

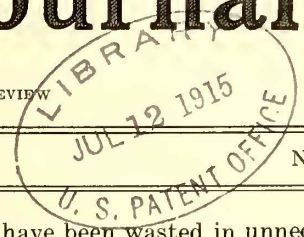
Electric Railway Journal

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LOSING TIME IN TERMINALS

On many large railroad systems it is often most difficult for a company to avoid losing time in terminal approaches, on account of the magnitude of traffic, with its great diversity of origin concentrated upon a limited trackage. In interurban electric railway practice, street traffic often reduces schedule speed unduly in the last stages of a journey, but this also cannot be helped in a good many instances. What can be helped, however, is unnecessary delay in entering terminals in smaller places where ample room in the streets is available, or where the trackage conditions are favorable to good service. Sometimes the construction of a short section of double track in a terminal city of moderate size is of great value in enabling in-bound and out-bound interurban cars to make fast time without waiting to pass slow-moving locals, whether the latter are on or off schedule. Again, by avoiding stops considerably in advance of the destination to read registers, adjust running boards or other details which may better be handled at the end of the route, time may be clipped off the total run, with the resulting improvement in the schedule.

JUDGING HUMAN NATURE IN LEGAL DEPARTMENT

In a paper at the Pacific Claim Agents' Association, reported in the last issue, C. F. Young, adjuster Puget Sound Traction, Light & Power Company, emphasized the necessity on the part of the claim investigator of ability to combine tact with firmness. The same principle applies very appropriately to another field of the legal department, that of the attorney engaged in hastening the vacating by owners of property legally condemned for a new right-of-way. The necessity for handling different types of people in totally different manners was shown recently by a certain lawyer's personal experience in such work in an important Eastern city. With some owners a polite explanation of the situation which legalized the condemnation of property was sufficient to carry conviction of the railway company's authority to take possession and honesty of intention to settle fairly, but with the more ignorant landowners it was found that a tone of politeness was often mistaken for suavity as a veil for unscrupulous motives. Continued politeness only served to excite their suspicions, and cause them to classify the attorney and his company among the members of the Jack Sheppard Club. Experience taught that an answer of unmistakable sternness to such resentful utterances had the effect of immediately quieting both the objections and suspicions of the property owners. Severity and firmness in this case encouraged respect and thus saved much

time that otherwise would have been wasted in unnecessary wrangling. The firm grasp took the sting out of the nettle.

MINIMUM CAR WEIGHTS FOR CLASP BRAKES

The report on clasp brakes made by a Master Car Builders' committee some weeks ago at Atlantic City constituted a very satisfactory indorsement of the device on the basis of experience obtained to date. There was, however, one feature of the report that serves also as an excellent argument for the use of the semicircular brass, at least by electric railways, in preference to the clasp brake as a means for eliminating the hot boxes due to journals that shift out from beneath their brasses under emergency applications. This was the establishment by the committee of a minimum car weight for clasp brakes, it being recommended only that cars weighing more than 96,000 lb. should be provided with them, and as there are very few electric railway cars whose weights even approach this figure the average interurban car, on the M.C.B. basis, would seem to be exempt from the necessity for clasp brakes. Undoubtedly, the establishment of this minimum weight was on the grounds of expense, the limit of 12,000 lb. per wheel being set by the prohibitive pressures per shoe involved with standard rigging for the higher wheel loads rather than by any doubt in the value of the clasp brake for lighter cars. Of course, it has been demonstrated that the shifting of journals depends upon the percentage of braking pressure and not upon the actual weight on the wheel, and if clasp brakes are going to be considered too expensive for ordinary cars the only apparent alternative is the use of the semicircular brass if the journals are to be kept in place.

RIVETING WITH STEEL PRESSINGS

An objection to steel pressings as opposed to castings has recently been raised on the ground of the necessity for riveting on lugs, fixtures and the like instead of having them cast integral with the original piece. Apparently the major part of the complaint is based on experience with riveted joints that have worked loose, and it cannot be denied that this has been far from uncommon in electric railway work in the past. It is also true, however, that much of the riveting work that is done in electric railway repair shops is by no means up to the best standards, and it is hardly proper to condemn the process in general because of failures that could undoubtedly have been avoided by proper care in fabrication. Riveting, when properly done, is infinitely superior to any other method of making up

a joint, and so far as reliability in attaching lugs is concerned it gives results quite as good as those obtained by pouring the projections solid on a steel casting and better than those obtained when cast iron is used. As compared with welding the riveted joint is distinctly preferable because it can be separated and remade at the expense only of cutting off the rivet heads and redriving them as desired, yet when once in place the strength of the construction is definitely known and does not depend, as does the weld, upon a complicated metallurgical process and a granular structure of the affected metal that is absolutely hidden from sight. All that is required is that the riveted pieces shall be firmly clamped together and that the rivet holes shall be rough-reamed before the rivet is driven. A high grade of rivet steel and the use of pressure riveters are largely incidental. Years of experience with locomotive boilers have shown this beyond a doubt, because there the riveted attachments never give the slightest trouble notwithstanding the continuous vibration and extraordinary strains set up by the wide temperature changes.

LIBERALITY WITH COST DATA

It is a pleasure to commend the American Institute of Electrical Engineers and the railroads which co-operated for their respective enterprise and liberality which made possible the publication of data of costs of construction and operation of different types of contact systems. This was a unique feature of the Deer Park convention, one which was the cause of surprise as well as congratulation. Even assuming the necessary willingness on the part of the possessors of the valuable data, the reduction of the information to form for comparison was no light task. One writer of a paper based his conclusions on entries filling 250 foolscap pages, the figures being drawn direct from the railroad company's job records and requiring an analysis of these. Another element in the success of the program laid out by the railway committee of the institute was its definiteness. The study was confined to one part of the field, contact systems. In this restricted region attention was focused upon the particular things likely to interest and prove of value to railway men. The result speaks for itself. The lesson in it all seems to be that the old policy of hoarding cost data by railroads is on the wane. Electric railways are committed to the policy of publicity and, like charity, this should begin at home. They must serve each other as well as the public, and one effective way to do this is through the interchange of information which will lead to more economical construction and maintenance. The pocket notebook of many a master mechanic and engineer contains information whose value would be enhanced by circulation, for such circulation would stimulate others to like liberality. An example of the kind of information which is of great value to operating men was printed in the issue of the *ELECTRIC RAILWAY JOURNAL* for June 26, page 1214. By giving these figures the Los Angeles Railway Corporation shows a real willingness to serve. By the dis-

semination of such data the industry benefits, and the giver is in no wise impoverished.

CONSTRUCTING STEEL TOWER LINES

A group of papers presented at the recent A. I. E. E. convention dealt with the very important matter of the construction of tower lines. One may at the present time say that the steel tower on about 500-ft. or 600-ft. spacing has become the standard construction for high-voltage transmission lines. At first towers were very crude in design and generally erred either on the side of insufficient strength or of being made abnormally heavy in the attempt at improvement. As things stand to-day there are available steel towers which have been really designed for the purposes for which they are to be used, and the old difficulties have for the most part disappeared. Yet it is perfectly certain from the performance of tower lines that there is a good deal to be learned yet about economical design and construction. The convention papers to which we have reference deal in the main with one important and rather neglected consideration, that is, the foundations of the towers. Whether the tower itself is designed to be a rigid structure or to have a considerable degree of flexibility, as in some of the A-frame structures, the working strains come ultimately upon the foundation.

It is not difficult to design beforehand a tower sufficiently strong to stand the maximum stresses imposed upon it without buckling. This does not, however, insure it against tipping over or against being forced into a position where the added load may cause actual failure. The tower is meant to do its work when standing erect and in its normal position, and if pulled out of it through lack of foundations it may absolutely tip over or be twisted out of shape. The foundation work consists essentially in bolting the base of the tower to anchors of one sort or another sufficiently embedded in the ground to resist the turning moment of the base. In the papers before us two forms of foundation are chiefly considered: Steel anchors, usually of tripod form, so embedded that they will not pull out, and concrete masses of the general form of an inverted mushroom with embedded bolts or angle irons to which the steel structure is secured. As between these two types the choice seems to be chiefly based on the local conditions. Either can be made adequately strong to hold up the tower under all practical conditions. It has been actually shown that in some cases one form is cheaper and in other cases the other, each in its own situation being adequately strong. On the lines of the Pennsylvania Water & Power Company it was found that the mushroom concrete foundation could be installed more rapidly and at lower cost than the steel used on the first tower line of the company. On lines elsewhere the reverse situation has occurred.

The moral of the discussion seems to be that with any given tower the best form of foundation must be determined for the situation in which the tower is to be used, irrespective of experience elsewhere. The nature of the ground, the cost of labor, the cost of

concrete, and transportation all play their part, and the indications are that it is wise before settling so important a question actually to try out the towers to be used under the stresses for which they are designed and with several types of foundation. The cost of such experimentation is small compared with the difference in final expenditure which can thus be determined. There seems to be no advantage in pushing such tests to the limit of breaking down the tower. It may be theoretically interesting to know whether with a given foundation the foundation itself will break or lift or the tower crumple under extraordinary stresses. The practical demand is merely whether the foundation is fully adequate to endure the stresses incurred when the tower is loaded to the designed point, with due regard to a proper factor of safety.

LINE INSULATION

Mr. Bang's institute paper on the operation of the transmission lines from the great plant on the Susquehanna into Baltimore, originally presented in Baltimore and brought up for discussion at the convention last week, brings to the front the ever-present insulation problem. The three circuits of aluminum cable which form this transmission system have apparently conditions not unfavorable to continuity of service. They are carried on steel towers provided with grounded cables for protection against lightning, are worked at a voltage which cannot be considered exceptionally high, and are supported on suspension insulators having a large factor of safety, much larger than is found on similar circuits using pin-type insulators. Nevertheless the partial or complete interruptions of service have averaged more than a score per year, and of this number the vast majority have been due to lightning, although the lines are protected not only by the ground wires but by electrolytic arresters which, on the whole, are perhaps the most satisfactory form of arresters yet produced. Lightning is, of course, a contingency to be treated as always dangerous, especially when a direct stroke falls upon the line. Generally the arresters at the ends of the line are sufficient to keep the discharge from doing damage in the station, although now and then there are failures.

The damage on the line, however, is a different matter for it is strictly local. Hence the presence of arresters somewhere else on the circuit makes very little difference so far as damage to insulators is concerned. The situation seems to have been, on the circuits which Mr. Bang studied, that a powerful lightning discharge frequently flashed up alongside the string of insulators to the tower and broke down insulation, sometimes shattering the insulator disks in a startling fashion. The following arc did the rest. With all the insulators in first-class shape the power of the series to resist the lightning flash ought to have been considerable enough to avert damage, but it frequently failed to do so. A direct lightning stroke falling upon the line has so enormous a potential that a flash-over is not at all unexpected. In the case of this line, however, it may be

questioned whether some of the destructive strokes were not due to gradually lessening strength of the insulators, caused by continued use and mechanical and electrical strains. Mr. Bang's investigation of the insulators by periodical resistance tests shows a somewhat disquieting state of affairs. Normally they were in first-class condition, but about one disk in seven or eight, after several years' service, showed a very great falling off of the resistance, practically rendering the injured disk useless. This was traced to two different causes, first superficial cracks, usually on the head of the disk, apparently developed from mechanical strains internal or external, and, second, failure of insulation, again usually at the head of the disk, not through cracking, but through a slight porosity of the porcelain, the effects of which seem to be cumulative with long exposure to moisture.

The moral appears to be that in the present state of affairs it is wise to make megohm tests of insulators from time to time to see whether any of them have become unreliable. Whether a similar condition holds for the pin-type insulators, more frequently used than the suspension insulators for the comparatively moderate voltages of railway transmission, remains to be seen. The situation as regards strains is quite different in the two forms, and at the commoner voltages also comes in the difference between glass and porcelain with respect to this particular kind of deterioration. Most lines use porcelain insulators, but in a great many cases glass is an effective substitute, and the relative reliability of the two materials as respects the progressive decrease in insulation deserves attention.

The most suggestive portion of Mr. Bang's paper deals with preventive measures to avert the damage following the lightning stroke. The real mischief is done by the arc which follows a breakdown of the insulation, and two devices tried seem to have proved effective in putting this arc out of business before the insulation was permanently destroyed. Both are described as in use here, and they have seemed to give promise of filling a very important function in line protection. One is a relay device for shunting the arc with a fuse as soon as it is established, thereby killing it, and then clearing the line by the destruction of the fuse. The other drops the excitation of the machines until the arc gives out and then re-establishes the field. The former can be made to act very quickly so that there is little risk of either damage to lines or of losing synchronous load. The latter operates more slowly but appears from Mr. Bang's results to be somewhat more certain in its operation. A combination of the two as worked out on the lines under discussion seems to have been very useful in lessening the trouble from lightning since these protective devices were installed. At all events it is clear that the insulators on a high-voltage line do require more watching than mere attention to physical breaks, and that protective apparatus properly installed is of material value in preventing interruptions of service even though the lightning may start trouble.

Shop Notes from Hampton, Va.

An Account Is Given of the Practices in Economical Management and Good Housekeeping at the Hampton Shops—Some Novel Features Are Described

In a recent visit to the Hampton shops of the Newport News & Hampton Railway, Gas & Electric Company, the following practices in economical management and good housekeeping were observed:

PAINTER'S STORAGE RACK OF ADJUSTABLE TYPE

The painter's storage rack shown in an accompanying half-tone is not an absolute novelty, but its principle deserves to be more widely known than it is. So far as the horizontal placing of panels is concerned, the rack does not differ from that seen in most paint shops. However, with the aid of ordinary door latches, the vertical partitions may be moved to accommodate any width of panel. The latches are mounted vertically at the top and bottom of each partition and their tongues are merely drawn out of pockets in the top and bottom of the rack to permit the shifting of the partitions to any desired stops to the right or left.

VERTICAL ARMATURE RACKS

Where room is scarce vertical armature racks deserve wider use. In the accompanying illustration may be seen one for motor armatures and another for compressor armatures. The armatures are quickly handled by means of a jib crane which is attached to a corner post, a crane being used because the shop is too small to require an overhead track. Formerly the armatures were stored on a table under canvas. This led to trouble because careless workmen would throw heavy tools on the canvas, thereby damaging commutator bars which previously had been passed as perfect.

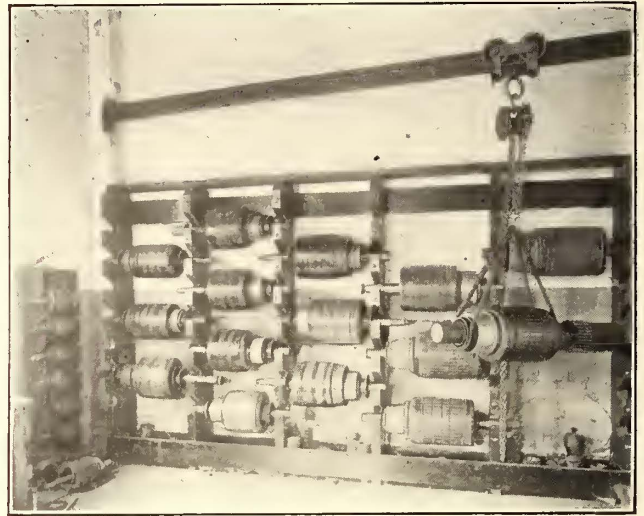
FIRE PAIL SUSPENSION

It is customary in many shops to carry the egg-bottomed fire pails through holes made for them in a solid wooden shelf. This shelf offers the shopmen a tempting place for so many odds and ends that eventually the pails themselves are lost to sight. Following a suggestion from the safety committee, all fire pails hereafter

will be carried from metal brackets so that the space between and on the pails will not be cluttered up so easily. The two illustrations on the next page show one of the old wooden shelves and the other the new metal bracket.

RECLAIMING TWO-POINT RESISTORS

The company has already reclaimed some fifteen sets of Westinghouse two-point resistors which had been rendered useless by the corrosion of the two-screw brass

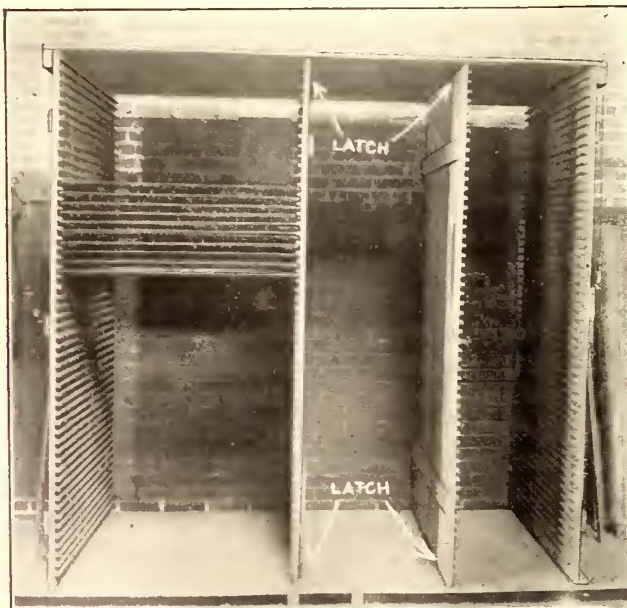


HAMPTON SHOPS—VERTICAL ARMATURE RACKS WITH JIB CRANE

lugs or contacts. After brightening the contact surfaces of the grids the old lugs were replaced by copper washers of the type used on the latest Westinghouse resistors.

ELECTRIC ARC WELDER

Out of five old resistors, the abandoned rheostat of a substation voltage regulator and a circuit breaker the



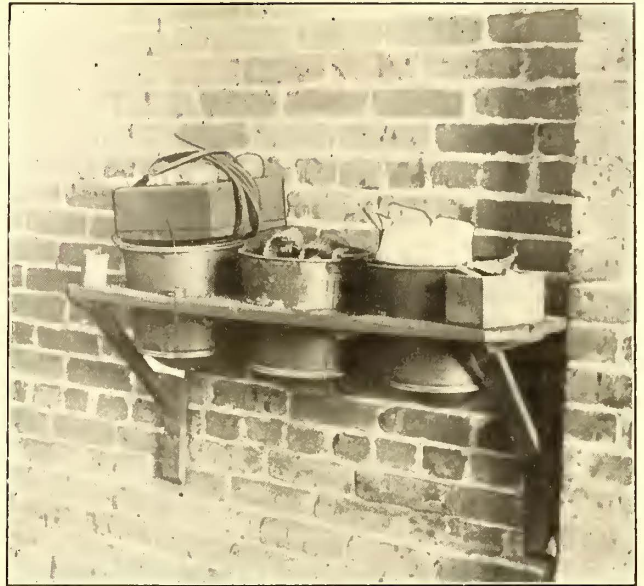
HAMPTON SHOPS—PAINTERS' RACKS WITH MOVABLE PARTITIONS



HAMPTON SHOPS—HOME-MADE WELDING OUTFIT IN USE ON A MOTOR SHELL



HAMPTON SHOPS—THE SAFE AND CLEAN WAY OF SUSPENDING FIRE PAILS



HAMPTON SHOPS—THE UNSAFE AND NEGLIGENT WAY OF SUSPENDING FIRE PAILS

shopmen constructed the electric arc welder illustrated. This equipment is mounted on a truck for convenience in working outside as well as inside the shops. The welding material is mild steel in the form of 5-16-in. diameter rods, and the flux is a cheap borax compound. The welding rods are held in a plug of metal bored for the purpose. The welder's metal hood has the usual combination of ruby and green lenses. The novel feature of the hood is that its weight is comfortably carried by building it around a cap made up of an ancient, rimless derby. The cap has a leather band to which brackets from the hood are attached.

One of the first jobs to which this welder was applied was the building up of No. 27-G truck side-frame brackets. It has also been used for patching gear cases and filling keyways and it will shortly be tried for building up trackwork.

CHANGE OF GEAR RATIO

The gear ratio of many equipments was 24:58, which corresponded to a maximum speed of 35 m.p.h. A careful study of running conditions showed that the

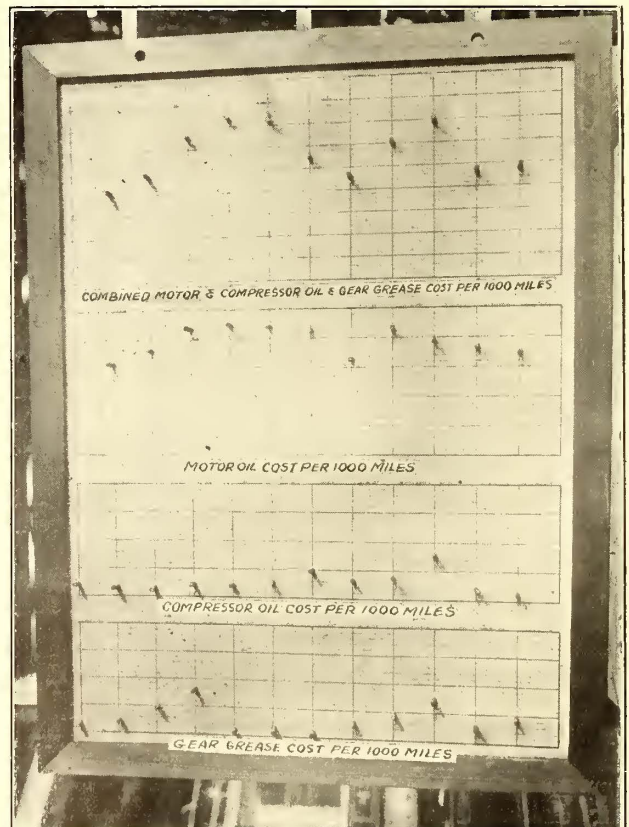
schedule could be maintained even if the maximum speed was cut to 28 m.p.h. The standard ratio is now 17:67. The saving in energy consumption has not been calculated, but there has been a very perceptible decrease in the number of baked armatures and fields. The company has also changed from bolted gears to the Cincinnati Tool Steel Gear & Pinion Company's solid gear.

MAINTENANCE RECORDS

Until the property was taken over in January, 1912, by Allen & Peck, Inc., with J. N. Shannahan as general



HAMPTON SHOPS—A DERBY ANCIENT OF DAYS ADAPTED TO CARRY THE VISOR WITH EASE



HAMPTON SHOPS—PEG BOARD POSTED IN SHOP TO SHOW MAINTENANCE COSTS

manager, no records of equipment life were kept, nor were the cars inspected and overhauled on a mileage basis. At present they are inspected every six days, which is approximately on a 1000-mile basis. Beginning March 15 all cars were put on an actual 1000-mile inspection basis. Mileage records are now kept showing actual service obtained from brakeshoes, wheels, trolley wheels, harps, lubricant costs, etc.

A keen desire to keep down the lubrication costs has been created by showing the men just how the cost of each item varies from month to month and how this affects the total cost. To secure this publicity a wooden frame was constructed to hold a record sheet which is ruled vertically for months and horizontally for cents per 1000 car-miles. This sheet is subdivided to show the costs of motor oil, compressor oil, gear grease, and also of these three items combined. As shopmen are not accustomed to reading graphs the points which would serve to draw each curve are represented by plugs of wood. When a year's record has been made in this way the curves will be drawn and the plugs used again to show the monthly records for the current year.

The cost of car lubrication has already been cut down from 42 cents in 1912-1913 to 24 cents per 1000 car-miles, exclusive of packing, but it is expected that during the present year the cost will be brought down to the Galena contract figure of 20 cents per 1000 car-miles. It will be difficult to drop below that figure so long as 25 per cent of the mileage is performed with such motors as the Nos. 49 and 12a. These older motors must be lubricated every day and their felt-pad lubrication through Perfection packing, while satisfactory for service, is uneconomical because of stand-by leakage. In fact, with these motors the oil consumption is almost as great when the cars are standing as when the cars are moving.

Milwaukee Fare Case Decided

Supreme Court of the United States Says That the City Under Existing Statutes Had No Power to Make a Contract Covering Rates

A short note was published on page 1226 of the issue of this paper for June 26 in regard to the decision of the Supreme Court of the United States in the Milwaukee fare case. The principal question involved in the decision was whether the city of Milwaukee had power to make a contract with the railway company covering a term of years for a specified rate of fare. The opinion, which was handed down on June 14, upholds the Wisconsin Supreme Court in denying this right.

The opinion first recites the history of this case, which was briefly as follows: On Jan. 2, 1900, there was granted by the city to The Milwaukee Electric Railway & Light Company the right to operate over certain streets. By the same ordinance all franchises expiring prior to Dec. 31, 1934, were extended to that date and all franchises which would otherwise expire subsequently to that date were made to terminate at that time. The ordinance permitted the company to charge a 5-cent fare when paid in cash but required it to sell twenty-five tickets for \$1 or six tickets for 25 cents good at certain hours up to Jan. 1, 1905, and thereafter good at any time. Subsequently, at the request of the city, the Railroad Commission held hearings to determine whether the rates were too high and finally ordered the company to sell thirteen tickets for 50 cents. The company claimed that this order took its property without due process of law. The case was first tried in the State courts and the order was sustained by the Supreme Court of Wisconsin. It was then taken by the company

to the United States Supreme Court as being a violation of Sec. 10 of Art. I of the Constitution of the United States and of the fourteenth amendment thereto.

In its decision the federal Supreme Court upholds the Wisconsin Supreme Court in its decision that the city had no authority to make such a contract and that the authority to establish fares remained with the State. As a basis for this conclusion it quoted Sec. 1862 of the revised statutes of Wisconsin of 1860 which reads in part as follows: "Any municipal corporation or county may grant to any such [street railway] corporation * * * the right to construct, maintain and operate street railways, the use, upon certain terms as the proper authorities shall determine, of any street, parkway or bridges * * *. Every such road shall be * * * subject to such reasonable regular rules * * * as the proper municipal authorities may by ordinance from time to time prescribe."

The opinion then says: "The fixing of rates which may be charged by public service corporations of the character here involved is a legislative function of the State, and while the right to make contracts which shall prevent the State during a given period from exercising this important power has been recognized and approved by judicial decisions, it has been uniformly held in this court that the renunciation of a sovereign right of this character must be evidenced by terms so clear and unequivocal as to permit of no doubt as to their proper construction." The principle involved is well stated, according to the court, in *Home Telephone Company vs. Los Angeles*, 211 U. S. 265, 273.

Continuing, the court says that the Supreme Court of Wisconsin held that Sec. 1862 quoted above gave no distinct authority to the city to contract away the legislative authority of the State to fix tolls and fares by lowering them if found to be excessive; that while the term "grant" was used, the grant was to be upon terms such as the municipal authorities might determine, and that this language was more appropriate to the exercise of power by the municipality than to the making of a contract between parties. The Supreme Court of the United States adds: "The language of the section certainly lends itself to this construction, and there is nothing in specific terms conferring the right to contract by agreement between parties, much less to make such contract during its existence exclusive of any further right of the State to act upon the subject in the exercise of its legislative authority. It authorizes the grant of the use of the streets upon such terms as the proper authorities shall determine, not upon such terms as the parties in interest shall agree to."

The Supreme Court says that the plaintiff relied upon *Detroit vs. Detroit Citizens' Street Railway Company*, 184 U. S. 368; *Cleveland vs. Cleveland Street Railway Company*, 194 U. S. 517, and *Minneapolis vs. Minneapolis Street Railway Company*, 215 U. S. 417, but it finds a material difference in circumstances concerned in this case and in the cases in question.

The opinion continues: "It is true that this court has repeatedly held that the discharge of the duty imposed upon it by the Constitution to make effectual the provision that no State shall pass any law impairing the obligation of a contract, requires this court to determine for itself whether there is a contract, and the extent of its binding obligation, and parties are not concluded in these respects by the determination and decisions of the courts of the States. While this is so, it has been frequently held that where a statute of a State is alleged to create or authorize a contract inviolable by subsequent legislation of the State, in determining its meaning much consideration is given to the decisions of the highest court of the State. Among other cases which have asserted this principle are: *Freeport Water Company vs.*

Freeport, 180 U. S. 587, and Vicksburg vs. Vicksburg Water Company, 206 U. S. 496, 509."

The court then discusses the Wisconsin decisions on this point quoted by both sides, particularly Linden Land Company vs. The Milwaukee Electric Railway & Light Company, 107 Wisconsin 493, and Manitowoc vs. Manitowoc & N. T. Company, 145 Wisconsin 13, and agrees with the Wisconsin Supreme Court in holding the latter to be controlling and that Sec. 1862 denies authority to municipal corporations to make contracts preventing the State from its further exercise of its power to fix the rates which may be charged by public service corporations.

As stated in the issue of this paper for June 26 The Milwaukee Electric Railway & Light Company now proposes to take the matter up with the lower courts, and possibly also with the Railroad Commission, on the question of the reasonableness of the original order, and hopes to win its case.

Cost of Highway Bridges*

Apportionment Between Street Railways and Cities—Four Conclusions Upon Which the Determination of the Proper Settlement Should Be Based

BY CHARLES M. SPOFFORD OF FAY, SPOFFORD & THORNDYKE, BOSTON, MASS.

The fact that trolley cars are so much heavier than other road vehicles puts street railway companies under different obligations than other users of highway bridges and makes it seem fair to assess upon them the extra expense required to provide for traffic of this character. The assessment of street railways to pay for the cost of new bridges in Massachusetts has been established by legislative enactment and has varied from a minimum of 10 per cent to a maximum of 25 per cent, the cost being determined by hearings before a commission appointed by the court.

If the structure is to be of a monumental type, it would seem that the scale of the towers, carving and other ornamental features may be a function of the width of the bridge, and if increased width is necessary to provide for street car traffic, additional expense for this purpose may legitimately be incurred.

Whether any material increase in width is necessary to provide for street car traffic depends upon the total density of the traffic. If the car service is infrequent, there would seem to be no reason for increasing the width of the bridge to provide for street cars other than by the slight amount necessary to provide safe clearance for crowded cars. Ordinary traffic can readily run on the portion of the bridge occupied by the track with little or no delay, and space for extra lines of traffic need not be provided. An example illustrating such a case is the Meridian Street Bridge of Boston, where it was agreed that the proper distance center to center of trusses would be increased only 2 ft. 6 in. by the presence of street cars, although it carries two lines of track.

Another example illustrating the same case is the Chelsea North Bridge of Boston. Provision for four lines of traffic was evidently necessary on this bridge, but it was agreed by both sides before presentation to the Apportionment Commission, that a roadway 40 ft. wide between curbs, with trusses 44 ft. center to center, was required whether street cars were operated or not, this space providing for four traffic lines. In consequence, no charge was made to the railroad for additional width.

To measure the capacity of a bridge or street in re-

lation to traffic, it is evidently necessary to consider the character of the vehicles and their speed as well as their number. For this purpose the London Board of Trade sets up as a unit a motor cab or carriage, and assigns the following numbers to other classes of vehicles, using the unit as one.

Trade Vehicles	Passenger Vehicles
One-horse (fast)..... 3	Electric trams 10
One-horse (slow)..... 7	Omnibuses (horse)..... 5
Two-horse (fast)..... 4	Omnibuses (motor)..... 3
Two-horse (slow)..... 10	Cabs (horse)..... 2
Motor (fast)..... 2	Cabs (motor)..... 1
Motor (slow)..... 5	Carriages (horse)..... 2
Barrows 6	Carriages (motor)..... 1
	Cycles 1/2

The board lays down the following definitions: "Traffic volume" is the average aggregate number of traffic units attributable to vehicles which pass a given point per minute during the twelve hours from 8 a. m. to 8 p. m. "Average traffic density" is the aggregate number of traffic units attributable to vehicles which pass the point during the twelve hours, per minute, per 10 ft. of available carriageway. "Greatest traffic density" is the average density per minute, per 10 ft. of available carriageway, during the busiest hour, expressed in traffic units. With the above units and definitions in mind, the following comparison of traffic on London bridges is clear:

	Westminster Bridge	Waterloo Bridge	Blackfriars Bridge	London Bridge	Tower Bridge
Traffic volume	91.4	60.5	105.9	89.2	84.7
Average traffic density, ...	20.3	22.0	14.4	24.1	24.2
Hour of greatest density, .	6 to 7	5 to 6	6 to 7	11 to 12	11 to 12
Density of that hour.....	23.8	22.5	15.3	27.4	27.9
Average vehicles	4.2	3.9	5.0	4.0	6.0

In connection with the width of bridges it should be remembered that the capacity of a bridge in vehicles per hour is considerably greater than that of the ordinary city street due to the freedom from interruption by traffic on intersecting streets and by vehicles stopping at the curb to discharge and receive freight or passengers. It is evident that the width of bridges on curves may have to be increased greatly to provide proper clearance for street cars.

The increase in strength necessary to provide for street cars is most marked in the floor systems. It is less noticeable in trusses and girders, and least of all in foundations. The allowance for impact and future increase of street car loads must be carefully considered in determining the additional strength of the structure, but so far as the foundations are concerned, it is doubtful if any allowance for impact need be made.

The best plan to pursue in determining the difference in cost of bridges with and without street cars seems to the writer to be that of comparing the necessary sizes of main members in the two designs. Allowance for the weight of the details of the second structure may be made by considering the details of each individual member to vary in weight in proportion to the variation in the cross-section of the main member. If the structure has been completed, the weight of details may be established by the gross shipping weights reduced by the computed weight of the main sections.

In the case of a reinforced concrete barrel arch bridge, it would seem as if the additional cost would ordinarily be dependent entirely upon the increased width. The cost of engineering, insurance, etc., may be assumed to vary directly with the cost of construction.

The fact that the cost of maintenance and operation of a highway bridge would ordinarily be borne by the municipality should be considered in apportioning the cost to the street railway. This would be particularly

*Abstract of paper presented before Western Society of Engineers, Chicago, on May 10, 1915.

pertinent in the case of swing bridges, where it would seem as if a fair arrangement would be for the railway to furnish the current necessary to open and close the bridge, and for the municipality to maintain the draw tenders and other attendants. In general, it would appear that the street railway might reasonably be charged, as its portion of the capitalized cost of maintenance, a share proportionate to its contribution to the cost of construction.

All of the above discussion should be considered with due regard to the fact that the railway is ordinarily subject to heavy taxes, and in consequence should be entitled to operate without charge across the bridge with vehicles of weight equal to that of the heaviest motor trucks. The only equity in charging the railway more than the ordinary transportation company is because of the heavy loads which it operates.

The conclusions which the writer has drawn from his experience in apportionment cases of this character are as follows:

1. Additional width to provide for street cars is ordinarily necessary only in the case of bridges with narrow roadways, providing for no more than two lines of traffic.

2. The extra expense involved in strengthening heavy city bridges of permanent type to provide for 50-ton trolley cars would not ordinarily be greater than 10 per cent of the total cost, and may be as low as 6 per cent. This percentage will be greater for light country highway bridges without paved floors, but if such bridges are designed for heavy motor-truck traffic, as they should be, the additional expense will not be excessive.

3. To apportion the cost equitably and with credit to the engineering profession, the engineers on the two sides should try to agree upon the additional cost of provision for street cars before the case is presented to an apportionment commission.

4. It is doubtful if the railway should ordinarily be charged for additional convenience due to the reconstructed bridge. This, however, is a matter the settlement of which hardly comes into the province of the engineer.

Jitney Statistics at Fort Worth

Even on the Best-Traveled Route, Over Which Jitneys Were Operated Seventeen Hours a Day, Very Unfavorable Conditions Are Shown

On March 25 the Northern Texas Traction Company made a detailed check of the jitney business on a day of heavy travel. From the figures so obtained tables and a series of corresponding graphs were reproduced.

An assembly of data covering the jitney operation on all Fort Worth lines, hour by hour from 6 a. m. to 12 midnight, showed that the average passengers per trip on the nine divisions ranged from 1.9 to 2.54. The total number of trips made was 7498, the number of passengers carried, 16,661, the average passengers per trip 2.22 and the gross income of 217 cars \$833.70.

The travel in opposite directions during any given hour showed marked differences, empty trips being numerous. One line, however, was somewhat exceptional in having a fairly even traffic both ways during business hours. The noon-hour traffic was about half that of the peaks on most of the lines.

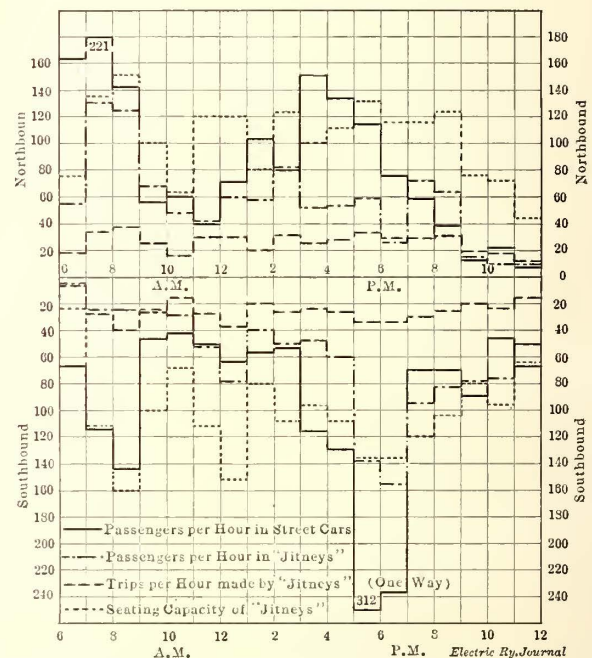
Among the individual cars on a typical line, which although the longest in the city is also the best-traveled, the highest gross earnings shown were \$8.30. But in order to take in this amount the car was operated for seventeen hours, and this necessarily implies the employment of two drivers sooner or later. The gross

earnings per mile ranged from 2.5 cents to 3.7 cents. The earnings per hour ranged from 26 cents to 51 cents. The schedule speed averaged about 12 m.p.h., this exceeding the Fort Worth cars by about 50 per cent, but one car made only 7.8 m.p.h. and another 9 m.p.h. The maximum schedule speed was 14.8 m.p.h.

It may be added that in the case of the line in question the maximum run of the jitney is only 3.7 miles long. Even this distance is in excess of the usual jitney ride in other cities, and this is reflected in the condition that the recorded earnings per hour are also somewhat less than usual.

The set of graphs shown in the accompanying cut relates to this line also. In these a comparison is made of jitney versus street railway traffic, also on an hourly basis. The trips per hour made by the street cars are not shown. They amount to four trips each way, during normal hours and from eight to twelve each way during rush hours. The seating capacity of a car on this line is forty, or ten times that of the average jitney.

One unusual feature of jitney operation at Fort Worth is that it was inaugurated by a company which began operation on Jan. 11 with thirty cars. This company has endeavored to keep to certain routes, but modi-



JITNEY STATISTICS—GRAPHICAL REPRESENTATIONS OF COMPARATIVE STREET CAR AND JITNEY TRAFFIC

fications have been made from time to time because of inroads from free-lance jitneys. A check of all the cars operated by this company as made on a given date showed that the maximum gross earnings of any one car were \$9.50. This must have included the wages of two men as the car was operated sixteen hours and forty-five minutes. The earnings per mile of this car were only 4 cents. The best figure for any car, 4.2 cents, was made by one which ran for twelve hours and thirty minutes, therefore omitting the leanest traffic hours. The average gross for all cars was but 3.37 cents, barely enough to cover depreciation, fuel and maintenance, let alone wages.

The Texas Power & Light Company on July 1 began to serve power to all Texas Traction Company lines. In the past the railway operated its own power plants, but recently a company was organized to take over the light and power plants.

Electric Railway Session at A. I. E. E. Convention

At the Deer Park Convention One Session Was Devoted to Heavy Electric Traction Contact Systems—
Abstracts of the Papers Presented and the Resulting Discussion Are Given

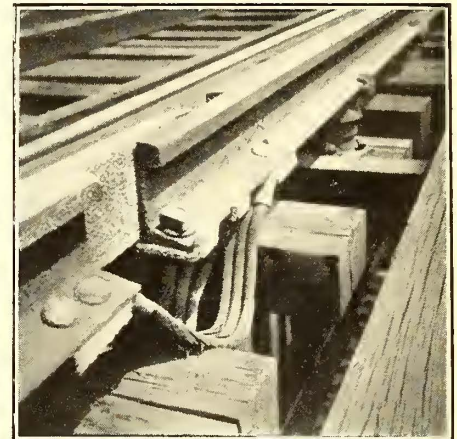
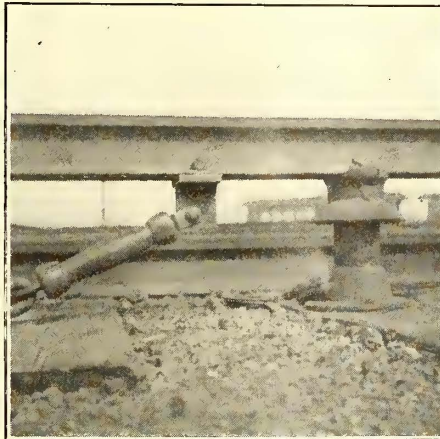
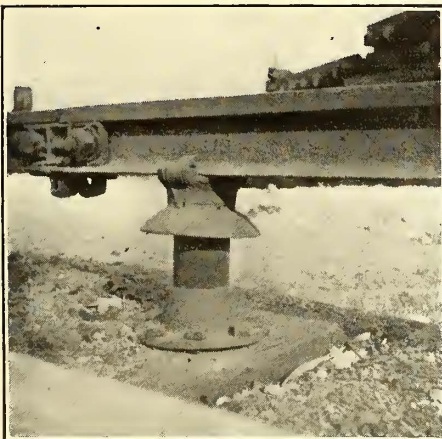
The Thursday morning session of the thirty-second annual convention of the American Institute of Electrical Engineers, which was held at Deer Park, Md., from June 29 to July 2, was devoted to a discussion of the construction and operation of overhead and third-rail contact systems with particular reference to costs. In these papers the practice of some of the most important electrified roads was described and the writers very frankly told of the difficulties which had been met and overcome. The salient features of these papers and of the resulting discussion are covered in the following abstracts.

TOP-CONTACT UNPROTECTED RAILS FOR 600-VOLT TRACTION SYSTEM

Charles H. Jones, assistant electrical engineer Metropolitan West Side Elevated Railroad of Chicago, discussed the various factors which enter into the construction, operation and maintenance of top-contact unprotected rail upon which the gravity type of collecting device was used. He took up the subject under the following subdivisions: weight of rail, quality of rail, insulating and supporting, bonding and jointing, anchoring, special work required, method of connecting at crossings and cost of installation and maintenance.

For rails weighing less than 80 lb. per yard, there is nothing to be gained by the use of high-conductivity rail, which is more expensive and is more difficult to handle than the hard rail, being softer and therefore more easily kinked during installation. There is no appreciable difference in the rate of wear between low-carbon and ordinary steel in the class of service covered in the paper. With light rail it is better to get increased conductance by using a larger cross-section rather than a softer steel. With heavier rail, if by the use of higher conductivity the expense of a paralleling feeder system can be avoided, the high-conductivity rail should be used. On the other hand there is a certain amount of intangible gain to be secured by having a paralleling feeder system, especially with the narrow working margin that is assumed when the difference in conductivity would decide the question of whether or not a paralleling feeder system would be required.

Insulation of a contact rail for a 600-volt system is more mechanical than electrical. Wherever there is any vibration, porcelain and reconstructed granite, or insulators having castings bolted together have not been satisfactory. Mr. Jones stated that a type of insulator consisting of a circular socket base with flange for bolting to the tie, a cylinder of impregnated



CONTACT SYSTEMS—THIRD-RAIL INSULATOR, ANCHOR INSULATOR AND ATTACHMENT, AND EXPANSION JOINT, RECOMMENDED BY MR. JONES

Referring to the tendency to use heavier contact rail, he stated that the advantage to be gained by the use of heavy rail lies in the fact that a large conductance can be secured for about the same amount of labor charge as that required to install lighter rails which can serve as contact members only. If a paralleling feeder system is required a medium weight of rail, say from 80 lb. to 100 lb., will give more satisfactory results. With heavy rails, the advisability of using a special section should be considered for the purpose of throwing more metal into the contact surface and thereby increasing the life. For weights of rail up to and including 80 lb., the standard A. S. C. E. section is satisfactory. As far as the wear is concerned, Mr. Jones gave data to show that contact rail will last twenty years or more.

wood set in the socket, and a circular top casting with a slot on the top to accommodate the base of the rail, a petticoat to shed moisture and a pair of clamps to keep the rail from jumping out of the slot without binding it had proved very satisfactory. The base casting is the same for all weights of rail. The life of an insulator is from ten to twelve years under ordinary conditions, although impregnated-wood insulators have been known to last from fifteen to twenty years.

The third-rail is cut up into sections of from 1000 ft. to 1200 ft. for anchoring purposes and these are anchored at the center. On surface track not provided with a wooden guard rail the conductor rail may be anchored by attaching several strain insulators in multiple to an iron plate which extends over, and is bolted to several ties, the other end of the insulators being

fastened to the base of the contact rail. If wooden guard rail is used, an anchor block consisting of a piece of 6-in. x 8-in. oak 2 ft. long, impregnated with preservative, can be attached to the guard rail, and the contact rail in turn can be bolted to the block. Porcelain insulators may be placed between this block and the guard rail. The best method of providing an expansion gap in the conductor rail is to end a run of rail with an incline leaving a 3-ft. space between stretches. A continuous expansion joint is shown on the preceding page.

Mr. Jones gave the cost of third-rail construction, using 80-lb. T-rail in 60-ft. lengths, as \$3,662 per mile for labor and material, of which the labor is somewhat less than 10 per cent. An additional 10 per cent is allowed for engineering and supervision, making a total of \$4,028 per mile. For a 50-lb. rail, in 30-ft. lengths, the cost is \$3,284 per mile. At an average cost of \$80 per mile per year the contact rail can be kept in first-class condition and the insulation changed every twelve years. This, however, does not include complete renewal of rails, plates and bonds, such as will occur when the rail is completely worn out.

OVERHEAD CONTACT SYSTEMS, CONSTRUCTION AND COSTS

Under the above title E. J. Amberg, engineer McHenry & Murray, New Haven, Conn., and F. Zogbaum, engineer of maintenance New York, Westchester & Boston Railway, summarized the experiences of the New York, New Haven & Hartford Railroad and the New York, Westchester & Boston Railway in so far as they related to the construction and maintenance of the overhead system.

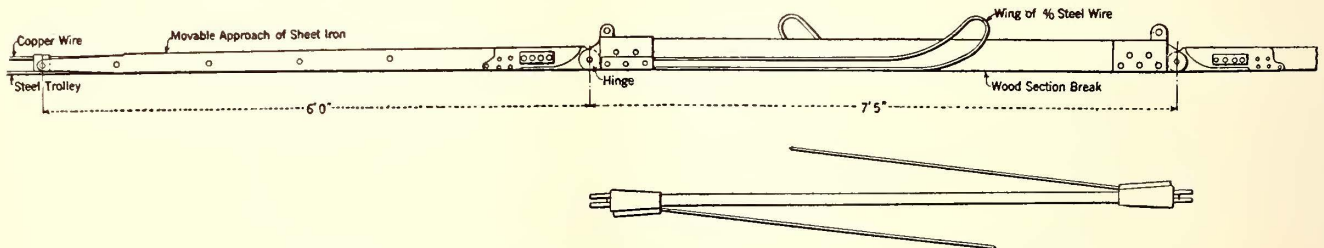
On the New Haven system three types of catenary construction are used; double, compound and single. The first-named was originally considered necessary to provide rigidity, but as first installed it was found not adapted to high-speed service. It was made flexible by the addition of a steel contact wire supported by clips from the copper conductor. The double catenary pro-

use. Steel trolley wire rusts considerably and the rust is washed off by rain and drips upon coaches and locomotives, making them unsightly and necessitating frequent painting. If there is not sufficient traffic to keep the under side of the wire bright the rust causes increased sparking and burning of pantograph shoes. On the subject of insulators he stated that the temperature strains in porcelain insulators should be given careful consideration, especially in the dead-end type. Failures have been caused by steam train operation in the electrified zone, breakdowns being most frequent where clearances between the locomotive stack and the insulator are restricted or where steam engines stop under or near insulators. Where clearances are restricted insulators should be located off the center line of the track or two insulators in parallel should be used. In tunnels two insulators in series are advisable.

On the New Haven electrification between Woodlawn and Stamford the bridges were designed so that all overturning moments were taken at the base, requiring large foundations. In later construction the bridges were designed so that the corner connection between the post and truss takes the moment acting across the track. The foundations need then only resist the overturning moment and the shear along the track and can thus be made much lighter. Cross-span construction is adapted for use over a large number of tracks equipped with single catenary, both on main line and in yards.

Mr. Amberg described a flexible wood section break for use in catenary construction, as shown in an accompanying illustration. It is designed to eliminate the hard spot produced by the rigid break. The break proper is connected in the line between two movable sheet-iron approaches. To prevent a train being stalled on the break, flexible wings of heavy steel wire, placed as shown, insure continuity of pantograph contact. These breaks are not necessary in yard construction on account of the slow movement of trains. On the New Haven line, air sectionalization is used wherever possible but there are a number of places where wood section breaks must be used.

Mr. Amberg gave also some curves and tables of



CONTACT SYSTEMS—FLEXIBLE SECTION BREAK NEW HAVEN SYSTEM

vided insurance against messenger-wire breakage but it involved several disadvantages. As two live messenger wires were carried over the bridges power had to be cut off to permit work to be done on the trusses. Lightning trouble was experienced with the insulated messenger wire even with electrolytic lightning arresters. The compound catenary provides a grounded messenger wire over each track, removing live parts from the trusses, eliminating lightning trouble and at the same time keeping the trolley wires nearly over the center of a track without the use of pull-off poles except on curves. On curves above 2 deg. the temperature has an influence on the alignment of the contact wire, requiring the use of pull-off spans between bridges. Single catenary is used for both main line and yards. In the latter the copper conductor can be omitted.

Mr. Amberg predicted that steel contact wire will be used less in future although its first cost favors its

costs somewhat similar to those given by W. S. Murray in his Philadelphia paper abstracted in the issue of this paper for Jan. 30, 1913, page 229.

Mr. Zogbaum gave the results of operating experience on the New York, Westchester & Boston Railway. He stated that it has not been found advisable to stagger the contact wire to secure uniform wear on pantograph shoes, but called attention to the necessity for allowing for swaying movement of locomotives and cars in locating the contact wire, especially on curves. Trains running at high speed on curves sharper than 1 deg. swing the pantographs toward the outside of the curve. More than 30 per cent of the 54 $\frac{1}{4}$ miles of contact wire on this system is over curved track, requiring slight adjustment from time to time.

In addition to the contact wire this system includes 181 miles of transmission line of which 109 miles are

for traction power only, and the balance includes signal feeders and control lines. In the catenary system are six sectionalizing bridges and seventy-seven high-tension oil circuit breakers used for sectionalizing the high-tension power. In maintaining this system a force consisting of an engineer of maintenance, a general electrical foreman, one day foreman, one night foreman, five linemen and one assistant lineman is required. The force is able also to do the necessary construction work. It uses a work train consisting of a gasoline-electric locomotive and a work car, the locomotive containing an overhead platform. On the work car is a searchlight for use in making inspections and repairs.

Very satisfactory operating efficiency has been secured, there having been in 1913 27,927 car-miles operated per pantograph failure; in 1914 55,503 car-miles, and in the three months ending March, 1915, 64,799 car-miles. The causes of pantograph breaks were: wire off center, low joints on running rails on curves, overhead frog on deflector out of adjustment, and loose sleeves on contact wire. In 1913 practically 880,000 train-miles were made with 210 delays of a total duration of 2170 min. from power trouble, and seventeen delays with a total duration of 129 min. from pantograph and contact-wire trouble. In 1914, with practically the same mileage, power trouble produced but ninety-seven delays of 2256 min. duration, while pantograph and contact-wire trouble produced fifteen delays of 117 min. duration. In the first three months of the current year, with proportional mileage, there was no power trouble, and but one delay of 2 min. duration from the other source. Details of the causes of the various delays were given, and train-minutes delays by months were charted. The road has an excellent insulator-failure record, troubles from this source being practically negligible.

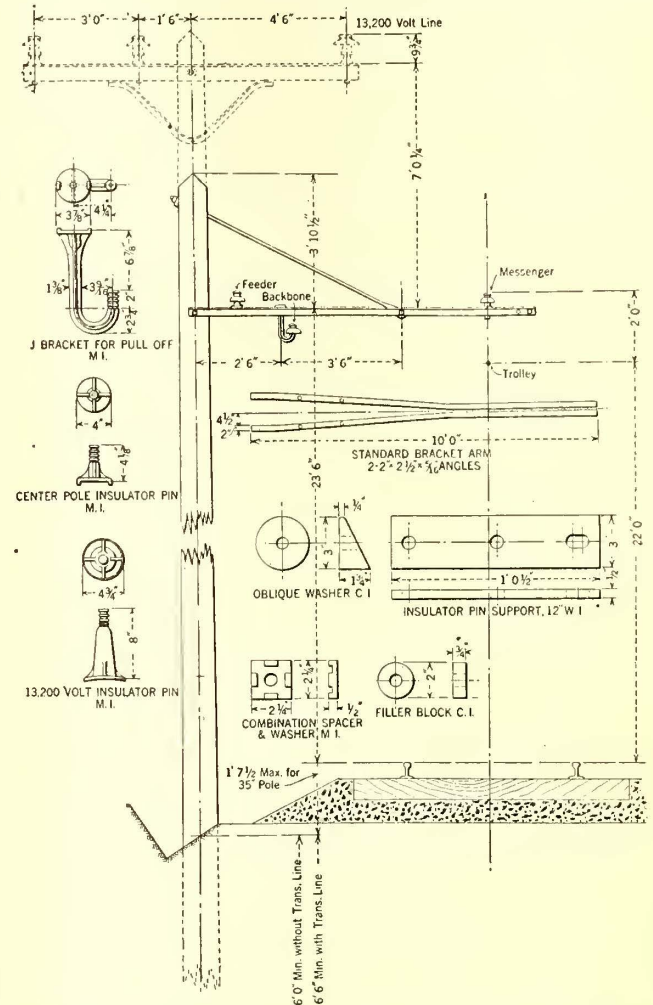
The wear on the under side of the grooved-steel contact wire has produced a $\frac{1}{8}$ -in. flat surface, and this has been uniform over the line, no difference being noted between high wire and low wire, tangent track and curves. From present indications the steel wire will have a total life of from six to seven years. Pantograph mileage varies from 1000 to 1300 miles in the winter up to considerably more than 2000 miles in the summer. The higher mortality in winter is due to the necessary increase in tension on account of the contraction in the contact wire. The total maintenance cost per car-mile for July, 1914, is given as 1.56 cents and for December, 1914, as 1.42 cents, including supervision of transmission and contact system, miscellaneous electric line expenses, work train, etc. Details of the actual expenditures for selected months are included in the paper. It also contains a digest of the operating rules and regulations of the organization.

CONTACT SYSTEM OF THE SOUTHERN PACIFIC COMPANY, PORTLAND DIVISION

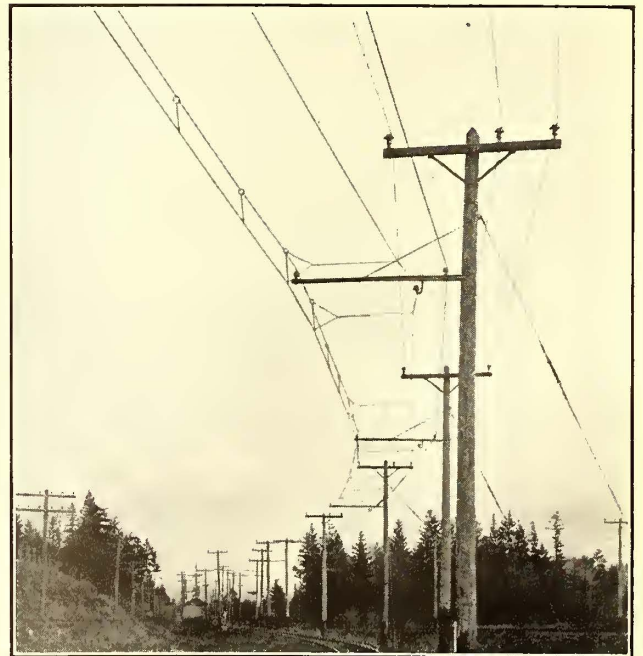
Paul Lebenbaum, electrical engineer Portland, Eugene & Eastern Railway, described the overhead construction of the electrified lines of the Southern Pacific Company between Portland and Whiteson, this being the first electrification in Oregon of the Southern Pacific System. The electrification involved 104 miles of single track with approximately 16 miles of second track and siding. With the exception of 3 miles of 600-volt trolley in Portland, the operating voltage is 1550. Electric operation was begun on this system in January, 1914.

In general, side-bracket catenary construction of the type shown in an accompanying illustration is used, the

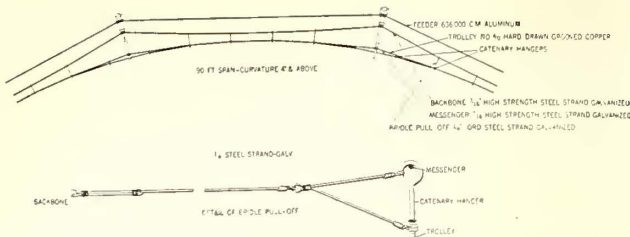
13,200-volt high-tension line being carried on the same poles on parts of the system. Standard pole spacing



**CONTACT SYSTEMS—STANDARD BRACKET CONSTRUCTION
PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY**



CONTACT SYSTEMS—SINGLE-TRACK CURVE CATENARY CONSTRUCTION, WITH 13,200-VOLT TRANSMISSION LINE, ON PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY

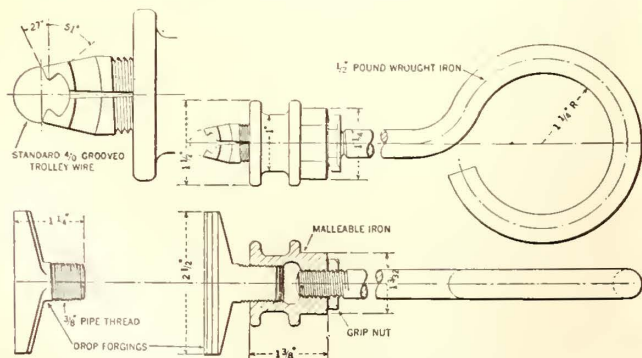


CONTACT SYSTEMS—STANDARD PULL-OFF CONSTRUCTION PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY

on tangents is 150 ft., but the average rate of distribution of poles is fifty-four to the mile, there being 25 per cent of the main line mileage in curved track. The standard pole length for catenary construction is 35 ft. and for transmission and catenary 40 ft. These poles cost at the hole as follows: 35 ft., \$6.90; 40 ft., \$7.50; 45 ft., \$8.25; 50 ft., \$8.85, and 55 ft., \$9.60, the lengths greater than standard being used for telephone and telegraph line crossings, etc. All poles were given two brush treatments with carbolinum avenarius from a point 18 in. above the ground to within 3 ft. of the butt. The preservative was applied by means of burlap fastened to the ends of long mop handles, and it was kept hot by steam coils placed at the bottom of the shallow tank over which the poles were rolled. Approximately 1 gal. of preservative, including losses, was used per pole.

The catenary hanger used was of the loop type. As roller pantographs were used, great flexibility of the contact system was necessary, especially on curves. On the latter a pull-off construction like that shown in an accompanying illustration was used.

Basing the annual cost of maintenance on the experience from Oct. 1, 1914, to March 31, 1915, when the contact system was almost new, the values are: For material, \$804; for labor, \$7,320, a total of \$8,124, or \$78.11 per mile per year. The maintenance crew consisted of one foreman, three linemen and four groundmen. In addition to maintaining the contact system this crew handled all repairs to the 13,200-volt transmission lines and 2 1/2 miles of 60,000-volt transmission lines. Gasoline section motor-cars, equipped with towers are used for maintenance. On the electrified section the average train-miles per day are 1460, motor-car-miles per day, 3041, and trail-car-miles per day, 560. The weight of the motor-car is 53 tons, that of the trail car 35 tons and the schedule speed is 20 m.p.h. The average running current per motor-car is 200 amp. The cost of maintaining the roller collectors, which are now equipped with roller bearings, is about 40 cents per 1000 motor-car-miles. The collectors are made of 5-in. steel tubing and they are operated at a pressure of from 30 to 35 lb. against the wire. The mileage per collector has been about 9700, but this



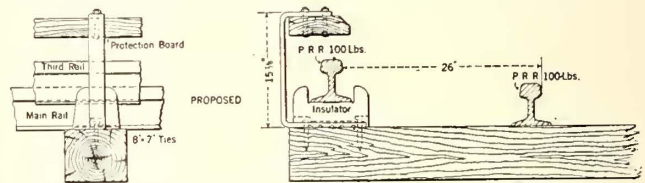
CONTACT SYSTEMS—STANDARD CATENARY HANGER PORTLAND DIVISION, SOUTHERN PACIFIC COMPANY

record was lower than it should have been because a defective quality of tubing was originally furnished. The wear on the trolley to date has been inappreciable.

THIRD RAIL AND TROLLEY SYSTEM OF THE WEST JERSEY & SEASHORE RAILROAD

J. V. B. Duer, assistant engineer Pennsylvania Railroad, Altoona, Pa., gave construction and operating data regarding this property in addition to those already available. The system has a total of 131.7 miles of third-rail track and nearly 20 miles of trolley track, about a mile of the latter overlapping the third-rail. Substations are 10 miles apart and no third-rail feeders are used. The substation bus voltage is 700. Trains of from two to seven cars are operated between Camden and Atlantic City.

The third-rail insulators are of reconstructed granite or porcelain and are held in position by a metal centering cup which is secured to the ties by means of lag screws. The rail rests upon the insulator and is not clamped thereto. The insulators are placed on



CONTACT SYSTEMS—PRESENT THIRD-RAIL CONSTRUCTION WEST JERSEY & SEASHORE RAILROAD

ties 9 ft. 4 in. long, spaced approximately 8 ft. apart. This type of insulator, shown in an accompanying illustration, has been adopted on account of a change in the method of supporting the top protection board.

Originally the third-rail was equipped with protection only at stations, 75 ft. on either side of road crossings, and in terminal yards. This protection consisted of side and top boards carried from castings attached to the rails by hook bolts. Maple posts were attached to the bottom castings by bolts and supported top castings carrying the top protection boards. During the early part of 1912 top protection was added to all unprotected rails using the plan already mentioned. The boards were treated with two coats of hot creosote, and contiguous boards were joined by means of wrought-iron plates.

The original cost of construction of this line was as follows: For the 131.73 miles of third-rail, including the rail, bonding, insulators, protection, etc., \$557,636, or \$4,235 per mile; for the 19.56 miles of trolley, including wires, poles, line material, lightning arresters, etc., \$80,500, or \$4,120 per mile. The track bonding of 151.29 miles cost \$102,659, or \$678.50 per mile.

Shortly after the third-rail was placed in service it began to creep in the direction of traffic, with constant



CONTACT SYSTEMS—STANDARD THIRD-RAIL APPROACH WEST JERSEY & SEASHORE RAILROAD

damage to insulators. To overcome the difficulty the third-rail was anchored to the ties at intervals of from 1000 ft. to 1500 ft. and the practice of periodically loosening the splice bars and oiling the joints was instituted.

Although sleet-cutting shoes were used on the cars during certain seasons, with a provision for applying extra tension of from 90 lb. to 100 lb. to the shoes, considerable delay was occasioned by sleet. This has been minimized by the use of calcium chloride supplied from tanks and distributed hot on the rail. These tanks were hauled over the road by steam locomotives when sleet began to form, with good results. The addition of the top protection to the rail prevented sleet formation except when a driving wind accompanied the sleet-forming weather, in which event the chloride cars were used as formerly.

During seven years past the average maintenance cost per single-track mile per year has been \$490.25 for the trolley, \$81.74 for the third-rail, and \$25.84 for the track bonding, which amounts are respectively 11.9, 1.9 and 3.8 per cent of the corresponding investments.

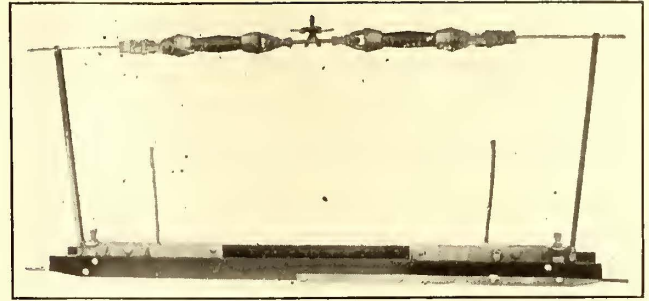
During the year 1912 the car-miles per minute of detention from various causes chargeable to the contact system were as follows: Third-rail short-circuits, 56,673; third-rail out of place, 1,161,809; third-rail protection out of place, 232,362; sleet on third-rail, 11,885, and trolley-wire trouble, 17,085.

CONTACT SYSTEM OF THE BUTTE, ANACONDA & PACIFIC RAILWAY

In an elaborate paper J. B. Cox, railway engineering department General Electric Company, described many of the special problems of the design of the rollers and overhead construction for this electrification. Overhead construction was used because approximately 60 per cent of the electrified tracks consist of yard trackage and sidings with numerous switches and street crossings.

The roller used consisted of a Shelby steel tube 5 in. in diameter, 24 in. long and $\frac{1}{8}$ in. thick when turned. Removable bearing housings of aluminum metal were fitted into each end of the tube, each carrying two bronze sleeve bearings. The complete roller revolved about a $\frac{5}{8}$ -in. steel shaft fixed at each end by clamps to the pantograph frame. The complete roller weighed about 31 lb. As this weight was much greater than that of the contact element of a sliding pantograph, it was decided not to attempt to make the contact device respond to inequalities due to hard or uneven spots in the trolley wire but to remove such spots. After experience with the operation of this roller it was modified by installing Hyatt roller bearings, which have proved very satisfactory. Early troubles in keeping the roller on the trolley wire have been overcome by the installation of improved wearing or guide plates.

In producing a flexible trolley wire a new hanger was devised. It was made up of $\frac{5}{8}$ -in. x $\frac{1}{8}$ -in. flat strap, with a malleable-iron ear secured by a $\frac{1}{2}$ -in. x $1\frac{1}{2}$ -in. carriage bolt. The upper end was looped over the messenger wire, giving a flexible support. The jaws were designed to permit the operation of a trolley wheel should such be desired. A special pull-off was also designed by means of which the messenger and trolley wires were held in position by separate clamps, from each of which ran an individual pull-off wire with a strut between the two, maintaining the pull parallel to the horizontal plane of the trolley wire and allowing a free vertical movement independent of the messenger. The single pull-off of the type described was found superior to a double pull-off or a rigid pull-off, although these were used in some cases. It was found unneces-

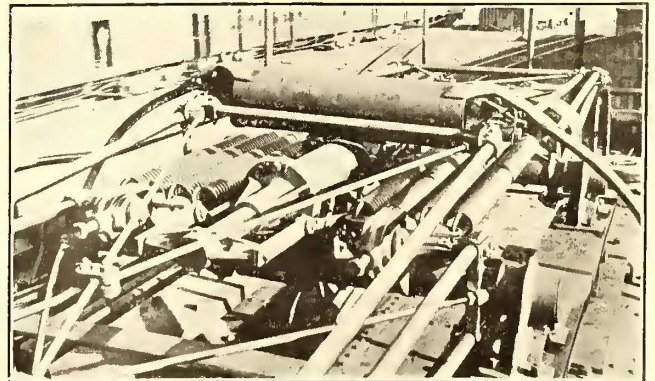


CONTACT SYSTEMS—SECTION INSULATOR FOR PANTOGRAPH COLLECTOR, WITH ATTACHMENT TO SPAN WIRE

sary to use deflectors such as are generally required with pantographs. Instead, the trolley and messenger wires which were intended to follow a switching track were started several feet ahead of the switch from a point convenient for dead ending, and several inches above the horizontal plane of the through wires, and gradually brought down to that plane a short distance ahead of the switching point where they were gradually carried away following over the switching track. Air-section insulation was used where practicable, the ends of the wires of each section being made to overlap the length of a pole spacing, the two sets of wires being carried in approximately the same horizontal plane and about 12 in. apart for a few feet in the middle of the span, from which point the dead ends of the trolley wire were gradually carried above the path of the collector to the anchorage.

At street railway crossings two wooden section insulators were connected in the 2400-volt line about 75 ft. apart with a protecting zone between. The railroad tracks cross street railway tracks at six points, four of which are at street level in Butte. Two in Anaconda are not at street crossings and here the street railway company coasts its cars over the crossings. At two crossings in Butte watchmen employed to operate gates manipulate the switches which are interlocked with the gates. Special commutating switches were provided to overcome arcing difficulties.

The total cost of the trolley and feeder system, inclusive of bonding and all changes made necessary in the way of clearance for poles, bonding, etc., up to June 30, 1914, was slightly more than \$500,000, or for the overhead system, including feeders and bonding, \$5,514.15 per track-mile or \$13,381 per route-mile. All of the construction was done while the road was under full operation and under many conditions which tended to increase the cost above normal. Among these were: the large percentage of curves and special work, the high price of all labor, interference of foreign wires, changes



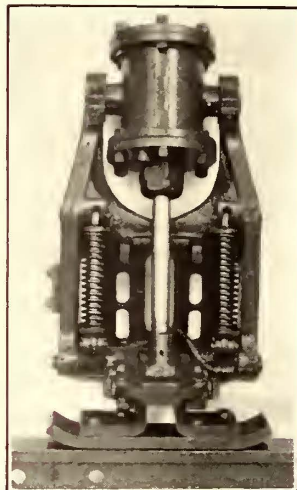
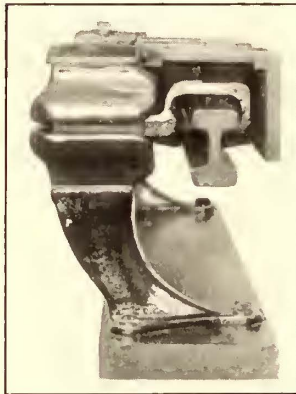
CONTACT SYSTEMS—ROLLER PANTOGRAPH MOUNTING WITH IMPROVED WEARING PLATES

in location of tracks, walkways, platforms, buildings, trestles, bridges, etc., extra-heavy foreign traffic on the main line, strike of electrical wiremen, cold weather, variation of ground condition, number of street railway crossings, etc. Seldom would there be found more complications than in this case.

Repair work on the 2400-volt trolley line is done from an ordinary wooden work car without special insulation with full voltage on the line and there have been no serious cases of shock to linemen.

The cost of maintaining the distribution system from October, 1913, to March, 1915, inclusive, has been slightly under \$15,000. This is at the rate of \$9,930.46 per year or \$109.13 per mile per year. The paper gives full details of maintenance costs. Measurements have been recently made to determine the rate of wear of the trolley wire, the original diameter of which was supposed to average about 0.482 in. With due allowance for the change in the form of the wire as it wears, and from the fact that the measurements show an average of 3041 pantograph passages per 0.001 in. wear, the wire can be expected to last twenty-two years.

The difficulties with the contact roller have not been greater than were expected. At first



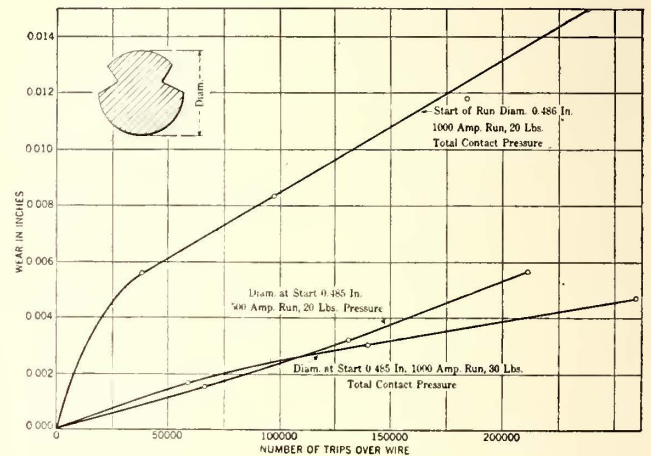
CONTACT SYSTEMS—HIGH-TENSION THIRD-RAIL ON EXPERIMENTAL LINE IN ERIE. AIR-OPERATED THIRD-RAIL COLLECTOR FOR HIGH VOLTAGE LINE IN MIDDLE WEST

sticking in the bearings occurred due to imperfect alignment of clamping jaws, loosening of the caps in the bearing head, collection of ice between the roller and the support, etc. These were overcome by simple expedients, including the adoption of roller bearings already mentioned. From results so far obtained the average mileage per tube is about 11,030. The average mileage with roller bearings is about 16,000, an increase of 35 per cent. The average cost of maintaining the original pantographs with three bearings was about \$185 per month, or \$3.20 per thousand locomotive-miles. The present corresponding cost is about \$35 per month, or \$0.62 per thousand locomotive-miles. At first a wooden lining was pressed inside the roller, but this was found unnecessary and is now omitted.

Measurements made to ascertain voltage drop and energy consumption show the maximum voltage drop to be 14.5 per cent, the average being 5.6 per cent. In the Smelter Hill service, with an average train weight of 1633 tons and a schedule speed of 15½ m.p.h., at an average voltage of 2293, the average power consumption was 1398 kw., and the current 767 amp., while the unit energy consumption was 55 watt-hours per ton-mile. From Rocker to East Anaconda, with a schedule speed of 20.1 m.p.h., the average was 13.73 watt-hours per ton-mile.

CONTACT CONDUCTORS AND COLLECTORS FOR ELECTRIC RAILWAYS

The problem of current collection as a whole and the essential factors in successful operation were discussed by C. J. Hixson, railway engineering department General Electric Company. He called attention to the fact that the A. I. E. E., when defining standards for electric railways, subdivides distributing systems into two classes—contact rails and trolley wires. He followed the same subdivision in contact devices, namely, contact rail collectors and trolley wire collectors. Similarly,



CONTACT SYSTEMS—WIRE WEAR WITH SLIDING CONTACT CURRENT COLLECTION

rail collectors were subdivided into: third-rail shoes, overhead shoes, center shoes, and underground shoes. Trolley-wire collectors were classified as wheel trolleys, roller trolleys, and slider trolleys. The frames supporting the collecting mechanism may be pole, bow, or pantograph. The term "pantograph trolley" is not definite, since it designates a form of frame common to all three types of trolley wire collectors.

Contact-rail systems possess great reliability and involve low maintenance cost. They are particularly adapted for elevated and subway work, especially where it is necessary to change quickly from one to the other. High collecting capacity and space considerations are also in their favor. The high initial cost, danger to life, difficulties from sleet and snow, and complications in yards have been among the factors preventing their wide application to interurban and steam road service. Inverting the rail and using an under-running shoe have overcome sleet and snow difficulties with some increase in cost. A 2400-volt third-rail is operative and its use permissible under some conditions.

Contact-wire systems are of two types, direct suspension and messenger or catenary suspension. The



CONTACT SYSTEMS—1200-VOLT SUSPENSION WITH PORCELAIN INSULATION

direct suspension is suitable for low speeds and moderate amounts of power and, with the contact wire insulated by suspensions of molded insulation or other suitable material, gives good service. Giant strain insulators are in many cases connected in the span wires. The wood pole is undoubtedly responsible for much of the success of direct suspension. The use of wood for poles and insulators is gradually decreasing and porcelain is being adopted for strain and suspension insulators. Direct suspension is cheap and has performed useful service in keeping down initial investments, but with increasing speed and capacity requirements a more flexible form of construction is needed.

With messenger suspension the effect of the messenger wire is of great assistance in increasing the

quency of steady braces against action of the wind.

Construction at tunnels and bridges both as regards insulation and collection.

The necessity for uniformity in the safety factors allowed in different parts of the country.

The best method of arranging "ticklers" for warning the brakeman of approaching bridges or tunnels upon electrified lines.

In regard to the problems which might be discussed in connection with trolleys might be mentioned:

The desirability of the air-locked vs. the air-raised type.

Height of the trolley wire.

Width of contact strips.

Shape of horn.

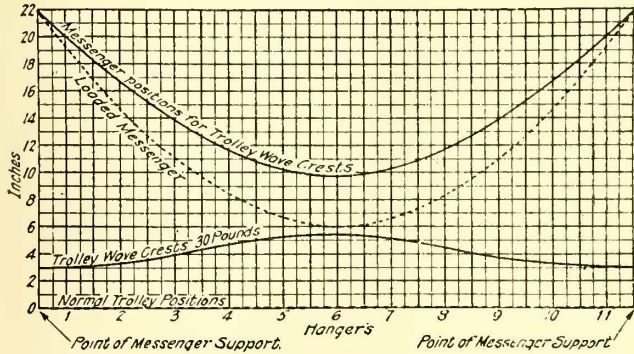
Clearance allowances between trolley and permanent way.

DISCUSSION ON CONTACT SYSTEMS

In the discussion of the topics covered in the papers and in connection with the presentation of the papers by the authors many valuable additional points were brought out. Mr. Duer said that on the West Jersey & Seashore Railroad reconstructed granite insulators are being used to replace worn-out porcelain ones. One reason for the selection of the same rail section for the contact rail as for the main rail was to give facility in making track repairs. He called attention to the independence of the new protection which he described from the contact rail, insuring non-interference with creepage, expansion, and contraction. Insulated anchors had been tried in an endeavor to prevent creepage, but they were the source of fires, and their use was abandoned in favor of oiling the angle plates. Stranded bonds have been substituted for ribbon bonds to give increased flexibility, although Mr. Duer thought that the latter might be satisfactory with very well ballasted track. The bond testing is done in a preliminary way by men equipped with contact points in their shoes connected to an indicating instrument. These men mark bad bonds for further and more accurate test. In reply to questions regarding the chloride treatment of steel he said that the specific gravity of the solution is 1.2 and that the solution is spread by means of special shoes. An overrunning conductor rail should be wide and low for stability, but raised on high insulators to protect the latter from stray ballast. Careful attention should be given to side and end approaches, as the shoes on high-speed cars are apt to be thrown against the protection boards at these points. On the West Jersey & Seashore Railroad end protection boards have to be renewed annually on account of the wear due to contact shoes. Metal sheathed side approaches were used on the Pennsylvania Railroad New York terminal.

Mr. Cox stated that on the Butte, Anaconda & Pacific electrification the safety of people who could not be kept away from the tracks was an important factor in the choice of an overhead contact system. In the paper no detention records were given because detentions had been negligible. While the dispatcher notes detentions on his record sheet they have not been important enough to warrant tabulation. Most of the troubles with the rollers at first were due to their not rolling.

Mr. Hixson said that he had felt the necessity of obtaining a comprehensive grasp of the whole subject of contact systems, and the purpose of his paper was to summarize the situation. The measurements described were the result of an effort systematically to improve operating conditions. He emphasized the im-



CONTACT SYSTEMS—TROLLEY WAVE CREST CURVE AND POSITIONS OF MESSENGER

height of the wave produced by the passage of the collector. The crest of this wave is over the collector and the height depends upon the elasticity at that point. If the hanger is designed to permit a free further upward movement of the trolley additional flexibility is secured.

Mr. Hixson gave the results of measurements made to determine the upward deflection of the trolley wire under different conditions of support and pressure. Typical results are shown in the accompanying diagrams. He also gave a pair of characteristic pantograph curves showing the relation of roller pressure to roller position, and other curves of importance in current collection under heavy traction conditions. He concluded by listing the following as topics worthy of discussion in this connection:

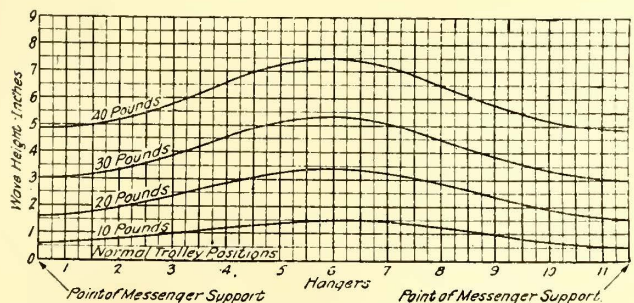
The use of deflectors or other devices at sidings.

The best method of section insulation.

Convenient means for taking up slack at anchorage vs. automatic take-up devices in conjunction with the introduction, artificially, of elasticity into the line.

Elimination of splicing sleeves, particularly of the soldered type.

The necessity for staggering the trolley wire and fre-



CONTACT SYSTEMS—TROLLEY WAVE CREST CURVES FOR DIFFERENT PRESSURES

portance of the flexibility of the messenger wire in absorbing waves as indicated by the hanger loop, which is lifted less at the center of the span than at the points of support. The pull-off presents the most difficult problems in overhead design and in choosing a method of support the designer must decide as to the influence to be allowed special construction, such as that on curves, in determining the plan to be followed.

G. H. Hill, engineer railway engineering department, summarized briefly a contribution to be published later in the proceedings. He stated that the costs of third-rail and trolley construction are about equal. The former is necessary with low-voltage heavy traction, but the general tendency is toward overhead construction. The lubrication of overhead pantograph shoes is a very important matter and can be accomplished readily, one plan being to use an inverted pressed-steel pan, shod with copper strips and with a central groove for storage of lubricant. The lubricant consists of graphite grease. This forms a film on the contact wire and incidentally prevents sleet accumulation. Adding lubricant does not interfere with current collection for the contact electrical resistance is actually lowered. Taking up the important subject of inductive voltage rises in overhead wires and in third-rail, Mr. Hill stated that there is a considerable rise and that this is about the same in the two. While the inductance of the rail is greater this produces a time lag which keeps down the voltage. The energy discharge is, of course, much greater from the rail. The peak voltage may be double the operating voltage.

H. M. Hobart, consulting engineer General Electric Company, described a novel form of third-rail construction being installed on the 1200-volt electrification in England between Manchester and Bury. This will be open for traffic in a few months. The rail is of the side-bearing type of channel section, protected all around with the exception of a top slot to admit the flat, hinged collector shoe. The rail with its protecting boards rests loosely in a slot on the top of the insulator and the protecting boards are held in place by means of steel spring clips and wooden wedges. Additional details of this installation will be given in an early issue of the *ELECTRIC RAILWAY JOURNAL*. The rail is the invention of J. A. F. Aspinall, general manager Lancashire & Yorkshire Railway. Mr. Aspinall is essentially a steam railroad man who appreciates the possibilities of electricity as a motive power. The installation is attracting much attention in Great Britain.

In reply to a query Mr. Zogbaum stated that wood insulators are generally used between tracks on the New Haven system with good results. They are thoroughly cleaned every three years. Prof. D. D. Ewing wanted to know if the maintenance cost of running rails is increased by the presence of the third-rail, and Mr. Duer said he would furnish data on that subject.

Prof. D. C. Jackson, Massachusetts Institute of Technology, chairman of the railway committee in charge of the program of the railway session, closed the discussion by referring to some research work which Dr. A. E. Kennelly, Harvard University, and he had under way relating to skin effect in rail conductors. This promises interesting results which will bear upon the subject of inductive effects in third-rail.

The session closed with an expression of its unique character and of the great value of the cost data contributed, such data being as a rule almost inaccessible.

A recent disastrous wreck in England was caused by the entry of an express train into a block where a local train was standing, an improper clear signal having been given by the manual-block operator.

A. S. T. M. Specifications for Trolley Wire

Committee on Copper Wire Outlines Reasons for Failure to Agree with American Electric Railway Engineering Association

At the eighteenth annual meeting of the American Society for Testing Materials, held in Atlantic City on June 22-26, the report of most importance to electric railways was that on copper wire specifications. In this the differences between the A. S. T. M. committee and the committee on power distribution of the American Electrical Railway Engineering Association were outlined as follows, the A. S. T. M. committee being referred to as Committee B-1 and the A. E. R. E. A. committee as the Power Committee:

"In the last two reports of the committee, reference has been made to work undertaken in conjunction with a sub-committee of the Power Committee of the American Electric Railway Engineering Association, with a view to the formulation of specifications for trolley wire, which might be adopted as the standard by both societies. Specifications were tentatively proposed by the A. E. R. E. A. sub-committee, which were reluctantly accepted by the sub-committee of Committee B-1. But Committee B-1 could not agree to these specifications, which in some important respects were different from our standard specifications, and radically at variance with definitely expressed opinions of the committee. Therefore, in 1914, Committee B-1 reported postponement of final action on these proposed specifications, and began to collect data and opinions from a number of large electric railways using trolley wire, on their practice with respect to specifications, and the necessary requirements for such wire. This canvass showed that a considerable majority of those roads buying under specifications had already adopted substantially the requirements of the standard specifications of this society. Many large purchasers were using no specifications, while others were buying a high-strength alloy wire instead of copper. In the meantime the Power Committee had presented to the American Electric Railway Engineering Association at its annual meeting, the proposed specifications which have been adopted.

"Finally at a meeting of Committee B-1, with nine of the eleven members present, it was unanimously voted that Committee B-1 recommend no change in the present standard specifications for hard-drawn copper wire in so far as they apply to trolley wire.

"For the information of the society, the committee makes this brief statement of the two points of difference between themselves and the Power Committee of the A. E. R. E. A.: (1) The Power Committee was of the opinion that trolley wire should not be hard drawn but should, in effect, be somewhat less than hard drawn, that is, more nearly what is defined as medium hard drawn; yet the values for strength proposed were, for minimum values, substantially those of our standard specifications for hard-drawn copper wire. (2) The Power Committee, after long consideration and after many tests had been made, appeared to agree that the twist test, upon the inclusion of which it was insistent, could only safely be applied qualitatively; yet the committee insisted upon specifying a definite minimum number of twists.

"To neither of these points could Committee B-1 agree. The first was considered inconsistent. The second the committee felt was adequately covered in the specifications as offered for amendment later in this report, namely, by the requirement that the wire shall be free from imperfections not consistent with best commercial practice. In the opinion of Committee B-1,

other tests than the twist test may be preferred for the inspection of wire, and the committee sees no reason to make arbitrary choice among them."

The report went on to say also that as a result of the canvass of the practice of electric railways, Committee B-1 was convinced of the desirability of offering specifications for high-strength alloy trolley wire, and tentative specifications for this material were appended to the report. These provided for bronze wire of 40 per cent conductivity and approximately 70,000-lb. tensile strength and from 2.25 per cent to 3 per cent elongation in 10 in.; also for bronze wire of 65 per cent conductivity, about 60,000-lb. tensile strength and the same elongation, which depended on the size of the wire.

Tentative specifications for bare concentric-lay copper cable, hard, medium-hard or soft, were also submitted and both of these were ordered printed in the association's year book. Minor changes in the previously-mentioned specifications for hard-drawn copper wire were referred to letter ballot.

Mandatory Rules *

BY F. M. METCALFE, SPECIAL REPRESENTATIVE FIRST VICE-PRESIDENT OF THE NORTHERN PACIFIC RAILWAY

The railroad workman of to-day is no longer an automaton. He has developed into a reasoning being. This has created new economic conditions and demands progressive methods.

The rules by which we are governed in our railroad work have been amended and amplified from time to time, as our business has increased, and have become more progressive and complex. To-day they are the product of the minds of our ablest and most experienced railway operators, formulated after much study and discussion and presented as the acme of good practice. The standard transportation rules are largely mandatory. They tell men what they must or should do. But by the frequent and continued infraction of these rules, despite disciplinary action, railroad managers now realize that education and persuasion must substitute coercion and compulsion, as is illustrated by their vast annual expenditures for increased supervision.

My belief is that mandatory rules do not materially prevent accidents but that organized effort and the persuasive use of safety devices and methods are the means which should be substituted.

Transportation by Fadgl Auto-Train at San Francisco Exposition

The Fadgl Auto Train, Inc., has been carrying approximately one-fourth of all Panama-Pacific Exposition visitors in eighteen three-car trains of sixty-six seating capacity or 105 total capacity per train. The longest run one way is 1½ miles and the shortest is ¾ mile. The initial fare is either 5 or 10 cents, according to the character of the run. Zone-fare additions of 5 cents each are charged when passengers make partial or complete circuits.

On Feb. 20, the opening day, fifteen two-car trains and one one-car train carried \$3,246.95 of business. Up to June 1 about 1,250,000 passengers were carried, but it is expected that heavy summer business will bring the total for the year in excess of 4,000,000. The number of fares during four days of June averaged 15,150 a day.

All fare collections during this period were handled with Rooke registers.

Medical and Claim Departments *

BY J. H. HANDLON, CLAIM AGENT UNITED RAILROADS OF SAN FRANCISCO

The relationship existing between the medical departments and the claim departments of rail transportation companies varies to such an extent that there is no general uniformity of co-operation. Some companies do not maintain a salaried medical staff but secure the services of outside surgeons when necessary. Others, particularly street railway companies, designate resident surgeons to examine the injuries in their several districts and report on a fee basis to the salaried chief surgeon of the company. These district surgeons also render emergency treatment. Many steam railroads and interurban and suburban electric railways adopt a similar plan on account of the convenience of having a surgeon representing the company promptly at the scene of the accident.

Some companies maintain a salaried medical staff, which, if possible, renders immediate and continuous surgical and medical attention at the sole expense of the company and without respect to the question of liability. Still others employ a salaried emergency surgeon who is always on duty, ready to make an immediate examination of personal injury cases and treat such cases, if necessary.

It is the practice of the United Railroads of San Francisco to request an early examination of all injured persons by one of its salaried medical staff, regardless of whether a claim has been filed or such action is intended. Medical attention and hospital accommodations are offered only in cases where the company's liability is clearly established. Emergency treatment is usually rendered by the city emergency hospital surgeons or surgeons residing or having their office near the scene of the accident. A fee of \$10 is allowed by the company to practising surgeons whose services are sought in an emergency by an employee.

Wherever feasible (local conditions always governing) the services of the medical department are more effective if it is composed of surgeons who are on the payroll and devote almost all of their time to company business. It is true that surgeons who are occasionally employed on a fee basis are not so likely to have their testimony attacked as prejudiced and biased, but unscrupulous attorneys often attack the reliability of such witnesses, particularly if they have testified on several occasions in behalf of the defendant corporation.

The surgeon whose time is devoted almost exclusively to the company becomes a specialist in personal injury cases. He is aware of the dependence placed upon him by the claim agent in reporting as accurately as possible the extent and length of disability, and he is alive to the advantage of employing simple and unsuspected tests of the claimant's veracity and physical ability. He is able to judge the monetary value of a claim and the reasonableness of charges for surgical services. If he is tactful and considerate in his behavior toward a claimant, he can influence him to deal directly with the company. It is highly important, however, that he should not make an intentional misstatement of the extent of the injury to an injured person with a view of minimizing the injuries and so enabling the claim agent to effect an unjust settlement. Neither should he resort to any similar deception, for the courts have held that a release secured through such fraudulent methods is voidable. An error in diagnosis is excusable in the eyes of the law.

*Abstract of paper presented at annual meeting of Pacific Claim Agents' Association, San Francisco, June 24-26.

*Abstract of paper presented at annual meeting of Pacific Claim Agents' Association, San Francisco, June 24-26.

COMMUNICATIONS

Flange-Bearing Special Work

METROPOLITAN STREET RAILWAY COMPANY

KANSAS CITY, MO., June 25, 1915.

To the Editors:

Concerning the question of flange-bearing special work, the following is my experience in Kansas City: In order to avoid noisy special work and the hard blows incident to the use of very abrupt rises in the flangeway, the writer adopted flange-bearing work with long approaches about four years ago. Experience with this type of work since that time has fully justified the change.

The principal problem to solve in connection with the flange bearings was the lengths of the inclined approaches to the intersections. It was impossible to get the desired results with the small manganese inserts that were in use a few years ago. Moreover, the best results cannot be obtained with the largest practicable plates used to-day except in those in very acute angle intersections. If it is practicable, the length of the approach from the point where the flange begins to take a bearing to where it is raised to its greatest height should not be less than 18 in. In order to secure approaches of this length we built some special work of carbon rails bolted together with the manganese fillers forming the flangeway floors. Similar construction with a bar of manganese inserted in a rolled filler in the bottom of the flangeway was adopted, and both types of work have given most excellent service. Later, crossings were assembled as bolted work, using high carbon rail in the bottom of the flangeways. This has given results as good as, if not better than, were obtained from that with the manganese in the bottom of the flangeway.

In all of these types of work, when the flangeway is worn down so that the wheels have a tread bearing, it is practicable to grind down the head of the rail and thereby secure a true flange bearing again. Our later work, some of which has been ordered in the solid manganese steel, provides for a flange bearing with 18-in. approaches. A feature found undesirable in our first flange-bearing crossings was the raising and lowering of the wheels over each flangeway intersection. To avoid this, it has been our practice, and it has proved entirely satisfactory, to raise our wheels upon the flange as they approach the first intersecting flangeway and continue the shallow depth through the crossing. This has been done in right-angle crossings and the wheels are carried upon their flanges entirely through the crossing or series of crossings as the case may be.

The only argument that the writer has ever encountered in recommending shallow flangeways has been that they might be the cause of chipped or broken wheel flanges. Curiously, these arguments have never been advanced by men connected with the mechanical departments or by the manufacturers furnishing wheels under contract. In fact, discussions with them of the effect of this practice has indicated that the adoption of the full flange bearing makes an easier riding car, reduces the shock to the equipment and causes less damage to flanges than the non-flange-bearing intersection, or one with a shallow groove only at the intersecting flangeways. Some manufacturers of cast-iron wheels have advocated a change in the contour of wheel flanges to give a wider bearing on the bottom of the flangeway than that given by the standard wheels. This change was only presented as a theory and has never been tried out.

As noted in some of the other communications, the

flange-bearing idea is an old one; in fact, it is so old that testimony in regard to the matter twenty years ago indicated that it was an obsolete practice. On the other hand, no doubt, the adoption of long approaches, giving a slight angle of impact at the point where the wheel flanges strike the bottom of the flangeway, has again made this practice useful and satisfactory. In conclusion I will say that there have been installed in Kansas City some thirty or forty crossings, built with flange bearings, and also a large number of frogs of various angles, and our experience with all of this work has fully justified our continuing its use.

A. E. HARVEY, Chief Engineer.

The Jitney and the Small Car

THE SOUTHWESTERN ELECTRICAL & GAS ASSOCIATION

DALLAS, TEX., June 29, 1915.

To the Editors:

I have been very much interested in the communication on "Jitneys vs. Light Cars" by Mr. Wilson of Mobile, Ala., in your issue of June 26.

Mr. Wilson is absolutely right in the first portion of his communication with regard to the profitable advantage of more frequent operation of cars or, to put it in another form, of more rapid service. The writer has proved this fact in times past in several small cities where the business section was only a comparatively few blocks from the residence section. He has taken non-paying properties and made them pay, largely by giving a more frequent, more rapid and a perfectly regular and dependable service, and the frequency of the service has been the main point of success. The instance which Mr. Wilson gives of the city where the revenue of the street car company had been reduced \$1,000 per day by something over 350 jitneys, gives a case in point. In the five months during which the jitney has been in active operation, the revenue of this company has been reduced \$150,000. Even allowing 33 1/3 per cent of this due to the hard times, the remainder, \$100,000, if applied to the purchase or hire of small cars and their operation on a much shorter schedule on the lines peculiarly afflicted by the jitney, would have saved them a considerable portion of this loss, would have discouraged the jitney, would have had a strong moral effect on the public and, I fully believe, the balance sheet at the end of the year, under the above suggested operation, would have shown a profit instead of a loss.

One of the lessons that the street railways, and in some instances the shorter interurbans, must take to heart from the jitney experience is the desire of the public to "get there" in the shortest possible time and to keep moving while it is getting there. While the public does not like overcrowded cars and prefers sitting down to hanging to a strap, it will, as between the two evils, accept the discomfort rather than the delay, in nine cases out of ten. This applies particularly to the rush hours. The intermediate light traffic hours of shopping, visiting and pleasure automatically provide seats and prevent overcrowding, by reason of the lessened traffic, and at such times a slightly longer wait for the car is not liable to cause complaint or lessen traffic to any great extent. But during rush hours, especially during the business rush hours at morning, noon and night, the ability to get to business or to get home with a minimum of waiting time is the overpowering desire of a majority of those who travel in public conveyances.

In large cities the "skip stop" has been introduced with success, simply to accomplish the end of a more frequent service, and enormously expensive terminals

and loops in city centers have been built, not especially for the end of greater convenience, comfort and safety in handling the traffic, but that the final end of greater dispatch in the vital matter of getting the passenger to his destination without unnecessary delay might be accomplished.

It is true that the abandonment of the large cars may mean a tremendous loss to a great many railway properties, necessitating as it will the virtual scrapping of cars and equipment, the purchase of smaller and lighter cars and the employment of more trainmen, but the handwriting is on the wall that the public will have more frequent service, even if it has to patronize the jitney or its equivalent and put up with its discomfort, inconvenience and danger. When the street railways make it more convenient and more pleasant to ride than to wait or walk, then and then only will street railways obtain all the traffic that is possible, and at that time only will they put themselves in a position where they will not be open to some character of destructive competition such as the jitney.

Outside of this is the matter of public policy which affects the street railways not only directly in their car receipts but indirectly in unfavorable and onerous franchises and taxes and in inequitable accident damage verdicts. As I have said in a previous article, the best three assets of a public utility are "satisfied customers, a pleased public and contented employees." Satisfied customers tend to make a pleased public, and a pleased public helps to make and maintain contented employees. There are yet some few public utilities who argue that it is impossible to "satisfy the public," and where there is this opinion in a public utility there is always a manifestation of it in the service which that utility gives. The jitney has awakened the public to the fact that it needs—and can have if necessary—a more frequent service, which means a lessened wait for the conveyance and, as a rule, a higher rate of speed, or, at any rate, a lessened interval between the starting point and the terminus of the desired trip. If the street car company is wise it will imitate this feature of the jitney as fully as is possible. It may not be able to give as frequent a service as does the crowded line of jitneys; this the public will not ask, for the reason that this effect of the jitney carries the compensating disadvantages of irregularity of schedule and service and also a limited zone of service.

There is one point, however, in Mr. Wilson's communication to which little attention seems to have been paid and which is a basic weakness of the jitney, whether in small or large size. Events within the last few years have proved that no unit vehicle generating its own power can compare in efficiency of operation and maintenance with the central-station-fed vehicle. One of the claims of the jitney as against the street car has been that the jitney was an independent, self-contained and self-operating, trackless vehicle and that therefore the failure of one jitney did not cause the stoppage or delay of other jitneys nor was it possible for any physical cause connected with the vehicles to compel the total cessation of operation of all the jitneys in any one community. It was emphasized that the break-down of a street car greatly delayed the handling of the cars following, that the break-down of trolley lines stopped the operation of all cars on those lines, and that a break-down at the central point of power supply stopped the operation of every street car in the community. This is true to a certain extent, but proper inspection and maintenance of the whole system will reduce this, as it has reduced it in many electric railway systems, to a negligible minimum, and this favorable claim of the jitney is true only to the extent that

the negligence of the electric railway company allows it to happen.

Any vehicle which generates and uses its own power does so in small and therefore inefficient units, and in order to do this it must have a myriad chain of intricate and delicate parts, which not only increase greatly its first cost but also increases its maintenance costs and its probability of break-down or of an increase of inefficiency.

The machinery which actuates the central-station-fed vehicle is, so far as the vehicle itself is concerned, the acme of simplicity and is built so as to give the minimum of maintenance. In nearly every case the machinery on central-station-fed vehicles, such as the street car, is in duplicate all the way through and while a failure of any one part of its propelling machinery may possibly cause a delay, it does not often cause a total cessation of operation, such as happens when the single vital part of a self-contained vehicle breaks down.

The initial economy and efficiency of generation in large units, the present economical method of supply from central station to vehicle and the present efficient propelling apparatus on the ordinary electric car all combine to give such a total economy and efficiency as is impossible with any present vehicle that generates its own power. It must be remembered that in the matter of efficiency "what is sauce for the goose is also sauce for the gander." Any efficient method of generating power in small units on self-contained vehicles can be applied even more efficiently in larger units in a central station, and the average or relative efficiency of large and small generating units has been proved to be such as more than to cover the costs of distribution from the large generating plant to the vehicle that it supplies.

This is the fundamental weakness of the jitney, whether as a small car or as a large bus, and this will be the fundamental weakness of Mr. Wilson's proposition as to self-power-generating vehicles to be used on tracks. When the interurbans first began to parallel steam roads, the gasoline and the gasoline-electric motor cars were pushed forward as being a means by which the steam roads could maintain themselves against the inroads of the electric interurban. With very few exceptions, this type of self-generating vehicle has gone to the scrap heap, has been relegated to little, non-paying branch lines, to locations where there are peculiar local conditions favorable to its use, or has been used for other purposes than comfortable, convenient and rapid transit such as is given by the electric trolley car. On the other hand, not only have the terminals of the larger steam roads done away with the self-power-generating locomotive of all types and kinds, but on their main lines, far away from cities, they are using central-station-fed traction vehicles over long distances, and the main reason for their doing this is economy and efficiency in the operating of the vehicle or tractor. If any further proof were needed on this point, it would be in the enormous increase in the use, in cities, of what is virtually a station-fed vehicle, viz., the storage-battery vehicle, which, as a rule, has proved its economy and efficiency for heavy work over the unit self-generating vehicle, and this notwithstanding the fact that it has an intermediate loss—the battery—to which the direct station-fed vehicle is not subject.

The final failure of the jitney as a competitor of the street car will occur through inefficiency and lack of economy alone, but that final failure might have been hastened tremendously if the electric railway companies had been prompt to take to heart the lesson of the jitney, viz., more frequent and faster service to the public.

H. S. COOPER, Secretary.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

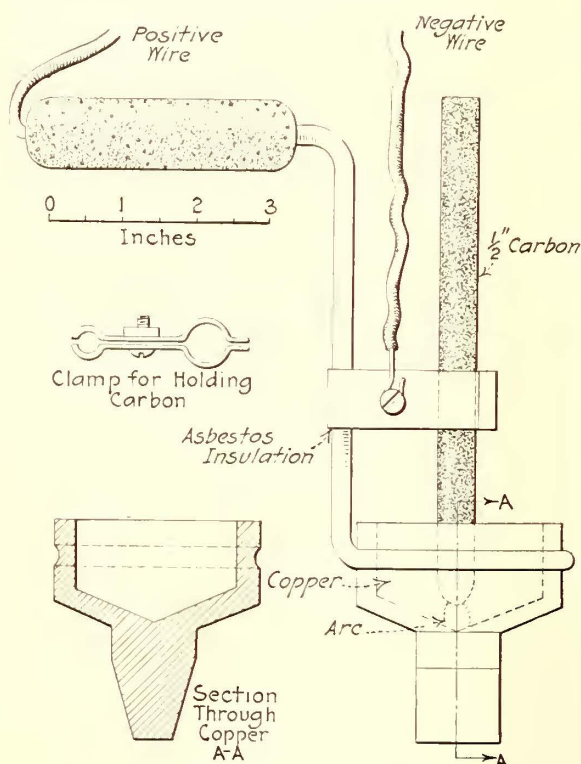
(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

A Convenient Electric Soldering Iron

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD & INTER-URBAN RAILWAY

The electric soldering iron illustrated in the accompanying drawing has been in use in the shops of the Rockford & Interurban Railway for the past year. It can be used on a 550-volt circuit and, when connected in series with an ordinary arc-headlight resistance, very good results are obtained in soldering the leads into commutators. It utilizes the heat of the electric arc in keeping the soldering tip at high temperature.

The body of the iron is made from a piece of 2½-in. round bar copper, turned to the form shown in the section. The point is planed down to ½ in. x 1 in. and is tinned like any ordinary soldering iron.



ELECTRIC SOLDERING IRON

The handle is made of ¼-in. round iron fitted in a groove turned in the body of the copper and bent in the form shown. At the upper end is a grip of wood or rubber used to protect the operator from electric shocks. An arc-light carbon, not less than ½ in. in diameter, is supported, as shown, from the handle by means of an adjustable clamp made of two pieces of flat iron held together by a small screw and nut. The clamp is insulated from the handle with sheet asbestos. It is adjusted so that it slides with sufficient ease to permit regulation of the arc length.

The lead wires are attached as indicated, one to the clamp by means of the screw and the other to the handle inside the grip. To protect the operator's eyes a washer

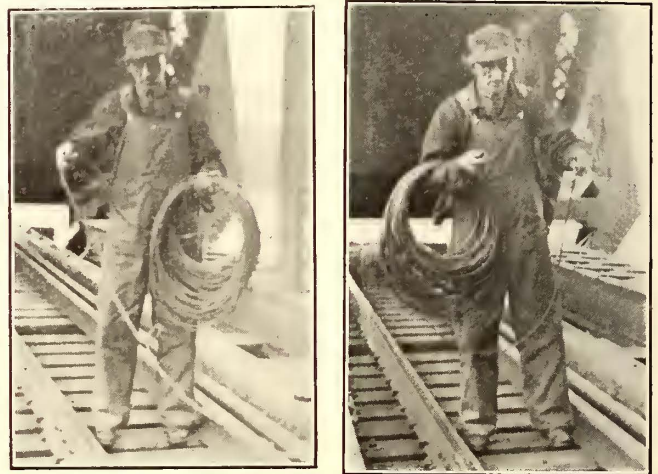
of transite is slipped over the carbon and rests on the copper. The heating of the copper can be regulated by adjusting the length of the arc.

Preventing Kinking in Handling Wire from Coils

BY J. G. KOPPEL, ELECTRICAL SUPERINTENDENT OF BRIDGES, SAULT STE. MARIE, MICH.

A recent experience with conduit wiring has impressed upon the writer the importance of careful handling of wire in conduit work. The general principles of conduit wiring are well understood, but this experience may be of interest.

The wiring in question was installed about sixteen months ago in a large new carshop, and all wires were in conduit with suitable conduit outlets for lamps and switches. Recently the new wiring began to give



ILLUSTRATIONS SHOWING INCORRECT AND CORRECT METHODS OF PAYING OUT WIRE FROM A COIL

trouble, indicated by the blowing of fuses. The substitution of larger fuses did not cure the trouble and a few days ago, when an accidental ground occurred on the trolley wire inside the carshop, some of the circuits were burned out. On removing the damaged circuits several kinks with broken insulation were found, indicating careless work on the part of the wireman in drawing in the wires.

The writer's experience has shown him that very few wiremen know how to uncoil wire by hand, that is without some mechanical device. The following simple method permits the uncoiling of wire without kinks:

Referring to the illustrations, the first one shows the ordinary method of taking off loop after loop from one side of the coil with the resulting kinks as shown. In the second illustration the wireman is taking off loops without the least tendency to kink and it will be noted that he has the coil on his right arm. He unloops two loops of wire in this position, then shifts the coil to his

left arm and pays out two more, alternating in this way until the entire coil is paid out. By this process his wire gets slight twists alternately backward and forward, the twists neutralizing each other.

Hand-Brake Pressures

BY L. W. HORNE, CHIEF ENGINEER LORD MANUFACTURING COMPANY

It will probably be admitted generally that too little attention has been given in the past to the design and installation of hand-brake rigging. Many cars even now are equipped with hand-brake rigging that does not assure uniform pressure distribution among the brakeshoes. The brake rigging of some double-truck cars is so arranged as even to afford no assurance that the brakes will be applied on more than one truck under all conditions.

The condition of unequal pressure is readily understood by reference to Figs. 1 and 2. The arrangement of hand-brake rigging shown in Fig. 1 assures the application of pressure to both front and rear trucks, as it does not embody a fixed fulcrum, the lever simply being hung in a slotted guide. Considering the brake pressure to be delivered to the forward truck, let P represent the brake pressure required in the front-truck top rod, the lower one in the figure, and X the brake pressure necessary to be exerted at the hand-brake rod at the top in the figure. Then the formula is

$$X = P \div g/h.$$

The pressure delivered to the rear truck is, of course, greater, the formula being

$$X = P \div [(g + h)/h].$$

It will be noted that the lever arm g for the forward truck becomes $g + h$ when the pressure is transmitted to the rear truck.

The method of calculating the forces transmitted by the lever system shown in Fig. 1 is sometimes puzzling. A simple diagram, however, will show the manner in which the different fulcrums are obtained. Consider that the hand-brake pull rod has moved the lever so that the brakeshoes have been brought up rigidly against the wheels of the rear truck. The truck-rod connection to the lever then becomes fixed and the lever rotates around it as a fulcrum, applying the brakes on the forward truck. The leverage then obtained is g/h . Considering the rear truck, it follows that when the brakeshoes on the forward truck have been brought up rigidly against the wheels its brake-rod connection to the lever becomes a fulcrum. The lever then rotates about this fulcrum, applying the brakes on the rear truck, and thus is obtained the leverage $(g + h)/h$.

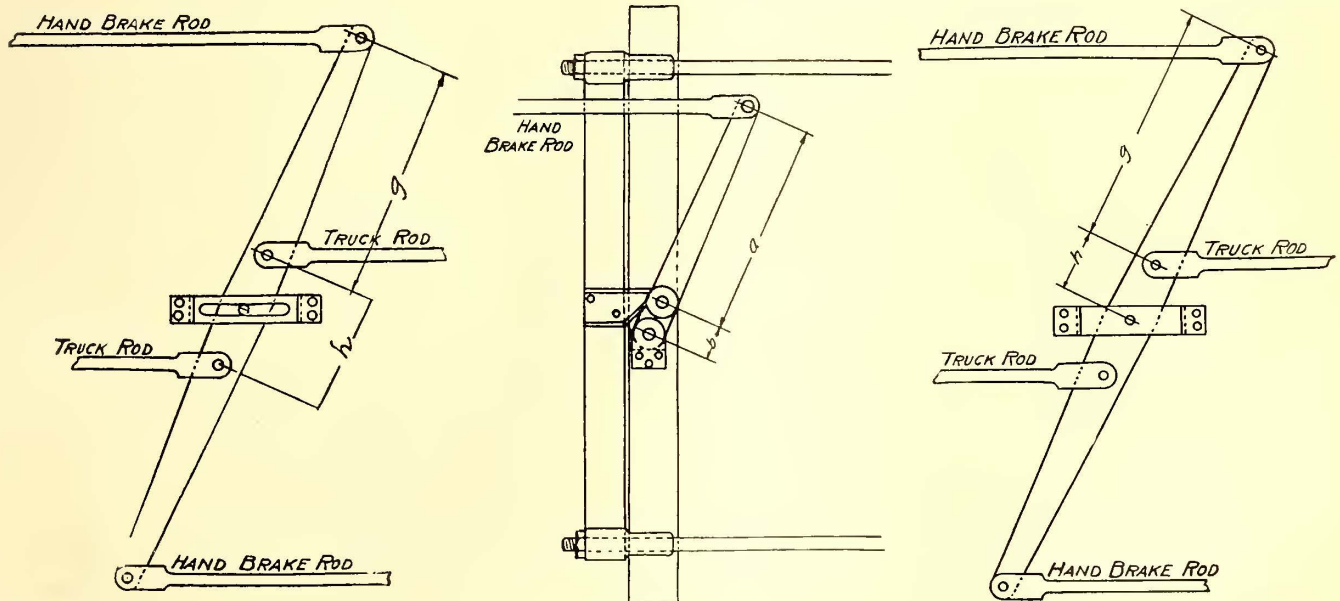
On single-truck cars the brake rigging shown in Fig. 2 is almost universally used. This also produces unequal pressures, having the same fault as the rigging shown in Fig. 1. The pressures on the forward and rear wheels are found respectively from formulas

$$X = P \div a/b \text{ and } X = P \div (a + b)/b.$$

Fig. 3 shows a most dangerous type of brake rigging sometimes used on electric railway cars. With this type of rigging, provided the shoe clearance and slack are not exactly the same on both trucks, the brakes are applied only on the truck having the least travel or slack. With this system of leverage a fixed fulcrum is used and, in applying the brakes, if one truck rod becomes rigid before the other, the lever has two fixed points and cannot rotate any farther. Consequently the brakes will not be applied on the other truck. The formula for computing the leverage developed by means of this rigging is

$$X = 2P \div [(g + h)/h].$$

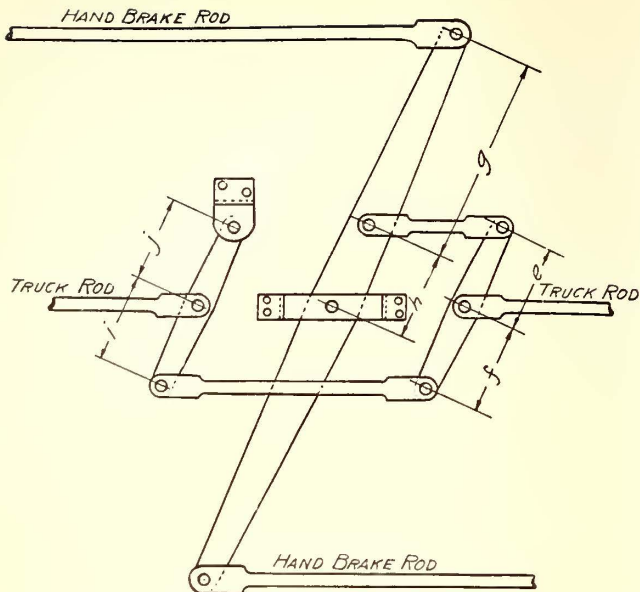
In comparing the formulas corresponding to Figs. 3 and 1 it is sometimes puzzling to understand why twice



HAND-BRAKE PRESSURES—FIG. 1—DOUBLE-TRUCK CAR-BODY BRAKE EQUIPMENT; FIG. 2—SINGLE-TRUCK BRAKE EQUIPMENT; FIG. 3—DANGEROUS TYPE OF BRAKE EQUIPMENT

This result is at variance with the correct theory of car retardation. A perfect arrangement of brake rigging should always provide a slightly higher pressure on the forward truck, because the car tends to overturn or rotate about the axis of the forward truck. This tendency is due to the centrifugal force exerted during retardation, which transfers part of its proportion of weight from the rear truck.

the force must be exerted in the hand-brake rod to give the same truck-rod pull as is obtained by the lever arrangement shown in Fig. 1. This is explained by considering the travel of the lever. It is well known that power and distance traveled are directly comparable. In Fig. 3 the brakes on both trucks are pulled up at once. Therefore each truck receives only half the force developed, and the travel of the lever is only that of



HAND-BRAKE PRESSURES—FIG. 4—BRAKE RIGGING GIVING PERFECT EQUALIZATION

the travel of one truck rod. In Fig. 1 each truck rod obtains the full pressure by means of a continued pull. In other words, one truck receives the full pressure and then the lever continues to travel until the other truck has also received the full pressure. The travel of the lever, therefore, is the total travel of the rear truck rod plus the total travel of the forward truck rod, or twice the travel of the lever shown in Fig. 3.

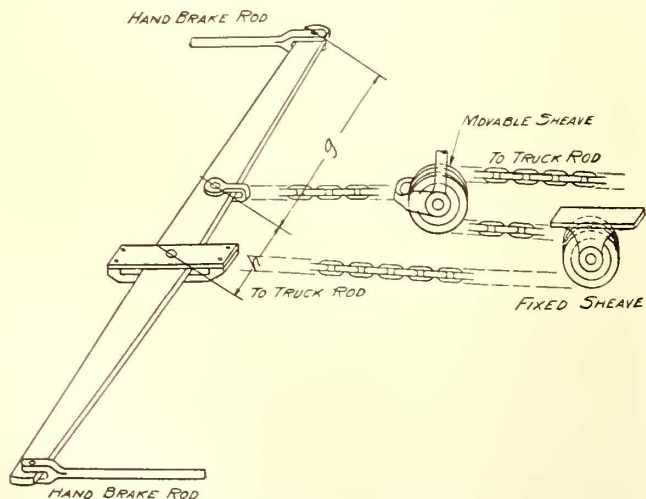
For cars not equipped with air brakes the system of hand-brake rigging shown in Fig. 4 produces exact equalization of pressures between trucks and absolute provision for applying the brakes on both trucks regardless of unequal travel and slack conditions. The formula for calculating the required brake pressure at the hand-brake rod for the rear-truck top rod is

$$X = P \cdot \left[\left(\frac{g+h}{h} \right) \left(\frac{e+f}{f} \right) \right]$$

and for the forward-truck top rod is

$$X = P \cdot \left[\left(\frac{g+h}{h} \right) \left(\frac{e+i+j}{f} \right) \right]$$

An arrangement of sheaves (Fig. 5) can also be used, which comprises the same type of rigging shown as Fig. 3, except that it has the advantage of affording exact



HAND-BRAKE PRESSURES—FIG. 5—RIGGING EMBODYING SAME PRINCIPLE AS THAT SHOWN IN FIG. 4

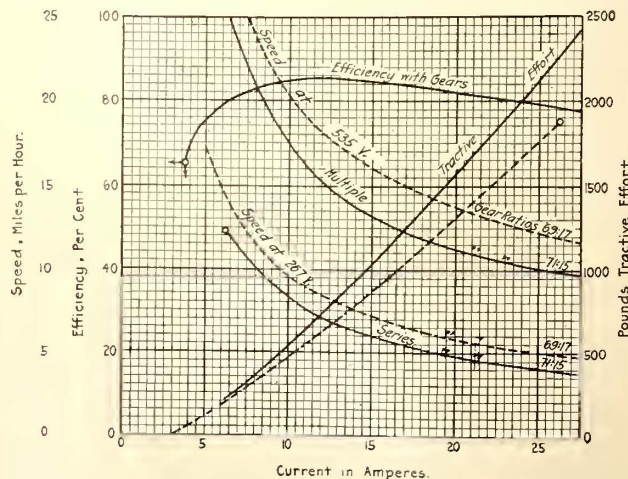
equalization of pressures and the application of brake pressure to both trucks under all conditions.

When hand brakes are applied to air-brake cars it has generally been the practice to provide levers for multiplying the hand-brake power and a chain for operating the brake-cylinder piston, thereby applying the brakes to the trucks through the air-brake live and dead levers. By this method exact equalization of hand-brake pressure is obtained through the air-brake levers. However, some master mechanics favor a separate and independent brake rigging right to the truck levers. Their preference is based on good, sound judgment, as it not only provides against a failure of the air, but against the breakage of any of the air-brake pull rods. The practice of operating through the air-brake rigging, however, has the advantage of extreme compactness, and an additional safety measure has been provided by means of the stop device recommended by the Westinghouse Traction Brake Company. This device limits the travel of the live and dead levers in such a way that, should one of the top rods break, the lever can fulcrum against the stop, assuring a brake on at least one truck.

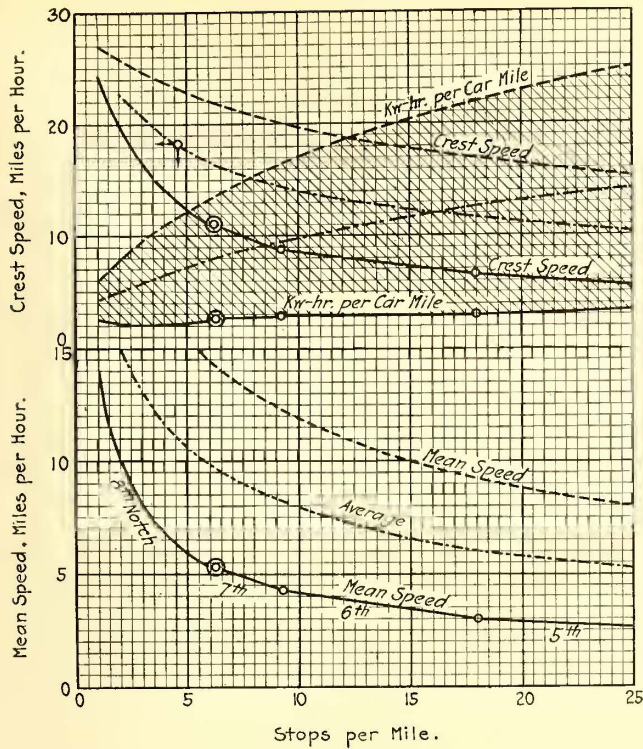
In designing hand-brake equipment and rigging for a car of known weight, it is desirable to obtain the maximum force possible in the hand-brake pull rod. Efficient hand-brake devices can be made very compact and can develop high power without the space required for the swing of long brake levers. For this reason the best proportion can generally be obtained by having the multiplying ratio transmitted through the car-body levers as low as possible, which results in short travel of the levers, the travel being directly comparable with the multiplying ratio. Economy of valuable space under the car is also thereby effected, allowing room for the many devices now being added to modern car equipment.

Effect of Gear Ratio on Operating Economy

In the sixth annual report of the Board of Supervising Engineers, Chicago Traction, the results of a study of a change in gear ratio are given. These results are shown in the accompanying curves. The study was made on a change in ratio from 69:17 to 71:15 on the standard 1908 Pullman car of the Chicago Railways, weighing 30 tons. Fig. 1 shows the characteristic motor curves for the two gear ratios, the efficiency being practically the same. On the assumption of an accelerating rate of 1.65 m.p.h.p.s. and different periods of coasting, the operating results obtained with the



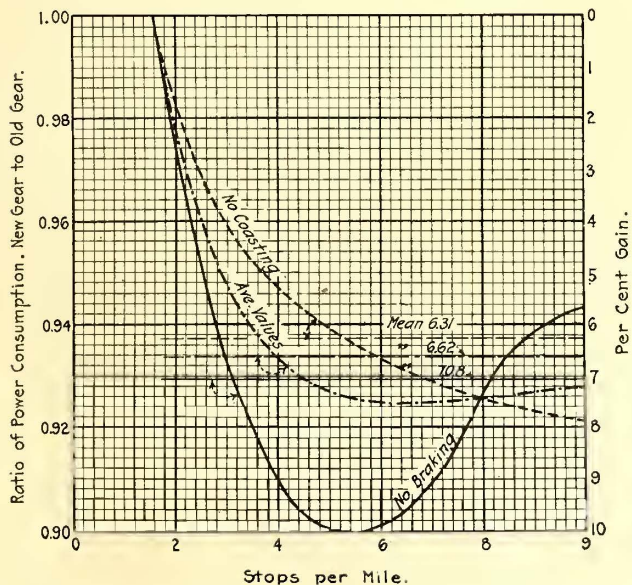
GEAR RATIO AND OPERATING ECONOMY—FIG. 1—CHARACTERISTIC CURVES OF CHICAGO SURFACE LINES MOTOR



GEAR RATIO AND OPERATING ECONOMY—FIG. 2—SPEEDS AND ENERGY CONSUMPTION WITH DIFFERENT COASTING PERIODS

gear ratio are shown in Fig. 2, the speeds given being running speeds with no allowance for stops. Assuming ten-second stops at intervals of 528 ft., or ten stops per mile, as typical of the service on heavy streets, the following results were indicated by the study:

1. With no coasting, a schedule speed of about 9 m.p.h. cannot be exceeded without increasing the acceleration rates assumed.
2. The maximum or crest speed of 20 m.p.h. is necessary to reach this average speed.
3. With part coasting and part braking, the relation between maximum and average speed is in general of the same character, i.e., with a maximum of crest speed the schedule speed is limited and cannot be raised without increasing acceleration rates. Con-

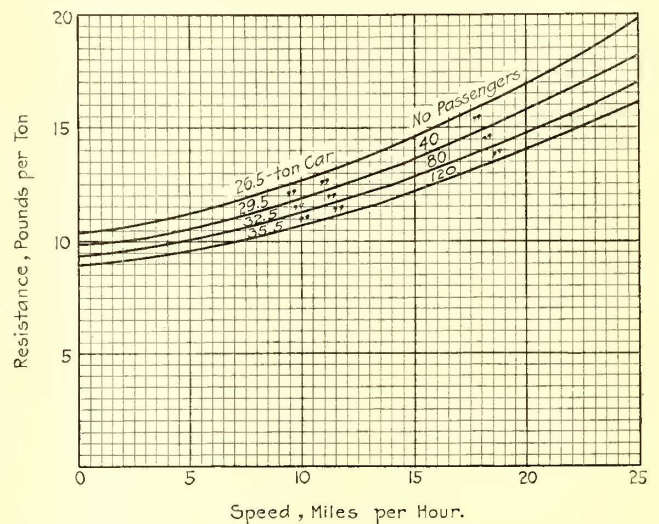


GEAR RATIO AND OPERATING ECONOMY—FIG. 3—CURVES SHOWING RELATION OF STOPS PER MILE AND SAVINGS DUE TO CHANGE IN GEAR RATIO

sidering the present average schedule speed of Chicago cars, i.e., 9 m.p.h., it appears from the average curve of Fig. 2 that a crest speed of fully 18 m.p.h. must be reached and stops limited to five per mile or their equivalent as an average, if the rated capacity of the equipment is not to be exceeded.

In general, from the results of the study, it appears that the new gear ratio is better adapted for the heavy Chicago traffic under the assumed conditions for the following reasons: 1. The maximum crest speed of the cars is reduced by about 13 per cent. 2. A mean power saving of 6.6 per cent may be realized within the usual range of stops. This can be seen in Fig. 3, where the ratio of power consumption between new and old gearing is plotted against stops per mile. 3. The rate of acceleration on subnormal voltage may be materially increased without dangerously overloading the motors. This is particularly advantageous in the congested districts as a means of increasing schedule speeds.

The report also calls attention to the effectiveness of field control, the principal advantage of which is in providing a flexible gear ratio, changeable electrically



GEAR RATIO AND OPERATING ECONOMY—FIG. 4—TRAIN RESISTANCE CURVES USED AS THE BASIS OF PREVIOUS CALCULATIONS

through the operation of the controller. The gear ratio suitable for field control is given as 69:15, or 4.6, as compared with 71:15, or 4.73, for the revised rheostatic control, and 69:17, or 4.055, with the rheostatic control then in use.

In calculating the schedules on which the above conclusions are based, the board employed the results of resistance tests made by the Chicago Railways in 1912, using standard passenger cars and the dynamometer or drawbar-pull method. These results are shown in Fig. 4. The tests were made upon a car weighing 26½ tons empty and loaded to 35½ tons, that is, with 120 passengers. The curves represent the resistance at constant speed, it being found that during acceleration the resistance is considerably higher, especially at low speeds. The resistances shown are much lower than are usually given for cars of this type.

The formula representing them is based upon the Armstrong train-resistance formula with the constants revised to fit the results of these tests. It is as follows:

$$R = \frac{53.5}{\sqrt{W}} + 0.05 S + \frac{0.00877 \times A \times S^{1.7}}{W}$$

where R = car resistance at uniform speed in pounds per ton.

W = weight of car in tons.

S = speed in miles per hour.

A = head end area square feet (100 sq. ft.).

The report calls attention to the fact that there is general acceptance of a form of curve starting at zero speed with a certain static friction, and increasing more rapidly than the speed due to head or wind resistance and track friction. But none of the empirical curves for free-running train resistance recognize the fact that the resistance during acceleration is considerably greater than indicated by the curve of free-running resistance, and that the curve of total drawbar-pull or resistance is very high at the start, minimum at a moderate speed and again rises at higher speed. Hence in the preceding study the resistance during acceleration was assumed as high as $22\frac{1}{2}$ lb. per ton, nearly double that found in free running.

Although these data were obtained from actual dynamometer tests, the great diversity of opinion and results among various investigators suggests the necessity for further analysis, especially differentiating between train resistance during acceleration and during free running.

Effect of Car-Wheel Diameter on Motor Heating

In a recent publication of the Westinghouse Electric & Manufacturing Company appears a continuation of the discussion of the effects of the size of wheel on motor heating begun in a series of articles in the ELECTRIC RAILWAY JOURNAL, to which the writer referred. These articles appeared in the issues for Oct. 3, 1914, page 622; Oct. 31, 1914, page 1014; Nov. 28, 1914, page 1203, and Dec. 19, 1914, page 1344. After referring to the discussion in the ELECTRIC RAILWAY JOURNAL the writer of the article proceeded as follows:

As an example of the effects of differences in wheel diameter, the case of a car which has wheels 30 in., $30\frac{1}{2}$ in., and 31 in. in diameter, equipped with typical 37.5-kw. (50 hp.) motors, has been considered and will show the difference in the load and heating for each of the motors driving the three sizes of wheels.

From the speed curves, Fig. 1, the amperes load taken by each of the motors for any given speed may be easily determined. For example, if the car is operating at 15 m.p.h., the motor on the 30-in. wheel is drawing 75 amp., and the motor on the 31-in. wheel is drawing $81\frac{1}{2}$ amp.

From this difference we have constructed curve No. 2, Fig. 2, which shows the per cent difference in the loading carried by the two motors based on the amperes in the motor driving the larger wheel. Due to the difference in amperes taken by the motors there is naturally a difference in the heating resulting therefrom. Curve No. 1, Fig. 2, shows the per cent difference in the heating between the motors driving the 30-in. and the 31-in. wheels, based on the heating in the motor driving the 31-in. wheel. At 25 m.p.h., which is the approximate free running speed, this heating will be 5.5 per cent less in the motor driving the smaller wheel than in the motor driving the larger wheel.

When the car is accelerating, these motors will draw approximately 90 amp., and when the resistance is all

cut out of circuit, the speed will be approximately 14.5 m.p.h. Therefore, the load on the motor on the 30-in. wheel is 7.3 per cent less than on the motor on the 31-in. wheel, and the heating is approximately 12 per cent less. It may be seen from the shape of the curve that when the motors are heavily loaded the difference in heating may be very great.

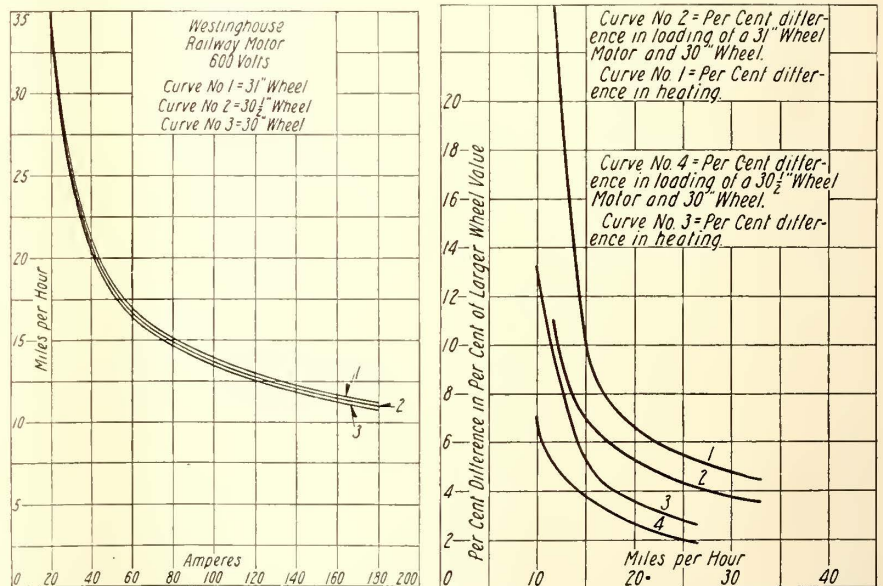
Fig. 2 also shows the difference in the load and heating between motors on 30-in., $30\frac{1}{2}$ -in. and 31-in. wheels.

These curves were worked up assuming the motors had identically the same speed curves, but in commercial production, due to the variation of materials, machining, etc., the speeds of different motors may vary as much as 5 per cent.

If the motor which is mounted on the larger wheel rotates at a higher speed for the same amperes than the motor on the small wheel, then the difference in loading will be greater than shown on these curves.

If the service is such that the motor is accelerating during the greater part of the time, the difference in wheel size permissible will not be so great as when it is operating in a service which is largely made up of running at high speeds with few accelerations.

It is not the purpose of this article to state what wheel-size variation is allowable, because this depends entirely on the shape of the speed curve, and particularly on the service to which the motor is subjected. It is evident that when the motors are running comparatively cool a certain difference in heating between two motors on a car is not so objectionable as with the motors worked to the limit. This means, in general, that it is not so necessary to be particular with reference to wheel sizes where the motors are running cool,



WHEEL DIAMETER AND MOTOR HEATING—FIG. 1—SPEED CURVES FOR DIFFERENT DIAMETERS; FIG. 2—DIFFERENCES IN CURRENT AND HEATING

while with motors running hot it may be best economy to keep the wheel sizes very nearly alike.

The approximate curves shown are given merely as an aid in deciding for each individual case the maximum difference allowable.

A recent census of the trainmen of the Louisville (Ky.) Railway showed that the men had been in the service of the company as follows: Fifteen for more than twenty-five years; forty-one for more than twenty years; forty-seven for more than fifteen years; eighty-four for more than ten years; 385 for more than five years; fifty-five for less than one year.

A Convertible Car for General Service

The Burlington (Vt.) Traction Company has recently placed in service a type of convertible car that has numerous features of advantage for general service. The design is standard with the builders, the J. M. Jones' Sons Company, Watervliet, N. Y., and it is claimed that the car probably constitutes the nearest approach to a single universal type for surface operation that has yet been attempted.

The special features, aside from the fact that the design provides an open car in summer and a closed body in winter, thus eliminating double equipment, consist in the low window sills, the absence of wall pockets that ordinarily collect rubbish, the maximum seat length and aisle space, the low platforms, and the inclosed platforms, preventing accidents to passengers and conductors, whether used as a summer car or as a winter car.

For the Burlington car, the general dimensions are as follows:

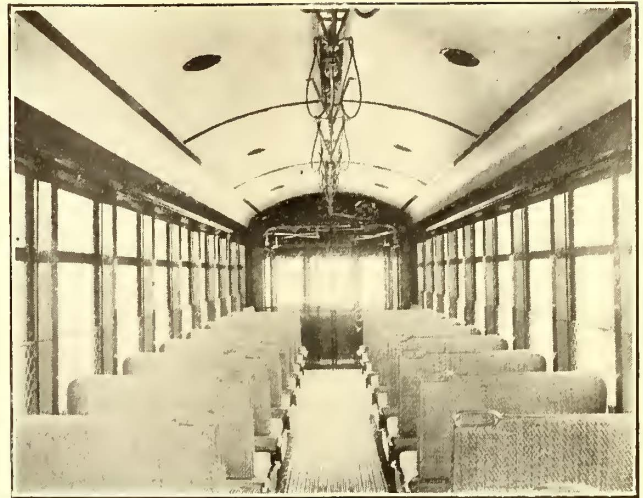
Length over all	45 ft. 0 in.
Length over corner posts.....	32 ft. 0 in.
Extreme width	8 ft. 5 in.
Height from rail to trolley board.....	11 ft. 10 in.
Weight fully equipped	45,000 lb.
Seating capacity (exclusive of platforms).....	58

The car body is constructed upon a steel underframe with steel-plate girders at the sides. The side posts are made of ash, but the roof sheathing is of sheet steel. The interior finish, in general, is of cherry. The interior equipment includes AA-DT American sheet glass, Globe ventilators, Curtain Supply Company's curtains, Heywood Brothers & Wakefield rattan-covered seats, solid-bronze polished trimming, folding platform doors and steps with Consolidated fixtures, Consolidated buzzers and heater equipment with thermostatic control, and International registers. Taylor trucks with 4-ft. 10-in. wheelbase and 34-in. wheels are installed, and with these is a four-motor equipment of Westinghouse 101-B motors.

The detailed weights of the various pieces of apparatus that enter into the construction are shown in the following table:

Car body	17,500 lb.
Trucks	12,500 lb.
Motors	10,800 lb.
Brakes and control	3,000 lb.
Doors and steps	900 lb.
Heaters	300 lb.
Total	45,000 lb.

It will be noted from one of the accompanying illustrations of the car that there are no hand straps at the ends of the car, and that the longitudinal end seats are



INTERIOR VIEW SHOWING STATIONARY SCREENS IN WINDOWS

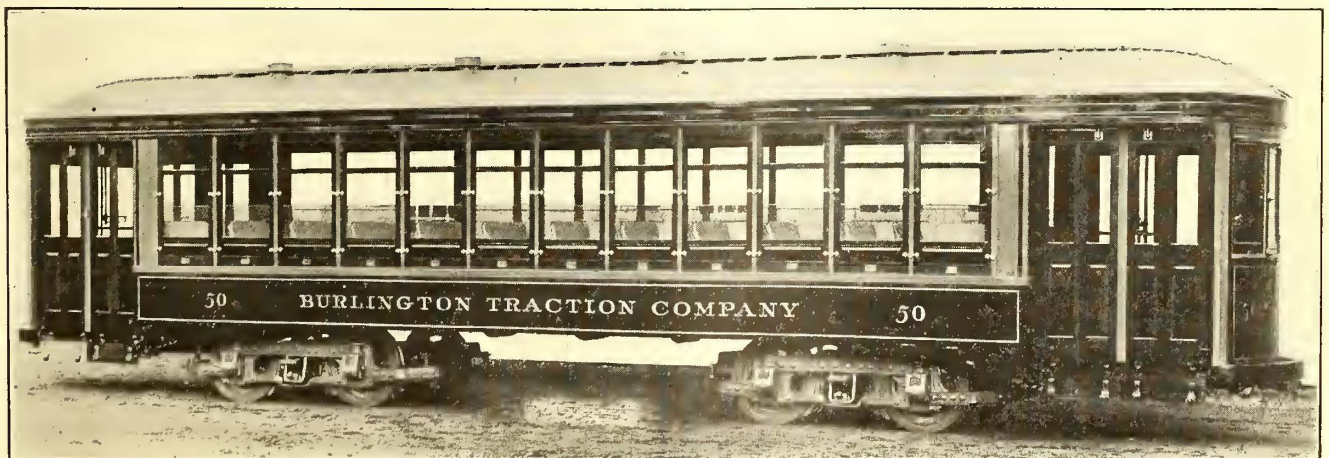
unusually short, seating only two passengers. The idea involved is that, by eliminating the hand straps, standees will move forward to a point where they can reach the handholds on the backs of the transverse seats, and in this way the ends of the car will be left clear for entrance and exit.

Tank Lifters for Small Oil Switches

Oil-switch tank lifters are a great convenience, particularly in stations where a large number of switches are installed, and although a tank with oil for a comparatively small switch is not especially heavy, the character of the load makes it somewhat cumbersome for one man to manage. The result of this is that often the oil-switch contacts are not inspected as regularly as they should be to insure the most satisfactory operation.

The tank-lifting arrangement, which is manufactured by the General Electric Company and illustrated on page 74, provides a very simple and easy means for lifting quickly an oil-switch tank either up or down through the entire distance between the switch frame and the floor. The lifter is made in two widths, one for single and the other for double-throw switches, and these widths differ only in the lengths of the three rods that join the two pairs of parallel operating arms, this being necessary owing to the differences existing in the dimensions of the tanks.

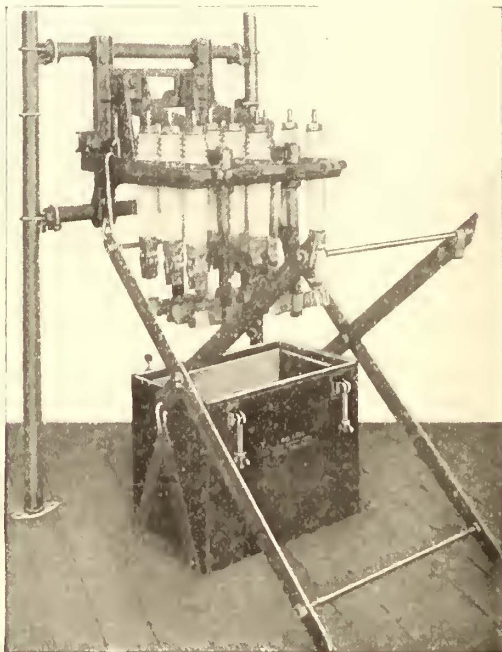
To fasten the tank lifter to the switch frame two hooks attached to the inner ends of the longer pair of



CONVERTIBLE CAR WITH SASH IN PLACE FOR WINTER SERVICE

operating arms are placed over the ribs of the switch frame, the operating arms are raised and the tank supports fitted under the tank. Then the wing nuts that secure the tank to the frame are turned to unfasten the tank, and the outer ends of the long arms are lowered to the floor. Finally two catches on the cross-rod between the inner pair of operating arms are released, and these arms are allowed to rise until the tank reaches the floor.

The tank supports are separate from each other and



VIEW OF TANK LIFTER FOR SMALL OIL SWITCHES

attach to the tank by continuations of the two equal sides of each strap-iron triangle, which are bent upward to fit over the rim on the bottom of the tank. Each support is removed from a tank by lifting an end of the tank a few inches from the floor and sliding the support from under.

To place the tank on the oil switch, the operation as described is reversed, the time required for the process being practically negligible.

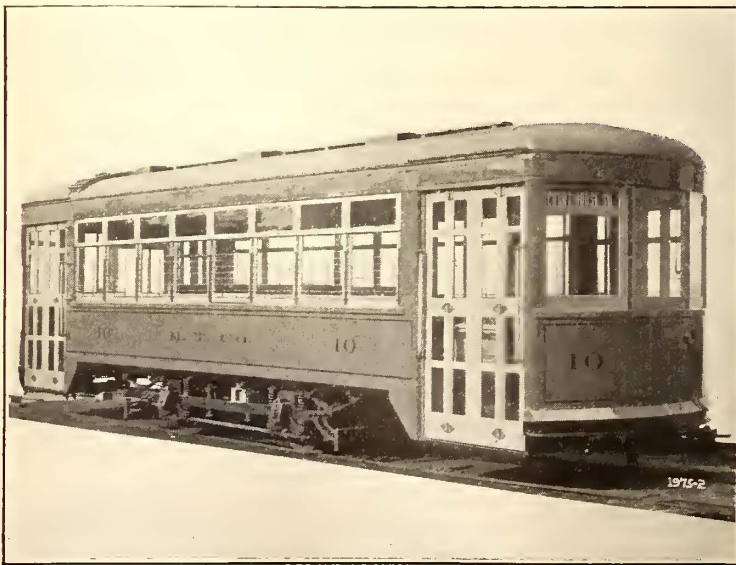
All-Steel One-Man Car

Some months ago the Marshall (Tex.) Traction Company, as noted in the *ELECTRIC RAILWAY JOURNAL* for March 27, ordered three all-steel one-man cars from the Cincinnati Car Company on a forty-five-day guaranteed delivery. The cars left Cincinnati on the date agreed and are now in service on the Marshall Traction Company's line. They possess a number of unique features, prominent among which is the all-steel construction notwithstanding their small size.

The side girders are made of $\frac{1}{8}$ -in. steel plates to which the side sills of 3-in. x 5-in. x $\frac{3}{16}$ -in. angles are riveted. From the side sills pressed-steel channel crossings of $\frac{1}{8}$ -in. steel plate are supported and these carry the flooring. All body posts are formed from continuous steel tee bars $1\frac{1}{2}$ in. x 2 in. x $\frac{3}{16}$ in., these members extending from side sill to side sill and forming the roof carlines. Vestibule corner posts are made of No. 12-gage sheet steel pressed into a box section, and the roof is covered with No. 18-gage sheet steel riveted direct to the steel carlines. The outside of the vestibule below the sash is covered with $\frac{1}{8}$ -in. sheet steel pressed at the top to form the window sill, and the letterboard for both body and vestibule is also a $\frac{1}{8}$ -in. steel plate, both top and bottom being shaped to receive respectively the canvas molding from the roof and the top sash.

The floor of the car is formed of two layers of wood applied longitudinally with the car body, and the interior finish, such as sash, doors and molding is made of ash. Outside of this, however, the construction is of steel throughout. No headlining is installed, the roof being covered on the outside with 1-in. thickness of compressed cork that is cemented to the steel, the cork, in turn being covered with No. 8 canvas secured to a wooden molding on the letterboard and bound with $1\frac{1}{2}$ -in. beveled edge iron. The wainscoting below the window sills also is made from compressed cork 1 in. thick and cemented to the steel side plates, and is covered with 1 16-in. linoleum. The vestibule between the floor and the windows is sheathed in the same manner.

A prominent feature of the car is the very high grade of painting that has been followed throughout, this being in accordance with the Cincinnati Car Company's standard system. The smooth finish is especially noticeable in the white enameled ceiling shown in one of the accompanying views. This has eliminated abso-



EXTERIOR AND INTERIOR VIEWS OF MARSHALL TRACTION COMPANY'S ONE-MAN CAR

lutely any objection to the absence of headlining on the grounds of appearance, as the exposed carlines give an impression of panelling that is exceedingly attractive. An air space under the steel roof sheathing is, of course, made unnecessary by the cork insulation on top of the roof.

The car seats thirty-two passengers and is 33 ft. 5 in. long over all. However, the weight of the car body, complete with all details but exclusive of the car-body electrical apparatus and trucks, was guaranteed not to exceed 10,000 lb. Single Brill trucks are used, these weighing 6800 lb. when equipped with two Westinghouse 307 motors and double-end control. This gives a total weight of 16,800 lb. for the car.

The following equipment specialties were furnished: Consolidated electric heaters, Hale & Kilburn seats, Hunter destination signs, Pantasote curtains, Rico sanitary strap covers, and Peacock brake mechanism with Cincinnati ratchet and pawl. Combination ventilator registers and lamp fixtures, sash locks, weather stripping, push buttons, and sand boxes were supplied by the Cincinnati Car Company.

The car body is fully inclosed and of the double-end type, the car having been designed for one-man operation. There are, however, two sets of folding doors and a stationery step on each side of the vestibule so that the car is suitable for two-man operation in case this is desired. The doors are normally under the control of the motorman by suitable operating mechanisms, and a removable division rail is provided in each vestibule to separate the entering from the exit passengers.

The general dimensions are as follows:

Length over all	33 ft. 5 in.
Length over corner posts	21 ft. 6 in.
Height, rail to trolley board	10 ft. 9 in.
Extreme width	8 ft. 2 1/4 in.
Step from rail	15 3/4 in.
Step to platform	13 in.
Step to car floor	8 3/8 in.
Door opening between posts	3 ft. 11 3/8 in.
Width of seats	37 in.
Width of aisle	20 in.
Side post center	30 in.
Seating capacity	32
Size of wheel	33 in.
Wheelbase	8 ft. 6 in.
Total weight of car	16,800 lb.

Effect of Zinc Chloride on Timber Strength

Some interesting results of a study of zinc chloride as a preservative of lumber were presented recently in a thesis by Alfred H. Clarke, at the Massachusetts Institute of Technology, Boston. The author pointed out that the main objection to the use of the cheaper grades of pine for structural purposes is the susceptibility of such lumber to destruction by dry rot. The seeds of the rot fungi are microscopic and may exist unobserved in new wood. If they are left unhindered they may, under proper atmospheric conditions, develop rapidly and injure the whole structure of the wood and be disastrous to the building. The usual means of prevention is by filling the wood with a poison which destroys the food of the fungi. Zinc chloride, often used for this purpose, is cheap, easy of application, and efficient as a rot destroyer. Under ordinary conditions it has not been thought harmful, but it has also been argued that under the conditions of temperature and humidity that favor dry rot, the zinc itself may impair the strength of the timber.

The method followed was to treat small sapwood specimens with the desired amount of the salt by immersion in a bath of weak solution, then to consider and observe in fairly large sets the wood so treated for strength in various ways, moisture content, etc. Comparisons were also made with untreated wood. A temperature of 150 deg. Fahr. was maintained for several

days. The moisture content was found to be about the same in treated and untreated woods, but the breaking strength of the treated pieces was only 38 per cent of the untreated specimens. The tests indicated the desirability of further research along this line.

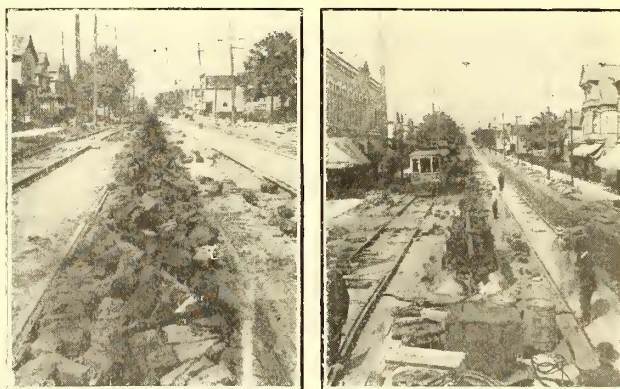
Tearing Up Pavement at 500 Ft. per Minute

Rooting up granite-block pavement between the rails at the rate of approximately 500 ft. per minute is the startling result obtained by the use of the pavement rooter invented by Charles H. Clark, engineer maintenance of way Cleveland Railway Company, and described on page 1346 of the ELECTRIC RAILWAY JOURNAL of June 13, 1914. The device consists of a heavy steel



VIEW OF ROOTER IN ACTION

plow casting mounted beneath a substantially built carriage which weighs complete approximately 11 tons. In the particular instance shown in the three accompanying illustrations, the total time required to set the plow in position for beginning the work, attach it to the motor car and plow up 1475 ft. of granite-block pavement between the rails was twelve minutes. The actual plowing time for this length of track was three minutes. Since this rooter accomplishes its work so

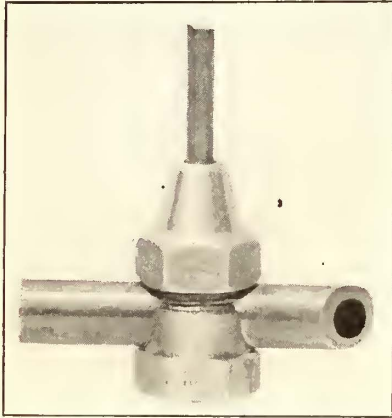


VIEWS OF TORN-UP PAVEMENT

quickly, pictures of it in action have been difficult to obtain. For the information of track and roadway engineers one need not dwell upon the saving in labor thus effected, only two men with the plow and the crew on the motor car being needed. Immediately after the pavement is torn up it is necessary for a few crew of men to make the street crossings safe, but this would be necessary in any case, hence this gang's time is not chargeable to the cost of tearing up the pavement.

Quickly Detachable Busbar Tap

The busbar tap shown in the accompanying illustration is one of the cable-connecting devices made by the Fargo Manufacturing Company which were mentioned in the *ELECTRIC RAILWAY JOURNAL* of June 26. This is reported to make a material current saving on account



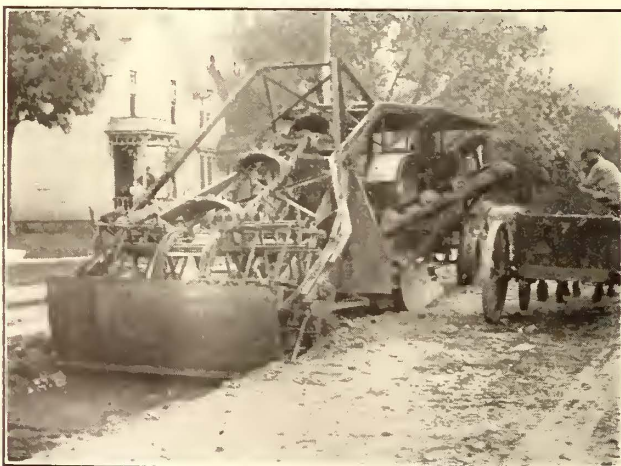
COMPRESSION-TYPE BUSBAR TAP

of its positive contact, as it makes a practically welded joint, the tap wire being forced against the busbar with almost any desired degree of pressure. This is accomplished merely by tightening the screw nut which holds the tap wire firmly through the cone-shaped grips fitting inside of it. The connection naturally has great strength and it is very easily installed, eliminating any necessity for using solder or bolted clamps. It can be disconnected with equal facility so that the work of cutting out a transformer, for instance, can be accomplished in a couple of minutes. This ease in handling obviously makes the device a great money saver in both the central station and the substation. In fact, wherever electrical taps are installed either permanently or for temporary work, this form of connection can be used with invariable success.

Track-Trench Excavating Machine

One operation to complete the track trench ready for ties, rail and ballast, is the result obtained by a special type of excavating machine that is operated by the General Engineering & Constructing Company, Rockford, Ill. This was designed particularly for excavating street railway track trenches in any width up to 9 ft., and depths up to 36 in. may be excavated in one operation. A roadbed true to grade is easily regulated, the depth of the trench being controlled by the boom operator who varies the depth of the cut as shown by an indicator on the machine.

This indicator points to the true grade which is



TRACK-TRENCHING MACHINE—VIEW OF MACHINE IN OPERATION



TRACK-TRENCHING MACHINE—VIEW OF INTERVAL BETWEEN TRACK AND EXCAVATING GANGS

established by a line and stakes set beside the trench. During the process of excavation the machine will deposit the spoil on either side of the trench or cast it into dump wagons in the street beside the trench. The ability of the operator to regulate this machine to cut a trench true to line and grade, and at the same time leave the trench practically clear of loose material, makes unnecessary any leveling of the finished trench.

In a contract recently completed for the Rockford & Interurban Railway, a 20-in. trench, 8½ ft. wide, was excavated at a rate of approximately 500 ft. a day. The material removed was a sandy loam paved with macadam. Before beginning the excavation the track was removed from the street with jacks, and the trencher followed this work so closely and was in turn followed by the track-laying gang, that a maximum distance of only 300 ft. was left between the point where the old track left off and the new track began.

Experience with various kinds of materials has demonstrated that the machine will successfully and economically excavate any of the usual composite materials found in city streets. If the spoil is to be used again for ballast it may be cast on one side of the trench, leaving the other side clear for traffic and track operations. When only a part of the spoil is to be used for future work, that which is to be hauled away may be run into dump wagons as the work progresses. In case all the spoil is to be removed from the street, the waste time of teams is minimized as the wagons are loaded rapidly and continuously after the teams have been properly spaced. The continuous flow of excavated material from the machine to the wagon makes it possible to load the average dump wagon in about two minutes, and experience has shown that it is possible also to obtain about ¼ yd. more load per wagon with machine-loaded material than with material loaded by hand. In the two accompanying illustrations the excavating machine and the interval between the machine and the track-laying gang are shown.

The recent talk by H. C. De Camp, Cincinnati, to two groups of trainmen of the Louisville (Ky.) Railway, is the first of a series which Mr. De Camp will deliver during the year. No meetings will be held during the hot weather. The company will resume the educational work in the fall, when Mr. De Camp will discuss the equipment of the street car. Other speakers will be heard from time to time. The meetings will be held at irregular intervals, according to the plans which the company has announced.

News of Electric Railways

TOLEDO FRANCHISE CONFERENCE

The conference between the franchise committee of the City Council of Toledo, Ohio, and Henry L. Doherty and other representatives of the Toledo Railways & Light Company on July 2 was brief and as a consequence not much was accomplished. Another conference was arranged for July 7.

The tentative draft as it stood on July 2 provides that the municipal ownership ordinance, passed by a vote of the electors on Aug. 4, 1914, shall not be changed, altered or affected in any respect by the provisions of the new ordinance, nor shall the new ordinance be construed as replacing the municipal ownership ordinance. This ordinance, it is expected, will state that its terms may be exercised whenever the city is in position to purchase the property.

Section 7 of the new ordinance provides that the city may buy the company's property under the provision of the referendum ordinance, the value to be based upon an appraisal which shall be determined by arbitration. The city must give the company notice twelve months before it expects to exercise this privilege and the purchase is to be settled by a referendum vote. The right to purchase may be exercised within sixty days after a referendum election, if the majority of voters favor the purchase.

It was agreed that when a question arises in regard to the fare to be charged, the rate in effect at the time shall be continued until the matter is settled by a court of common jurisdiction. Attorney Thomas H. Tracy suggested that if it is found that the fare was not sufficient to meet requirements provided in certain sections of the franchise, the loss should be made up to the company. While the matter was not definitely settled at the conference on July 2, the committee seemed inclined to concede this contention. Mr. Tracy also insisted that questions of efficiency in operation should be left to arbitration.

ROCHESTER CONNECTING RAILROAD

The Rochester Connecting Railroad has applied to the Public Service Commission of the Second District of New York for a certificate of public convenience and necessity for its 2½ miles of line in the outskirts of Rochester. The company recites in its petition its connection with the Buffalo, Lockport & Rochester Railway, an electric line, which is also connected with the proposal to build a new international bridge across the Niagara River and to connect it with the Buffalo, Lockport & Rochester Railway by a new line from Niagara Falls to Lockport. The New York Central Railroad has objected to the granting of a certificate to the Niagara Falls and Lockport line. The eastern end of the Buffalo, Lockport & Rochester Railway, through the proposed Rochester Connecting Railroad, is to be connected with the Pennsylvania Railroad and the Erie Railroad at Rochester.

It was said at a recent hearing before the commission for a certificate for the western connecting link that this, with the new bridge, would give the Pennsylvania Railroad access not only to the rich territory of the Buffalo, Lockport & Rochester Railway, but also would afford a connection over the new bridge with the Canadian trans-continental lines. The project is backed by men prominent in electric railway affairs in western New York, including E. G. Connette, president of the International Railway, Buffalo, and the petition for the Niagara frontier link of the new road is supported by petitions of the local authorities, boards of trade, and prominent manufacturers. The New York Central Railroad in its opposition to the project maintains that the territory is already supplied, if not over-supplied with railroad facilities. It says that the present railroad bridges into Canada are of a capacity sufficient to care for the business of many years' growth, and that to allow competition in this territory would be ruinous to its own interests as well as to the business of the new road. A hearing has been held before the commission on the Niagara link and the question of the Rochester connection will be heard within the next few weeks.

THE CHICAGO ARBITRATION

Employees Complete Presentation of Evidence—Railway Begins with Testimony of President Busby

Day and night sessions are being held by the arbitrators selected to pass upon the differences between the Chicago surface and elevated railways and their employees. The employees completed the presentation of their case with the examination of President Mahon of the Amalgamated association. The railway opened its case with L. A. Busby, president of the Chicago Surface Lines.

The hearing of June 30 was largely devoted to taking the testimony of employees regarding wages and working conditions. With each witness counsel for the employees emphasized the point that one year of training was sufficient to warrant paying a motorman the maximum wage. One witness stated that he knew of no skilled trade where the men received the maximum wage in one year unless it was the hodcarriers. This witness said that hodcarriers worked only about eight months of the year and he was not sure that men of this trade received more pay than motormen. Joseph Riordan, a motorman on a supply car, contended that his duties were more difficult than those of a regular motorman. For that reason he should receive the same pay and be of the same grade as the motormen in the train service. In cross-examination, however, Mr. Riordan stated that most men who went from the supply-car service to the train service did not like the work and quit. According to the witness motormen on supply cars would not be credited with seniority when they entered the train service.

The examination of motorman Myles Callaghan showed that he had a split run, from 6 a. m. to 8 a. m., and then from 1.40 p. m. to 9.30 p. m. He admitted, however, that he could have chosen a run with fewer consecutive hours which would have paid as much as the one he had selected. Practically all the other motormen witnesses had objected to smoking on the platform, but Motorman Callaghan advised that he had not suffered. It was very easy to ventilate the vestibule. The witness admitted that the company purchased the uniforms of new men in cases of emergency, and that the cost of uniforms had decreased. Ten years ago the extra men averaged four days a week. At present they average at least five days a week. The men were permitted to select the system by which runs were picked.

Maurice Lynch, assistant financial secretary of the union, was examined regarding the speed of cars. He stated that this was computed from one end of the line to the other, and included delays. On a line of fifty runs, each run having ten trips, or a total of 500 trips, a minute taken off each trip would save the company 1500 minutes. Also, if one hour was required for a round trip on a three-minute headway, and the time was reduced to fifty-seven minutes the company would save four men, or \$12.80 a day. High speeds required greater alertness on the part of the motormen, took cars off the line, and threw men back on the seniority list.

Ordinary common sense, a little clerical ability and honesty were essential for a man to be a good conductor. Concerning unemployment in other trades, bricklayers worked about 75 per cent of the year, structural iron workers 75 to 80 per cent, plasterers 75 per cent, lathers the same, and steam fitters continuously. Trainmen in the street railway service could not work the entire year.

Lawrence D. Bland, editor of the *Union Leader* since 1905, presented a table of increases in the prices of articles of food since 1907.

On July 2, W. D. Mahon, president of the Amalgamated Association, outlined the history of the organization and the railway industry. More than 200 locals had contracts with the companies. He believed the responsibility of motormen and conductors was greater than that of any men in any other form of transportation. The financial statements of companies in the United States showed a steady increase in gross income. In 1902 one out of 18,000,000 passengers was killed, and in 1907 one out of 13,000,000. In the last three years in Chicago, twenty-two trainmen were

killed on the surface lines, and eight totally disabled. The industry owed the employees a living when they became too old for service. Mergers resulted in a reduction of the cost of management. In 1892 there were six companies in Chicago. Now there was only one. The reduction in the expense of supervision should make it possible to take better care of the men. The men were not properly provided for anywhere in the street railway industry in this country or Canada. The arbitrators should consider only local conditions. When Mr. Mahon had finished, counsel for the employees announced that he had completed their side of the case.

L. A. Busby, president of the Chicago Surface Lines, took the stand on July 5. He outlined his ten years' connection with street railways, and explained briefly the development of the graded scale up to 1909, when the present five-year spread was established. Mr. Busby introduced exhibits showing the average monthly wages of regular, extra and carhouse men for May, 1915, for all employees to be \$74.20 a month. With \$3.10 a month added as the cost of free transportation to the men, the general average of all men in the service was \$927.60 a year, with the average for high-rate men \$1,011.60 a year. Other statistical exhibits were introduced to show that Chicago conditions were better than those in other cities as regards fall-backs, pull-outs, turn-ins, accident report time, night cars and receiver's pay. An exhibit was also introduced showing that bonus and dead-time allowances cost the company 3,255,540 man-hours a year, or \$1,011,786. This resulted in the Chicago trainmen receiving the equivalent of 34 cents an hour maximum wage.

Exhibits introduced showed that the average fare per passenger ranged from 2.8 cents in Chicago to 4.96 cents in some of the Eastern cities. The purpose of the graded scale was to insure just recognition of increased efficiency, to reward the men for long years of service, and to keep them in the service. In connection with the graded scale, Mr. Busby introduced an exhibit showing conditions in other cities.

The graded scale had been adopted for Chicago school teachers and was in line with the apprenticeship courses required in other skilled trades averaging approximately four years. According to Mr. Busby 200 days a year was the average working time for carpenters, with 185 days of the year as the average working period for all trades. The average earnings per annum for outdoor trades amounted to \$785. The average wage in Chicago in all industries was approximately \$590 a year, and the average wage of all industries in Illinois ranged from \$588 to \$914 a year. Most of this information was taken from the census of 1910.

Mr. Busby said that 6546 new applications were filed within the past year. In addition more than 5000 men had been refused permission to file applications. Only 871 positions were available during the year. Chicago conditions did not warrant an increase in wages at this time. Operating expenses were increasing faster than the gross income. Between 1902 and 1912, the capital required to develop and carry on the industry increased 113 per cent. Other exhibits showing the per cent of increase in passenger receipts over previous years, the decrease in the last annual report and the decrease since Feb. 1, 1915, were introduced. Another exhibit showed the receipts, expenditures and divisible receipts per revenue car-hour as increasing prior to 1914, and decreasing since that time. Numerous other statistical exhibits showing the expenses of maintaining property and making renewals were also introduced. In 1912 46,380 accidents were reported, or 46.7 per million passengers. In 1913 these figures were 39,330 accidents, or thirty-five per million passengers. In 1914 there were 37,143 accidents or thirty-three per million passengers. During the first four months of 1915, beginning Feb. 1, the number was reduced to twenty-eight accidents per million passengers. This included accidents of all kinds as reported by the trainmen. This closed the testimony taken on the evening of July 5.

On July 6 Mr. Busby was cross-examined regarding wages and transfers. Counsel for the employees questioned him about the surface railways contract with the city, the original purchase price of the properties and the allowances on construction costs when work was done by company forces. Mr. Busby thought that the Cleveland Railway and New York subway ordinances were more favorable to the

companies than the 1907 Chicago ordinance. Mr. Busby received \$60,000 a year salary; Henry A. Blair, chairman of the board of operation, \$30,000 a year, and John M. Roach, adviser to the president, \$20,000 a year. Each of the other four members of the board of operation received \$2,500 a year. Counsel for the employees criticised the company for setting aside 14 per cent in cash for maintenance and renewals. Questions of depreciation, taxes and dividends paid by the surface railways were also touched upon.

William Weatherwax, general superintendent of transportation of the Chicago Surface Lines, followed Mr. Busby. In direct examination, he stated that men were promoted from the train service to responsible positions in nearly all the railway departments. He would rather not employ ex-trainmen because it was difficult for them to overcome their old habits. Mr. Weatherwax outlined his experience with the company beginning as a tow-boy in 1886. He compared old-time and present-day working conditions. Mr. Weatherwax thought that the five-year period was just right for a man to attain maximum efficiency. The request of the employees that all Sunday runs be eight hours or less was not practical. It would require the use of many men who would not have work on other days of the week. Mr. Weatherwax had not endeavored to increase the schedule speed, but found it difficult to keep the men from running in advance of the schedules.

MARKET STREET OPERATION, SAN FRANCISCO

Superior Court Judge Sturtevant granted a temporary injunction on July 6 to the United Railroads, San Francisco, Cal., restraining the city of San Francisco from operating municipal C and D line cars on the outer Market Street tracks below Geary Street. The court held that the city violated the contract with the United Railroads dated Nov. 12, 1912. No question of the usurpation of the franchise is involved, and municipal railways may still operate on Market Street the lines in operation prior to the 1912 agreement. This means that all passengers from the ferry to the exposition via Market Street must transfer. The court finds the municipal cars on the outer ferry loop so numerous that the United Railroads business is affected and excessive wear caused to the track and overhead construction. The judge states that his decision parallels the case of the Second Avenue Passenger Railway, Pittsburgh, involving the same principle. The United Railroads has been placed under a bond commensurate with the financial loss estimated by the Municipal Railway. Appeal to the Supreme Court is to be made immediately.

LATEST DETROIT PURCHASE DRAFT ACCEPTABLE

The Detroit (Mich.) United Railway, through President J. C. Hutchins, has notified the Detroit Street Railway Commission that the latest draft of the proposed agreement for the purchase by the city of the company's property within the one-fare zone is acceptable to the officials and will be presented to the stockholders on July 14 with a recommendation for acceptance. The letter to the commission also advised that upon acceptance by the commission of the contract the company would take steps immediately to procure the consent required of the trustees for the holders of the bonds to appear in the chancery court to fix the price of the property provided the contract is accepted by the electors. The commission accepted the contract and gave the company until Aug. 2 to obtain formal ratification by the stockholders and consent of the trustees of the bondholders to appear in the suit. In addition to the contract a number of city charter amendments must be prepared, and upon these agreement must be made by both parties.

In a letter to the commission, Mr. Hutchins repudiated the suggestion that the company's attorneys had endeavored to write anything into the contract "prejudicial to the city's interests," and stated that a similar allegation might be made against the city's attorneys. The company also wrote the commission to the effect that it would not accept the idea of having the grievances of the street car men's union threshed out before the commission, maintaining that the present method of arbitration is sufficient to take care of the matter. It is stated that Elihu Root will pass upon the agreement for the bondholders.

CINCINNATI TAX CASE

On the plea that the State is attempting to collect double taxes, the Cincinnati, Milford & Loveland Traction Company appealed to the Ohio Supreme Court on June 18 for an order directing the Hamilton County Court of Appeals to certify the record of the decision it recently rendered in favor of the State. This court decided that the company must list for taxation as its gross earnings all the sums collected by it, although under the terms of the agreement between it and the Cincinnati Traction Company it is compelled to turn over 3 cents out of every 5 cents from fares collected in the city to the Cincinnati Traction Company. As the Cincinnati Traction Company pays excise taxes on this portion of the receipts the interurban line holds that the construction of the law made by the lower court is incorrect.

The State Tax Commission has placed the value of the Cincinnati, Newport & Covington Light & Traction Company's property in Ohio at \$1,020,620, an increase of \$360,000 over 1914. This amount was fixed on the basis of the company's settlement with the Hamilton County authorities for the years prior to 1911, it is said. The question now arises as to whether the commission can add to the valuations for the years 1911-1914 inclusive. This has been submitted to the Attorney-General for a ruling. The increase grew out of a complaint recently made by Attorney R. S. Alcorn of Cincinnati.

QUESTION OF CONSENTS

Neither Cleveland nor Cincinnati may be able to push through certain contemplated extensions and improvements, requiring consents of owners of abutting property before October, if the Ohio Supreme Court does not convene in special session to render decisions on the cases that were argued on June 30 and July 1, since this tribunal has adjourned for the summer vacation. The cases were those of property owners on Euclid Avenue, Cleveland, between East Twentieth and East Fortieth Streets, and David L. Carpenter and other property owners on Reading Road, Cincinnati, who object to the extension of the Bond Hill line over their street.

Walter M. Schoenle, city solicitor, appeared for the city of Cincinnati and argued that the law requiring the consent of property owners to a street railway is unconstitutional and that a decision for the city would be of great advantage to all cities and towns of the State. Attorney Dinsmore, representing the property owners, asserted that the consent law is not a delegation of legislative power, as had been contended, but that it merely states conditions upon which the city may act.

The main question in the Cleveland case is whether the new charter adopted takes precedence over the State law, when there is a conflict between them. The charter provides that consents of property owners along the line of a proposed street railway track are not necessary. Law Director Stockwell represented the city and Attorney Harry J. Crawford represented the Cleveland Railway, while Attorney Wilbur Wilkin appeared for the property owners. Mr. Stockwell contended that the charter under the home-rule amendment to the constitution supersedes the State law.

Director Stockwell contends that if the Supreme Court rules against the city, it will have the right to build the track itself and lease it to the Cleveland Railway.

STATEMENT OF RAILROADS ON RAILWAY MAIL PAY

The committee on railway mail pay, representing 264 railroads, operating 218,000 miles of line, made public on July 3 a booklet entitled "What the Railway Mail Pay Problem Means to the Railroads." In the booklet the committee discusses the law dealing with the system of payment for mail transportation advocated by the Post-office Department introduced in the last session of Congress. This proposed law, known as the Moon bill, failed of passage, but the Postmaster General has announced that he intends to have it introduced again in the new Congress. In the opinion of the committee as set forth in the booklet, the defects of the present practice respecting the payment to

the railroads for carrying the mails can best be remedied by providing the following reforms:

1. That the mails be weighed, and the pay be readjusted, at least once a year on every railway mail route, instead of once in four years, as at present.

2. That the railroads be paid for the use and operation of compartment post-office cars—for which the present law allows no pay—on a pro rata basis with the compensation allowed for full railway post-office cars.

3. That the railroads be paid for, or relieved from, the duty of carrying the mails between railroad stations and post-offices.

The booklet contains the resolutions unanimously adopted at the meeting of railroad executives in New York City on May 20, last, at which 90 per cent of the mileage of the country was represented. These resolutions completely sustained the position of the committee on railway mail pay, and indorsed the remedies it has suggested. The resolutions also approved the suggestion of the committee that in its opinion the ultimate solution of the railway mail pay problem would lie in reference of the matter to the Interstate Commerce Commission, with full power.

PHILADELPHIA TRANSIT LOAN APPROVED

The Councils of Philadelphia, Pa., on July 1 by unanimous vote passed ordinances appropriating the \$6,000,000 transit loan to the Department of City Transit and authorizing Director of City Transit A. Merritt Taylor to let contracts and start work immediately on the Broad Street subway and the Frankford elevated. The ordinances allotted \$3,000,000 of the loan for each of these projects. Actual construction work on both projects will be started on Sept. 13. Mr. Taylor says that if there is no delay in making the loans available, the entire Broad Street subway can be completed in thirty-two months and the Frankford elevated road within two years.

Advertisements appeared in the Philadelphia morning papers of July 2 inviting bids for the construction of the section of the Broad Street subway which will extend from a point in Broad Street at the north side of the existing subway structure of the Market Street Elevated Passenger Railway north of City Hall to a point in Broad Street at the south side of the existing subway structure of the Market Street Elevated Passenger Railway south of City Hall. This section will pass diagonally under the westerly side of City Hall. Bids for this work will be opened on Aug. 16. The specifications call for actual construction to be commenced on Sept. 13, and for the contract to be completed within thirty months.

Advertisements were scheduled to appear in the papers on July 8, inviting bids for the construction of the foundations for the Frankford elevated line, between Callowhill Street on the south and Unity Street on the north. Bids for this work will be opened on Aug. 16. The specifications call for actual construction to be commenced on Sept. 13, and for the contract to be completed within eight months. Advertisements will appear in the papers on July 26 inviting bids for the construction and erection of the steel work for the section of the Frankford elevated line, extending from Callowhill Street on the south to Unity Street on the north. Bids for this work will be opened on Aug. 23. The specifications call for the erection of the steel work to be commenced on Dec. 1, 1915, and for the contract to be completed within one year.

On July 1 Mr. Taylor issued a statement in regard to the work which he concluded as follows:

"Now that the policy of the city of Philadelphia has been finally determined by formal action on the part of the electors and the municipal authorities, after three years of research and public discussion, with full knowledge of all relevant facts, I hope that all parties in interest will cooperate generously in expediting the completion of the much-needed facilities which have been authorized, and such additions thereto as will be necessary, to the end that Philadelphia and Philadelphians may enjoy the bounteous returns which they will gain in time saving, convenience and comfort, and from a wider field of opportunity which will result from the establishment and operation of adequate rapid transit facilities in Philadelphia on a proper basis."

The Mayor has signed the transit loan bills.

WAGES IN SPRINGFIELD AND WORCESTER

The employees of the Worcester (Mass.) Consolidated Street Railway and the Springfield (Mass.) Street Railway have ratified the wage agreement with the New England Investment & Security Company referred to in the *ELECTRIC RAILWAY JOURNAL* of July 3, page 34. The new wage schedule provides for the same daily rate of wages now paid conductors and motormen on the Springfield Street Railway, but hereafter all overtime will be reckoned on the basis of nine hours a day instead of ten hours a day, as was settled upon when the previous agreement became operative. The employees of the Worcester Consolidated Street Railway, who received a minimum wage of 23 cents an hour and a maximum wage of 28½ cents an hour, will receive a minimum wage of 25 cents an hour and a maximum rate of 30½ cents an hour for the first six months and a minimum of 25 cents and a maximum of 31 cents for the last six months under the new agreement. The agreement will expire on May 31, 1916.

The miscellaneous departments, which include messengers, freight handlers, yard men and other employees, exclusive of conductors and motormen, will all receive increases in wages. The messengers hereafter will receive conductor's wages, which will mean that instead of working on an hourly basis at 25½ cents an hour for a ten-hour day, they will receive \$2.85 for a nine-hour day, or an increase of about 6 cents an hour over the present rate. The platform men will receive an increase of 7½ cents an hour, with a reduction in hours. Instead of working a ten-hour day for \$1.92½, they will receive \$2 for a nine-hour day. All other departments classified under miscellaneous will get a nine-hour day, with an eight-hour day on Sundays and holidays. They will receive time and a half for all overtime work. It is estimated that 120 or more men of the miscellaneous departments will receive an increase in wages ranging from 5 to 37½ cents a day over and above what they receive now, not including the increase that is represented in the reduction of the working day from ten to nine hours.

Under the new management the wages of the employees of the Springfield Street Railway and the Worcester Consolidated Street Railway are practically equalized, the former still profiting by a small margin. The Worcester men receive a minimum of \$2.25 a day for a nine-hour day as compared with \$2.30, the present wages on the Springfield lines. They will receive a maximum of \$2.75 for the first six months of the agreement and \$2.79 for the last six months of the agreement, as compared with \$2.85, the maximum daily rate on the Springfield lines. They will still continue to operate on platform time, whereas the Springfield conductors and motormen will continue to operate under a day schedule. The Springfield employees, instead of receiving a minimum of 23 cents and a maximum of 28½ cents for overtime, will receive about 25½ cents an hour for the minimum schedule and about 31½ cents for the maximum schedule. This means an increase of 2½ cents an hour for the one-year men and an increase of 3 cents an hour for the three-year men.

KANSAS CITY-CLAY COUNTY SUIT

Nine of twelve jurors in the Jackson County Circuit Court gave a verdict on July 1 for \$1,500,000 damages to the Interstate Railway against the Kansas City, Clay County & St. Joseph Railway, the Wyandotte Construction Company, and the estate of George Townsend. The motion for a new trial will be heard on Aug. 2. If unsuccessful, appeal will follow. The Interstate Company, suing for \$2,000,000, alleged that the defendants had usurped a right-of-way, which two-year options received several years ago had kept alive. Some property owners testified they had not given consent as claimed by the plaintiffs to notation of renewal on options. One question involved was whether the plaintiffs had paid for any land, or had done the work required by law to preserve the charter rights. A similar suit by the Interstate Company against the Missouri River & Camden Company, a Townsend steam road project, was thrown out of court four years ago. Suit similar to the Interstate case had been filed against the Kansas City, Clay County & St.

Joseph Railway for \$200,000 damages by the Kansas City & St. Joseph Electric Railway. This suit was dismissed, and the Kansas City-St. Joseph Electric Railway joined the Interstate Company, alleging it had sold its rights to the Interstate.

CINCINNATI TRANSIT COMMISSION REPORTS

The Rapid Transit Commission at Cincinnati, Ohio, made its report to Mayor Spiegel on July 2. It calls for the construction of a line under what is known as Modification H of Plan No. 4 and locates the line from a point in Norwood, a suburb of Cincinnati, through the Duck Creek ravine, under Owl's Nest Park, skirting the bluff and Mount Adams to a point near the Pennsylvania Railroad station; thence over Pearl Street to Walnut Street, as a subway under Walnut Street to the canal, in the canal to St. Bernard and then through the open country to Norwood. The cost of the line, exclusive of power house, equipment, and damages to adjoining property, is estimated by the commission at \$5,717,849.

The commission says that the line should be built by the city according to the plan mentioned in its entirety and that the people should be asked to vote for a bond issue that will cover the cost. It is the opinion of the commission, however, that the line should be leased to an operating company. If no tenant is found in advance the city should operate the line in order to give the interurban lines an entrance to the business section.

The report contemplates a high-speed line over private right-of-way on the section between St. Bernard and Norwood as soon as the city is built up in that section and street crossings become dangerous. The commission recommends that land be purchased at once for that purpose. The opinion is expressed that the line would not earn its fixed expenses in the beginning and that the city should arrange to make this good in some way. The commission suggests that the proposed boulevard along the Miami and Erie canal be developed with the construction of the road. The subway should be open between street crossings, so that as much light and air as possible may be admitted to the cars.

The commission has been at work a year and has had the aid of George F. Swain, chairman of the Boston Rapid Transit Commission, Engineer F. B. Edwards, and Engineer Ward Baldwin, the latter having charge of the electrical phase of the proposition.

Mayor Spiegel has expressed disapproval of the plan, principally because it would provide excellent advantages to St. Bernard and Norwood, both of which have opposed annexation to the city. He says the western part of the city has been practically ignored by the commission. He also favors a wide street along the canal, instead of a boulevard. Mayor Spiegel said he would be in no hurry to act on the report, because such a large proposition should not be rushed through without due consideration. The report urged the appointment of a commission at once under the Bauer rapid transit act, so that the road may be built as soon as possible.

ARBITRATION OF WAGES IN RHODE ISLAND

The question of wages, about which the officers of the Rhode Island Company, Providence, R. I., and the representatives of the men have been unable to agree, will be arbitrated. A. E. Potter, president of the company, was quoted by the *Providence Journal* of July 2 in part as follows:

"We have agreed to arbitrate the wage question. We have reached a good understanding on all other matters, that is, the five demands made by the men. It is true that we offered the extra men \$1.50 a day. In fact, we even went further, as we agreed to give that sum to all such men who were required to report for duty. This was done in lieu of any arbitration on this particular point. At yesterday's conference I offered to grant without further arbitration such increases as the men asked for in their recent demands, providing the company received an increase of 2 per cent in its business month by month compared with the previous year. Likewise I assured them that I would recommend to the board of directors that they be

given the increase asked for next year, providing we received an additional increase of 2 per cent in our business. I do not know what action has been taken on these proposals."

Electrification of Short Oregon Line.—It is reported that the purchase of the Rogue River Valley Railroad by the Southern Oregon Traction Company, Medford, Ore., means the electrification of the Rogue River line for its entire length, 8 miles, which includes 1 mile in Medford, 5 miles between Medford and Jacksonville, and 2 miles to the brickyard, and the extension on West Main Street of the present line of the Southern Oregon Traction Company.

First-Aid Chests Required on Illinois Railroads.—The Illinois Legislature, which adjourned last week, passed a bill requiring all railroads to provide emergency chests for first-aid to the injured on all trains. The workmen's compensation act was also amended so that its provision would apply to transportation companies, and a third bill amends the public utilities act to permit railroads to give transportation to newspapers and magazines in exchange for advertising.

New Publicity Department for Barstow Properties.—W. S. Bartow & Company, New York, have started a new publicity department in charge of E. Burt Fenton, manager, an experienced newspaper man. For the present Mr. Fenton's headquarters will be in Sandusky, Ohio. The purpose of the new department is to distribute information of interest to the public concerning the various railway and lighting properties controlled by this company and bring the public into closer relations with these properties.

Mr. Moore Returns.—George Gordon Moore, well known through his activities in electric railway promotion in Michigan and his connections with the San Francisco-Oakland Terminal Railways, Oakland, Cal., has returned from Europe. When the war began Mr. Moore was invited by General Sir John French to visit France, and he was at the British army headquarters almost continuously from the outbreak of hostilities up to the time of his return to this country. It is said that Mr. Moore has the distinction of being the only American permitted to visit the English headquarters.

Question of Tunnel or Bridge in New York.—Chairman Edward E. McCall of the Public Service Commission for the First District, has sent a letter to the Board of Estimate and Apportionment, inclosing a report from Alfred Craven, chief engineer of the commission, upon the proposal made by the Board of Estimate that a tunnel under the East River at Sixtieth Street be substituted for the use of the Queensboro Bridge for the tracks of the new Broadway subway, to be operated by the New York Municipal Railway Corporation. The chief engineer prefers the use of the bridge in accordance with the dual system contracts rather than risk the delay which may follow a change in plans at this time. Commissioners J. Sergeant Cram and Robert C. Wood, however, favor the tunnel and have notified the Board of Estimate and Apportionment to that effect.

Pennsylvania Public Service Commission Appeals.—In declaring that it had no jurisdiction over appeals from the decisions of the Public Service Commission of Pennsylvania under the revised act of June 3, 1914, the Dauphin County Court has left nearly twoscore of such appeals from various business men's and improvement associations undecided with no apparent way of ever questioning these decisions in court. Under the act of 1913, the Dauphin County Court was named as the tribunal to hear all appeals from the Public Service Commission's decisions. When the act was superseded on June 3, the appeals were directed to the Superior Court with the proviso that they must be made within thirty days of the commission's decision. Some forty decisions had already been filed for argument in the Dauphin County Court, and when the first of these came up the court announced that it had no jurisdiction under the latest act. As more than thirty days have elapsed since the commission's decision, these appeals have no means of disposition. Several appeals have already been made to the Superior Court and at least one of these will question the constitutionality of the new legislative act.

Financial and Corporate

ANNUAL REPORT

Pittsburgh Railways

The statement of income, profit and loss of the Pittsburgh (Pa.) Railways for the year ended March 31, 1915, follows:

Gross earnings from street railway operations.....	\$11,670,091
Operating expenses:	
Maintenance of way and structures.....	\$1,183,427
Maintenance of equipment.....	733,076
Traffic.....	28,017
Transportation.....	4,384,329
General and miscellaneous.....	1,286,271
Total operating expenses.....	\$7,615,120
Taxes.....	438,082
Total operating expenses and taxes.....	\$8,053,202
Net earnings from street railway operations.....	\$3,616,889
Auxiliary operations:	
Gross earnings.....	\$143,532
Operating expenses and taxes.....	97,098
Net earnings.....	\$46,434
Total net earnings.....	\$3,663,323
Other income.....	112,833
Total income.....	\$3,776,156
Deductions from income.....	2,955,797
Net income before deducting fixed charges.....	\$820,359
Interest on funded debt.....	389,620
Interest on income debentures.....	330,739
Net income for the year.....	\$100,000
Surplus, April 1, 1914.....	636,982
Additions to surplus.....	6,984
Gross surplus.....	\$743,966
Deductions from surplus.....	116,692
Surplus March 31, 1915—per balance sheet.....	\$627,274

Although the territory served experienced a very severe industrial depression covering almost the entire year, the loss in gross earnings from street railway operation was more than offset by economies practised and reduced cost of power. A comparison of the results of 1915 with those of 1914 show a decrease in the gross earnings from street railway operation of \$112,769, or 0.95 per cent, the operating expenses having been decreased \$280,747, or 3.55 per cent. The result was a gain in net earnings of \$167,978, or 4.32 per cent. The operating ratio for street railway operation was 65.25 per cent in 1915 as compared with 67.01 per cent in 1914. The average passenger earnings per car-mile were 31.29 cents, as compared with 31.45 cents, a decrease in 1915 of 0.16 cent.

There was expended during 1914 the sum of \$1,453,061 for improvements, betterments and extensions, of which \$1,073,970 was charged to property accounts, and \$379,091 to a deferred maintenance account, to be amortized during the life of the property benefitted. In addition, there was expended by the maintenance of way department \$1,183,427 for ordinary maintenance of roadway, tracks, bridges and overhead construction. By improvements the fire-insurance cost for the year was reduced \$7,955. During the year the toll bridges showed an increase in receipts of \$4,875, or 20.19 per cent, and a decrease in expenses of \$1,065, or 7.24 per cent.

During the year the company received the one hundred low-floor motor cars mentioned in a previous report. Nearly all of these are now in service. The low-floor, low-wheel, side-entrance car has met with the approval of the public, and it has been very satisfactory in operation. Owing to the public educational program adopted by the transportation and claim departments, the accidents and expenditures for claims have been greatly reduced. All the employees, with the exception of the trainmen, have been insured under the group-policy plan of the Equitable Life Assurance Society.

The above information is contained in the annual stockholder's report of the Philadelphia Company, which controls the Pittsburgh Railways. This report states that during the year the Philadelphia Company caused valuations to be made of its transportation and distribution lines, service lines, regulators, meters and compressing stations by independent

engineers. After making due allowance for depreciation these were incorporated in the balance sheet to the extent of a total increase of \$12,556,441. The book values of the Philadelphia Oil Company, the Pittsburgh & West Virginia Gas Company and Equitable Gas Company shares were increased to represent more correctly the actual value. The company availed itself of the above increases to make a reduction of \$8,924,254 in the valuation upon its books of street railway and traction stocks and other reductions in gas values sufficient to make the total amount of reduction in book values \$15,774,052.

The report also contains the annual statement of the Beaver Valley Traction Company, showing in the main the following results: Gross earnings from railway operations, \$334,093; operating expenses and taxes, \$236,704; net earnings from railway operations, \$97,388; net deficit from auxiliary operations, \$4,262; total net earnings, \$93,126; other income, \$518; total income, \$93,644; deductions and fixed charges, \$96,132; deficit, \$2,488, and surplus on March 31, 1915, \$92,336.

NORTHERN ELECTRIC REORGANIZATION

Preliminary Details of New Arrangement—Plan Believed to be Satisfactory to All Parties

It is reported that the reorganization of the Northern Electric Railway, Chico, Cal., has been brought into concrete form. The new organization plan represents the perfected work of the attorneys representing the bankers' committee, the underlying bondholders' committee, the Spreckels interests and the Sloss trustees.

The general features of the plan are that a new railroad corporation will be created to acquire the properties of the Northern Electric Railway, the Sacramento & Woodland Railroad, the Marysville & Colusa Branch and the Sacramento Terminal Company, the latter subject to the \$150,000 existing mortgage. This new corporation will issue first income bonds in exchange, bond for bond, for the bonds of the Northern Electric Company, the Sacramento & Woodland Railroad and the Marysville & Colusa Branch, and it will issue second income bonds in exchange, bond for bond, for the bonds of the Northern Electric Railway. All the bonds will bear interest at the rate of 5 per cent per year.

The unsecured creditors of the present companies will receive, as security for their claims, second income bonds equal to 50 per cent of their claims. These second income bonds will be delivered to the unsecured creditors by the Sloss Securities Company, and will be the consideration which the latter company will receive for its participation in the plan and for its cancellation of various unsecured claims it now holds against the Northern Electric Railway amounting to more than \$1,000,000.

The new corporation will also create a first mortgage bond issue of \$500,000 for the purpose of raising sufficient money to pay for necessary repairs and replacements to the road, receivers' certificates, expenses, attorneys' fees, costs of litigation, preferred claims for labor or materials which have been ordered paid by the court, and expenses of reorganization.

Interest will be payable unconditionally on the first mortgage bonds from the date of issue, and after five years from date upon the first income bonds. During the first five years interest will be payable on the first income bonds only as and when earned by the new corporation. Upon the second income bonds the annual interest charges will be non-cumulative.

All of the stock of the new corporation will be placed in trust with the Union Trust Company of San Francisco for a period of five years, with the power of selling the same for not less than \$2,000,000. In case of such sale the money will be distributed pro rata among the unsecured creditors and those secured by second income bonds. While the stock is so held in trust, the trust company will vote a majority of the stock in accordance with the instructions of the first income bondholders.

It is expected that the complete reorganization plan will soon be submitted to the bondholders and the creditors for their final approval. Support for the arrangement from all sources is anticipated.

REASON FOR PUGET SOUND DIVIDEND CUT

A circular has been addressed by the directors of the Puget Sound Traction, Light & Power Company, Seattle, Wash., to the stockholders in regard to the reduction of the quarterly dividend on the preferred stock of the company to three-quarters of 1 per cent, as noted briefly in the *ELECTRIC RAILWAY JOURNAL* of July 3, page 38. The directors say:

"This reduction of dividend is due to a decrease in earnings caused by operation of jitney buses at a time when business conditions have been generally unsatisfactory. The jitney first appeared in the Puget Sound district in January of this year, rapidly increasing in number until in February and March there were about 700 in operation, resulting for a time in a loss in gross earnings to the company of more than \$2,000 a day. A careful study of jitney operation throughout the country gives every indication that such cars under fair and reasonable regulation cannot be operated permanently and profitably in competition with street railways. A gradual decrease in such competition is, therefore, to be expected and such decrease is already taking place in the Puget Sound cities, the number of cars now in operation being less than 400.

"It is the opinion of the directors that neither the business depression alone, nor the operation of the jitney alone, would have affected earnings to such an extent as to make the reduction of dividend advisable. The company is at present in a strong position financially, with a substantial cash balance and only a small floating debt. The directors believe that this position should be maintained. As the company has had but six months of jitney competition, and as under most favorable circumstances this competition will not immediately disappear, they feel the company's resources should be conserved through postponing the payment of a portion of the preferred stock dividend.

"A return of general business toward normal conditions, or a further reduction in the operation of jitanies, should warrant the resumption of preferred stock dividends at the regular rate. The preferred stock is cumulative and, therefore, any deferred payments must be made up before dividends are paid on the common stock."

DES MOINES RECEIVERSHIP

Emil G. Schmidt, president of the Des Moines (Iowa) City Railway, has been appointed receiver of the property by the Federal Court as a result of action by the bondholders of the company to protect their interests. The decision of the State Supreme Court that the company's right to operate in Des Moines ends on Aug. 22 is believed to have been nullified by this latest court proceeding. Franchise negotiations are continuing, however, and a franchise settlement is expected. The franchise rights of the company were already being contested for by the bondholders in the federal courts, and the receivership will enable the company to make much-needed improvements which could not be made before on account of the unsettled franchise situation. Mr. Schmidt says that the jitney traffic in Des Moines is showing a big decrease and is now on the point of vanishing, if the growing receipts of the city railway are a criterion. The validity of the new jitney ordinance, which has been attacked in the courts, is undecided. Previous reference to the default in bond interest and the franchise difficulty of this company was made in the *ELECTRIC RAILWAY JOURNAL* of April 17.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga.—The officers of the Augusta-Aiken Railway & Electric Corporation recently filed with the Secretary of State of South Carolina a certificate of increase in capital stock from \$1,500,000 to \$2,500,000.

Bay State Street Railway, Boston, Mass.—The directors of the Bay State Street Railway have decided not to pay any dividend at this time on the \$20,517,200 of common stock, practically all of which is owned by the Massachusetts Electric Companies.

Belvidere (Ill.) City Railway.—W. C. Foster, Rockford, Ill., representing interests of that city, has purchased at auction the Belvidere City Railway.

Camaguey (Cuba) Company, Ltd.—The stockholders of the Camaguey Company, Ltd., have approved a proposition

to give the Electric Bond & Share Company an option for ninety days on the \$1,000,000 of capital stock of the company at \$90 a share. Examinations of the properties will be made.

Cleveland (Ohio) Railway.—The State Tax Commission has fixed a tentative valuation of \$24,891,100 on the property of the Cleveland Railway. Although the company has refused to pay the amount of taxes demanded for the last two years because of the excessive valuation placed on its property, and has brought suit to enjoin the collection of the amounts claimed each year, the tentative figures show an increase of \$2,138,370 over the value fixed last year and about \$5,000,000 more than the company is willing to concede. Each year the company tendered a check for the amount of taxes it was willing to pay and each year this was rejected by the county treasurer. These amounts have been set aside for payment when the courts adjudicate the matter. The company has insisted that the commission make known its methods of fixing the valuation, but this request has been refused.

Grand Valley Railway, Brantford, Ont.—The offer by the city of Brantford of the sale of the Grand Valley Railway line from Paris to Galt for \$30,000 and electrification of the Lake Erie & Northern Railway from Port Dover to Brantford, has not been accepted by M. H. Todd, acting for the Canadian Pacific Railway.

Lake Shore Electric Railway, Cleveland, Ohio.—The directors of the Lake Shore Electric Railway have decided to use the surplus earnings in the development of the business instead of making further dividend disbursements at present. The power service of the company is being improved at considerable cost, but the changes are expected to reduce the cost of production materially and make it possible for the company to increase the business of this department. The first preferred stock of the company is a cumulative issue.

Norton & Taunton Street Railway Company, Norton, Mass.—Judge De Courcy in the Supreme Court has appointed Amos F. Hill, Lowell, as receiver of the Norton & Taunton Street Railway Company, until foreclosure proceedings are brought by the American Trust Company, trustee for the bondholders, on account of defaulted interest. The company is a consolidation of the Mansfield & Norton, Mansfield & Easton, Norton & Attleboro and Norton & Taunton street railways. On June 1, 1903, all were mortgaged to the American Trust Company to secure \$296,000 of 5 per cent bonds.

Pacific Gas & Electric Company, San Francisco, Cal.—The board of directors of the Pacific Gas & Electric Company has declared a stock dividend of 6 per cent on the outstanding common stock, payable with stock certificates for whole shares of new common stock and stock dividend warrants for fractional parts of such shares in two instalments, 3 per cent on July 15, 1915, and 3 per cent on Dec. 15, 1915, to holders of common stock of record on June 30, 1915. Previous reference to this declaration was made in the ELECTRIC RAILWAY JOURNAL of June 19.

Peoria (Ill.) Railway.—The Illinois Public Utilities Commission has issued an order permitting the Peoria Railway to sell \$115,000 of first and refunding 5 per cent mortgage bonds.

Southern Oregon Traction Company, Medford, Ohio.—The purchase of the Rogue River Valley Railroad, an 8-mile steam line, by the Southern Oregon Traction Company is reported.

Washington & Maryland Railway, Washington, D. C.—The Public Utilities Commission of the District of Columbia has authorized the Washington & Maryland Railway to issue \$66,200 of first mortgage thirty-year 5 per cent bonds at the highest price obtainable under such details of sale as may be approved by the commission. The proceeds are to be used to fund indebtedness for cost of construction and improvements now made and to provide working capital. In a previous decision the commission valued the property of the company, including working capital, at \$63,381 as of Aug. 15, 1914. The present debt to be funded is \$53,000, and in order that the total securities may not exceed the fair value, the outstanding capital stock must be reduced to \$10,360.

Western Ohio Railway, Lima, Ohio.—The Western Ohio Railroad was authorized by the Public Utilities Commission of Ohio to transfer its interurban property to the Western Ohio Railway and its electric light property at Sidney to the Standard Power & Equipment Company.

DIVIDENDS DECLARED

- Bay State Street Railway, Boston, Mass., 3 per cent, first preferred.
- Boston (Mass.) Suburban Electric Companies, 50 cents, preferred.
- Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.
- Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.
- International Traction Company, Buffalo, N. Y., 2 per cent preferred.
- Kentucky Securities Corporation, Lexington, Ky., quarterly, 1½ per cent, preferred.
- Ottawa (Ont.) Traction Company, Ltd., quarterly, 1 per cent.
- Ottumwa Railway & Light Company, Ottumwa, Iowa, quarterly, 1¼ per cent, preferred.
- Public Service Investment Company, Boston, Mass., quarterly, \$1.50, preferred.
- Puget Sound Traction, Light & Power Company, Seattle Wash., quarterly, 75 cents, preferred.
- Railway & Light Securities Company, Boston, Mass., 3 per cent, preferred; 3 per cent, common.
- South Carolina Light, Power & Railways Company, Spartanburg, S. C., quarterly, 1½ per cent, preferred.
- Springfield & Xenia Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.
- Youngstown & Ohio River Railroad, Leetonia, Ohio, quarterly, 1 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., May, '15	\$165,033	\$114,124	\$50,909	\$39,678	\$11,231
1 " " '14	186,749	125,732	61,017	39,604	21,413
11 " " '15	1,818,854	1,175,487	643,367	438,487	204,880
11 " " '14	1,920,524	1,219,435	701,089	420,259	280,630

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$60,920	\$32,008	\$28,912	\$17,500	\$11,412
1 " " '15	56,965	*27,962	29,003	17,367	11,636
12 " " '15	791,131	*332,303	458,828	209,925	198,903
12 " " '14	772,137	*352,698	419,439	208,423	211,016

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$90,909	*\$59,018	\$31,891	\$30,079	\$1,812
1 " " '15	94,761	*59,111	35,650	28,840	6,810
12 " " '15	1,045,731	*704,925	340,806	347,431	†6,625
12 " " '14	1,172,194	*709,159	463,035	315,806	147,229

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$245,947	*\$151,170	\$94,777	\$37,821	\$56,956
1 " " '15	254,559	*166,580	87,979	43,673	44,306
12 " " '15	3,065,554	*1,846,344	1,219,210	467,975	751,235
12 " " '14	3,052,154	*1,965,552	1,086,602	489,108	597,494

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$1,108,008	*\$585,862	\$522,146	\$359,853	\$162,293
1 " " '15	1,106,985	*586,519	520,466	343,608	176,864
12 " " '15	14,017,929	*7,520,595	6,497,334	4,294,048	2,203,286
12 " " '14	13,894,073	*7,697,943	6,196,130	3,988,669	2,207,461

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$204,546	*\$117,802	\$86,744	\$70,326	\$16,418
1 " " '15	197,885	*114,135	83,750	63,504	20,246
12 " " '15	2,550,473	*1,441,152	1,109,321	769,781	339,540
12 " " '14	2,429,876	*1,398,351	1,031,525	747,687	283,838

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$194,301	*\$117,593	\$76,708	\$63,889	\$12,819
1 " " '15	227,430	*153,711	73,719	59,686	19,033
12 " " '15	2,498,810	*1,483,543	1,015,267	747,005	268,262
12 " " '14	2,751,609	*1,731,975	1,019,634	611,725	407,909

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$323,324	\$191,317	\$132,007	\$51,524	\$80,483
1 " " '15	323,036	191,808	131,228	50,660	80,568
5 " " '15	1,424,675	900,768	523,907	255,962	267,945
5 " " '14	1,403,920	860,110	543,810	250,815	292,995

REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.

1m., May, '15	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 " " '14	\$247,644	*\$148,625	\$99,019	\$56,845	\$42,239
1 " " '15	256,325	*159,538	96,787	56,454	40,407
5 " " '15	1,210,228	*755,134	455,094	284,286	†171,132
5 " " '14	1,247,905	*777,784	470,121	279,187	†191,284

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

THE JITNEY BUS

Philadelphia Regulatory Measure Signed—New Orleans Ordinance Sustained in State Supreme Court

On July 2 Mayor Blankenburg of Philadelphia signed the Jitney regulation ordinance after it was returned to him by Councils with his amendment to the zone clause refused. The ordinance will become effective on July 12. In a statement the Mayor made it plain that he objected to the zone clause in the measure, but that he was opposed to permitting jitneys to operate unregulated all summer. Immediately after announcement was made that the Mayor had signed the bill, G. S. Winner, president of the Jitney Auto Service Company, said his organization would ask the Court of Common Pleas to grant a temporary injunction restraining the department of public safety from enforcing the provisions of the law. If this request is refused, he said, the company would appeal to the Public Service Commission for redress. John H. Fow, counsel for the Jitney Auto Association, also said he would file a bill in equity restraining the police department from enforcing the zone section of the ordinance.

The New Orleans ordinance designed to regulate jitney traffic was upheld on June 28 by the State Supreme Court, and a temporary injunction obtained in the Civil District Court by jitney owners to prevent the city authorities from enforcing the law was dismissed. Owners of jitneys objected principally to a provision of the ordinance which stipulated that all owners must give an indemnity bond of \$5,000. Each of the cars of the New Orleans Railway & Light Company is affected by the ordinance.

When the proposed ordinance regulating the jitneys in Scranton, Pa., came before Councils, a delegation of jitney owners asked Councils to define regular routes for them to travel on streets not occupied by the lines of the Scranton Railways, and offered to furnish the city with a blanket bond covering all members of the association. The offer was accepted.

At the request of the Pottsville (Pa.) Jitney Owners' Association, Judge Brumm has issued an injunction on Mayor Mortimer and the City Council preventing the enforcement of the jitney ordinance recently passed. The jitney owners say the new law is impossible of enforcement, as it requires a certificate of efficiency from all drivers, and there is nobody with authority to issue such certificates. They also charge that taxicabs exact large fares and are taxed only \$10 annually, while jitneys with 5-cent fares are taxed from \$25 to \$100.

City Solicitor Field of Baltimore, Md., has submitted to the Board of Estimate a tentative ordinance for the regulation of the jitney in that city. The measure fixes the license fee at \$200 for a car with a capacity of eight passengers or less, with an additional payment of \$25 for every passenger in excess of eight. A further tax of 9 per cent of the gross receipts is provided, this being at the same rate as the tax imposed on the earnings of the local railways for park purposes. The matter of an indemnity bond has not been covered in the measure as prepared by Mr. Field, as the Mayor believes that this could perhaps be dealt with better in a separate measure.

The jitney regulatory ordinance passed by the City Council of Grand Rapids on May 10 has gone into effect. The Council found that of the 3385 names signed to a petition presented by the jitney men for a referendum only 947 were qualified electors and the petition was promptly revoked. The ordinance provides for the payment of a license fee of \$3.50 for each passenger according to seating capacity. The bond for each driver is fixed at \$10,000. Jitneys are required to operate between 6 and 10 a. m., noon, 1 and 2 p. m., and 5 and 8 p. m.

Judge Leslie R. Hewitt of the Superior Court at Los Angeles, Cal., has sustained the city's demurrer to the suit of J. M. McClasky for an injunction to restrain enforcement of the motor bus ordinance. The ordinance became effective July 1, but the provision for \$11,000 indemnity bonds does not become effective until July 17.

JITNEY DECREASE IN OAKLAND

Careful counts made by the San Francisco-Oakland Terminal Railways of the jitney buses operating in Oakland, Cal., indicate a gradual decrease in the number of 5-cent auto vehicles. The craze began the latter part of December, 1914, and within thirty days approximately 500 machines appeared in the service. The need of legislation was quickly demonstrated. At that time jitney drivers were operating under a resolution passed by the City Council, permitting them to operate on a \$5 per annum license fee. The first formal ordinance, passed in February, 1915, added an indemnity bond of \$10,000 for each machine. Under this clause the jitneys have been paying a premium of \$80 to \$100 per annum to the Pacific Coast Casualty and the Guardian Casualty & Guarantee Companies. The latter company, however, has recently withdrawn from the field, gradually cancelling all bonds already written and refusing to write any new business. This ordinance also raised the city license fee from \$5 to \$60 per annum, payable quarterly; specified regular routes; called for a full stop at all railway crossings and other minor regulations under direct supervision of the chief of police of the city.

The ordinance was objectionable to the jitney operators, particularly the clauses in reference to the \$60 annual license fee and full stop required at all railway crossings. The City Council reconsidered the matter and passed a new ordinance which, while requiring the annual license fee of \$60, provided full stops at railroad crossings not controlled by flagmen or traffic officers and permitted operation over street railway crossings at a reduced speed of 5 m.p.h. This second ordinance was also opposed by the jitney operators on the ground that the \$60 license fee was exorbitant. An amendment was proposed to reduce this amount to \$10 per annum. This proposal was referred to a referendum vote by the people at the regular mayoralty election on May 11, and was defeated. The election at the same time approved an amendment making it obligatory upon the chief of police to revoke jitney licenses for violation of any part of the ordinance or any traffic law passed by the city.

The principal point now in dispute is between the city and those jitney operators who are operating under the original \$5 annual license fee. The city is endeavoring to collect the license fee under the new ordinance while the jitneys contend they are not liable to the \$60 tax until their original license expires. The city attorney has advised the Council that the right to increase the license fee is a legal one and the jitney operators received grace until July 1 to come in under the new license.

At present about seventy-five jitney operators are running under the original \$5 license fee which nominally expires on Jan. 1, 1916. They are preparing to contest the ruling of the city attorney through a case now pending in the lower courts, but with little encouragement for relief.

During the latter part of April 284 machines were licensed for jitney operation, but from actual count only 246 operated regularly during the week, except that on Saturdays due to increased travel and half-holidays, nearly all were operated. At that time the average earning per car was about \$4.25 per day, the longest route was 4.4 miles and the shortest 2.1 miles. In the latter half of May the total of machines licensed to operate had decreased to 270, but only 196 were in actual operation on week days other than Saturday. The greatest reduction was noticeable on the longest routes. By the middle of June the total number of licenses had decreased to about 200, which is accounted for by the rapid deterioration of machines, accidents, extraordinary wear, decrease in earnings and the apparent wearing off of the novelty as well as the usual loss of travel during the summer months on account of the absence of vacationists from the city.

Inquiry among jitney bus drivers indicated that no operators have made more than a living wage; also that a great many who are now running contemplate leaving the jitney field as soon as they are able to procure employment elsewhere. It was considered likely that many machines would be withdrawn from service under the provision for the renewal of licenses which was to go into effect on July 1.

THE PUGET SOUND COMPANY'S JITNEY SERVICE

A. L. Kempster, manager of the Puget Sound Traction, Light & Power Company, operating in Seattle, Everett, Bellingham, and Tacoma, states that preparations for installing jitney bus service in Seattle, heretofore reported in the *ELECTRIC RAILWAY JOURNAL*, are well under way, and that the first unit of fifty machines will be in operation in the very near future. Mr. Kempster said:

"Some of the machines are being operated temporarily in Everett, but they will be put on in Seattle as soon as we are in shape to handle the traffic. The first fleet will consist of fifty machines. We may confine the jitney system to that number or we may put on 200 more, just as there seems to be profit in a speedy short-haul business. No selection of routes has been made as yet, but it is probable that the Broadway and the Woodland Park runs will receive our attention first, as these seem to be profitable and much desired by the independent jitney operators. We are training our own men for the operation of our jitneys, and shall not accept anyone from the ranks of the licensed jitney bus operators. In this manner, we will find an outlet for certain labor not productive of profit now, and in addition we will be utilizing men whose records are well known to us and who have the fullest measure of our confidence. This will reduce the possibility of reckless driving, inefficient handling of traffic, or discourtesy."

The company contends that with a central repair plant, the ability to purchase supplies in large quantities, and other advantages that accrue through its well-developed organization it will make a better profit than is possible for the independent operators. According to the plans of the company, there will be no specially constructed bodies on small-car chassis, the company taking the stand that as soon as the attempt is made to carry a large number of persons in a jitney the element of speed, which is apparently one of the main desires of the traveling public, is lost.

SAN DIEGO TRAFFIC DECREASE

Division of Traffic Losses in San Diego Ascribes 62 Per Cent to the Jitney

Although it is the seat of the Panama-California Exposition, San Diego has suffered a slump in travel of all kinds due to the business depression. So far as the San Diego Electric Railway is concerned, the losses are enlarged by the still-unregulated jitney business. The company has made analyses of the jitney travel from time to time, and from these it has drawn the conclusion that about 62 per cent of the losses are due to this cause. The comparative figures for Sept. 1 to April 30, 1914 and 1915 respectively show a decrease in gross earnings from \$638,399 to \$625,847, or \$12,551, equivalent to 2 per cent. During the period of Sept. 1, 1914, to April 30, 1915, the jitneys carried about \$84,000 of business, while the hard times were held responsible for a loss of \$50,153. The latter two figures are based on comparisons of actual business and what the company expected with the normal annual increase in business up to May 1, the influence of the Panama-California Exposition has not become a determining factor in the company's revenues.

A count of jitney business at San Diego on May 29 for the eighteen hours from 6 a. m. to 12 midnight showed 2954 round trips, 7046 passengers, and \$352.30 in receipts. The average passengers carried per trip were 2.39. The total number of cars was 125, giving an average of \$2.82 per car. An ordinance regulating jitney traffic was passed by the Common Council on May 1, but its enforcement was postponed pending the service of a restraining order which expired on June 7. Since Jan. 1 the number of jitneys has averaged about 125. At one time as many as 200 men were engaged in jitney operation.

The company has lately adopted the plan of carrying its case to the public through a series of advertisements in the newspapers. All of the advertisements occupy large space and are directly concerned with problems growing out of the jitney competition. The subjects dealt with are indicated by the headings on the advertisements. Some of the headings in recent statements to the public follow: "Reduce Fares and You Break the Street Car Company," "Why

We Reduced Our Car Service," "Would the People Stand for the Jitney Bus if They Owned the Street Railway Lines?" "A Crippled Street Car System Is the Surest Way to Cripple a City," "Is the Jitney Competition Fair?" "Jitney Buses Make Hundreds of Men Jobless."

THE RECKLESS CHAUFFEUR

Vigorous Campaign of the Long Island Railroad to Inculcate Respect for Safety

The Long Island Railroad has inaugurated a campaign to induce chauffeurs and automobile drivers to be more careful when driving over grade crossings on Long Island. At prominent points on Long Island, where they cannot fail to be seen by those in automobiles, the railroad is placing huge signs which read:

THIS SIGN MAY SAVE YOUR LIFE TO-DAY
All the Precautions in the World Will Not Save the
Lives of Those Who Drive Automobiles Recklessly
Over Railroad Crossings

When Approaching a Crossing Please Stop, Look and Listen
We Are Doing Our Part. Won't You Do Yours?
LONG ISLAND RAILROAD.

The first of these signs has been placed at Broadway, Flushing, on the electrified division, where the railroad bridge crosses the highway. Some of the signs will be 50 ft. long and 10 ft. high, while others will be 10 ft. square. Several of them will be electrically lighted at night.

Not only is the Long Island Railroad putting up signs calling the attention of motorists to the danger of driving recklessly over grade crossings, but it is going to conduct an advertising campaign with a series of "life saving bulletins." These bulletins will make a plea for greater care on the part of drivers of motor cars on Long Island. There are still 631 grade crossings on Long Island. Up to date, 305 have been eliminated at a cost of more than \$15,000,000. At the present time, work on the elimination of thirty-two more crossings is in progress.

J. A. McCrea, general manager of the company, is urging upon the State of New York action similar to that taken by New Hampshire, which has just passed a law requiring every city and town to maintain a warning sign on every highway approaching a crossing at a reasonable distance on each side of the crossing. Under the New Hampshire act grade crossing protection is put in the hands of the Public Service Commission. That commission has ordered that enamel metal signs 24 in. x 12 in., white letters on a blue ground, shall be placed at varying distances from grade crossings. If any town for sixty days neglects to comply with the commission's order, it forfeits \$1 for each day. Anyone injuring or defacing these signs is liable to a fine of \$10.

Since 1911 there have been some 507 accidents at grade crossings on Long Island as the result of recklessness on the part of automobilists, motorcyclists, carriage and wagon drivers. In that period forty persons were killed and 111 persons injured, for none of which casualties the railroad company was responsible. Of the people killed twenty-four were in automobiles, twelve in wagons and carriages, and four on bicycles and motorcycles. Of the people injured sixty-seven were in automobiles, twenty-six in wagons and carriages, and eighteen included pedestrians, bicyclists and motorcyclists. In forty-two of the 507 grade-crossing accidents nobody was injured. In 157 cases automobile and wagon drivers defiantly ran their machines and vehicles through lowered gates, damaging the railroad's property to the extent of breaking the crossing gates. In attempting to cross the tracks 125 autos and fifty-three wagons were damaged. Some were struck by trains while others sustained damage by contact with lowered gates. From 1911 to June 17, 1915, a total of sixteen horses were killed and eight injured at Long Island grade crossings through the carelessness of their drivers.

J. A. McCrea, general manager of the Long Island Railroad, said on June 20:

"The Long Island Railroad management regards every accident as one too many, and it is now in the midst of an aggressive campaign to the end that life and property shall be preserved. If those who have occasion to use grade crossings on Long Island will co-operate with us, we shall succeed in accomplishing this distinctly humane object. Without their aid we must fail."

MILWAUKEE FARES

Pending the determination of the reasonableness of the original order by the Railroad Commission of Wisconsin commanding thirteen tickets to be sold for 50 cents by The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., the fare coupons given out by the company pending the Supreme Court Appeal will not be accepted for passage, according to J. D. Mortimer, president of the company. In a statement which he made Mr. Mortimer is quoted as follows:

"This company's investment in railway business is now earning so little as to make the expenditure of additional capital for further facilities absolutely impossible without obtaining some relief. Relief should take two forms—increased revenues and the cessation of hostile attacks on the business of the company. Both are necessary and the latter is as important as the former.

"When The Milwaukee Electric Railway & Light Company appealed from the decision of the Railroad Commission of Wisconsin, ordering the company to sell thirteen tickets for 50 cents, it was agreed by stipulation that the company should have the opportunity of contesting the reasonableness of the order, should the courts finally hold that the commission had the power to modify rates of fare prescribed by the company's franchise.

"The courts have now held that the commission possesses this power. Pending the determination of the reasonableness of the 'thirteen tickets for 50 cents' order, the fare coupons cannot be accepted in payment for transportation.

"Subsequent to the entry of the commission's order referred to, many things have occurred. The expense of the company of maintaining paving within the track zone has developed into large proportions. Requirements for increased service, resulting from special orders of the commission, have largely increased operating expenses. Opening of new lines and extensions of track, yet unproductive of appreciable earnings, have further reduced the margin which the commission believed to exist in the year 1912. General advances in prices paid for materials and labor have also increased expenses. More recently the advent of the jitney bus has reduced receipts without reducing expenses."

The decision of the United States Supreme Court in the Milwaukee fare case is abstracted elsewhere in this issue.

SAFETY FIRST IN BROOKLYN

The safety organization of the surface transportation department of the Brooklyn (N. Y.) Rapid Transit Company has presented its first half-yearly report, for the six months ended June 7. The report is signed by A. Maxwell, superintendent of employment, who is secretary of the departmental safety committee of the surface transportation department. In summarizing the results of the safety work to date Mr. Maxwell says:

"As to what bearing the net result of the safety movement to date has had on the accident situation is an interesting question. The monthly claim department accident statement for Classes A, C, D, and E accidents for the six months under review shows as follows in per cent, when compared with the corresponding period of the previous year:

Classification	Dec., 1914	Jan., 1915	Feb., 1915	Mar., 1915	Apr., 1915	May, 1915
Car collisions	-57.2	-32.1	-70.0	-35.5	-16.7	-53.1
Car and vehicle collisions	-32.9	-18.9	-42.6	-52.2	-21.2	-28.1
Cars striking persons	-43.1	-12.5	+43.1	+11.7	-4.9	-35.7
Boarding and alighting	-25.9	-2.4	-17.3	-0.7	Even	-21.7

"The prime reason for tabulating only the above four classes of accidents here is that these classifications more directly concern platform employees than any other class of accident, and, if statistics count for anything, these figures should reflect just what the men themselves are accomplishing toward minimizing and reducing our accident hazard.

"In conclusion it is believed that the safety movement of the surface transportation department has been fairly and successfully launched, and that, as time advances, what may now be described as an imperfect system will become a complete, harmonious and perfect system to the ultimate benefit and gain of the company and the community at large."

Curbing the Philadelphia Chauffeur.—The trainmen in the employ of the Philadelphia (Pa.) Rapid Transit Company have been asked to co-operate with the police of that city toward reducing reckless auto driving by reporting infractions of the traffic rules by chauffeurs.

One-Man Car Request Refused.—The Public Service Commission of Massachusetts has refused the request of the Milford, Attleboro & Woonsocket Street Railway for authority to operate electric cars in charge of one man on its lines between Cellingham, Four Corners and Caryville.

St. Louis Skip-Stop Hearing Concluded.—The hearing before the Public Service Commission of Missouri upon the request of the United Railways, St. Louis, for permission to eliminate 770 car stops was concluded on June 26. Attorneys were instructed to file their briefs within ten days.

Passes Withdrawn.—A bulletin has been issued by the East St. Louis & Suburban Railway, East St. Louis, Ill., in regard to free transportation. Mail carriers will hereafter be carried gratis only between 6 a. m. and 8 p. m. Deputy sheriff badges will not be honored, nor will the special agents of railroads receive free rides. Terminal Association agents will be carried free only on Eads Bridge. Policemen and firemen will be carried free only when they are dressed in full uniform.

Invites Manufacturers.—The Indiana & Michigan Electric Company, South Bend, Ind., is advertising in the Chicago daily papers, the manufacturing advantages of the St. Joseph Valley and the many attractions of South Beach, Elkhart, Mishawaka, Niles, Buchanan and other communities to manufacturers seeking smaller cities for location. Manufacturers are invited to submit their industrial problems to the Indiana & Michigan Company and the traction company promises co-operation.

New Detroit Interurban Station.—On July 1 the Detroit (Mich.) United Railway opened a new interurban station in Detroit. The ground floor is given over almost entirely to the uses of patrons of the interurban lines, while the remaining five stories of the building will be used for the general offices of the company. One of the features of the building is a wide gallery which has been fitted up as a ladies' rest room. The new office building and station is at Bates Street and Jefferson Avenue and was formerly the Edson-Moore Building.

Lexington Participation Plan.—All of the non-union trainmen of the Kentucky Traction & Terminal Company, Lexington, Ky., have accepted the contract proposed by the company some time ago, on the basis of an increase in wages proportioned on the saving made through any reduction in the cost of accidents. The union men have declined to accept the contract. They are reported to have drawn up a substitute contract which they will present to the company to replace the old one, which expires this month. The contract with the non-union men went into effect on July 1 for a term of three years. The general conditions of the participation plan were referred to in the ELECTRIC RAILWAY JOURNAL of June 19, page 1183.

The Memphis "Jim Crow" Case.—The Memphis (Tenn.) Street Railway has won its case in the courts in which its interpretation of the "Jim Crow" law was involved, the State Supreme Court having upheld the measure thus reversing the Circuit Court and the Court of Appeals. The case centered on the question of seats, two white men having entered a street car when there were plenty in the white compartment and having taken seats reserved for negroes. When the car filled up the conductor called upon them to give up their seats to negroes. They agreed to if he would get them seats in the white section. The upshot of the incident was that the conductor ejected the men and had them put under arrest, whereupon they brought suit for damages, getting an award of \$1,000 each in the lower court. The Supreme Court said in part: "These seats must be kept separate and apart; there should be a well-defined dividing line; blacks should be made to occupy their own seats and the whites theirs. Conductors have a sort of police power over passengers, and the latter are subject to orders from this officer, who must live up to the statutory provisions." The case was that of A. M. Keisker, and Ralph Bowden against the Memphis Street Railway.

Personal Mention

Prof. Charles M. Spofford, of the firm of Fay, Spofford & Thorndike, consulting engineers, Boston, and head of the department of civil and sanitary engineering of the Massachusetts Institute of Technology, has been appointed by the Governor of Massachusetts a member of the Terminal Commission, constituted by a recent legislative act to investigate the subject of terminal facilities and the improvement of facilities for the transportation of freight in the Boston metropolitan district.

Mr. Frank C. Rose has been appointed purchasing agent for W. S. Barstow & Company, Inc., New York, N. Y., engineers and manager for the General Gas & Electric Company and the Eastern Power & Light Corporation, which control among other properties the Rutland Railway, Light & Power Company, Rutland, Vt.; the Claremont Railway & Lighting Company, Claremont, N. H.; the Reading Transit & Light Company, Reading, Pa., and the West Virginia Traction & Electric Company, Wheeling, W. Va. Mr. Rose was connected with the Delaware, Lackawanna & Western Railroad for eighteen years, with J. G. White & Company for seven years as assistant purchasing agent and with the Foundation Company, Ltd., Montreal, for a year and a half as general purchasing agent. He succeeds Mr. F. A. E. Thorling as purchasing agent with Barstow & Company.

Mr. Fred F. Stockwell has been appointed treasurer of the New England Street Railway Club, succeeding the late Edward P. Shaw, Jr. Mr. Stockwell is widely known in the electric railway field as treasurer of the Barbour-Stockwell Company, Cambridge, Mass., manufacturer of special track-work. He was born in Brattleboro, Vt., but his parents moved to Cambridge soon after his birth, and after attending the local schools Mr. Stockwell learned the machinist's trade in Boston. He entered business with a partner in 1889, and a consolidation of interests led to the incorporation of the Barbour-Stockwell Company in 1893. The new treasurer has been closely identified with the development of electric railway special work since the days of horse traction. He is a charter member of the club and is active in the American Electric Railway Manufacturers' Association.

Col. Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, celebrated twenty years of service with the company and its constituents on July 1. On his arrival at his office on the morning of July 1 President Williams found on his desk a huge silver loving cup filled with American beauty roses—the gift of nineteen men of the company's official staff, whose service with the company has been coextensive with his own. The men who presented the loving cup to Colonel Williams were Messrs. G. H. Beck, E. Brower, T. S. Curley, J. H. Dwyer, G. H. Jackson, W. J. O'Neill, J. F. Throckmorton, J. Weidman, F. J. Spaulding, C. D. Meneely, J. H. Bennington, H. A. Crowe, J. Duffy, W. H. Gordon, A. Maxwell, W. Siebert, J. Walsh, Jr., C. T. Victorine, I. Isaacsen. The loving cup is inscribed on one side with the names of the donors and on the other side bears the following inscription: "To our president and friend, Col. Timothy Shaler Williams, to whose wisdom, foresight and courage is so largely due the conception, nurture and development of the Brooklyn Rapid Transit System to its present proud pre-eminence, from those who have been associated with him for twenty years, who have to some extent shared his labors and who rejoice in his well-earned success."

OBITUARY

Joseph H. Pierson, assistant claim agent of the Terre Haute, Indianapolis & Eastern Traction Company, was killed when his automobile turned over on the evening of June 23, while he was driving from his office to his home at Valley Mills, a few miles south of Indianapolis. Mr. Pierson was born in Wayne Township, Marion County, Ind., in 1870. He was educated in the public schools of his native township and later took a course in the Central Normal College, Danville, Ind. He taught in the schools for several years. Mr. Pierson was active in Democratic politics for many years and was elected as representative to the 1909 session of the Indiana Legislature. He became connected with the claim department of the Terre Haute, Indianapolis & Eastern Traction Company in 1909.

Construction News

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

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

RECENT INCORPORATIONS

Lauderdale Power Company, Florence, Ala.—Incorporated in Alabama to construct a railway between Florence and Huntsville, 75 miles. Alan Jemison, Birmingham, president.

Intercity Terminal Railway, Little Rock, Ark.—Incorporated in Arkansas to construct and operate a railway in Little Rock and Argenta. It is reported that the company has been organized to take over the Argenta Railway. Capital stock, \$500,000. Officers: C. C. Kavanaugh, president; E. W. Jackson, vice-president, and F. J. Schmutz, secretary and treasurer.

Mississippi Valley Railway & Power Company, Dover, Del.—Incorporated in Delaware to construct railroads and to operate by steam, electricity, or other power. Capital stock, \$4,500,000. Incorporators: Charles B. Bishop, Clarence J. Jacobs and Harry W. Davis, Wilmington, Del.

FRANCHISES

Phoenix, Ariz.—The Phoenix Railway has received a franchise from the Council to build a double-track line down Fourth Street from Roosevelt Street to Washington Street and to extend the Monroe Street loop to Fourth Street.

Los Angeles, Cal.—The Council decided on June 26 to advertise for sale a franchise for a street car track covering a distance of 448 ft. on Central Avenue in front of the Southern Pacific Station. The track is to turn in toward the station at a point 69 ft. south of Fifth Street and turn back to the present tracks at a point 448 ft. farther south. The track is desired by the Los Angeles Railway to provide for its passengers easier access to the station than is afforded by the present arrangement. The plan has been indorsed by the board of public utilities and the public utilities committee of the Council.

Los Angeles, Cal.—The Board of Public Works has been authorized by the Council to advertise for bids on the street railway franchise on South Park Avenue. Bids will be received on two sections of the line, the first extending from Jefferson Street to Slauson Avenue, and the second from Slauson Avenue to Florence Avenue.

Hutchinson, Kan.—The Hutchinson Interurban Railway has received from the Council a franchise to extend its line on Second Street from Main Street to a point 300 ft. east of Walnut Street. The Council also granted to the Arkansas Valley Interurban Railway the right to use the Second Street track for reaching its terminal station which will be located at 111 Second Avenue, East, recently purchased.

Pittsburgh, Pa.—In a recent letter to the Council Mayor Joseph G. Armstrong recommended that seventeen out of the twenty-five requests for franchises for curves, additional tracks and sidings made to him by the Pittsburgh Railways be granted. Together with this letter the Mayor submitted to the Council a proposed ordinance in which the conditions under which these franchises should be given were fully stated. The Mayor told the Council that he had prepared his recommendations after conferences with the law department and the Department of Public Works. He asked for immediate action on the part of the Council, inasmuch as conferences with the officials of the Pittsburgh Railways will probably be necessary.

TRACK AND ROADWAY

Birmingham, Ala.—In connection with the proposed electric railway from Birmingham to the Warrior River, it is planned to continue the line to Jasper, about 35 miles from Birmingham. W. W. Shortridge, Birmingham, is interested. [June 26, '15.]

Douglas (Ariz.) Traction & Light Company.—This company is constructing 300 ft. of additional trackage at Camp Douglas, extending the line eastward from its former terminus to a point near the eastern boundary of the Eleventh Infantry camp. It is later intended to extend the

trackage the entire distance to the eastern edge of the camp.

Hoxie Electric Railroad, Calico Rock, Ark.—Plans are being made to revive the project for an electric railroad from Hoxie to Calico Rock. J. W. Myers, Calico Rock, is interested. [Feb. 27, '15.]

Burlingame (Cal.) Electric Railway.—It is stated unofficially in San Francisco that the Burlingame Railway, owned by Ansel M. Easton, Burlingame, and others, will be equipped with the overhead trolley. The road, 2 miles long, has been operated since March 1, 1913, with storage battery cars.

Marin County Electric Railway, Mill Valley, Cal.—Construction has been begun on the first unit of this company's line. This stretch of track will extend from the heart of the town to the upper end of Cascade Canyon. It is expected that the system will eventually be extended to Sausalito. [May 22, '15.]

San Francisco (Cal.) Municipal Railway.—Bids will be received by the Board of Public Works on July 14 for steel rails to be used in the construction of the Church Street municipal railway. The city engineer plans to have the construction of the road contracted for in three parts—one from Van Ness Avenue and Market Street to Church Street and Eighteenth Street; another from Eighteenth Street to Twenty-second Street and the third from Twenty-second Street to Thirtieth Street. The plans for the section from Van Ness Avenue to Eighteenth Street will provide for the construction of two tracks on Market Street from Van Ness Street to Church Street.

Capital Traction Company, Washington, D. C.—The Public Utilities Commission of the District of Columbia has denied the application of this company to build an extension of its lines on Seventeenth Street, I Street, Thirteenth Street, H Street and other streets in Washington.

Orlando (Fla.) Interurban Traction Company.—W. C. Temple, president, reports that the project to build an electric railway to connect Orlando, Kissimmee and Sanford has been abandoned. [April 12, '13.]

Palatka-Hastings Interurban Railway, Palatka, Fla.—This company reports that the project to build an electric railway from Palatka to Hastings has been abandoned on account of the inability to secure permission from the Putnam County Commissioners to use the bridge crossing the St. Johns River upon a basis that would enable it to operate. F. J. Von Angelken, East Palatka, secretary. [Nov. 15, '13.]

***Pearl Harbor, Hawaii.**—Bids are desired until Sept. 18 by H. R. Stanford, chief of the bureau of yards and docks, navy department, Washington, D. C., for the construction of a marine railway at the naval station, Pearl Harbor, Hawaii, according to specification 2172. The appropriation for this work is \$94,000.

Lincoln Railway & Light Company, Lincoln, Ill.—This company expects to lay new track on Union Street from Broadway to Tremont Street. The 40-lb. rail now in use will be replaced by 60-lb. rail. The company has laid 80-lb. rail on its Broadway line.

Evansville & New Harmony Traction Company, Evansville, Ind.—This company announces that it has contracted with M. A. Peoples, Chicago, for the financing and construction of its line from Evansville to New Harmony, 30 miles. The line will connect a number of suburban towns in the vicinity of Evansville. It is expected that construction will be begun about Sept. 1. C. J. Seibert, Evansville, general manager. [Nov. 28, '14.]

Louisville & Northern Railway & Lighting Company, New Albany, Ind.—Complete suspension of traffic on Market Street between Washington Street and Vincennes Street has been ordered by the Board of Public Works, while the concrete bed for the new brick pavement is laid and allowed to settle, the railway company transferring passengers from car to car across the intervening square. The city and the Louisville & Northern Railway & Lighting Company are in a controversy as to the nature of a crossing which the company is to construct over Market Street. The city calls for T-rails embedded in cement between the tracks, and the railway wants to use oak planks.

Topeka (Kan.) Railway.—Material has been ordered and work will be begun at once on the extension of this company's line on Kansas Avenue from Seventeenth Street to Twenty-first Street. A bridge across the Shunganunga River will be built in connection with the extension. It is estimated that the bridge will cost about \$19,000.

Cumberland & Manchester Railroad, Manchester, Ky.—T. J. Vermillion & Son, Barbourville, have received the contract to construct a 3-mile section of this company's line from Manchester to Barbourville. The route extends via Cannon, Girdler, Hopper and Woollum. M. E. S. Posey, Barbourville, chief engineer. [June 19, '15.]

Brandon (Man.) Municipal Railway.—This company reports that it is constructing 6700 ft. of single track, forming a belt line 5½ miles long.

United Railways, St. Louis, Mo.—This company will construct new tracks on Olive Street between Fourteenth Street and Boyle Avenue, St. Louis.

***Rutherfordton, N. C.**—Plans are being considered to build a line from Rutherfordton to Columbus, about 15 miles. L. D. Miller, Rutherfordton, is interested.

***Dayton, Ohio.**—Plans are being considered to build a railway between Dayton and St. Marys. At a meeting of the citizens of the towns on the proposed line, held at Covington on June 30, Judge Dennis Dwyer of Dayton was appointed chairman of the committee to look after the financing of the line.

Oklahoma (Okla.) Railway.—Plans are being made by this company to reconstruct its tracks from the Rock Island Railroad tracks north on Broadway to Tenth Street and on East Fourth Street.

Sand Springs Railway, Tulsa, Okla.—This company contemplates the construction of an extension of its lines southwest to the oil fields, about 30 miles.

Northampton (Pa.) Traction Company.—Arrangements for the physical connection of the property of this company with the Northampton, Easton & Washington Traction Company across the Delaware River are under consideration and are expected to be completed in the near future.

Philadelphia, Pa.—Bids will be received until Aug. 16 by A. M. Taylor, director department of City Transit, 754 Bourse Building, Philadelphia, for the construction of the City Hall station section of the Broad Street subway under City Hall and Market Street subway and work appurtenant thereto, known as Contract 101. This section will be about 700 ft. long, and will include the underpinning of the west side of City Hall and the Market Street subway. Plans and specifications may be had at Room 748, Bourse Building, upon a deposit of \$50 per set, pending return.

Rhode Island Company, Providence, R. I.—Work has been begun by this company laying double tracks on North Main Street between Camp Street and Mill Street, Providence.

Southern Public Utilities Company, Greenville, S. C.—Material has been received and work will be begun at once on the reconstruction of this company's tracks on Whitner Street and South Main Street, Anderson.

Carolina, Greeneville & Northern Railroad, Greeneville, Tenn.—A. H. Jacoby, Greeneville, has been awarded the contract for part of the work of this company's line from Bristol to Knoxville, via Kingsport, Newport and Sevierville, 140 miles. The maximum grade will be 1.5 per cent and the maximum curvature 10 deg. Three steel bridges aggregating 1500 ft. will be built on the line. H. S. Reed, 205 Grant Building, Los Angeles, president. [June 26, '15.]

Corpus Christi-Ward Island Interurban Railway, Corpus Christi, Tex.—Grading has been begun on this company's line from Corpus Christi to Ward Island, 7 miles. The work of laying track will be begun in about four weeks and it is expected that the line will be completed about Oct. 1. The company plans to develop Ward Island as an amusement park. J. H. Caswell, San Diego, is interested. [May 15, '15.]

Dallas (Tex.) Southwestern Traction Company.—At a meeting of the stockholders of this company on June 21 it was announced that the sale of \$60,000 of the company's \$2,500,000 of bonds has been authorized. E. P. Turner, Gaston Building, Dallas, president. [June 12, '15.]

Lynchburg (Va.) Traction & Light Company.—In connection with improvements being made by the city, this company plans to double track its line on Main Street.

***Norton, Va.**—Plans are being made to construct a railway from Norton to High Knobs in Stone Mountain, about 5 miles. Patrick Hogan, High Knobs, is interested.

Radford-Willis Southern Railway, Radford, Va.—The contract for constructing this company's line from Willis to Radford has been awarded to Williams Brothers Construction Company, Roanoke. John L. Vaughan, Shawsville, president. [March 13, '15.]

Virginia Railway & Power Company, Richmond, Va.—In connection with the proposed extension of this company's line on West Broad Street from Robinson Street to the corporate limits, officials of the company have stated that further extensions of its lines are practically at a standstill owing to the difficulty in securing the desired legislation, jitney encroachment and general depression. It is stated that at the present time the company finds it impracticable to build the line, and, as the time limit has already expired on the franchise, is prepared to avail itself of the alternative provision of forfeiting the \$5,000 bond which it put up as assurance at the time of securing the franchise.

Charleston (W. Va.) Interurban Railroad.—Four miles of track on this company's 25-mile extension from Charleston to Montgomery has been laid and it is stated that cars will be operated between Charleston and Malden, 6 miles above Charleston, by July 15.

***Morgantown & Wheeling Railway, Morgantown, W. Va.**—This company advises that it is extending its line from Cassville to Blacksville, 15 miles. All the grading and masonry is completed with the exception of one bridge 186 ft. long. The bridge is completed and ready to put in place as soon as it is reached by track. Seven miles of track have been completed and are being operated by steam. The company is using 70-lb. A. S. C. E. rails and oak and chestnut ties. It is planned to operate the line by steam for about two years, when it will be operated by electricity.

Weston & Glenville Electric Railroad, Weston, W. Va.—Surveys will soon be begun by this company on its proposed line between Weston and Glenville. Lloyd Rinehart, Weston, is interested. [Oct. 17, '15.]

SHOPS AND BUILDINGS

Connecticut Company, New Haven, Conn.—A new trolley station will be built at Woodmont by this company in the near future. The structure will be of stucco. The cost of the building is estimated at \$5,000.

Detroit (Mich.) United Railway.—On July 1 this company removed its interurban station and general offices to the Detroit United Building on the southeast corner of Jefferson Avenue and Bates Street. The waiting room is located on the ground floor with the main entrance on Jefferson Avenue, while the exit to the cars will be on Bates Street, as will also be the entrance to the general offices.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—This company announces that it will soon begin the construction of general repair shops at Faribault, Minn.

Citizens' Traction Company, Oil City, Pa.—Announcement has been made by this company that it will erect a modern carhouse on the site of the present structure in Franklin. The building will have a frontage of 52 ft. on Liberty Street and will be 150 ft. deep. The structure will be of brick with concrete floors and rolling steel doors.

POWER HOUSES AND SUBSTATIONS

Pittsburgh (Pa.) Railways.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for four 1800-kw., 600-volt d.c., six-phase sixty-cycle, 514-r.p.m. compound wound commutating-pole rotary converters; twelve 625-kva. single-phase, sixty-cycle, 11,000-volt high-tension to rotary voltage low-tension O. I. S. C. transformers and one thirty-three-panel switchboard to control the above apparatus; also three 1000-kw., 550-volt, commutating pole d.c. generators with 1440-hp., three-phase, sixty-cycle, 10,000-volt, a.c., 514-r.p.m. synchronous motor generator sets with d.c. exciters.

Manufactures and Supplies

ROLLING STOCK

Southern Traction & Power Company, Alexandria, La. will probably purchase two or three cars.

Mobile Light & Railroad Company, Mobile, Ala., is expecting to purchase a number of single-truck cars.

Little Rock Railway & Electric Company, Little Rock, Ark., has ordered three buses from the Southern Car Company.

New York & Queens County Railway, New York, N. Y., noted in the *ELECTRIC RAILWAY JOURNAL* as expecting to purchase six double-truck cars, has ordered this equipment from the Southern Car Company.

Ogden, Logan & Idaho Railway, Ogden, Utah, has ordered six trailers from the American Car Company, St. Louis, Mo. This item is a correction of a note in last week's issue, in which the name of the contracting carbuilder was erroneously stated.

Connecticut Company, New Haven, Conn., noted in the *ELECTRIC RAILWAY JOURNAL* of May 15, 1915, as having issued specifications for ninety-two all-steel cars, has ordered forty-six cars from the Wason Manufacturing Company, and forty-six from the Osgood-Bradley Car Company.

TRADE NOTES

Automatic Ventilator Company, New York, N. Y., has received an order to equip with ventilators seven cars of the Union Electric Company, Dubuque, Iowa.

Q. P. Signal Company, Needham, Mass., has erected at Needham a new four-story brick and concrete manufacturing plant 103 ft. x 40 ft. The plant is completely equipped and will be ready for operation in about two months. Special power house apparatus and substation signal apparatus and trolley catchers will be manufactured in the new plant.

General Railway Signal Company, Rochester, N. Y., has received a contract to build a new interlocking plant at the crossing of the Illinois Traction System and Wabash, Illinois Central and Alton railroads at Pontiac, Ill. Work will commence at once and will be completed in ninety days. The plant will be all electric and of the latest type of modern construction, and will have eighty levers.

Universal Safety Tread Company, Waltham, Mass., is now manufacturing all types of its safety treads in its new plant at Waltham, Mass. All the machinery and shops have been moved from Groton, N. Y., where the treads were formerly manufactured, to Waltham, Mass. The new plant is completely equipped with lathes, presses, stamping and special machinery for the manufacture in all its processes of "anti-slip" and lead-filled safety treads used in the transportation and building industries.

Esterline Company, Indianapolis, Ind., manufacturer of "Golden Glow" headlights, has received an order for twenty-four SE-95 headlights from the Shreveport (La.) Railways. This makes a complete installation of this equipment by the Shreveport property. The company reports deliveries of this equipment during June to the following railways: Austin (Tex.) Street Railway; Atchison Railway, Light & Power Company; Chicago & Joliet Electric Railway; Helena (Ark.) Interurban Railway; Arizona Copper Company, Clifton, Ariz.; Sioux City Service Company; Scranton Railway; American Car Company for new cars of the Fort Dodge, Des Moines & Southern Railway; Wichita Railroad & Light Company; Pressed Steel Car Company for new cars of the New York, Westchester & Boston Railway; Des Moines (Iowa) City Railway; Hutchinson Interurban Railway; Denver & Interurban Railroad; Auburn & Syracuse Electric Railroad; St. John (N. B.) Railway; Windsor, Essex & Lake Shore Rapid Railway; Biddison & Crow Interurban Railway, Tulsa, Okla.; San Antonio (Tex.) Traction Company; Cincinnati Car Company for new cars of the Lancaster Traction & Power Company; Union Electric Company; Shreveport (La.) Railways; Seattle (Wash.) Municipal Railway; Trinidad Electric Transmission Railway & Gas Company; Hocking-Sunday Creek Traction Com-

pany; Wisconsin-Minnesota Light & Power Company; Georgia Railway & Power Company; Denver Tramway; Ephrata & Lebanon Traction Company; South Carolina Light, Power & Railways Company; Northern Texas Traction Company; Tarentum, Brackenridge & Butler Street Railway; Binghamton (N. Y.) Railway, and Topeka (Kan.) Railway.

ADVERTISING LITERATURE

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a folder listing its various types of rolling stock and other railway equipment.

G. M. Gest, New York, N. Y., contracting conduit engineer, has issued a folder which contains a map on which are designated the various cities where he has completed contracts.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a price list of its second-growth hand-shaved hickory handles for use as axe, hammer, hatchet and pick handles in railroad work.

L. S. Brach Supply Company, New York, N. Y., has issued a catalog describing its types 36 and 40 vacuum arresters, mica shield protected, to meet the requirements of telephone train dispatching.

General Electric Company, Schenectady, N. Y., has just issued Bulletin No. 44,712, which illustrates and describes G-E lightning arresters for electric railway service, both in the station, on the line and on the car. This bulletin supersedes the company's previous bulletin, No. A-4135.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a folder on its tool steel gears and pinions, also a reprint from an article by T. C. Goodyer in the *Tramway & Railway World* which contains data showing the greater length of life of treated as compared with untreated gears.

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued advertising sheets describing and illustrating the Burke switching and protective apparatus, high-voltage air-break switches, horn-type fuses, improved horn-type lightning arrester and choke coil, and combination horn-type fuse and series horn-gap lightning arresters and choke coil.

Rail Joint Company, New York, N. Y., has issued an attractive catalog illustrating its continuous, Weber and Wolhaupter rail joints as applied to A. R. A. Series A and B rails, guard rails, frogs and switches, T-rails and girder rails. Illustrations are also shown of the different types of joints with fiber and with wood insulation, the "twin" insulated rail joint and the step rail joint.

Ohmer Fare Register Company, Dayton, Ohio., has issued a folder on its fare register system. The folder states that the *Denver Tramway Bulletin*, referring to the monthly list of conductors' Ohmer efficiency grades records that the general average for the entire system for April broke all previous records. This company has also issued an advertising blotter on its fare register system.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued in pamphlet form a paper entitled "Considerations in the Design of Railway Motors," a treatise on the ventilation of this type of motor, by R. E. Hellmund. This paper is a reprint of an article which appeared in the *ELECTRIC RAILWAY JOURNAL* of May 1 and also the *Electric Journal* and goes very thoroughly into this important subject. A large number of illustrations are used showing practice in ventilating motors, together with diagrams showing the air currents through the windings and cores of the armatures.

Electric Service Supplies Company, Philadelphia, Pa., has issued a general catalog on the Garton-Daniels lightning arresters. The catalog is divided into four sections, so arranged as to make easy the selection of proper apparatus for any set of conditions. Part I contains descriptions and price lists of a.c. arresters up to 20,000 volts, d.c. arresters up to 2400 volts, arc circuit lightning arresters for both a.c. and d.c. circuits, panel-board arresters, and lightning arrester cross-arm hangers. Part II contains a description and price lists on choke coils and disconnecting switches. Part III deals thoroughly with the subject of lightning phenomena as regards the construction and

operation of a.c. and d.c. arresters. Part IV contains valuable information accompanied with diagrams on the installation of lightning arresters, their grounding, distribution, and inspection.

Sangamo Electric Company, Springfield, Ill., has issued Bulletin No. 41, which describes and illustrates its "economy" electric railway meters, for use in aiding motormen to increase their efficiency by saving energy in operation. These meters are of two varieties, ampere-hour meters and watt-hour meters. They are both of the mercury motor type and therefore have all the advantages inherent to mercury flotation, the chief of which is immunity from damage due to vibration and shock. Through the use of these meters it is claimed that the motorman will take active interest in his car or train in that he will look for troubles and promptly report all defects for repair. The catalog contains tables and data concerning the use of these meters on the Chicago & Milwaukee Electric Railroad and shows the saving in power consumption per car-mile effected thereby. Testimonial letters from the Chicago & Joliet Electric Railway and the Rockford & Interurban Railway are also included which are significant in showing the saving brought about on these lines.

Trussed Concrete Steel Company, Detroit, Mich., has issued a comprehensive 128-page publication on its united steel sash. The book covers all the various types of sash with its applications in building construction. The first portion of the book is devoted to the general discussion of the features of steel sash construction, covering the questions of strength, weathering, workmanship, daylighting, ventilation, hardware, and glazing. The large variety of sections that are combined to make up steel sash are described in the next portion of the book, including among them the mullions. Standard pivoted sash is next thoroughly covered, including the horizontally and vertically-pivoted sash of all types. Continuous sash of the top-hung and center-pivoted type are comprehensively covered with numerous pages of details. Vertical-sliding sash represents the most recent development in steel-sash construction, and a large amount of space is devoted to the various types, including vertical-sliding sash with removable jamb guides, counter-balanced sash, counter-weighted sash and spring-balanced sash. Horizontal-sliding sash is also indicated at this point. Partitions and steel sliding and swinging doors are shown. The remaining portion of the book is devoted to photographic reproductions of important installations. One page contains illustrations of the attractive stations and shops of the New York, Westchester & Boston Railway where these windows are used. They are also shown in views of a paint shop of the Los Angeles (Cal.) Railway and a power house of the Philadelphia (Pa.) Rapid Transit Company.

NEW PUBLICATIONS

Proceedings of Sixth Annual Convention Pacific Claim Agents' Association, Spokane, July 9-11, 1914. 79 pages. Paper.

This book contains a list of the officers and committees of the Pacific Claim Agents' Association, and presents the running discussions, papers and reports before the convention in Spokane last year. A general index permits the ready finding of any desired information.

Human Nature and the Railroad, by Ivy L. Lee, published by E. S. Nash & Company, 620 Sansom Street, Philadelphia, Pa., 129 pages. Price, \$1.

Mr. Lee's easy style and analytical reasoning are well known through his contributions to the popular and technical press and his addresses before various bodies. The present volume is made up of ten of these addresses, and while they will be of interest and instruction to the general public because they tell the story of the railroad, they are equally of interest and instruction to the railway official because they explain to him his weaknesses and foibles, tell him the importance of telling the story and how to tell it as well as to live up to the story. The purpose, as explained by the author, is to establish a point of contact, to make the railroad manager, the employee and the public in their mutual relations understand one another's point of view. We hope that the volume will be widely read so that this wish will be fulfilled.