back same as M. C. B. (?)

Answer from Barbour-Stockwell Company.—Yes.

Question E. What do you consider the proper point from which to measure the wheel gage (referring to wheels other than M. C. B. standard for electric railways)?

Answer from Lorain Steel Company.—From a point on the fillet to root of the flange, ¼ in. below the tread line.

Answer from Pennsylvania Steel Company.—One-quarter in. below the tread line on all except M. C. B. standard wheels, where it should be from a point 17/64 in. below the tread line.

Answer from Wm. Wharton, Jr., & Company, Inc.—One-quarter in. below the tread line on standard wheel for electric railways. When M. C. B. standard is used ⅝ in. below tread line, in accordance with Master Car Builders' standard rules.

Cleveland Frog & Crossing Company.—No answer.

Paige Iron Works.—A point ¼ in. below tread satisfactory.

Barbour-Stockwell Company.—We consider the point as fixed on your blue print as correct.

Question F. Do you consider that an allowable variation in the setting of the wheels of the ⅛ in. above the normal width of wheel gage and ⅛ in. below the normal width of wheel gage, making a total variation of ¼ in., is proper?

Answer from Lorain Steel Company.—We consider the allowable variation in setting of wheels on axle should be ⅛ in. maximum, or a variation of 1/16 in. on each side.

Answer from Pennsylvania Steel Company.—We consider the maximum allowable variation in setting wheels to gage 1/32 in.; that is, 1/64 in. wider or narrower than the normal.

Wm. Wharton, Jr., & Company.—One-sixteenth in. below and 1/16 in. above the normal for each wheel, making a variation of ⅛ in. above and ⅛ in. below the normal width of wheel gage, or a total variation of ¼ in.

Cleveland Frog & Crossing Company.—No answer.

Paige Iron Works.—Should be as small as possible, 1/16 in. above and below a standard of 4 ft. 8⅛ ins. should be sufficient.

Barbour-Stockwell Company.—We consider the wheels should be set to standard gage without an allowance either way.

New York Switch & Crossing Company.—No answer.

From the above few answers it would appear that there is a considerable difference in opinion as to the feasibility of the establishment of a common standard wheel tread and wheel flange for both city and interurban railways. The opinions, however, as to what such a wheel should be, if it was found feasible, seem to be quite close together, particularly in regard to the width of wheel tread. If the objection to a common standard is to the depth of ⅞ in. or more for the flange for city conditions, on account of present shallow rails and special work, the suggestion of the Pennsylvania Steel Company to stub off this flange without reducing its thickness may form the solution.

In reference to the difference between wheel gage and track gage, the opinions seem to be practically unanimous, except for M. C. B. standard wheels, which latter, however, are really outside of this consideration, and a difference of ¼ in. would appear to be correct in the opinion of all.

In reference to the point from which the wheel gage is to be measured, the opinions likewise seem to be unanimous, except in the matter of the M. C. B. wheels, that is, that it should be measured from a point ¼ in. below the tread line on the fillet at the root of the flange.

In reference to the allowable variation in the setting of the wheels, it is of course desirable from the standpoint of the special work maker, that it should be as small as possible; but it is really a question that should be determined by the wheel and axle manufacturer, and the railway companies themselves and be kept within the smallest limit that has been found practicable. The blue prints submitted and also blue print of development of the proposed standard wheel and flange mentioned in the letter to the special work manufacturers, are attached hereto.

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Mr. Evans, after stating that the thanks of the committee were due Mr. Angerer for the very active interest he had taken in the subject, said that he was particularly interested to notice that the manufacturers of special work are practically unanimous in favor of a wheel which has a ⅞-in. flange for interurban work, and in some cases recommend it for both city and interurban work. As it has been said that the special work in a good many of the cities would not permit such a wheel, especially in cities which employ the grooved rail, he asked Mr. Angerer to discuss that question.

Mr. Angerer said that present conditions in cities may not permit of a standard of a ⅞-in. flange, which certainly is the minimum depth of flange which should be used on interurban railways. He thought that this transition state would exist for some years,—a number of years, in fact. This remark, however, did not apply to the tread which could be widened. In regard to the depth of flange, the same width of flange could be used but it could be stubbed off. As far as going over existing special work is concerned, with the exception of such cities as Washington, where special flange is prescribed, such a flange would go through, all special work that is now in existence and made for the present ordinary flanges. As the development will show, the grooves in guard rails at present are 1 9/16 in. when new, and this 1⅝ in. will let this new standard wheel through on all except with the 9-ft. wheel base and on a 35-ft. radius curve. But that condition is very seldom met. Only the depths of the flange would be an objection, not its other dimensions. If the 3½-in. wheel tread were adopted, it would make a flange bearing unnecessary, so that all new special work would be made with grooves deep enough to take the ⅞-in. flange, and wheels with a stubbed-off flange would run over that special work without detriment.

Mr. Cuntz said that his company was guided in its suggestions to some extent by the fact that the tendency at the last meeting was to adopt a 2½-in. tread and ¾-in. depth.

Mr. Vickery said that his company would like to see a wheel adopted with the flange shown but with 3½-in. tread. He realized, however, that in a great many of our cities where the cars do not run high speed, this will be a hard thing to do, and that is why his company suggested a 2½-in. tread.

Mr. Rhodes thought that it would be difficult to get a standard wheel for both interurban and city work, on account of local conditions. The chief difficulty with the 3½-in. tread was the paving.

Mr. Larned called attention to the fact that the discussion had borne upon the effect of the wheels on the special work but not on the rails. The special work forms a very small proportion of the number of feet of track laid in the cities. Most of these rails have a step not over 1⅛ in. in depth and such a rail is not economical with a ⅞-in. wheel flange. A company would get on the average at least from four to six years less life of rails using a ⅞-in. flange than with one ¾ in. in depth. He thought this had considerable

bearing on the question as to whether the committee adopt two different depths of flanges or only one.

Mr. Page said that in the city of Springfield the same pattern of rail is used as in New York. There are about thirty miles of grooved rail in Springfield, and it would be impossible to operate cars economically over the line, especially in the winter time, if the wheel-flange was 7/8 in. high. In fact, the 3/4-in. flanges now employed rub on the sides of the curves. Rails have been designed within the last few years to take a 7/8-in. flange, but it will be a number of years before the street railway companies in Massachusetts will be able to use a 7/8-in. flange, or even the stubbed off flange mentioned, as they will be compelled to employ considerable grooved rail. Mr. Page also thought that a wide tread would present difficulties on account of projecting paving and thought that a width of tread of 2½ ins. would have to be employed.

Mr. Evans then read a part of a letter which he had received from F. G. Simmons, of Milwaukee, the vice-president of the Engineering Association. Mr. Simmons was unable to be present at the meeting, but wrote the following upon the work of the committee:

"Regarding the work of the Committee, I believe you can arrive at conclusions so that your report to the Association will be able to bear absolute recommendations as to standard wheels, standard axles and standard brake shoes. On the rail matter I scarcely think that the Committee will be able to make a final report, but my idea is that when the final report on rails is made, it should recommend as absolutely best practice two types of Shanghai T-rail; first, the heavy type to be used in larger cities and under conditions where city traffic is heavy; second, a lighter type of Shanghai T-rail to be used in smaller cities and under less exacting conditions. The Committee should also recommend as best practice a type of rail similar to the A. S. C. E. standard for interurban work.

Mr. Adams then presented the following written opinions which he had received in reply to three questions which he had sent to prominent managers:

Question 1. Do you consider it possible to adopt for the service on your system one wheel having a width of tread 3 inches and a flange 7/8 inch high? If this wheel is not practical for you to adopt under present conditions, do you feel that you would be warranted in working to a wheel of this character by making provision for the same in new rail and new special work, either to provide for the possible use of your tracks in the future by high-speed interurban cars or for any other object?

I do not consider it possible on account of city ordinance prohibiting T-rail. Richard McCulloch, United Rys. of St. Louis, Mo.

I consider this the most practical wheel to adopt and we are equipping our road bed to make this wheel standard. W. W. Cole, Elmira W., L. & P. Company.

The development of the rail and special work should be in the direction of using a 3-in. tread and a 7/8-in. flange. F. W. Brooks, Detroit United Ry.

I fully realize that it would be of great advantage to all companies if they were able to adopt one standard wheel, but believe it impossible to do so for years to come. E. W. Olds, Milwaukee E. R. & L. Company.

We could not run a 3-in. tread and 7/8-in. flange on all the lines here and in the vicinity. H. C. Page, Springfield St. Ry. Company.

I doubt very much if it could be used with present track, but if no objection from city, it might be employed in the future. H. D. Wright, Rhode Island Company.

We could use this wheel, but it would necessitate relaying pavement to bring it lower than the rail. W. J. Hield, Twin City Rapid Transit Company.

Question 2. If the 3-inch tread and 7/8-inch flange wheel is not a practical wheel for your system, or one for you to consider in the future, kindly give me your opinion on the use of a wheel with a width of tread 2½ inches and a flange 3/4 inch in height, to be used for strictly urban and light suburban service.

Our present wheel of 2½-in. tread and 5/8-in. flange differs so little from 2½-in. tread and 3/4-in. flange that we would not care to change. Richard McCulloch, United Railways of St. Louis.

I consider one standard wheel desirable, viz., one with a 3-in. tread and 7/8-in. flange. W. W. Cole, Elmira W., L. & P. Company.

At present, under conditions existing in Detroit, I should advocate a 2½-in. tread and 3/4-in. flange. F. W. Brooks, Detroit United Ry. Company.

The standard for our city lines is 2½-in. tread and 3/4-in. flange. H. C. Page, Springfield St. Ry. Company.

Recommend a 2½-in. tread and 3/4-in. flange. H. D. Wright, Rhode Island Company.

I am of the opinion that a 2¾-in. tread and 7/8-in. flange are sufficient. W. J. Hield, Twin City Rapid Transit Company.

Question 3. One object of making this inquiry is to determine to what extent city roads should make provision in their track construction for taking care of future interurban roads which desire to enter the city over the city company's tracks. It has been suggested that these interurban roads in the larger cities will probably enter the cities over private right of ways, or elevated roads or through subways, and hence would use the M. C. B. wheel. For this reason your opinion upon this point and the direction in which the association should work in the direction of widths of treads and heights of flanges would be helpful.

I believe in the use of a special rail for city tracks that will take either 2¼-in. tread and 5/8-in. flange or 3-in. tread and 3/4-in. flange. For suburban, I recommend a 90-lb. rail, which will allow the passage of a wheel with a 3¾-in. tread and 7/8-in. flange. F. H. Lincoln, Philadelphia Rapid Transit Company.

Every effort should be made to bring about a form of track construction in cities that will enable interurban cars to pass over city tracks. F. W. Brooks, Detroit United Railway Company.

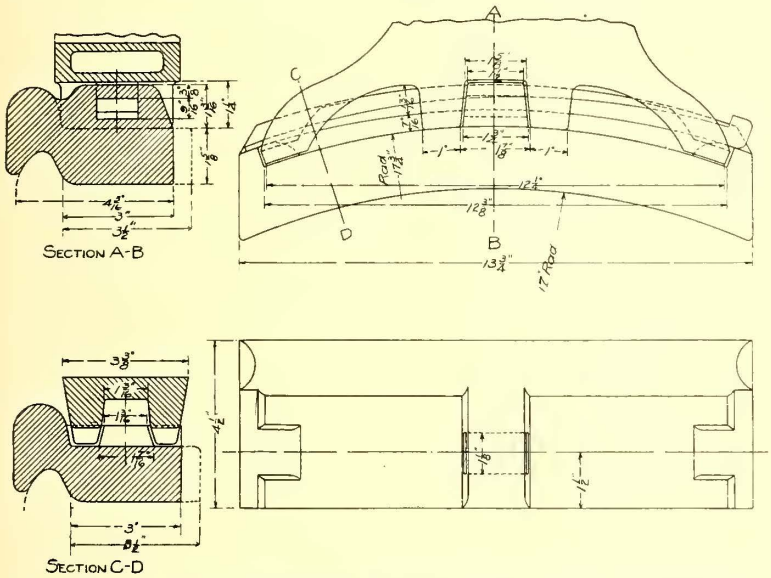
I consider that where interchange occurs the road must eventually come to the M. C. B. tread and flange. I advocate, therefore, continually increasing the width of tread and depth of flange until the M. C. B. standard is reached. E. W. Olds, Milwaukee E. R. & L. Company.

Mr. Yardley said that he did not believe that the large roads in the East like those in Washington, Baltimore, New York, Philadelphia or Boston, could use a tread of 3 ins. or over. In most cases the paving is the limiting condition. In Washington there is the additional limit that the head of the rail is fixed by the District of Columbia Commissioners. A rail with a head beveled on the outside like that being installed in Philadelphia now would overcome the trouble. Under present conditions in the East he did not see how a wheel with a 3½-in. tread could be adopted for ten or fifteen years.

Mr. Page said that personally he should be much pleased to see a T-rail recommended for city work. In time the girder rail will go out of existence almost entirely. It is not a practical, common sense, reasonable rail. There never has been one built that balanced right, or that was economical to use. But at the present time in Massachusetts it is like putting a red flag in a bull's face to say anything about T-rail in the city of Springfield. He thought the roads were largely to blame for this condition because of the poor T-rail construction which they had installed in the early days. If the work had been done with the same care as is now used in installing grooved rail there is no reason why the city authorities would not have been perfectly satisfied with it. The only way the companies are going to get back to T-rails in city streets is to gradually work in a small lot so that the authorities can see it in use. This has been done in Boston, where an 8-in. T-rail has been laid in good granite block paving. It has been there for two years, and one can walk up and down the track and cannot find a block that has moved a particle. It is like solid granite. If the companies are willing to wait long enough the 3-in. wheel tread, if it is recommended, will be what will come. But

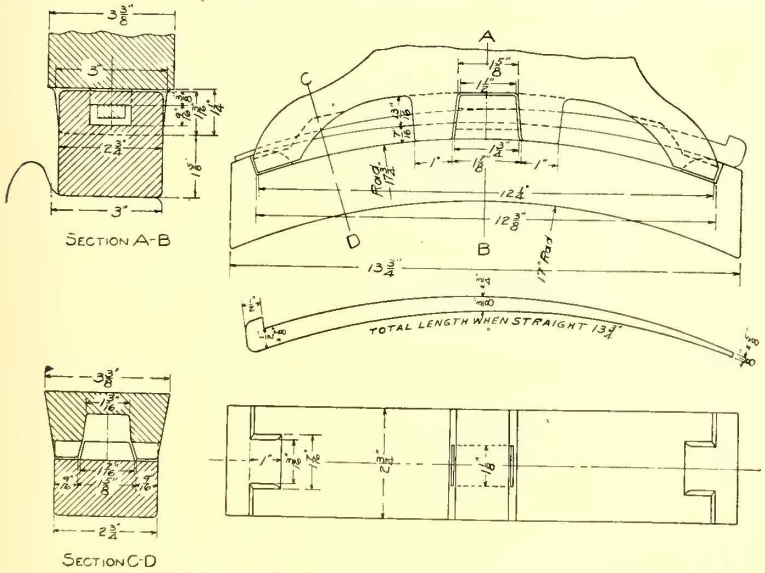
it seemed to him that two treads will be desirable at this time.

Mr. Angerer explained that the 3½-in. tread was recommended because it was the minimum width which would allow the manufacturers to make special work without a flange bearing. A 3-in. tread is not wide enough. A 3½-in. would be. There are now a number of systems that do use 3-in., 3¼-in. and 3½-in. treads. They are not, however, as Mr. Yardley remarked, in the large cities. They do run into smaller cities, like Scranton and Altoona, Pa.; but the tendency of the larger cities, with the exception of such cities as Washington and Cincinnati, is to work toward wider tread by adopting rails providing for it. In this



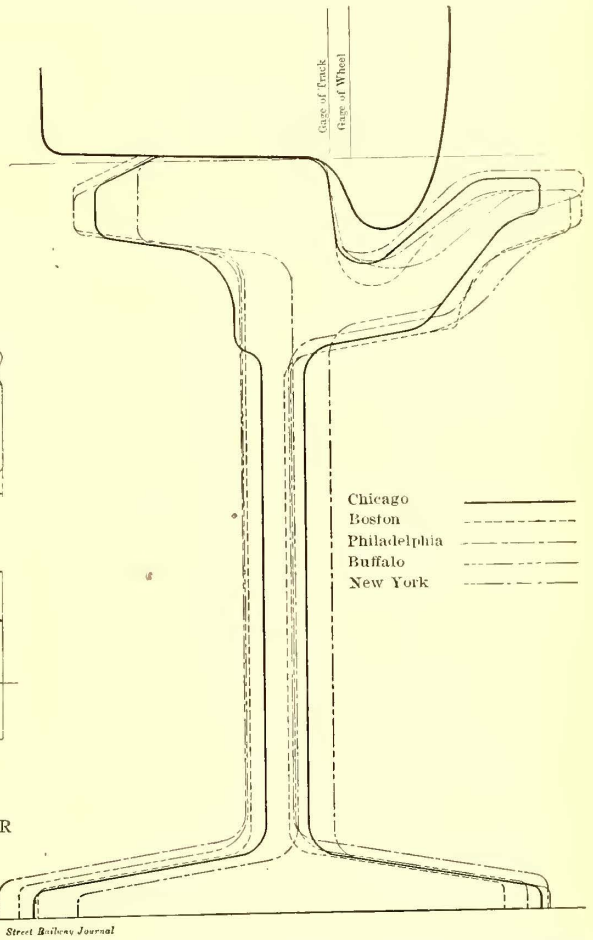

PROPOSED STANDARD BRAKE HEAD, FLANGED SHOE AND KEY FOR WHEELS, WITH 3-INCH TREAD AND OVER

connection Mr. Angerer exhibited the accompanying composite drawing of the rails of Chicago, Boston, Philadelphia, Buffalo and New York, showing the position on them of a ⅞-in. flange and a 3½-in. wheel tread. He said that while the wheel overhangs even the wide head to some slight extent, it is not any worse than the 2¾-in. tread




PROPOSED STANDARD BREAK HEAD, UNFLANGED SHOE AND KEY FOR WHEELS, WITH 3-INCH TREAD AND OVER

which is used in Brooklyn now. He thought no doubt some chipping of treads would take place, but so far as he had been able to learn it has not been very serious, and while the first wide wheels put on had been interfered with by the paving, the paving blocks have usually proven softer than the wheels and have chipped away rather than the wheels. While both chipped at first, the paving blocks went faster, so that after a while the trouble diminished. He said he did not speak from experience, only from observation, but




DRAWING SUBMITTED BY MR. ANGERER, SHOWING POSITION OF 3½ IN. TREAD WHEEL ON DIFFERENT CITY RAILS

so far as he had been able to learn from people who have used wider rails than the head of the rail was calculated to bear, they have not experienced any serious difficulty over it. It diminished very much after a short time. Another reason which might be given for a wider wheel is that the weight of the cars calls for a stronger wheel, both laterally and in bearing load. A 3-in. tread would require a flange bearing.

Mr. Rhodes said that the taper of the wheel was an important point. The majority of wheels in street car service have a 1-32 taper. The B. & O. have a taper of 1-16, and the Pennsylvania a taper of 1-20, with a double taper. If the companies are going to adopt a wide tread wheel it would be necessary to decide what the standard taper should be.

Mr. Page thought that if the wheels had to make a path for themselves outside of the rail in the paving there would be a good deal of breakage with chilled wheels.

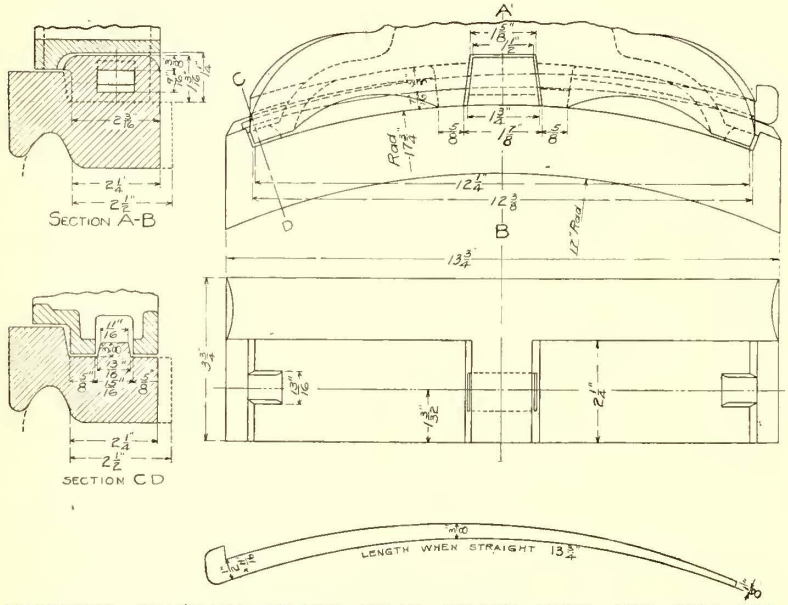
Mr. Dougan thought that a wheel with a 2½-in. tread and ¾-in. flange could be used on most of the larger roads in the country.

Mr. Thorpe said the question of gaging electric railway wheels had been a serious one with his company for three

reasons. In the first place, different kinds of rails are used by different companies; some have both T and grooved rail, some T, and some all grooved. In the second place the wheel flanges are innumerable in contour; and in the third place the amount of play allowed varies very largely. The method of measuring has also varied very largely. His company had adopted the practice of sending to its customers a white print showing the contour of a grooved rail and the contour of a T-rail, and asking them to specify what play they want and the point from which they take the measurement. The usual allowance for play is ¼ in.

BRAKE SHOES

Mr. Evans then brought up the subject of brake shoes and explained that the sub-committee on brake shoes had practically decided that two heads were necessary, one that would follow closely along the lines of steam railroad practice and would be applied to wheels of 3-in. tread and over. The unflanged shoes with this head would be reversible on their own wheels, and the flanged shoes would be reversible by changing the shoes from end to end of the brake beam.




PROPOSED STANDARD BRAKE HEAD, BRAKE SHOE AND KEY FOR NARROW TREAD WHEELS

To accommodate wheels in service with treads narrower than 3 ins. the committee suggested a second brake head which can use either a flanged or unflanged shoe. These shoes would be reversible in like manner to those of the wider head.

Mr. Sargent was asked whether there was any advantage in the flanged shoe over the unflanged. He replied that the flanged shoe was better whenever it could be used properly. For instance, on freight cars, with the brake beam hanging over the body of the car, and sometimes over the outer edge of the truck, a flange shoe cannot always engage the flange of the wheel. In that kind of service an unflanged shoe is best to use, but wherever the beams hang between the wheels, as with an inside hung brake, a flanged shoe is an advantage, because the flanges of the shoe hold the brake shoe to the proper place on the wheel. With a flanged shoe the shoe always engages the wheel in the same place, tending to wear the flange and outer tread proportionately, and undoubtedly giving better wear to the top of the wheels. Not only that, but the flanged shoe gives better braking effect, gives a stronger grip on the wheel, a better control and more uniform braking in a car or train. The flanged shoe is the one in general use on electric roads.

Mr. Griffin at this point entered and was asked his opinion of the sections of wheels under discussion. He replied that the wheel makers would naturally be in favor of a wider tread. He continued: "On the question of flanges, after an experience on that question of some ten or fifteen years I find people who have had large experience on that question have different views. For instance, in England they favor the use of a very light and shallow flange, and in most Continental work—in Germany, for instance—they favor a thin flange. The question of tread, after all, is one that wheel makers can only deal with as their customers ask them. As to what will be the best type of flange, that is the question still to be worked out with practice. We have had quite a large experience in the matter of wheels in almost every country in the world and have exported a great many. Some years ago we made a flange similar in construction to the one now proposed, but with a flat bottom, and it was very extensively used in Pittsburg. Generally speaking, there should be an ideal combination on the part of the special work and the part of the wheel. You also have to consider the type of flange that would best support the load in going over a crossing. But the trouble with that ideal condition is, it cannot be maintained, so a good many railroads adopted the practice of going to one extreme, getting a condition of special work or wheel flanges that after an average amount of service—that is, after a reasonable amount of service—would approach the ideal. The tendency of a good many car wheel makers is to put on the thickest flange they could put on in the belief the wear on that flange and the service it had to do would leave the wheel in the best position after a certain period of time. That utterly disregards the fact that the flange is too heavy to go through the special work. There will be an extreme amount of friction in using that flange. So far as using a shallow flange is concerned, the car wheel makers will naturally favor a shallow flange, because that does not produce as much chipping of the flange. As you all know, a large proportion of the wheels taken out of electric service to-day are taken out on account of defective condition of flanges. So far as steel wheels are concerned, you do not have the chips, but you have the extra wear, and between the two you will have to decide as to which is the better wheel to use."

In reply to a question on the wheel taper used on steam roads Mr. Griffin said: "At the present time the Pennsylvania Railroad differs in its practice from that of the master car builders and has a slightly increased taper over the M. C. B. The sole purpose of the taper on a car wheel is to center the car on the track. One-thirty-second in. or even 1-16 in. taper on a car wheel under a heavy car would not last long because the contact must be, while the taper is there, over a very small dimension of the wheel, and it will wear that off soon."

A further discussion then followed on the tread and flange, after which the meeting adjourned. A subsequent meeting of the members of the committee was held Saturday to draw up the report, which will be issued by the secretary at an early date.

## SNOW FIGHTING AND SNOW COSTS IN QUEBEC

The electric railway companies of the United States who are apt to bewail the profit shrinkage that comes with a severe winter may find some comfort in the fact that what is only intermittent with them is the annual lot of many of their Canadian friends. This is especially true of Quebec, where narrow and hilly streets add to the company's burdens. Despite conditions so unfavorable for winter operation, the Quebec Railway & Light Company manages to keep up its schedules in the worst blizzards because of its efficient and abundant snow-fighting apparatus.

The city or citadel division of the Quebec company's system embraces 17.22 miles of track, for which two double wing plows and six sweepers are provided. Ten of the passenger cars are furnished with double-end scrapers, while twenty-five cars have scrapers at one end and track brushes at the other. These brushes and scrapers are found sufficient to care for light snowfalls, but as soon as the cars begin to slow up the sweepers and then the plows are placed in service. On the suburban, or Montmorency division, the customary rail flangers attached to the cars or locomotive pilots are used.

An unusual and onerous condition imposed on the railway is the allowance made to property owners for snow piled in front of their houses by the plows and sweepers. The company first measures the property parallel with the route and then makes the landlord an annual allowance, which averages about 13 cents per running foot. Different rates are fixed, according to the width of the street. The company now pays out $8234 a year for this purpose exclusive of all other snow costs.

## INTERURBAN INSPECTION TRIP BETWEEN INDIANAPOLIS AND DETROIT

A number of officials of Indiana lines recently made a trip to Detroit from Indianapolis over the four lines which form the chain between Indianapolis and Detroit. The private car "Martha" was used, and considering the stops excellent time was made. H. A. Nicholl of the Indiana Union Traction Company and president of the Central Electric Railway Association; Frank D. Norveil and C. C. Reynolds, of the Terre Haute, Indianapolis & Eastern; A. A Anderson, of the Indianapolis, Columbus & Southern; J. B. Crawford, of the Fort Wayne & Wabash Valley; F. B. Carpenter, of the Western Ohio, at Lima, and vice-president of the Central Electric Railway Association; J. L. Smith and John Collins, of the Toledo Urban & Interurban Company, composed the company. The car went through to Fort Wayne by way of Peru, thence to Lima, Ohio, and Toledo, and thence to Detroit. The distance between the cities of the route traveled is 336 miles, and the average speed, including stops and layouts, was a little more than thirty-six miles an hour. The object of the visit to Detroit was to interest the officials of the Michigan lines in the Central Electric Railway Association. As a result a number of Michiganders are expected to attend the September meeting of the association at Columbus, Ohio, Sept. 26.

The Connecticut Company has issued blank applications for school children's half fare tickets, which have to be signed by the parent or guardian of the pupil and a principal or teacher. The tickets are being issued this year in books of forty instead of twenty-five, so the school children would not have to come so often.

## HIGH-TENSION PAPERS AT THE ANNUAL MEETING OF THE CANADIAN ELECTRICAL ASSOCIATION

At the last annual convention of the Canadian Electrical Association, held in Montreal on Sept. 11-13, two papers were presented which are of equal interest to electric railway engineers dealing with high-tension transmission systems. M. A. Sammet, of the Montreal Light, Heat & Power Company, wrote on the "Trials of the Operating Man," and C. E. Delafield on "High-Tension Insulators from an Engineering and Commercial Standpoint."

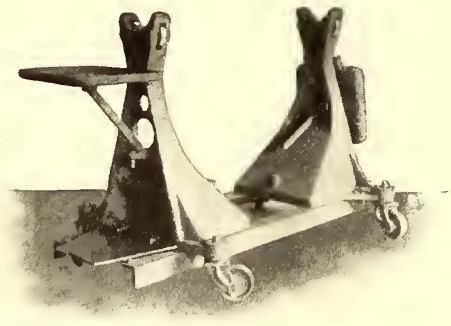
Mr. Sammet confined the greater part of his paper to troubles that can be cured rather than those beyond control, such as lightning. He considered it essential that the power plant and sub-stations should be capable of carrying 25 to 50 per cent overloads for considerable periods without injurious heating. Good voltage regulation was another important point in the operation of such systems. One difficulty he had met was that of operating differently designed transformers in parallel; if they will not divide the load in proportion to their capacities corrective reactances must be added to the transformers to equalize them in this respect. As to transformers in general, he believed the air-blast type was open to criticism, as it accumulates dust too easily, which involves objectionable increases in temperature. Compressed air for blowing out the dust adds another source of danger if it contains moisture, and still another disadvantage is the ease with which flames are carried from one transformer to the other through the air chamber. The disadvantages of the oil-insulated type are principally the possibility of water getting at the winding and the breaking up of the oil to form a thick, non-condensing mass. The first difficulty may be overcome by using a water coil capable of withstanding 200 lbs. hydrostatic pressure and proper connection of the coil to outside piping, while care in removing the water from the coils by an air pump or by filling it with oil under pressure will prevent water freezing in the pipes. As to the second difficulty, it has been found that the breaking up of the oil occurs only at high temperatures. A sample of oil subjected to 90 deg. C. formed a heavy deposit in two weeks. Further tests could not be made at the time, but from the one mentioned it is concluded that it is not advisable the transformer oil should exceed 70 deg. C.

In selecting insulators, aside from dielectric strength, the surface leakage should be such as to have under rain conditions a factor of safety three times the normal voltage. For voltages of 60,000 and over, however, this factor would have to be reduced to avoid the cost of very large insulators. Another point requiring consideration is the constitution of the local atmosphere, both natural and artificial. An insulator with a factor of safety of four for arcing over under a breakdown test will justify the expenditure for a more costly but safer insulator that minimizes breakdowns.

Mr. Delafield called for an insulator capable of successively carrying transmission potentials over 100,000 volts. As the pin type seems to have reached its limit, he asked that consideration be given to a suspended form. The latter would have the advantage that ample arcing distance could be provided without making the insulator top heavy and difficult to manufacture. It should be so designed that arcing cannot occur until the voltage is sufficient to rupture the air and cause the current to arc from end to end, this feature being of great importance where the insulators are mounted on steel towers.

## ARMATURE WINDING STAND

An armature stand designed to take the place of the wooden buck and trestles commonly found in car barns and which embodies features of strength and convenience for winding and repairing armatures not possessed by the bucks and trestles is manufactured by the Device Improvement Company, of Hanover, Pa. It consists of two cast-iron standards mounted on angle steel sills, one standard bolted stationary to the sills, the other easily adjustable to armatures of various lengths. Each standard carries a hinged shelf which can be lowered out of the way when desired. The flaring bases of the standards provide small



ARMATURE WINDING STAND

lockers with doors in which the armature winder can store his tools, such as hammers, chisels, pliers, files, clips, tape, etc. The armature revolves on brass rollers, preventing any possibility of damage to the shaft and admitting easy rotation. The safety stops prevent the armature from accidentally getting off the bearings while being pushed around the shop.

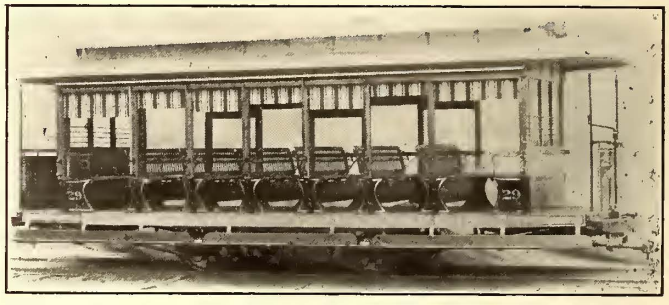
The stand is mounted on four large casters so that it may be placed under chain block or hoist, and the armature placed in position and easily moved by one man to any desired location. The shelves are strong enough to be used as seats when putting leads into the commutator, thus bringing the operator close to the work. In winding an armature the coils may be thrown over one shelf and the armature winder therefore has everything necessary for the operation within easy reach without changing his position, considerations that make for speed and low cost. An armature to be wound or repaired may, when it is ready, be moved to the banding machine for banding and need not touch the floor.

## POLE REMOVALS IN MONTREAL

An interesting decision in favor of a street railway company in connection with pole removals was handed down recently by City Attorney Archambault, of Montreal. It concerned the laying of a track by the Montreal Street Railway Company on Papincan Avenue, in which iron poles were used for the overhead suspension. The Montreal Light, Heat & Power Company has a line of 2300-volt wires on this street, and the correspondence submitted to the road committee showed that the power company considered the placing of the iron poles near its line detrimental to public safety. The power company therefore asked the Montreal Street Railway Company to defray the cost of raising its wires. The street railway replied that as its poles had been placed there by the city officials, it was the city which was responsible for any extra expense in the matter. Mr. Archambault was also of that opinion and quoted a judgment of the Superior Court in support.

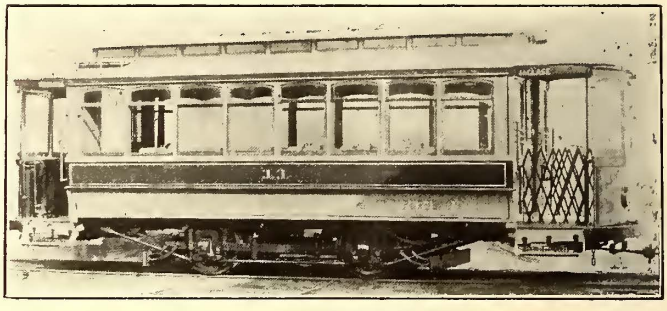
## MOTOR AND TRAIL CARS FOR SERVICE BETWEEN LERDO AND TORREON, MEXICO

One of the first roads to be electrified in Mexico was the F. C. Electrico de Lerdo a Torreon. Lerdo and Torreon are about five miles apart and are situated on the borders of the States of Durango and Coahuila. The J. G. Brill Company and the American Car Company have furnished the entire rolling stock for the line, which consists of 20 ft. 8 in. closed cars, 8-bench open trail cars, 10-bench open motor cars (first and second class), 12-bench open "Narragansetts," and also combination cars of the "California" type. Repeat orders have been received for the 20 ft. 8 in. closed cars, trailers and "California" cars, which are the



MEXICAN TRAIL CAR

standard cars for the road. About two months ago the J. G. Brill Company shipped the third lot of 20 ft. 8 in. closed cars; also four 8-bench trailers and a number of gondola cars for trailer service, although both motor and trailer gondola types are operated. In the accompanying illustration may be seen one of the drop-sash closed cars (first class) and also an 8-bench trail car. The former cars measure 20 ft. 8 ins. over the end panels, 28 ft. 8 ins. over crown pieces and vestibules; width over sills, including panels, 7 ft. 4 ins.; size of side sills, 3½ ins. x 5⅜ ins.; end sills, 3½ ins. x 6⅝ ins. The cars are mounted



MEXICAN MOTOR CAR.

on the No. 21-E truck with 7 ft. 6 ins. wheel base; the motors used have a capacity of 40 hp each. The trailers measure 27 ft. ⅜ in. over the end panels, are 6 ft. 3 ins. wide over the sills and are mounted on gear trucks.

In connection with the contract recently placed by the Utah Railway & Light Company with the General Electric Company for motors, as noted in the Street Railway Journal of Sept. 14, it is learned that the Utah Company has placed a contract with the St. Louis Car Company for fifty steel cars. The new cars will be longer and wider than those now in service and have greater seating capacity. A feature of them will be a Detroit platform 6 ft. wide. The seats in the middle of the cars will be turnovers, while those at the ends will be longitudinal. The National Brake & Electric Company was awarded the contract for the brakes.

## EXHIBITS AND AWARDS JURY AT JAMESTOWN

The jury of awards of the Jamestown Exposition, comprising about seventy-five members, chiefly university officials, government experts and men prominent in technical bodies, under the presidency of Dr. Albert Shaw and the vice-presidency of Ambrose Swasey, began its work last week. From this body and its departmental groups no appeal is permitted by the rules of award, but a superior jury has been constituted to take care of various difficult points that arise in such work. The whole week was devoted by the jury of awards to its task, and the present week will probably see the close of the work of its jury of review. It is understood that the awards will be announced in October. While the exposition is relatively small, it is in some respects very select, and the rules have aimed to limit the award of only one medal to any exhibitor in any given department. Hence the work of the jury has been of an unusually critical nature.

In the general group of machinery, electricity and transportation, J. M. Dodge was made chairman of the machinery and transportation section, and Dr. Carl Hering chairman of the electrical section. The department group for electricity comprised Dr. Carl Hering, Prof. B. V. Swenson, secretary of the American Street & Interurban Railway Association; T. C. Martin, editor "Electrical World," and C. T. Malcolmson, expert U. S. Fuel Testing Plant.

The jury of awards of the transportation group consisted of five members, three of whom were present, viz., Prof. B. V. Swenson, Prof. G. Lanza, of the Massachusetts Institute of Technology, and C. T. Malcolmson.

## NEW CARS FOR TERRE HAUTE, INDIANAPOLIS & EASTERN AND CHICAGO, SOUTH BEND & NORTHERN INDIANA COMPANIES

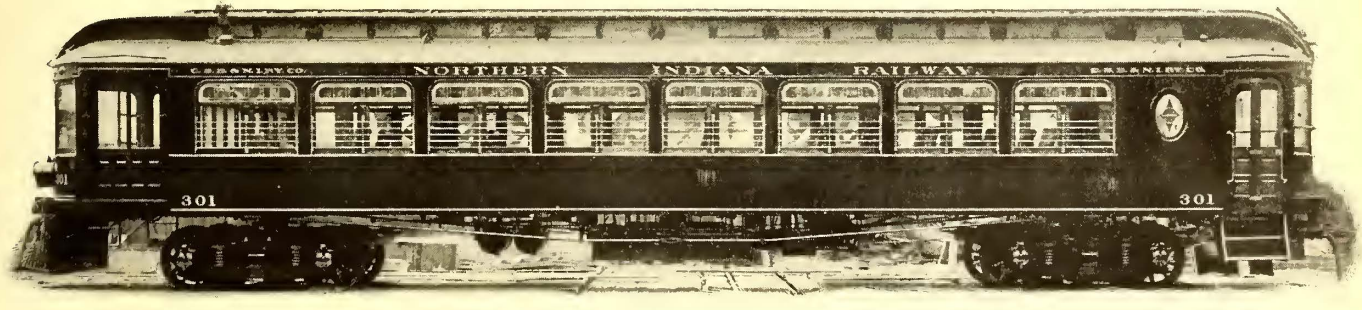
The Cincinnati Car Company is delivering to the Terre Haute, Indianapolis & Eastern Traction Company and the Chicago, South Bend & Northern Indiana Traction Company the first of a lot of twenty-five cars, which are handsome examples of the interurban type of car for high speed on long runs and which combine all the features to be found in the most modern steam and electric coaches. The overall length of the cars is 64 ft. and the width 9 ft. 4 ins., in metal above the double windows. The interior finish is in Honduras mahogany.

The coach bodies are carried on Baldwin heavy M. C. B. interurban trucks, having 7-in. axle at gear seat, 6-in. motor axle bearings, 5½ in. x 9 in. journals fitted with Symington boxes and 37¼-in. steel tired wheels. All the cars have been furnished with Westinghouse automatic air brakes

INTERIOR NORTHERN INDIANA RAILWAY CAR

with train connections, D-2 compressors and 14-in. brake cylinders, with American automatic slack adjusters.

Fifteen of the cars, which will be immediately put into through service between Terre Haute and Indianapolis, are equipped with four Westinghouse No. 121 90-hp motors with Westinghouse unit group switch control. Ten of the cars, for service between South Bend and Chicago, will




EXTERIOR NORTHERN INDIANA RAILWAY CAR

admitting of ample room in the main passenger, smoking and baggage compartments, commodious seats with end arm rests and wide aisles. Some of the salient features in the cars are roomy, metal lined, cement floor toilet rooms, equipped with flush sanitary closets; nickelline wash basins, water coolers, etc.; Pullman type platform, steps and doors; Edwards trap door fixtures and rubber matting, Edwards bronze window fittings throughout, decorated art glass set

be equipped with General Electric No. 73 motors with its latest style multiple unit control apparatus.

The Cincinnati Car Company is also shipping the present month five semi-convertible suburban cars to the Eastern Pennsylvania Railways Company at Pottsville, Pa., five 30-ft. double-truck cars to the Consolidated Railways at New Haven, Conn., and three 55-ft. single compartment coaches to the Northern Electric Company, California.

# FINANCIAL INTELLIGENCE

Wall Street, Sept. 18, 1907.

## The Money Market

There has been no notable change in the monetary situation during the past week. The tone of the market has been easy, but rates for all classes of accommodation have ruled practically unchanged from those recently quoted. The demand for money at all the Western and Southern points continues active as a result of the preparations making for financing the grain and cotton crops, but in New York the inquiry for accommodation has fallen off considerably. Money has been offered here during the past week with more freedom, some of the large banking houses putting out considerable amounts on the basis of 6 per cent for six months. For the shorter maturities rates have eased off a trifle, sixty-day money being obtainable in quantity at 5¼ per cent, while money for four months was placed at 5¾ and 6 per cent. Present indications are that the market will rule easy for some time to come. It is understood that some of the large railroad companies are in the market as lenders of large amounts on time. Many of the railroads and other corporations contemplated large expenditures for betterments and improvements, but in some cases the plans have been abandoned entirely, while in others the expenditures have been materially reduced. The money which would have been expended on these improvements is now, it is said, being placed for short periods and on call. Corporate borrowing has practically ceased. The subscriptions to the $1,500,000 6 per cent notes offered by the American Light & Traction Company were closed on last Saturday and it is understood that a very large portion of the notes was taken by the shareholders. The balance of the issue was to be taken by the underwriting syndicate. The foreign exchange market continues to display a downward tendency, rates for sterling sustaining a further sharp decline under freer offerings of bills against cotton and grain shipments. Rates for sterling, however, are well above the gold import point, but the opinion prevails in foreign exchange circles that the inward movement of the yellow metal will be larger this year than usual. It is pointed out that during the present season the advances made to our bankers by Europe have been extremely small, which has placed local bankers in a much stronger position than has been the case for some time. The European money markets have improved considerably, rates for money at all of the principal financial centers showing further slight recessions.

The bank statement published on last Saturday was somewhat disappointing. Loans increased $375,000 and deposits decreased $1,632,600; cash decreased $861,800. The reserve required was $408,150 less than in the preceding week, which, deducted from the loss in cash, resulted in a decrease in the surplus reserve of $453,650. The surplus now stands at $6,918,700, compared with a surplus of $3,536,400 in the corresponding week of last year and a surplus of $4,635,300 in the corresponding week of 1905.

## The Stock Market

The good feeling engendered in the stock market through the overwhelming success of the New York City bond sale and which was reflected in a considerable enhancement in security values, was completely obliterated during the past week. The copper situation was entirely responsible for this change in conditions. As is well known, copper metal prices have for several weeks been steadily declining from the fictitious figures that prevailed a few months since, which resulted in a complete deadlock between producers and consumers that even thus far has not been broken, notwithstanding that quotations are now almost 10 cents a pound under the high prices current earlier in the year. The climax was reached during the past week when it was announced that many of the largest copper mines would shut down in whole or in part and that several of the larger companies, chief among which was the Calumet & Hecla, had decided to curtail their dividends to stockholders. By some the decision temporarily to suspend mining operations was regarded as a good move, as it would afford the various companies an opportunity to work off their enormous supplies, but even at the reduced level of prices for lake and electrolytic, there was no apparent increase in the demand, and the feeling in the trade was that still further cuts would have to be made before buyers would come into the market in any quantity. All this very naturally had an extremely depressing influence on the shares of the entire copper group, with severe declines, accompanied by heavy liquidation, in Amalgamated, Smelters and Anaconda.

Relatively speaking, the general market ruled firm for a time, this having been especially true of the railway shares, but eventually all stocks gave way in sympathy with the fall in the "coppers," the industrials leading in the downward movement, which, however, was due more to bear selling than to any such liquidation as that which took place during the month of August. The reason for the heaviness in the industrial list is contained in the fact that fears are entertained that the decline in prices for copper metal may sooner or later lead to cuts in other commodities, especially iron and steel. While such a condition of affairs may arise, there is not at the present writing any evidence of a shading off in quotations on any of this country's leading manufactures, and thus far at least, all talk in that direction is nothing more or less than pure conjecture. However, the mere possibility of such an occurrence was sufficient to bring about sharp declines in many stocks in this category, the United States Steel issues being conspicuous cases in point.

As for conditions otherwise, they were such as would have ordinarily resulted in a continuance of the upward movement inaugurated during the closing days of last month. The Government crop reports indicated at least satisfactory yields of wheat, corn and cotton, monetary conditions improved somewhat, there were signs of a possible early beginning of gold importations and the railroads generally reported a large business, with a shortage of cars. Despite all these important considerations, the market sagged and at the close was heavy.

About the only noteworthy happening in connection with the local traction stocks during the week was the decision of Judge Hendrick denying the application of the Attorney-General of the State for permission to proceed against the Interborough-Metropolitan Company with a view to the annulment of its charter. Nevertheless the shares of that company, together with all others of a similar character, yielded more or less in sympathy with the declining tendency of the general stock market, even Brooklyn Rapid Transit receding several points in the face of prospective enormous earnings to result from the Mardi Gras festival now being conducted at Coney Island.

## Philadelphia

Trading in the local traction shares developed large proportions during the past week, and price fluctuations were unusually violent. At the outset there was heavy selling of Philadelphia Rapid Transit which was accompanied by many rumors concerning the affairs of the company. For a time all stock offered was well taken, but later on, under heavy liquidation, the price yielded from 20 to 15½, the lowest price attained on the present downward movement. The decline was subsequently checked by a statement issued by President Parsons, of the company, in which the many rumors regarding the company were characterized as false. President Parsons also stated that the company has no floating indebtedness or overdue accounts and has cash in the bank to the amount of upward of $3,000,000, and that the cash balance of the company and the money to be secured on the next and last call will completely finance the company's requirements and complete all extensions and betterments under way. At the low level, excellent support was rendered, and on strong buying the price recovered to 19½, or nearly all of its early loss. Upward of 35,000 shares were traded in. The stocks of the Philadelphia Traction and Union Traction companies were sympathetically affected by the drop in Philadelphia Rapid Transit. From 90½ Philadelphia Traction declined to 87, but later recovered to 89, while Union Traction, after an extreme loss of 7 points to 45, moved up to 49½. Transactions in the latter stock aggregated 9000 shares. Otherwise trading was rather quiet, and while prices displayed heaviness, the net changes were for the most part confined to the fractions. Other transactions included Philadelphia Company common at 39 to 38, preferred at 41; American Railways at 46½ to 47½; Consolidated Traction of New Jersey at 66½ to 67½, and United Companies of New Jersey at 241 to 240.

## Chicago

Trading in the local traction shares was extremely quiet and unimportant. Metropolitan Elevated rose from 21 to 22, while the preferred rose 2 points to 62 on the declaration of the usual dividend. Northwestern Elevated sold at 21, and Chicago & Oak Park common at 3⅛ to 3.

Certain interests in the Chicago Union Traction Company are trying to put through a modification of the plan that was

rejected by the Court and it is understood that the new plan calls for default on the bonds of the underlying companies of the Chicago Union Traction Company. Naturally the bondholders would be opposed to such a plan, and it therefore seems certain of failure. Another plan will be presented within the next month or two which will more fully protect, and it is believed, will meet with the approval of both stock and bondholders.

**Other Traction Securities**

The feature of the Boston market was the activity in Boston & Worcester which was attended with rather sharp fluctuations. At the opening the stock sold at 19, from which it ran off to 18, and later recovered to 18½. More than 1000 shares changed hands. Trading in the other issues was quiet and without noteworthy change in prices. Boston Elevated held firm at 130 and West End common and preferred brought 85 and 100½, respectively. Boston & Suburban sold at 14; Massachusetts Electric at 12½ to 12, and the preferred at 50 to 49½. The Baltimore market was extremely quiet but steady. United Railway 4s sold at 85 to 85½, the incomes at 51¾ and the funding 5s at 78¼. Other sales were Norfolk Railway & Light 5s at 95, Baltimore City Passenger 5s at 102 and Knoxville Traction 5s at 102½.

As a result of the cutting in two of the October dividend on the preferred stock of the New Orleans Railway & Light Company, the stock took a decided drop Sept. 11, falling 3½ points on the opening call and later going down again half a point, bringing the quotation to 54, compared with quotation of Sept. 10, of 59½—59.

Considerable activity was shown in traction securities on the Cleveland Stock Exchange the past week. The larger transactions were in Cleveland Electric, which showed a weakening over the price to which it advanced suddenly a few days ago. On Wednesday it dropped two points, 120 shares going at 50 and on Friday two 150-share lots were sold, one at 48 for immediate delivery, and the other at 49½, buyer sixty days. It closed Tuesday at 49 bid. On Wednesday ten shares of Aurora, Elgin & Chicago preferred went at 74, the price being unchanged, and a day or two later ninety shares were sold at the same figure. Common declined ½ to 31½ on Saturday. Forest City dropped to 97 on Thursday, but has held its own pretty well, considering the fact that political matters are assuming shape in the way of a proposed settlement of the street railway troubles. Washington, Baltimore & Annapolis pooling certificates have remained about 11 for the past few days.

**Security Quotations**

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

| | Sept. 11 | Sept. 18 |
|---|---|---|
| American Railways | 46½ | 47¼ |
| Boston Elevated | 129 | 129 |
| Brooklyn Rapid Transit | 45⅜ | 45¼ |
| Chicago City | 150 | 150 |
| Chicago Union Traction (common) certificates | 2⅞ | — |
| Chicago Union Traction (preferred) certificates | — | — |
| Cleveland Electric | 50 | — |
| Consolidated Traction of New Jersey | 67 | 67 |
| Detroit United | 64 | 62 |
| Interborough-Metropolitan | 8¾ | 9 |
| Interborough-Metropolitan (preferred) | 26 | 25½ |
| International Traction (common) | — | — |
| International Traction (preferred), 4s | — | — |
| Manhattan Railway | 117 | 114 |
| Massachusetts Elec. Cos. (common) | 12 | 12½ |
| Massachusetts Elec. Cos. (preferred) | 50 | a49½ |
| Metropolitan Elevated, Chicago (common) | 21 | 21 |
| Metropolitan Elevated, Chicago (preferred) | — | 61 |
| Metropolitan Street | 37 | 41 |
| North American | 60 | 59½ |
| North Jersey Street Railway | 40 | 40 |
| Philadelphia Company (common) | 38½ | 38½ |
| Philadelphia Rapid Transit | 19¾ | 19⅜ |
| Philadelphia Traction | 91 | 89 |
| Public Service Corporation certificates | 65 | 65 |
| Public Service Corporation 5 per cent notes | 92 | 92 |
| South Side Elevated (Chicago) | 80 | 80 |
| Third Avenue | 50 | 50 |
| Twin City, Minneapolis (common) | 91 | 91 |
| Union Traction (Philadelphia) | 51¼ | 49¼ |

a Asked.

**Iron and Steel**

According to the "Iron Age" there is increasing interest in the pig iron market, particularly in the East. Some of the large iron makers have taken the lead in meeting the new conditions and have reached a basis upon which business is being done. This level is close to $18.75 delivered for basic pig and $20 delivered for No. 2 foundry. While it is acknowledged quite generally in the finished trade that a diminished tonnage must be expeeted during the winter, it looks as though prices will be kept steady at close to present levels by the large interests. Steel continues scarce.

## REPORT OF THE PHILADELPHIA COMPANY FOR THE YEAR

At the annual meeting of the stockholders of the Philadelphia Rapid Transit Company, held Wednesday, Sept. 18, the annual report of the company was submitted. It showed a deficit on the year's operations of $364,048, compared with a surplus of $303,996 in the preceding twelve months. The gross earnings exceeded $18,000,000, the largest in the company's history. The earnings follow:

| | 1907. | 1906. |
|---|---|---|
| Gross receipts | $18,095,503 | $17,483,144 |
| Operating expenses | 10,046,487 | 9,153,603 |
| Net earnings | $8,049,016 | $8,329,541 |
| Other incomes | 196,577 | 193,103 |
| Total income | $8,245,593 | $8,522,644 |
| Taxes and licenses | 1,120,683 | 1,075,216 |
| Balance | $7,124,910 | $7,447,428 |
| Fixed charges | 7,488,958 | 7,143,431 |
| Deficit | $364,048 | *$303,997 |
| Passengers carried | 492,137,038 | 448,576,785 |

*Surplus.

Philadelphia Rapid Transit's general balance sheet as of June 30, compares as follows:

ASSETS.

| | 1907. | 1906. |
|---|---|---|
| Cash | $379,521 | $442,458 |
| Fire insurance fund | 850,000 | 850,000 |
| Advances to leased lines | 656,633 | 580,316 |
| Supplies | 1,255,248 | 746,859 |
| Construction and equipment | 29,159,320 | 19,863,238 |
| Real estate | 1,013,522 | 891,669 |
| Accounts received | 56,947 | 8,845 |
| Sundry stocks | 2,597,750 | 2,597,500 |
| Franchise accounts | 115,325 | 115,325 |
| Total | $36,084,268 | $26,096,210 |

LIABILITIES.

| | | |
|---|---|---|
| Capital stock | $20,882,140 | $12,850,060 |
| Accounts and notes due | 183,463 | 490,955 |
| Charges and taxes accrued | 1,342,705 | 631,906 |
| Open accounts | 1,311,028 | 3,347,328 |
| Profits and losses—surplus | 1,074,912 | 1,063,960 |
| Proceeds, sales of bonds of underlying companies | 11,200,000 | 7,712,000 |
| Package tickets | 90,019 | ..... |
| Total | $36,084,268 | $26,096,210 |

President Parsons in his report says:

"During the past twelve months there has been considerable criticism about the affairs of your company, much of it of a frenzied character. This in a great measure accounts for the large sums paid out in the settlement of claims, which during the past year amounted to $1,217,586, an increase of $236,266 over the previous year. Ten years ago 2½ per cent to 3 per cent took care of the accident account. To-day it is approaching 7 per cent, equivalent to a dividend of $2 a share upon the stock.

"This increase is due largely to a new enterprise which has grown up and which has been termed 'ambulance chasing.' The slightest accident is hunted up and reported by runners in the employ of lawyers of doubtful standing, many of whom are briefless except for this class of business, but who are most expert in preparing cases of this character in such a manner that they will meet the requirements of the law and catch the sympathy of the jury. There are many physicians in league with these lawyers, whose testimony is of such a nature as to exaggerate the injury and to show that any trouble the claimant may be suffering from might have been caused by the accident."

After the annual report had been read, Mr. Parsons addressed the meeting. He said among other things:

"For the past year our company has been the subject of much criticism. There has been a wave of unrest and socialistic clamor throughout the city. There has been no more fruitful subject for the demagogues or the theorists than to attack street railway companies. The city is in a turmoil over fares, yet during the last few years the average of fares has been reduced from 4 83-100 to 3 18-100 cents."

## TRANSIT MATTERS IN NEW YORK—REPORT ON EAST RIVER SUBWAY

The Public Service Commission, on Monday, held the first of a series of hearings on the subject of increased service on certain lines. The New York City Company was requested to show cause why thirty additional cars should not be put on Madison Avenue south of 116th Street between 6 and 9 a. m., why twenty more cars should not be run south from 135th Street during the same hours, why the same additions to the service should not be made during the evening rush hours, and why other increases in the service both week days and Sundays should not be made.

Vice-President and General Manager Root, of the company, as a witness, said that the company found it impossible to live up to its present rush hour schedule, which called for 190 cars on the line, whereas 170 were about all that could be operated. He ascribed the entire trouble to what he called controlling points—places where it was impossible to get the full quota of cars past a given point, owing to the traffic conditions. These points were Grand Street and the Bowery, Twenty-Third Street and Fourth Avenue, and Forty-Second Street in front of the Grand Central. Between 5.15 and 6.15 o'clock in the evening, he said, the company tried to get 645 cars of all lines past Twenty-Third Street and Fourth Avenue, but it seldom succeeded in passing more than 550.

The hearing was then adjourned until Sept. 23 at 2 o'clock.

In connection with traction affairs in New York the startling statement was made on Sunday that President Shonts, of the Interborough-Metropolitan Company, had expressed the opinion that all tunnels and bridges should be operated by the city, and that Mr. Shonts had formally communicated with the Public Service Commission regarding the sale to the city of the Belmont tunnel under the East River to Long Island City. While nothing official regarding the matter was given out for publication by Mr. Shonts, the statement is now made on authority that the rumor has no foundation in fact.

Chief Engineer Rice, of the Public Service Commission, has submitted a report of the work being done on the Battery tunnel. He says the tunnel will probably be ready for the operation of trains within two months. Referring to the tubes of the East River tunnel, Mr. Rice said in his report:

"The tubes are practically complete and ready for track laying and the installation of the signal system, except for that section which runs from the middle of the river to the Brooklyn shore. The work on that section is being pushed with extraordinary rapidity; the reconstruction work is entirely finished, the piles are all in, and the lining has been made watertight already.

"The main work that now remains to be done before track laying consists in lining the roof and sides of the tunnel with reinforced concrete over the two sections where the bottom is in fine sand, and finishing the ventilating shaft in Brooklyn.

"The details of the interior work were not determined until after the contract had been let, as at that time the exact conditions which would be necessary for the proper operation of the road were not known.

"For over a year the engineers of the Rapid Transit Subway Construction Company were in consultation with the engineers of the Rapid Transit Board in perfecting the details for this particular work, and plans for the interior construction of the tubes had been carefully designed. These contemplated the building of a concrete lining over the entire length of the tunnel in the bottom, sides and top of the tubes.

"The section of the tunnel as originally designed was made large so in case of changes the operation of trains would not be seriously affected. Because of the methods pursued by the subcontractors the extent of the variation provided for was exceeded, and those portions of the tube in sand have been reconstructed in parts so that a clearance of 4 inches as a minimum can always be maintained throughout the work.

"I consider that the work has been well done, but, like all work where the conditions are questionable, the time for the completion has been extended beyond the contract time."

The effort of Borough President Coler, of Brooklyn, and other prominent citizens of that place, to have the Public Service Commission take up the subject of the Fourth Avenue subway to Coney Island, has resulted in a mass of protests against the building of the line from civic bodies and citizens' associations in other parts of the city who feel that a grave mistake was made in selecting the Fourth Avenue route. It is urged that a subway be built up Gates Avenue to Broadway and thence to Jamaica. The argument made is that this is a more densely populated district than the South Brooklyn territory and that South Brooklyn is not suffering near so much as the Eastern district from congestion.

## FINANCING IMPROVEMENTS AT NEW ORLEANS—REDUCTION IN DIVIDEND.

At a meeting of the directors of the New Orleans Railway & Light Company Sept. 10, it was decided to cut the quarterly dividend of $1.25 per share on preferred stock in two, paying the share-holders only sixty-two and one-half cents, the half of the regular dividend to be devoted to betterment and improvement which represent additions to the company's property and an increase in its capital and investments.

The company's report for the seven months ending Aug. 1, 1907, shows:

| | |
|---|---|
| Gross earnings | $3,532,903.25 |
| Operating expenses | 1,864,880.88 |
| Net earnings | $1,668,022.37 |
| Taxes, interest and fixed charges | 1,170,471.60 |
| Surplus | $497,550.77 |
| The estimated amount of surplus for the month of August, 1907, based on 1906, is | 16,000.00 |
| Making a total surplus for the first eight months of 1907 | $515,550.77 |

Of the above surplus $250,000 was paid in dividends on April 15, 1907, and July 15, 1907.

Between July 15, 1905, and Aug. 1, 1907, the company expended in betterment and improvements of its property $5,863,500.57, and has also spent $210,432 in the acquisition of additional stock of its constituent companies.

## WORCESTER COMPANY SEEKS TO ISSUE ADDITIONAL BONDS

In asking the Massachusetts Railroad Commission for approval of an issue of additional bonds to the amount of $1,364,000 last week the Worcester Consolidated Street Railway Company, through President F. H. Dewey and Treasurer J. W. Lester, filed a balance sheet showing its condition June 30, as follows:

ASSETS.

| | | |
|---|---|---|
| Roadway and traction | $3,276,196.81 | |
| Electric line | 598,227.88 | |
| Engineering | 99,283.99 | |
| Total cost of railway | | $3,973,708.68 |
| Cars and rolling stock | $695,599.97 | |
| Electric equipment of same | 702,382.56 | |
| Horses and other property | 160,036.80 | |
| Total cost of equipment | | $1,558,019.33 |
| Power stations and machinery | $505,307.03 | |
| Land and buildings | 893,802.74 | |
| Total cost of land and buildings | | $1,399,109.77 |
| Total permanent investment | | $6,930,837.78 |
| Cash | $29,205.50 | |
| For collection | 212,312.26 | |
| | | $241,517.76 |
| Material for supplies | | 154,651.74 |
| Total assets | | $7,327,007.28 |

LIABILITIES.

| | |
|---|---|
| Capital | $3,550,000.00 |
| Funded debt | 1,060,000.00 |
| Loans and notes payable | 2,286,000.00 |
| Audited vouchers | 138,581.54 |
| Interest accrued | 54,051.17 |
| Taxes accrued | 81,836.92 |
| Profit and loss | 156,537.65 |
| Total | $7,327,007.28 |

Additions and improvements for which this issue is intended to meet the cost foot up $941,295, of which the Leominster, Sterling & Boylston line cost $618,938.96; track and roadway, $52,202.65; line, $73,210.95; land, $22,043; buildings, $52,577.15; car equipment, $54,252.47; electric equipment, $50,950.23; other equipments, $5,313.15; office furniture, $375; power-house and machinery, $6,278.87; telephones and signals, $2,409.30; state highway, $2,381.19.

There was no opposition at the hearing and the board took the case under advisement.

## ABSTRACT OF STATISTICS OF RAILWAYS IN THE UNITED STATES FOR THE YEAR ENDING JUNE 30, 1906

Advance figures of railroad operation have just been made available, based on summaries in the Nineteenth Annual Statistical Report of the Interstate Commerce Commission, prepared by its statistician, as the complete report for the year ending June 30, 1906. This report contains tables showing details of mileage, capitalization, earnings and expenses by roads, and besides includes many summaries of statistics for the roads as a whole.

On June 30, 1906, the report shows that the total single-track railway mileage in the United States was 224,363.17 miles, or 6,262.13 miles more than at the end of the previous year. The operated mileage for which substantially complete returns were rendered to the Commission was 222,340.30 miles, including 7,865.97 miles of line used under trackage rights. The aggregate length of railway mileage, including tracks of all kinds, was 317,083.19 miles. This mileage was thus classified: Single track, 222,340.30 miles, as just mentioned; second track, 17,936.25 miles; third track, 1,766.07 miles; fourth track, 1,279.66 miles, and yard track and sidings, 73,760.91 miles. These figures indicate that there was an increase of 10,286.45 miles in the aggregate length of all tracks, of which 3,819.24 miles, or 37.13 per cent, represented the extension of yard track and sidings.

The number of railway corporations for which mileage is included in the report was 2,313. During the year railway companies owning 4,054.46 miles of line were reorganized, merged, or consolidated. The corresponding figure for the year 1905 was 3,802.02 miles.

The report shows that for the year ending June 30, 1906, the mileage of roads operated by receivers was 3,971.43 miles, or an increase of 3,175.61 miles as compared with 1905. The number of roads in the hands of receivers was 34.

On June 30, 1906, there were in the service of the carriers 51,672 locomotives, the increase being 3,315. These locomotives, excepting 1,090 were classified as: Passenger, 12,249; freight, 29,848, and switching, 8,485. The total number of cars of all classes was 1,958,912, or 116,041 more than for the year 1905. This rolling stock was thus assigned: Passenger service 42,262 cars; freight service, 1,837,914 cars, and company's service, 78,736 cars. These figures do not include cars owned by private commercial firms or corporations.

The reported number of persons on the pay rolls of the railways in the United States on June 30, 1906, was 1,521,355, which is equivalent to an average of 684 employees per 100 miles of line. These figures show an increase in the number of employees as compared with the year 1905, of 139,159, or 47 per 100 miles of line.

On June 30, 1906, the par value of the amount of railway capital outstanding was $14,570,421,478, which is equivalent to a capitalization of $67,936 per mile. Of this capital there existed as stock $6,803,760,093, of which $5,403,001,962 was common and $1,400,758,131 preferred; the remaining part, $7,766,661,385, represented funded debt, consisting of mortgage bonds, $6,266,770,962; miscellaneous obligations, $973,647,924; income bonds, $301,523,400; and equipment trust obligations, $224,719,099. Of the total capital stock outstanding $2,276,801,333, or 33.46 per cent, paid no dividends. The amount of dividends declared during the year was $272,795,974, being equivalent to 6.03 per cent on dividend-paying stock. For the year ending June 30, 1905, the amount of dividends declared was $237,964,482.

The report indicates that the number of passengers carried by the railways in the year ending June 30, 1906, was 799,507,838, this item being 60,673,171 more than for the year ending June 30, 1905. The passenger mileage, or the number of passengers carried 1 mile, was 25,175,480,383, the increase being 1,375,330,947 passenger miles.

The number of tons of freight shown as carried (including freight received from connections) was 1,631,374,219, which exceeds the tonnage of the year 1905 by 203,642,314 tons. The ton-mileage, or the number of tons carried 1 mile, was 215,877,551,241, the increase being 29,414,441,731 ton-miles. The number of tons carried 1 mile per mile of line was 982,401, indicating an increase in the density of freight traffic of 121,005 ton-miles per mile of line.

The average revenue per passenger per mile for the year ending June 30, 1906, was 2.002 cents. For the preceding year the average was 1.962 cents. The average revenue per ton per mile was 0.748 cent; the like average for the year 1905 was 0.766 cent. The earnings per train mile show an increase both for passenger and for freight trains. The figures show an increase in the average cost of running a train 1 mile. The ratio of operating expenses to earnings for the year 1906 was 66.08 per cent. For 1905 this ratio was 66.78 per cent.

The gross earnings of the railways in the United States from the operation of 222,340.30 miles of line were, for the year ending June 30, 1906, $2,325,765,167, being $243,282,761 greater than for the year 1905. Their operating expenses were $1,536,877,271 or $146,275,119 more than in 1905. The following figures present a statement of gross earnings in detail and show the increase of the several items over those of the previous year: Passenger revenue, $510,032,583—increase, $37,337,851; mail, $47,371,453—increase, $1,945,328; express, $51,010,930—increase, $5,861,775; other earnings from passenger service, $11,314,237—increase, $274,095; freight revenue, $1,640,386,655—increase, $189,613,817; other earnings from freight service, $5,645,222—increase, $564,956; other earnings from operation, including unclassified items, $60,004,087—increase, $7,684,939. Gross earnings from operation per mile of line averaged $10,460, the corresponding average for the year 1905 being $862 less.

The operating expenses assigned to the four general classes were: For maintenance of way and structures, $311,720,820; maintenance of equipment, $328,554,658; conducting transportation, $836,202,707; general expenses, $59,752,230; undistributed, $646,856. Operating expenses averaged $6,912 per mile of line, this average showing an increase of $503 per mile in comparison with the year 1905.

The income from operation or the net earnings of the railways amounted to $788,887,896. This amount exceeds the corresponding one for the previous year by $97,007,642. The net earnings per mile of line for 1906 averaged $3,548; for 1905, $3,189, and for 1904, $2,998. The amount of income attributable to other sources than operation was $256,639,591.

## DECISION AGAINST TRENTON COMPANY IN PAVING SUIT

Justice Reed, of the Mercer County Branch of the New Jersey Supreme Court, handed down a decision Friday, Sept. 13, to the effect that the Trenton Street Railway Company must pay to the city of Trenton the sum of $45,290.15, with interest, the total amounting to $55,756.42, as its share of the cost of repaving certain streets within the city. The cause of the trouble dates back to Feb. 12, 1894, when the Board of Public Works, since defunct, granted to the Trenton Passenger Railway Company certain privileges, stipulating among other things that the company should pave and repave, when necessary, between the track or tracks and for a distance of 2 ft. on each side of a single track, and 3 ft. each side of a double track. The Trenton Passenger Railway Company was, in turn, succeeded by the Trenton Street Railway Company.

In 1902 and 1903 ordinances were passed for the repaving of a number of streets, and the paving of certain other streets, with asphaltum or vitrified brick, depending upon the locality, and a part of this cost was assessed against the Trenton Street Railway Company, after it had been notified to perform the work and failed to do so. It was held by the railway company that the Act of 1898, assessing such parts of the cost upon abutting property owners as they might be benefitted, abrogated the effect of the ordinance of 1894, but Justice Reed denied that this was so.

The defense of the street railway company that it was not allowed to do its share of the work, on its own account, was dismissed by the justice with the statement that the company failed to do such work, after it had notice that it was to be done, and further, that such action upon the part of the city worked no hardship to the company inasmuch as the city only assessed a proportionate share of the cost for the whole area of the streets covered, whereas that portion occupied by the railway tracks undoubtedly cost more than the rest owing to car traffic and the special features associated with it. It would be neither reasonable nor feasible, Justice Reed said, to repave that portion of the street not affecting the street railway company and leaving the balance pending legal settlement of the case. In view of this he refused to reduce the amount asked for by the city.

The Trenton Street Railway being the original company to operate cars on Trenton's streets is most affected by repaving plans.

## THE CLEVELAND SITUATION

The suits of the Cleveland Electric Railway Company against the Forest City Railway Company to prevent its using portions of the tracks of the old company have been on trial in Common Pleas Court the past week before Judge Lawrence. The main point sought to be made is that Mayor Tom L. Johnson was financially interested in the Forest City Railway Company at the time most of the grants were made to it. To this end the evidence has mostly been regarding the transfer of shares of stock and the guaranteeing of contracts made for material. If it can be established that the Mayor guaranteed orders and furnished money on stock that was eventually turned over to some one else, the attorneys for the Cleveland Electric believe that they will be able to show an interest that will invalidate all rights granted the company originally and that will make the curative ordinance passed on Aug. 3 void.

Congressman Theodore E. Burton, who was nominated for Mayor by the Republicans of Cleveland a few days ago, has announced that he will take a square stand on the traction issue. As proof of his sincerity in the matter, he has asked both President Horace Andrews of the Cleveland Electric and A. B. DuPont of the Municipal Traction Company to call upon him and discuss the matter either together or separately, and afterward to furnish their views and all the information possible in writing. Mr. Burton wants full information as to rates of fare in the zone plan, as proposed by the new companies, and the general fare of seven tickets for a quarter, to apply to the entire territory. With this before him, he expects to map out a plan and plank for his campaign, but he still adheres to his original declaration that the campaign must not be allied with any corporation and that the final settlement, if he is elected, will be made fair to the people and all concerned.

A resolution was adopted by the City Council at its session last week, directing that the Cleveland Electric Railway Company place in the hands of H. J. Davies and A. B. DuPont all the data relative to the operation of the Central Avenue and Quincy Street lines between Jan. 14 and April 23. It seems that the Council is not satisfied with the report on the receipts from these lines, as made by these gentlemen some time ago, and is planning to secure further information. It is questionable whether the subject will receive much more attention from the company, as it submitted its books to the committee when the first investigation of the matter was made.

## MEETING OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

The first regular fall meeting of the Central Electric Railway Association will be held at Columbus, Ohio, Sept. 26. The program, which is now being prepared, will include the report of the standardization committee and two papers—one, "The Single-Phase System," by George D. Nichols, electric engineer of the Indianapolis & Cincinnati Traction Company, and the other "One Thousand Two Hundred Volt System of Operating Electric Trains," by a representative of the Westinghouse Company. A good attendance is anticipated, as a special invitation has been extended to the officers of Michigan, Illinois and Kentucky companies.

## THE CLEVELAND & SHARON RAILWAY COMPANY

Francis B. Morgan, president of the Cleveland & Sharon Electric Railway Company, Cleveland, Ohio, states that the bonds have all been underwritten. The road will be built directly out of Cleveland and will pass through Burton, Middlefield, Mesopotamia, North Bloomfield, Greensburg, Gustavus, Kinsman, Vernon, Weldon, Brookfield, Orangeville and terminate at Sharon. Here connections will be made for other towns over roads that are already in operation, and it is believed that finally a through route between Cleveland and Pittsburg will be formed through mergers or connections. The track will be laid with 80-lb. steel rails and for the freight trains it has been decided to use locomotives. It is believed that a 2-hour express schedule between Cleveland and Sharon can be maintained without trouble. With three-mile turnouts, the road will be practically double-tracked and there will be no necessity for delaying cars. The power house and plant will entail a cost of about $475,000, and the generating equipment will probably be furnished by the General Electric Company.

## B. R. T. SEEKS TO RAISE FUNDS FOR FOUR TRACKING "L"

The Brooklyn Rapid Transit Company proposes to raise $20,000,000 to be spent in improving its elevated lines, the most important new work in contemplation being the building of a third and fourth track in some instances. To this end the company has applied in the name of the Brooklyn Union Elevated Railroad to the Public Service Commission to issue a mortgage for $20,000,000, and a hearing was held regarding the matter last week. Of the total new issue proposed, some $7,000,000 will go to reimburse the Brooklyn Rapid Transit Company for money it has advanced the Brooklyn Union Elevated Company. Mr. Williams, for the company, last Thursday said it was the intention of the company to apply to the commission for permission to extend its Flatbush Avenue lines to the Manhattan Bridge, and made the following statement in regard to the extensions and improvements contemplated by the company:

"Our plans for the Flatbush Avenue extension to the Manhattan Bridge are nearly ready and will be submitted to the commission probably within a week. If that extension is approved plans for third and fourth tracks on certain other sections of the system will also soon be submitted to the commission. If the Flatbush Avenue extension should not be approved, the third and fourth tracks would be useless. We believe these improvements, however, are vitally important in relieving Brooklyn's traffic conditions."

William S. Menden, general superintendent and chief engineer, testified in detail as to the cost of the proposed improvements and expenditures.

## STREET RAILWAY PATENTS

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

UNITED STATES PATENTS ISSUED SEPT. 3, 1907.

864,794. Car Fender; Carl Meyer, Toledo, Ohio. App. filed May 29, 1907. Provides means for causing the forward end of the fender to recede and descend when struck by an object and means for automatically returning the forward end to elevated position when the object is removed.

864,808. System for Railroad Trains; Eli D. Small, Little Rock, Ark. App. filed Feb. 15, 1906. An office car through which the passengers pass to other cars of the train after paying their fares.

864,848. Pivoted Car Step; Robert M. Lamb, Woodbine, Ga. App. filed Dec. 24, 1906. Details of a supplemental car step pivoted under the regular step and adapted to be swung back and fastened when not in use.

864,866. Automatic Train-Stop; Hiram G. Sedgwick, Mill Valley, Cal. App. filed Nov. 28, 1906. The track rails are constructed with long and with intermediate short insulated sections, and special contact plates are also employed engaged by a brush or shoe on the train. This arrangement closes the circuits for operating the train-stop relay magnets.

864,867. Compound Railway Rail; Alonzo E. Smith, New York, N. Y. App. filed Oct. 10, 1906. The web of the rail comprises a slot to receive a lug depending from the tread, whereby the tread may be removed and replaced.

864,870. Railway; Herbert L. Stillman, West Acton, Mass. App. filed Dec. 26, 1906. Relates to improvements in railways adapted for light cars having rubber tires or a combination tire of rubber and metal, and consists of an inverted channel rail, the depending members of which are embedded in the cross-tie. The tread of the rail has transverse furrows.

864,879. Automatic Switch Mechanism; Carroll M. Bell, and August Dykstra, Goodland, Ind. App. filed June 26, 1907. Mechanism for effecting the closing of a switch in case it be left open by accident. Consists of a stub shaft operatively connected with the switch rails and provided with a tappet, an operating shaft having terminal fingers for engagement with the tappet and a track device for rotating the operating device to effect the closing of the switch.

864,895. Rail Joint; Carl C. Jantzen, Hood River, Ore. App. filed April 11, 1907. A triangular plate is dovetailed in diagonal grooves in the thread of the abutting rails.

864,912. Jointed Trolley Pole; Harry Padley, Elyria, Ohio. App. filed June 1, 1906. The pole is hinged substantially at its middle and the hinged members are constructed each with an

abutting face at an inclination to a right angle whereby the trolley pole will bend when the car backs against an obstruction, thereby avoiding breakage.

864,961. Automatic Electric Gong-Ringing Device for Street Cars; Nathan Fallek and George F. Wolfe, Denver, Col. App. filed April 22, 1907. Provides means for automatically and continuously ringing the gong when a car is standing still, unless the motorman holds the crank handle against the stop post of the controller.

864,963. Mechanism for Moving and Locking Railway or Like Points; Luis de M. G. Ferreira, London, England. App. filed May 16, 1907. Details of construction.

865,013. Railway Block-Signal System; Winthrop M. Chapman, Needham, Mass. App. filed Jan. 24, 1906. Relates to the arrangement of the apparatus, circuits and contacts whereby the signals cannot be improperly actuated under abnormal conditions.

865,035. Switchback Apparatus; Cyril J. Hartley, Stone, and Robert Hodges Bishop, Islington, England. App. filed May 21, 1907. A wheel of cam-like contour having a track on its periphery, the car being held stationary while the wheel is rotated thereunder.

865,087. Car Mover; James R. Doty, Knoxville, Tenn. App. filed March 28, 1907. Details of construction.

865,163. Railway Switch; Joseph A. Cappock, Pinehurst, Ga. App. filed June 11, 1907. The track when the switch is open is continuous as to both rails, and the points are so constructed as to lift the wheels to cause the flanges thereof to clear the main tracks when the train is taking the switch.

865,169. Signal: Charles R. Dowler, Denver, Col. App. filed Sept. 12, 1906. Indicates dangerous conditions to a railroad comprising a weight buried in an embankment and connected to a semaphore apparatus whereby the semaphore will be displayed when the embankment is washed away and the weight allowed to fall.

865,210. Air Brake Apparatus; William T. Robinson, James W. Neighbours and Wilbourn O. Pierce, Pulaski, Va. App. filed June 10, 1907. A main reservoir, an air pump therefor, a brake valve in communication with the reservoir, a train pipe leading from the brake valve, and pipes extending from the main reservoir for the conduct of air therefrom in opposite directions.

865,227. Rail Joint; Joseph F. Bastel, St. Louis, Mo. App. filed May 3, 1907. Comprises a rail chair for inclosing the meeting ends of the rails, said chair having notches in the flange portions thereof, transverse braces provided with recesses to accommodate the rails and the chair, said braces engaging the notches in the chair and notches in the base flanges of the rails.

865,258. Car Fender; Henry M. Lambert, Portland, Ore. App. filed May 31, 1907. Two fenders or catchers are provided, one behind the other, for fore fender being particularly adapted to catch a standing person and the latter a person lying on the track.

865,287. Safety Appliance for Railroad Cars; James T. Andrew, Montgomery, Ala. App. filed March 18, 1907. Means carried by the trucks for automatically lifting and applying braking action in case of accident, said means including spring-supported shoes and anti-friction rollers located near each end of the shoes.

865,317. Railroad Crossing; John E. Reese, Louisville, Ky. App. filed Feb. 1, 1907. Intersecting track rails, each embodying a movable section divided to comprise end to end separable members, and means for simultaneously shifting the members of opposite sections into and out of position, including a double set of toggle levers.

865,323. Trolley; Leslie S. Wilder, Northampton, Mass. App. filed Jan. 10, 1906. Flaring arms spring-mounted upon a U-shaped frame which is in turn mounted on the axle of the trolley wheel. The arms are yieldable downward and laterally in passing hangers, etc.

### UNITED STATES PATENTS ISSUED SEPT. 10, 1907.

865,375. Collapsible Step; Charles E. Frye, Laconia, N. H. App. filed June 20, 1907. A step for attachment to the corner of a car whereby the conductor can mount to the roof. Folds upwardly and inwardly when not in use.

865,412. Attachment for Electric Motor Controllers; Albert H. Mathewson, Thompsonville, Conn. App. filed March 28, 1907. A mechanical arrangement for the handle of a motor controller, including inclined blades and balls which co-operate therewith to insure a momentary stoppage at the notches of the controller when the current is being turned on.

865,456. Passenger Street Car; William S. Twining, Philadelphia, Pa. App. filed June 24, 1907. Details of construction.

865,474. Trolley; Joseph Ashurst, Chicago, Ill. App. filed March 25, 1907. The trolley consists of a pair of vertically mounted rolls with flanges at their lower ends to receive the conductor.

865,501. Motor Truck; William F. Kiesel, Jr., Altoona, Pa. App. filed March 25, 1907. Relates to method of hanging the motor frames upon the trucks of electric railway cars, and consists in so constructing the truck and arranging the "noses" of the motor frames that the points of support shall be directly under the center line of the center-plate.

865,500. Steel Railway Car; William F. Kiesel, Jr., Altoona, Pa. App. filed Feb. 23, 1907. Details of construction.

865,552. Automatic Switch Apparatus; Reginald H. Wentworth, Santa Monica, Cal. App. filed March 20, 1907. Means whereby a track switch is thrown from a moving train.

865,730. Controlling System for Railways; Max Trautmann, Dresden, Germany. App. filed March 21, 1907. A series of conductors divided into two groups and corresponding to the number of passing trains, which conductors lead from the line to indicators and are put in circuit by suitable line contacts operated by the passing trains at the place to be controlled.

865,742. Railway Switch and Automatic Signal Apparatus; Thomas Wolfe, Kansas City, Mo. App. filed Feb. 19, 1907. Signal operating mechanism consisting of two pair of cylinders and pistons, pipeways connecting one pair of cylinders with the other pair, connections between the pistons of each pair of cylinders, and a non-compressive fluid in each pipeway adapted for transmitting movement from one piston of each pair to the companion piston of the other pair of cylinders.

865,770. Rail Joint; Augustus Doratella, Steelton, Pa. App. filed June 6, 1907. The tread of each rail comprises a tongue and recess adapted to interlock. No fish plates are used.

865,781. Electric Railway Signaling Device; Edward B. Howell, Butte, Mont. App. filed June 25, 1906. System whereby signals are automatically produced in two trains when they approach each other within a predetermined distance. Has special trolleys with circuit connections to the train.

865,848. Automatic Signaling Apparatus; James E. Anderson, Ames, Neb. App. filed May 20, 1907. A pair of longitudinal rails or shoes are mounted on top of the locomotive for contact with depending plates above the track.

865,866. Block Signal; Pierre I. Chandeysson, St. Louis, Mo. App. filed Dec. 23, 1905. A three-position semaphore arm operated by an electric motor having a magnetic clutch to control the positions of such semaphore arm.

865,879. Electric Contact Rail; Ed. W. Farnham, Chicago, Ill. App. filed July 17, 1905. A U-shaped third-rail from which current is taken from the under side and having a cable inclosed therein.

865,882. Combination Amusement Vehicle and Boat; John E. Garrette, Indianapolis, Ind. App. filed March 24, 1906. An amusement vehicle and boat comprising a conveyance made to imitate a passenger car adapted to move and provide with suitable attachments adapted to be shifted into positions to represent a boat.

## PERSONAL MENTION

MR. FRANCIS DUNCAN BRIGHT, for nine years president of the Railway World Publishing Company, of Philadelphia, is dead.

MR. THEODORE H. BAILEY, who has been with the General Electric Company for the past twenty years as assistant general manager, has gone to St. Louis to take charge of the automobile department of the St. Louis Car Company.

MR. A. J. McCLURE has been appointed storekeeper for the New London lines of the Consolidated Railway Company of Connecticut, succeeding Mr. Charles B. James. Mr. McClure is a graduate of Princeton, of the class of 1906.

MR. FRANKLIN D. SHERWOOD, vice-president of the Hornellsville Electric Street Railway, of Hornellsville, N. Y., is dead. Mr. Sherwood was prominent in business affairs in Hornellsville and vicinity, and was well known throughout the state on account of his active participation in the affairs of the Republican party.

MR. W. S. TOWNSEND, master mechanic of the East Liverpool Traction & Light Company, of East Liverpool, Ohio, has been appointed as a member of the Standardization Committee of the Central Electric Railway Association to succeed Mr. W. H. Evans, formerly of Indianapolis, who now is with the International Traction Company of Buffalo, N. Y.

MR. H. C. WARREN, superintendent of the Toledo, Port Clinton & Lakeside Railway, has resigned to accept a similar position with the Toledo & Indiana. It is understood that Mr. Warren will take up the duties performed by Mr. E. Darrow, whose resignation was presented a few days ago. Mr. Warren was formerly with the Wheeling & Lake Erie and later with the Toledo & Indiana, so in making the change he goes to work that is familiar to him.

MR. FRANK B. BATCHELDER has been appointed acting superintendent of motive power of the United Railways & Electric Company of Baltimore, Md., having charge of the operation of the power plant and sub-stations. Mr. Batchelder is peculiarly well fitted for this position on account of his long experience, first as chief clerk and later as assistant to the superintendent of motive power and machinery of the Boston Elevated Railway Company, of Boston, Mass. Mr. Batchelder resigned from the Boston company last January and came to Baltimore as assistant to Mr. Chas. F. Baker, superintendent of power and construction for Mr. L. B. Stillwell, consulting engineer, of New York, who has the contract for the reconstruction and operation of the plants for the United Railway Company.

MR. JAS. L. RICHARDS, president of the subsidiary companies of the Massachusetts Gas Companies, has been chosen president of the subsidiary companies of the Boston Suburban Electric Companies, to succeed Mr. Samuel L. Powers, who has resigned to devote all his time to the practice of law. Mr. Powers was president of the subsidiary companies only a short time, succeeding Mr. Adams D. Claflin, who resigned to give his whole attention to the Claflin estate. Mr. Claflin continues as president of the Boston Suburban Electric Companies, which is the holding company. The Boston & Suburban system includes the Newton Street Railway, the Lexington & Boston, the Newton & Boston, and all the electric railways which touch Waltham. The Boston & Suburban is a voluntary association, the subsidiary companies retaining their individual corporations.

MR. W. D. YOUNG has resigned as electrical engineer of the Baltimore & Ohio Railroad and Mr. Lucius T. Gibbs has been appointed as his successor. Mr. Gibbs was born in New York in 1869. He served an apprenticeship in the machine shop of the Otis Elevator Company and was assistant to the mechanical engineer of the Chicago, Milwaukee & St. Paul Railway. He graduated at Cornell University in 1891 and was afterward made electrical engineer of the Milwaukee Electric Railway & Light Company. He was also vice-president and chief engineer of the Gibbs Electric Company of Milwaukee. During the Spanish-American War Mr. Gibbs was assistant engineer on board the Newark and was afterward transferred to the Brooklyn. After the war he resigned from the navy and went to New York, where he was engaged in various capacities as consulting engineer and with the Westinghouse Company. Mr. Gibbs is a brother of Mr. George Gibbs, Chief Engineer of Electric Traction of the Pennsylvania Railroad.

MR. E. DARROW has resigned as general manager and chief engineer of the Toledo & Indiana Railway Company to accept a position as expert engineer with a syndicate of New York and St. Louis bankers, with headquarters in New York. The new field offers an opportunity for the exercise of engineering knowledge and experience in the broadest sense and the selection of Mr. Darrow is a compliment to his ability in that direction. Graduating from the engineering department of the University of Michigan in 1892, Mr. Darrow soon became general superintendent of the Edison Company at Cincinnati. He served six years in this position, after which he became constructing engineer of the Cincinnati & Columbus Traction Company and the Cincinnati, Newport & Covington Railway Company, serving four years in this capacity. The next three years were spent as chief engineer of the Toledo, Bowling Green & Findlay Railway, during which the entire roadbed was reconstructed and brought up to its present degree of excellence. Two years ago Mr. Darrow took the position from which he has just resigned, and under his management the physical condition of the property has been brought to the standard of the best interurban roads in the country. As announced elsewhere in these columns, Mr. Darrow's old duties will be taken up by Mr. H. C. Warren.

MR. F. J. STOUT, general manager of the Lake Shore Electric Railway Company, died in the Toledo Hospital, Toledo, Ohio, Saturday, Sept. 14. Mr. Stout was operated on about a month ago, and was improving when complications set in. For the past two weeks he was in a precarious condition. Mr. Stout was born at Deerfield, Mich, and began his railroad career when fifteen years of age as a brakeman on the Toledo-Elkhart division of the Lake Shore & Michigan Southern. Within a few years he became a freight conductor and then was promoted to passenger conductor, then train master and finally yard master of the division, with headquarters in Toledo. This latter position he retained until 1893, when he became superintendent of the Wheeling & Lake Erie Railroad, with offices in Toledo. The headquarters were later moved to Norwalk and then to Massillon, where the division terminals were moved. This position Mr. Stout retained until the road went into the hands of a receiver, when he became general superintendent, reporting directly to the receiver. In the summer and fall of 1896 Mr. Stout, as superintendent of the road, spent most of his time in Canton looking after the crowds that went to that city during the campaign of President McKinley. In 1900 he resigned the superintendency of the Wheeling & Lake Erie to become general manager of the Toledo, Fremont & Norwalk Electric Railway. Two years later, when the line was acquired by the Everett-Moore syndicate, he was made general superintendent of the Lake Shore Electric System under General Manager Danforth. In April, 1903, he was made general manager, with headquarters at Norwalk. Mr. Stout is said to have been the first man to apply steam railroad methods to the operation of electric roads. His work has always been of the highest character and he was looked upon as an authority in the management of electric railway systems. The funeral took place at the late residence of the deceased in Norwalk on Tuesday. Officials of the company from the office in Cleveland went to Norwalk in a special car. The body was sent to Detroit for burial. Mr. Stout leaves a widow.

MR. CHARLES N. BLACK, who since January, 1905, has been general manager and chief engineer of the Metropolitan Street Railway Company of Kansas City, Mo., has just been appointed vice-president and general manager of the United Railroads of San Francisco, succeeding to the duties of the late Mr. Geo. F. Chapman. Mr. Black's connection with the Kansas City company dates from the time when as chief engineer for Ford, Bacon & Davis, of New York, the reconstruction of the system was entrusted to him. This work was finished in September, 1903, and Mr. Black was induced to continue with the company as its chief engineer. Two years later he was appointed manager in 1905, when Mr. Bernard Corrigan, president and general manager, relinquished the latter office duties. Mr. Black is by profession an electrical engineer. Princeton is his alma mater. In 1888 he was graduated with the degree A. B., and two years later secured the degree E. E. He was subsequently connected with the Brush Electric Company, the Short Electric Railway Company and the Walker Company. Mr. Black will assume his new duties Sept. 23.

MR. CHARLES N. BLACK.