

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, February 23, 1918

Number 8

The Journal Again Broadens the Scope of Its Service

NEARLY eleven years ago, or on April 4, 1908, we issued our first "Maintenance Number." Since then a special number, devoted to the problems of the engineering department, especially of the shopmen, has been published early each year. Our coming Annual Maintenance Number will be issued on March 16 and will also be a "Fuel and Labor-Saving Number."

The wide popularity of these issues has suggested a still further broadening of the field of this paper. Briefly, the plan contemplates the inclusion in one issue during every month of special articles devoted to the fundamental problems of the electric railway engineer in addition to the concentration of short or "kink" articles in one issue. The number this week is the first of these special monthly issues. It is expected that those which follow this will appear on the third Saturday of each month.

It is the purpose in these numbers to take up broad engineering questions in all electric railway departments rather than detailed accounts of individual installations. For this reason the program should appeal particularly to the ambitious younger men in the industry who wish to obtain first-hand an understanding of the fundamental principles in electric railway engineering. At the same time, it is hoped that the articles will appeal strongly also to the older and more experienced men in the industry who will take this occasion to refresh their memories on basic principles.

The publication of the articles outlined will not interfere in any way with the service now being given by the ELECTRIC RAILWAY JOURNAL to its subscribers. The articles mentioned are an addition to, not a substitution for, any part of the present service. We shall continue to publish promptly and in the first available issue all of the technical and other news of the week relating to the electric railway industry. The only difference will be that the "Equipment and Maintenance Department" will be given up as a weekly department.

Two Kinds of Master Mechanics—And Others

THIS paper has consistently advocated a more general recognition of the importance of the work of the men who design or maintain the track, power plant, overhead and rolling stock. We have insisted from time to time that these men are not paid enough, which is still true. Reasonable salaries must be paid if the electric railways are to retain men of the type which the mechanical and engineering departments must have.

If a competent man was required five years ago to supervise a shop, a power plant or a track department, a more competent one is required to-day. Adequate

recognition and compensation will help to retain good men and encourage them to develop themselves in their specialties.

But the management cannot do it all. The best service cannot be bought with money or even with recognition. There must be loyalty on the part of the employee—to himself, to the public, to his employer. This means that he must be keeping up with the times through study, through careful observation. He should thus not only be increasingly competent to do the work for which he is directly paid, but he should constantly be learning its relation to the whole organization. In the end the men who are not growing will eliminate themselves by the process of "natural selection."

Technical men—and others—divide themselves into two classes—those who work by rule-of-thumb and those who use their heads. It is high time that the latter class predominated. The hope of the industry for the future lies in the aggressive young men (and older ones if they are not becoming fossilized) who are using every means to make the most of themselves. Issues of the ELECTRIC RAILWAY JOURNAL like the present one are planned with these men in view.

Royaltyphobia or Aversion to All Payments for Inventions

THE symptom of Royaltyphobia in an electric railway man is a pronounced aversion to buying any article on which patent rights are enforceable. The victim strives desperately to find a "just as good," and as few mechanisms worth while are free to use, he falls back upon obsolete or discarded apparatus which can be made on a poundage basis. Curiously enough, the disease manifests itself only in connection with the victim's own business. He cheerfully pays the royalties that go into the cost of his Hanan shoes, his Stetson hat, his Rolls-Royce automobile, his Gillette razor, etc.; but he cannot see why Smithkin's beautifully balanced trolley wheels should cost more than the misshapen article that is making his trolley wire better known for pyrotechnic display than reliability of service.

Surely the inventor, like the laborer of old, is worthy of his hire. Royalty is simply reward for brains, skill and progressiveness. In the electric railway field the royalties charged are modest indeed when the cost of development, education and marketing an article is considered. We doubt if they usually exceed 5 per cent, and this charge, in comparison to the benefits conferred, is trifling in most cases. Yet regardless of this fact, so self-evident to those who know the manufacturer's sorrows and tribulations, there are still some operators so obsessed with the idea that inventors are little better than buccaneers that they might well adopt for their slogan: "Millions for the junk heap, but not one cent for brains."

It May Be a Patriotic Duty to Hold Conventions

WHEN the war broke out there was a general and commendable desire on the part of association managements temporarily to confine their activities to such as bore directly upon preparations for fighting. The result was a postponement of convention plans until the country had settled down to a steady and rapid pace in training its soldiers, sailors and airmen, and in producing and transporting the supplies needed by them. This time is now approaching.

It is generally conceded that the great world war is a war of engineering, especially of machinery and transportation. To make it most completely successful will require the perfect co-ordination of all contributing agencies. As utilities and manufacturers must somehow get together in their respective fields in order to discuss those questions which touch upon their relation to the war, it would seem to be the proper thing now gradually to resume the usual national and sectional gatherings. There should be no frivolity in connection with these; rather, a sober consideration of duty, of opportunity and of facility for the work in hand.

In holding its midwinter meeting in New York City last week the A. I. E. E. did that which was eminently fitting and patriotic. Much was made of the occasion for pressing home the lessons of the war preparations. There was nothing in the proceedings to offend the most sensitive patriotism. The same spirit evidently underlies the plans for the Central Electric Railway Association annual meeting to be held on Feb. 28 and March 1, the convention of the Southwestern Electrical and Gas Association, scheduled for April 15 and 16, and others which will be held soon. Such gatherings, with serious purpose and definite aim, cannot but contribute a share to the winning of the war.

Outside Traffic Expert Serves an Important Purpose

Traffic reports by outside experts have become quite the fashion during the last five years, but not all of them have produced an appreciable and early degree of relief. One of the chief reasons for this, perhaps, is the fact that the observers lacked operating experience. They were keen enough to see what was wrong, but not experienced enough to suggest practicable remedies. Sometimes, too, they fell into the error of assuming that all that was expected of them was an excoriation of the local railway from A to Z rather than constructive aid to the public.

Many reports by outside experts, however, have been really invaluable because they have directed attention to practical methods for ameliorating improper conditions. Sometimes such conditions have been due to the unprogressive policies of the railway; sometimes they have been due to financial limitations or to operating restrictions imposed by public representatives. In either case the report of the traffic expert has tended to create a better understanding of the existing conditions and to promote a desire for co-operation between city and company in improving them.

Thus to bring the two parties together is really the big function of the experienced traffic specialist. He sees the woods—the situation as a whole—because he

has not been dwelling among the trees. He is free from the ingrained traffic habits so often acquired in the course of years by the local operator and the local public, and he is not blinded by prejudice or by a desire to cater to special interests. Therefore, if he takes up his work in a spirit of true inquiry and co-operation, he makes it easy for the municipality and the railway to do together what they had never been able to accomplish alone.

Preparing for Changed Conditions in Interurban Passenger Traffic

INTERURBAN passenger earnings, while never fulfilling the roseate hopes of the early promoters, were nevertheless fairly uniform and dependable until the advent of the popular-priced automobile a few years ago. On the heels of this disturber of the rail peace of mind came the war, which indirectly acted as a traffic stimulus and thus made up in part the losses incident to automobile competition. The freight congestion resulting from the early foreign war orders, while throwing some local freight to the interurbans, only slightly affected passenger traffic conditions. Our own entrance into the great maelstrom of Mars, however, has produced more marked changes. Gigantic war preparations and at the same time the shipment of vast quantities of supplies to our allies so congested the traffic on the steam railroads, hedged in as they were by peace-time regulations and by the conditions set by competition, that the governmental control recently established seemed the only way out of an otherwise inextricable tangle.

From the evidence in hand there seems little doubt but that with the steam railroads so controlled very little consideration, perhaps some direct discouragement even, will be given by them to passenger traffic. Already many passenger trains have been removed from service, schedules have been slowed down and many of the luxuries of travel discarded. These things, vitally affecting passenger traffic on the steam roads as they do, are bound to have some influence on interurban passenger traffic. Local interurban passenger traffic should increase because of the abandonment of competing trains on steam roads and the general depreciation in the quality of steam road service. Likewise and for the same reasons through traffic on interurbans should increase.

The war in general and the fuel situation in particular have aroused the country at large, as nothing else could have done, to the necessity of efficient use of our "steel roads." From the psychological point of view the recent order of the Fuel Administrator, drastic as it may have seemed to some of the industries affected, was a godsend to the railways in that it brought before the people in a startling way their dependence on our transportation systems. Certainly the war is putting away many of the old petty jealousies and bursting asunder the shackles of tradition which have so long hampered many of our railways in their efforts to meet satisfactorily the transportation needs of our communities.

In the governmental control order the interurbans were specifically excepted. Whether such control is desirable to the users and owners of interurbans is beside the point in the present discussion. What the

interurbans must do is to keep their eyes open to opportunities for public service and increased earnings—for happily, in the long run, the two always go hand-in-hand. They, too, must seek to work their equipment to the limit of its safe capacity. As has previously been pointed out in these columns, the electric railway is particularly well adapted to the handling of a “gathering” and “distributing” type of traffic. Taking over local traffic, selling through tickets and checking through baggage over intersecting and even over paralleling steam roads, acting as nimble hands for the heavily loaded steam trunks, these are things that the interurbans can do and do well. The ideal from the standpoint of public service would be such co-operation as to make all of the railways, both steam and electric, one vast system, each member of the system doing the thing for which it is best fitted. By striving to attain this ideal the electric railways will be doing a patriotic service as well as increasing their earnings. Further, if for reasons of policy it would appear desirable at some time in the near future to place the electric railways under federal control also, much of the co-ordinating work would already have been accomplished and accomplished with a minimum of confusion to the users and of jeopardy to the owners.

Welfare Work Should Be Sympathetic, Not Paternalistic

EMPLOYERS interested in welfare work may find stimulus for thought in an article in the current Monthly Review of the United States Bureau of Labor Statistics. While only fifteen electric railways are included in the 274 establishments which furnished the information on which this study was based, the conclusions are applicable to all. The article deals with the means taken by many of the companies for the entertainment or the mental stimulus, through lectures and club work, of employees outside of the working hours. Figures are given as to the number of establishments having social gatherings, lectures, moving pictures, auditoriums, musical clubs and outings. Each of these features of welfare work is considered from the information given by the various companies.

Reference is made to the fact that some employers have encountered discouragement through the feeling of certain employees that time “after hours” is their own and must not be “interfered with” by any company plans for amusement. There is also danger, as pointed out, that it is easy in this line of work for employers to assume a paternalistic attitude. For this reason many employers have left the development of recreational features to the employees themselves, with the understanding that proper efforts along these lines will be assisted and encouraged by the company.

Experience is a good teacher in such matters, as in all others. Splendid results have been secured from welfare work on certain electric railway properties which we have in mind. The better side of employees has been developed in a manner which must be encouraging to the men in charge. Nearly always such work brings about a helpful *esprit de corps*. It is well, however, for the employer who would undertake such work to guard against a development of paternalism, which may arouse a feeling of resentment worse than the first state.

Don't Neglect the Refinements in Turn-Back Service

NO EASIER way to squander money can be imagined than the use of ill-considered schedules by a street railway company. A thoughtful analysis of this fact was presented by Mr. Layng in the Jan. 5 issue of this paper. To weigh only one of the points made by this expert, it is worth while to take up the question of turn-back service. Nearly every manager has had experience with critics who believe every car on a given route should operate to the most remote terminus. Perhaps there are just as many who insist that additional cars should be turned back at this or that point to accommodate unusual crowds. Between the two contentions there is a solution which may satisfy neither faction, but would give the fairest apportionment of service. It is in the settlement of this point that the best operating skill will show itself.

As Mr. Layng stated in his article, “It is just as wrong to run too much mileage as too little mileage; in one case the hardship suffered by the company is reflected in its finances; in the other, the hardship borne by the public is reflected both in decreased earnings and in the increased dissatisfaction.” There are few lines on any system which call for 100 per cent through service. In fact, the longer a line is the more delays there are to be expected, thus affecting all intermediate points. On the other hand, not every heavy loading point is entitled to special turn-back service.

It is easy to exaggerate the importance of such requirements and thus deprive another district of its proper facilities. It must be remembered also that to switch back at a certain point entails discomfort and inconvenience to the passengers who must be unloaded, even though it accommodates a crowd waiting to travel in the opposite direction. This consideration shows the importance of correct destination signs on cars as well as the advisability of making known the existence of special service by advertising.

Efficient management calls for the placing of cars where and when they are most needed. There are various methods, of course, for determining such needs, and in the choice of the proper system good judgment will again assert itself. As Mr. Layng says, it is necessary to analyze the passenger loads on all cars at all hours of the day. This does not mean a mere reading of the register, which shows only the total passengers, or only the cash passengers, up to this or that point. Such figures would not show where the load had tapered off. There must be made an actual count or close estimate of passengers on the car at the various points designated. The selection of an “average” day from the two or three days’ survey will give the best index as to conditions.

The points of maximum demand having once been determined, the service must be proportioned accordingly, and the usual appeals from disgruntled passengers must not cause the operating official to change his schedule unless a new check shows that conditions warrant such action. Economical requirements of the present day call for careful thought on such features of operation as are touched on in the article referred to. No wide-awake manager will “take things for granted” nor overlook any possible opportunity to conserve or add to the revenues of his company.

Considerations in the Choice of Car Equipment

Electric Car Equipment Has Grown More Specialized to Save Time, Secure More Revenue and Increase Safety—How a Traffic Survey to Determine Requirements Is Made

By C. W. Squier
Electrical Engineer

THE necessity of adequate means to meet present operating expenses which are mounting by leaps and bounds has made "efficiency" a watchword of all public utilities. The importance of what has appeared to the average official as dry technical calculations and uninteresting studies of operating requirements is so very great in the actual dollars and cents that can be saved and additional revenues that can be earned that the principles underlying them are now receiving increased attention.

In this and following articles on electric car equipment the writer does not claim to be developing any new principles. The material used and the facts brought out may be familiar to many railway engineers who are actively engaged in this work. Yet by a rearrangement and regrouping of the principles of operation and maintenance with a definite object in mind, it is hoped that certain of these fundamental requirements will be impressed more definitely in the minds of those most interested and prove an additional source of information and a benefit to the young men who are coming up in the electric railway field.

Comparison of First Car Equipments with Present

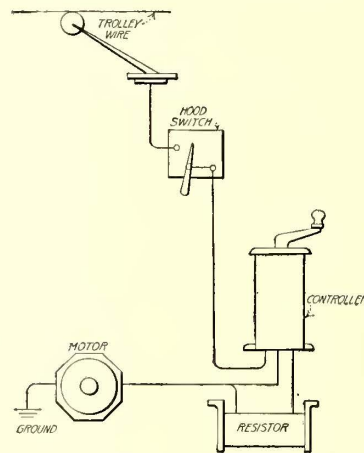
The equipment of the first electric cars was very simple, consisting only of a motor, controller, resistance and hood switch with the necessary wiring to connect the various parts. Contrast this with the equipment of the latest types of cars to-day. Motors have interpole and tap field windings and ventilated cores and windings for increasing their continuous capacity. Control equipments are arranged for multiple-unit operation with automatic and selective acceleration so that the acceleration of the car or train will remain constant regardless of the load. Current-limiting relays are provided which can be quickly adjusted to change the rate of acceleration to meet changes in service requirements. Electro-pneumatic brake equipments are used with quick recharge, graduated release and empty and load brake control so that the braking pressure will increase with the load, and thus maintain a constant rate of retardation. Automatic couplers are in use with main reservoir and train-line air connections made automatically and coupler slides with contacts for automatically making the electrical train-line connections between cars. Doors and steps are pneumatically operated and electrically controlled and their operation is interlocked with the signal system and main control connections so that the starting signal will not be given and the car cannot start until all doors are closed, and the doors cannot be opened till the car stops. Electric heaters are provided with thermostatic control, and

coasting recorders or power recording meters are used to keep a check on the operation of the car.

From the foregoing comparison it is evident that an advance has been made toward automatic and power operation of all car parts; and there is no reason why a further elimination of manually operated devices should not be made. This permits the use of labor and cars that could not otherwise be employed in this capacity. Men can continue in the service longer, as age and physical weakness do not prove as great disadvantages as would otherwise be the case. The satisfactory use of women in car service as conductors in this time of great demand for labor has been made possible principally by power-

operated and automatic devices and the consequent reduction of the labor necessary on the platform so that the conductor becomes little more than a car cashier.

Another and greater advantage is the saving in time that can be effected by the use of power-operated devices. Other things being equal, anything that saves time is valuable to a railroad, since this is its chief purpose and service.



SIMPLIFIED DIAGRAM OF CONNECTIONS IN EARLY CARS

Time saved by shortening the duration of stops is just as valuable as time saved during acceleration or retardation of the car. Napoleon regarded time as irreplaceable and of the greatest value. "Ask me," he said, "for anything but time." A saving in time increases the capacity or earning power of the road and also affords greater flexibility of operation and greater convenience to the traveling public.

The chief virtue and usefulness obtained from employing electricity as a motive power for railroads lies largely in its convenience and its economy in the use of power. The more use that is made of this power, the greater the economy that can be expected. Railway officials in general have been eager for improvements as necessity demanded them, and not a few have been willing to try out new devices in the hope of bettering conditions. The argument that a new device is not necessary because we have hitherto been able to do without it is seldom advanced. It is obvious that if such an argument had been universally followed we would still be digging roots with our finger nails for a living.

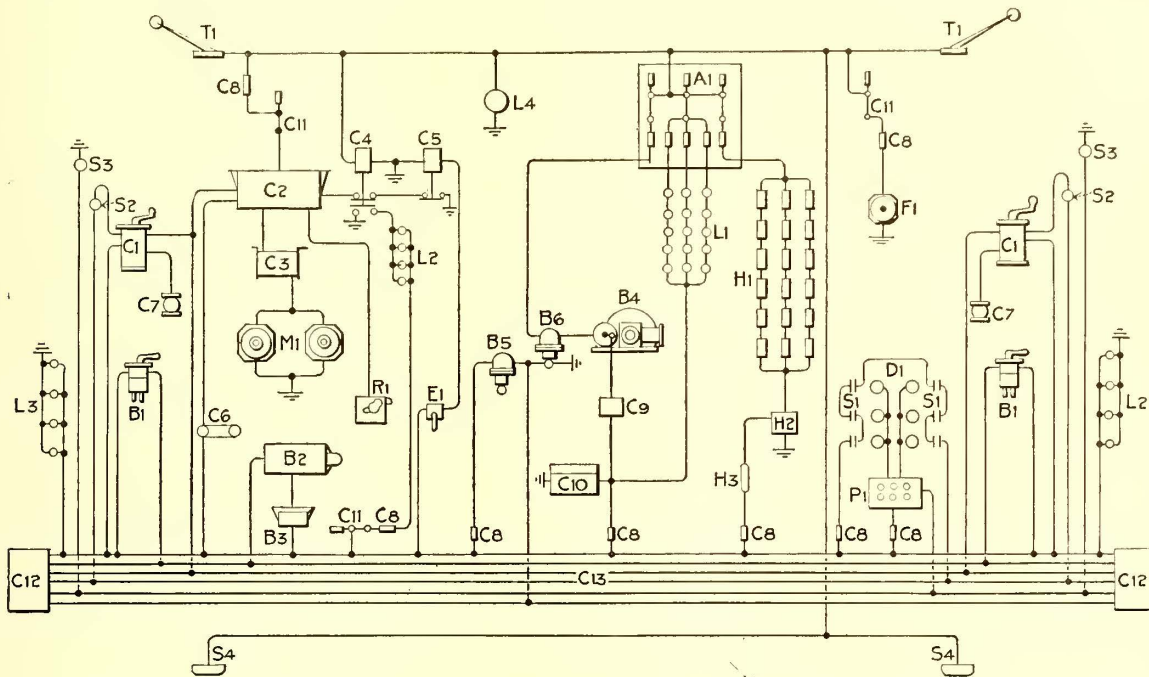
A discussion of electric car equipment may be for convenience separated into the following parts:

1. Determination of operating requirements.
2. Characteristics necessary to meet various classes of service.
3. Necessary details for proper installation.
4. Operation necessary for economy and safety, and
5. Inspection and maintenances practices.

The various parts comprising a complete car equipment may be logically divided into (a) those necessary for propulsion, (b) those used in braking, (c) auxiliary operating devices, and, (d) equipment for the safety, convenience and comfort of the traveling public.

operating data of the latest requirements should be obtained by a traffic survey. Methods for conducting such a survey and for collecting the desired data have been very fully treated in the article by J. F. Layng in the *ELECTRIC RAILWAY JOURNAL* of Jan. 5, 1918, but the list of headings given below for data desired will be found helpful.

The larger operating companies have engineers who are in constant touch with operating conditions and who conduct tests at intervals so that the data enumerated above are readily available. Manufacturing



LIST OF ELECTRICAL EQUIPMENT FOR LATEST TYPE CARS

- | | | |
|-------------------------------------|-----------------------------|----------------------------------|
| A1—Switchboard. | C7—Dead man's valves. | H3—Thermostat. |
| B1—Brake valves. | C8—Fuses. | L1—Main lights. |
| B2—Universal valve. | C9—Battery charging switch. | L2—Emergency lights. |
| B3—Empty and load brake attachment. | C10—Storage battery. | L3—Head, tail and marker lights. |
| B4—Compressor. | C11—Knife switches. | L4—Lighting arrester. |
| B5—Master governor. | C12—Electric couplers. | M1—Main motors. |
| B6—Compressor switch. | C13—Train line. | P1—Push button box. |
| C1—Master controllers. | D1—Door operators. | R1—Coasting recorder. |
| C2—Unit switch group. | E1—Emergency trip switch. | S1—Door signal contacts. |
| C3—Resistors. | F1—Ventilating fan. | S2—Signal lights. |
| C4—Line relay. | H1—Electric heaters. | S3—Buzzer signals. |
| C5—Emergency relay. | H2—Heater switch. | S4—Contact shoes. |
| C6—Selective accelerating device. | | T1—Trolleys. |

SIMPLIFIED DIAGRAM OF MODERN CAR CONTROL EQUIPMENT

Let us consider first those parts used in the propulsion of the car. As the motors are the heart of this equipment they will be discussed first.

Choosing a Motor Car for a Particular Service

In order to choose a motor intelligently for any particular requirements, we must first know just what service it will be called upon to perform, and what future requirements may be expected within the life of the equipment. This, then, requires an accurate knowledge of the present operating conditions and an estimate of the changes that may result from increases in population and manufacturing industries necessitating a change in operating demands and lengths of lines. A large amount of this consists of data in connection with the character of the line and service which form a part of the records of most operating companies. Additional

companies are usually willing to assist in conducting such tests in order to find out just how their equipments

- | | |
|--|--|
| Character of Line | Operating Data |
| Length of run. | Line voltage by sections. |
| Length of single track. | Duration of "power on" period |
| Length of double track. | Duration of coasting. |
| Number of turnouts. | Duration of braking |
| Distances between turnouts. | Rate of acceleration. |
| Length and percentage of heavy grades. | Rate of braking. |
| Number and radii of curves. | Number of passengers on and off at each stop. |
| Length of congested sections. | Maximum number of passengers on car at one time. |
| Special characteristics. | Congestion at terminals and transfer points. |
| Character of Service | Delays. |
| Number of stops. | Car Equipment Data |
| Number of slow-downs. | Type of car. |
| Length of stops. | Special features of car. |
| Maximum speed. | Weight of car. |
| Time for run. | Number and type of motors |
| Layover time. | Type of control. |
| Headway by periods. | Hand or air brakes. |
| Cut-offs. | Type of trucks. |
| Turn-backs. | Diameter of wheels. |
| Single car or train operation. | Gear ratio. |
| Lengths of rush-hour service. | Trouble and Defect Record |
| Car-miles per day. | Number of run-ins. |
| Car-hours per day. | Number of cars held from rush-hour service. |

are operating and for the information that they thus obtain to help in their calculations and designs for new equipment. Also if there is a prospect of securing an order for new equipment they are anxious to check conditions to make certain that any equipment ordered will fulfill the requirements. In addition to these sources there are, of course, consulting engineering firms which make a business of conducting tests and advising regarding specifications for new equipment.

In making such a traffic survey it simplifies matters somewhat, and prevents duplicating information, if all data desired are taken at the same time, but this is not necessary if the tests extend over a considerable period. All the data on "character of service" for a specific line can be obtained and recorded by one man riding cars of that line. Three or four days' service should be sufficient in most cases. Another man can obtain all the operating data necessary.

The accompanying illustrations show two data cards that have been used by the writer on numerous traffic tests, and which satisfy all requirements. They have been kept as simple as possible in order to prevent confusion. The use of special men to obtain this information has been found more satisfactory than relying on conductors to fill out forms correctly. Another point the writer has endeavored to impress on those obtaining data is that if they miss a reading or neglect to record one they should not hesitate to make a note on the form to that effect and in no case enter figures that they have to estimate.

The man taking down the data as to character of service should be in a position where he can see and count readily all passengers boarding and alighting.

This is done at each stop of the car. At the same time the length of stop is taken with a stop watch. Record is made of all slow-downs and their causes; also of any special stops or unusual occurrences that have a bearing on the service. At the beginning and end of the run he should fill in the following data as called for on the record card: Date, line, car number, run number, trip number, motorman's and conductor's numbers, leaving terminal, leaving time, arriving terminal, arriving time, weather and the number of passengers carried as shown by the fare register.

For obtaining operating data the car should have a voltmeter connected from the trolley pole to ground so that the line voltage can be read, and, if possible, a watt-hour meter and an ampere-hour meter. The man taking and recording the data takes a position where he can observe the operation of the car. With a split-second stop watch he takes the time during which power is on, and the time consumed in coasting and braking. This is most readily done by starting the watch

as the motorman applies power. Then by the use of the split-second hand he records the time that power is cut off and braking began. By stopping the watch as the car stops he has the complete cycle. The motorman may apply and cut off power several times before he starts to brake or he may apply and release his brakes several times before he stops, but by recording the time that each different operation is begun the total time consumed in acceleration, coasting and braking can be readily computed. Voltage readings are taken at certain definite points along the run, and all high or low readings are recorded with their proper locations. Of course, a more extensive record can be



The choice of size of motor depends upon efficient use of their qualities

SERVICE DATA CARD

DATE May 27, 1917. LINE St. Johns Place WEATHER Fair
 RUN No. 17 TRIP No. 20 LEAVING TERMINAL Subway
 LEAVING TIME 5:22 P.M. ARRIVING TERMINAL Kingston Av.
 ARRIVING TIME 5:35 1/2 P.M. CAR No. 5097 MOTORMAN'S No. 425
 CONDUCTOR'S No. 172 No. PASSENGERS SHOWN BY REGISTER 41

STREET OR LOCATION	PASSENGERS			LENGTH STOP SEC.	REMARKS
	ON	OFF	TOTAL ON CAR		
Subway	28	—	28	—	Slow down
5th Ave	4	—	32	6.8	Slow down
	—	—	—	1.0	Special Stop
Vanderbilt	4	—	36	12.0	Slow down
Candehill	—	—	—	6.0	Slow down
	—	—	—	—	Slow down
Dean	1	1	36	6.8	Slow down
Bergen	—	2	34	2.8	Slow down
	—	—	—	—	Slow down
Park Place	—	3	31	6.2	Special Stop
Stirling	—	1	30	4.2	Special Stop
	—	2	28	4.0	Special Stop
	—	—	—	1.2	Special Stop
Classon	—	1	27	4.0	
Franklin	2	3	26	8.8	
Bedford	—	2	24	5.2	
Rogers	—	1	23	18.0	
St. John	—	1	22	3.8	
Northend	2	4	20	8.8	
Station	—	1	19	3.0	
New York Ave	—	2	17	5.8	
Bend Sin	—	1	16	6.0	
Kingston	—	16	—	—	

OPERATING DATA CARD

DATE June 17, 1917. LINE Vanderbilt Ave. WEATHER Fair
 RUN No. 28 TRIP No. 3 LEAVING TERMINAL 20th St.
 LEAVING TIME 10:46 A.M. ARRIVING TERMINAL Park Ten
 ARRIVING TIME 11:22 A.M. CAR No. 2791 MOTORMAN'S No. 412
 CONDUCTOR'S No. 616 WATTMETER 8432 AMP. HR. METER 9626

STREET OR LOCATION	POWER		BRAKES		STOP	VOLTS			REMARKS
	ON	OFF	ON	OFF		POWER ON	COASTING	BRKING	
20th St.	0	10.2	—	—	—	54.5			
	15.4	12.5	2.9	2.20	—				
	—	—	32.4	—	—	36.4	12.6	12.4	11.4
18th St.	0	12.1	12.2	20.4	—	55.6			
Park Ten	22.0	26.5	25.9	—	—	31.2	16.9	8.2	6.0
	—	—	—	—	—	55.1			

What the Maintenance of Way Department Does

Good Maintenance of Way Is Necessary Not Only to Secure Maximum Life of Track and Structures, but Because the Upkeep Costs in Other Departments Depend Upon It

By R. C. Cram

Assistant Engineer Way and Structure Department
Brooklyn Rapid Transit System

THERE is no standard book on modern electric railway track construction and maintenance to which the young engineer or student can refer for information. There are handbooks which treat the subject in a rather formal way as a part of the general subject of electric railways, but none of them begins to tell the whole story. They lack the essential features of co-ordination and sufficient elaboration. Similarly, the steam railroad track maintenance field was not covered by a book devoted entirely to the subject until Willard's work on "Maintenance of Way and Structures" appeared in 1915.

The electric railway track, particularly that in streets, is intimately connected with the nature of rolling stock, vehicular traffic and street pavements. It is a fundamental part of the railway, and has a vital influence in the operating and maintenance cost of the road. The location of the tracks, largely in streets or highways, is responsible for the principal differences between electric railway track and steam railroad track, and contributes many details of construction and maintenance expenses which the steam road escapes.

The materials, appliances and methods used in electric railway track maintenance have entered upon a new phase, which began about 1908, principally as the result of extraordinary replacements required by much trackage reaching its wear limit. During the life of the electric railway the track has passed through a cycle which has attempted to follow the rapid changes in type and weight of rolling stock. It began with the light electrified horse car running on "tram" or stringer rails in cobble pavement. These were succeeded by the double-truck car whose weight steadily increased up to 35,000 or 40,000 lb., and the rails were changed to deep girder sections on ties in rough 8-in. granite or other block pavements. The recent tendency in rolling stock is in the nature of a return to the light-weight car, often of the single-truck type, and the track construction is returning to rails of less depth and sometimes of less weight. The pavement is tending toward the smooth types, such as asphalt and other bituminous pavements, 4-in. grouted granite, concrete and brick. Along with these changes in rolling stock and track, the

character of vehicles using the streets has been changing. The narrow steel-tired wagon wheel of the horse-drawn vehicle is being supplanted by the rubber-tired motor vehicle, with a consequent lessening of the destructive action upon track pavements.

In company with these developments, much attention has been directed toward the materials of construction, and there has been a crystallizing force at work in the track-maintenance organizations so that they are rapidly approaching quite similar lines of endeavor.

It is believed that the work as now conducted will admit of description, and in this attempt to co-ordinate available data an effort will be made to set forth the best accepted practice now current in that important branch of electric railway engineering which has come to be known as maintenance of way and structures. Advantage will be taken of the privileges enjoyed in co-operation with other maintenance engineers through joint service for several terms as a member of the committee on way matters of the American Electric Railway Engineering Association. The Engineering Manual and Proceedings of that association will be drawn upon frequently, as it is responsible in a large measure for the standards now existing in electric railway engineering practice.

The similarity which modern interurban and high-speed tracks have to steam-road tracks makes the work of the American Railway Engineering Association particularly valuable to electric railway engineers, and the material from its proceedings as co-ordinated in Willard's work on "Maintenance of Way and Structures" will be used as occasion warrants. The valuable reports of the Board of Supervising Engineers, Chicago Traction, will also be consulted freely, since the reports cover many original investigations made in conjunction with the practical reconstruction of the entire surface railway system in Chicago, now about finished.

The work of others, and of periodicals, societies and associations, will also be credited where credit is due.

Maintenance of Electric Railway Track Is a Big Task

In round numbers there were 50,000 miles of single track operated by 1029 electric railway companies in the United States on June 30, 1917. This mileage is about 12 per cent of the steam-railroad mileage as of January, 1918, and is greater by about 9000 miles than the entire steam-road mileage of the Dominion of Canada in 1914. The electric railway trackage in operation would provide a double-track railroad around the earth at the equator. About 300,000 people were employed in operating and maintaining electric railways in the United States in 1917.

The upkeep of 50,000 miles of electric railway track, about 60 per cent of which is in densely populated areas within cities or towns (which means that this trackage

(Concluded from page 356)

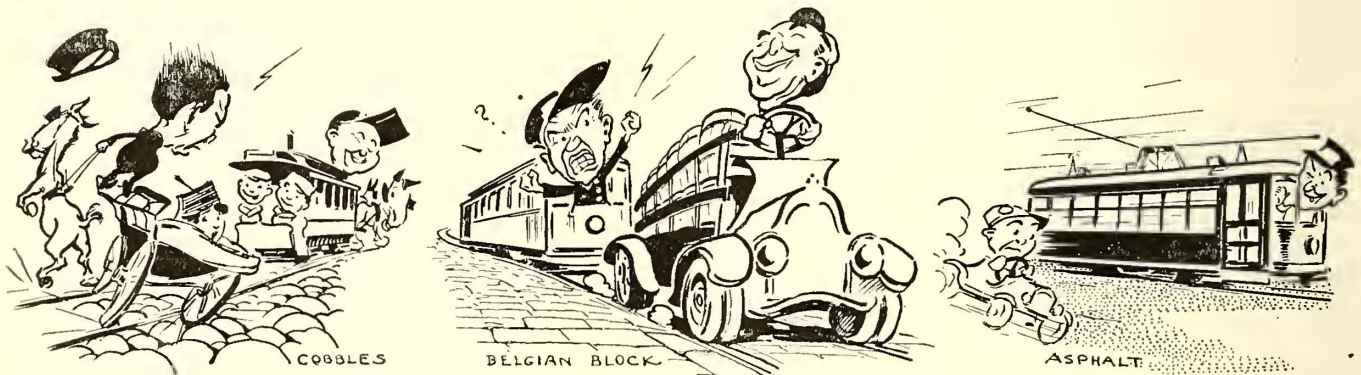
obtained by the use of recording instruments. However, these suggestions presuppose that such instruments are not available, or that the time and expense of conducting a more elaborate test is not warranted. After the data cards for each trip are turned in they are summarized and the results thus secured are entered on the traffic data record as shown in an illustration on the preceding page.

is generally well paved) presents a problem worthy of the best engineering talent. The work involved is so full of detail as compared with steam-railroad maintenance work, that the force required by the electric railways could probably maintain more than twice as much mileage if employed in steam-road service. In common with the latter service, the work is termed "Maintenance of Way and Structures" or sometimes simply "Maintenance of Way." Its importance is indicated by the records, which show that about 16 per cent of the total operating expense is on maintenance of way and structures. The track is the basis part of an electric railway property, and because of its usual location in streets its maintenance must require a high order of skill, judgment and executive ability, and often considerable diplomacy, particularly in dealings with numerous civic authorities. Organization also plays a big part in the successful conduct of the work.

It should be remembered, as Willard has well said,

much work should be completed before the heavy rush of midsummer business. The fact that cars must be operated and service maintained, with the necessary maintenance of equipment and operation of power plants, makes it plain as to why the way department must suffer first in consequence of any policy of economy. Such economies, however, are expensive in the end, as the usual result is a heavier proportionate expense later. Combined with this are increased expenses in maintenance of equipment, overhead line and transportation. These follow because track deteriorates rapidly if not well maintained, and rough track, bad joints and poor bonding soon cause excessive damage to equipment, extraordinary side wear on trolley wire, increased power consumption, and even the reduction of car speed in sufficient amount to require more cars to operate the line.

There is little doubt that the hitherto prevailing time for closing the financial year coming in June, as



PAVING HAS A VITAL RELATION TO TRANSPORTATION PROBLEMS

that "two important facts should be understood, viz.: (1) The large proportion of the operating expense which is expended in track and pavement maintenance; (2) the relation existing between the kind, location and condition of the track and the economical operation and business of the road." (The italics are the writer's.)

The track, pavement and roadbed represent the greater part of the investment in such roads, as a rule, yet the maintenance of this part of the property as a branch of engineering has not been recognized until recently as being of any particular degree of importance.

In line with steam road history, the work in the past was often in the hands of the practical man who had worked up from the ranks. In recent years, the necessity for the proper recognition of the importance of the work has been more and more apparent, so that to-day quite a number of roads have cadet engineers in training for the work, and we now generally have the engineer of maintenance of way replacing the old-time roadmaster or general foreman.

The tendency of electric railway managements to disregard the recommendations of the way department is perhaps not so pronounced as it is in steam-road practice. Nevertheless, when it seems necessary to reduce expenses the way department is generally the first one to receive the axe of retrenchment, and usually at a time when the performance of the work could be done most economically.

This is particularly true of the spring season, when

it has for a long period, has been responsible for the enforcement of retrenchment policies during the best part of the working season. However, the movement is gaining headway, and has been sanctioned by the various regulatory bodies which provides for an agreement between the financial year and the calendar year. The effect of this change will be appreciated by all having charge of maintenance-of-way matters.

It is believed that most managements now realize the importance of two basic principles: (1) The need for continued minor repairs and renewals to keep the track and pavement up to some fixed standard to offset normal wear and tear or depreciation; and (2) the need for a certain minimum amount of reconstruction or extraordinary maintenance to keep up a reasonable balance between traffic increases and increased loading or excessive wear on some portions of the system.

Improvements That Are Suggested by the Way Engineer

It is clearly the duty of the way engineer to point out to the management such improvements in tracks and structures as conditions may suggest, and from time to time to make requests for appropriations of funds to carry out the work desired. It is also his duty to make the best possible use of the moneys assigned for such improvements. He must, in addition, be prepared to furnish plans and estimates for the various improvements, additions and betterments which are

TABLE I—SUMMARY OF THE PRIMARY CONSTRUCTION COSTS FOR A PROPOSED ELECTRIC RAILWAY (FISCHER)*

Accounts	Cost per Mile of Track	
	Minimum	Maximum
1—Engineering and superintendence.....	\$1,000	\$2,000
2—Right-of-way.....	2,000	4,000
3—Other land used in electric railway operations.....	100	500
4—Grading.....	2,500	6,000
5—Ballast.....	1,500	4,500
6—Ties.....	1,820	2,600
7—Rails, rail fastenings and joints.....	3,700	4,200
8—Special work.....	400	600
9—Underground construction.....	.....	.....
10—Paving.....	.....	.....
11—Track laying and surfacing.....	800	1,200
12—Roadway tools.....	50	50
13—Tunnels.....	.....	.....
14—Elevated structures and foundations.....	.....	.....
15—Bridges, trestles and culverts.....	2,000	4,000
16—Crossing, fences, cattle-guards and signs.....	500	1,000
17—Interlocking and other signal apparatus.....	.....	2,500
18—Telegraph and telephone lines.....	100	500
19—Poles and fixtures.....	500	1,500
20—Underground conduits.....	.....	.....
21—Transmission system.....	500	1,200
22—Distribution system.....	1,500	5,000
23—Dams, canals and pipe lines.....	.....	.....
24—Power-plant buildings.....	600	1,200
25—Substation buildings.....	300	500
26—General office building.....	.....	.....
27—Shops and carhouses.....	400	600
28—Stations, waiting rooms and miscellaneous buildings.....	100	200
29—Docks and wharves.....	.....	.....
30—Power-plant equipment.....	2,000	4,500
31—Substation equipment.....	750	1,500
32—Shop equipment.....	150	300
33—Park and resort property.....	.....	.....
34—Cost of road purchased.....	.....	.....
35—Cars.....	800	2,600
36—Locomotives.....	.....	.....
37—Electric equipment of cars.....	600	1,600
38—Other rail equipment.....	200	500
39—Miscellaneous equipment.....	.....	.....
40—Law expenses.....	200	500
41—Interest.....	1,000	2,000
42—Injuries and damages.....	100	200
43—Taxes.....	50	100
44—Miscellaneous.....	500	1,000
Total.....	\$26,720	\$58,650

*See article by L. E. Fischer, on "Estimating Operating Expense and Cost of Construction," ELECTRIC RAILWAY JOURNAL, Sept. 6, 1913, page 387.

constantly being brought forward by the operating officials. These projects take the form of suggestions for double tracking, changes in special trackwork for re-routing of cars, construction of additional sidings and turnouts on single-track roads, and sometimes grade reductions and changes in alignment. The betterment and changes in bridges and other structures are also items which require a great deal of attention, with the view of securing all possible economies in maintenance charges. There are many municipal and state projects which require the engineer's most careful attention because of the necessity for co-operation with public authorities in connection with public improvements. It is not the purpose of these articles to discuss these improvements, except to point out occasionally how neglect of consideration of the maintenance point of view, when improvements and construction work are being planned, may ultimately provide excessive charges for maintenance.

Maintenance Never Stops

The construction of an electric railway is naturally of first importance, but once the road is finished its maintenance begins. The construction period is comparatively short, while the maintenance period never ceases unless the road is abandoned. Consequently the work of the maintenance-of-way department may be said to assume first importance so soon as the construction department ceases its activities. This is particularly true in electric railway work, because new construction is and has been almost at a standstill for the last five years at least, and what little construction work has been done has usually been carried out by

the engineer of maintenance of way, acting through a specially assigned construction engineer. In times of stress, construction work can be stopped entirely for comparatively long periods, but a reasonable amount of maintenance must go on so long as the road is in operation.

In common with steam roads, the proportion of maintenance expense to total operating expense is high. This has been assigned to the fact that, like the early steam roads, the electric railways were originally built rapidly, and often in undeveloped territory. They were also built with the view to cheapness in first cost rather than to economy in future maintenance. Furthermore, quite a long period of time was required for inherent defects in early construction to develop, and much trackage was built with these inadequate early types as patterns before the defects of such types could be determined. There was also a long period of constant and rapid increase in car weights and traffic, which finally reached the point where the track construction was really not strong enough to sustain the loading. Under these conditions it is to be expected that the maintenance costs would mount to high figures.

No Common Standard of Track Classification

The steam roads have adopted classifications of track construction which correspond to certain predetermined amounts of traffic and varying numbers of main tracks, and their standards of track construction and maintenance are based upon the classifications adopted by the American Railway Engineering Association, which are as follows:

Class A Track.—All districts of a railway having more than one main track. Also all single-track districts where the traffic equals or exceeds a freight-car mileage of 150,000 per mile per year; or a passenger-car mileage of 10,000 per mile per year and a maximum passenger-train speed of 50 m.p.h.

Class B Track.—All single-track districts of a railway where the traffic is less than for Class A, and is equal to or exceeds a freight-car mileage of 50,000 per mile per year; or a passenger-car mileage of 5000 per mile per year and a maximum passenger-train speed of 40 m.p.h.

Class C Track.—All districts of a railway not meeting the traffic requirements of Classes A or B.

The modern interurban and high-speed electric railway construction, however, often meets and at times exceeds the requirements of Classes B and C in all respects except freight traffic, but there are no standard track classifications of this kind in the electric railway field. On the other hand, the electric railway is generally found to have only one fixed standard for its new construction or reconstruction in any one city or system covering a wide variation in traffic and disregarding the number of tracks. This applies to the interurban and other high-speed electric railways as well. It must not be understood that all the electric railway tracks on any one system or in any one city are alike. Far from it, because most properties of any considerable size are consolidations made up of different types of construction, which were perhaps selected by as many managements as there were companies. But it will be found that each system now has a fixed standard for city track and another for track on private way, and

the attempt is being made to get the trackage rebuilt to only one or two general types for the system. This practice has both advantages and disadvantages, but the fundamental principles in back of it are sound, as they are based on many economies in materials and labor which accompany the use of only one or two standard types of construction.

What Does Electric Railway Track Cost?

Electric railway track construction costs are subject to many variable conditions which will increase or decrease the cost over a wide range. There are at least five distinct types of roads, which in turn call for as many distinct differences in cost. These types are: (1) Urban or city lines; (2) interurban or suburban lines; (3) high-speed lines operated by means of third-rail or high voltage d.c. and a.c. overhead trolley wires; (4) elevated railways, and, (5) subways. There is also a variation in strictly urban line costs, in New York and Washington, for instance, where the very expensive underground trolley system of operation is in use. Furthermore, the variation in character of country traversed and in cost of materials and labor in different parts of the country has considerable influence on costs.

Another factor which has a decided effect on the cost of urban or city lines is track pavement, which may vary as much as \$10,000 per mile of track on lines similar in all other construction details, but situated in different cities, in one of which the paving requirements may call for a more expensive type of pavement than in the other.

In addition to these items, there are the variations in construction costs caused by the nature and extent of storage yards, terminal facilities at fair grounds, ferries, baseball parks and other places where large crowds of people congregate, and the important factor of special track work contributes cost variations which differ widely.

It is obvious that there can be no fixed rule governing the construction cost of electric railways, but it may be stated in a general way that, according to estimates by L. E. Fischer, the modern interurban road costs complete anywhere from \$26,720 to \$58,650 per mile of track (see Table I), and that the cost of right-of-way, tracks, bridges, signals and incidental structures, other than overhead work, will range from \$16,140 to \$32,710 per mile of track (see Tables I and II). These estimated figures were for 1913, and were based on an analysis of costs for ten interurban roads.

Tracks on lines located entirely in cities or towns, and requiring pavement, will range in cost from \$20,000 to \$45,000 per mile of track. The latter figure is taken from actual costs of a 6-mile extension built in 1917 in a large Eastern city, while the former covers a 2-mile construction job done in 1914 in an Ohio town.

The construction costs for tracks on high-speed lines, elevated roads and subways are usually equal to the costs for first-class steam road tracks.

There is a great deal of money spent on track maintenance for which there is no improvement in permanent value. Tracks on private way are continually re-surfaced and re-aligned; rails and ties are renewed here and there and joints tightened up. In paved tracks, joint and rail repairs are more costly because of

TABLE II—ESTIMATED TRACK AND ROADWAY COSTS OF A PROPOSED ELECTRIC INTERURBAN RAILWAY, BEING A SUMMARY OF CERTAIN ESSENTIAL ITEMS TAKEN FROM TABLE I WITH 5 PER CENT FOR ENGINEERING ADDED

Accounts	Cost per Mile of Track	
	Minimum	Maximum
1—Engineering and superintendence.....	\$770	\$1,560
2—Right of way.....	2,000	4,000
3—Other land used in electric railway operations.....	100	500
4—Grading.....	2,500	6,000
5—Ballast.....	1,500	4,500
6—Ties.....	1,820	2,600
7—Rails, rail fastenings and joints.....	3,700	4,200
8—Special work.....	400	600
9—Underground construction.....	.....	.....
10—Paving.....	.....	.....
11—Track laying and surfacing.....	800	1,200
12—Roadway tools.....	50	50
13—Tunnels.....	.....	.....
14—Elevated structures and foundations.....	.....	.....
15—Bridges, trestles and culverts.....	2,000	4,000
16—Crossings, fences, cattle guards and signs.....	500	1,000
17—Interlocking and other signal apparatus.....	.....	2,500
	\$16,140	\$32,710

(Note: Track bonding is omitted because it is classified as a part of the distribution system.) From article by L. E. Fischer, ELECTRIC RAILWAY JOURNAL, Sept. 6, 1913.

the incidental removal and restoration of the pavement. It is a well-known fact that pavement maintenance represents from 30 to 40 per cent of the total maintenance cost for tracks in paved streets. These details require careful consideration from an economic standpoint and it will often be found that large expenditures on radical improvements will result in great and continued economies in maintenance. There should be a constant effort to keep the condition of the track up to such a degree of efficiency that a proper relation between the track condition and car traffic will be maintained since the deterioration of the tracks, if allowed to go too far, will have a marked influence on costs of car operation and maintenance of equipment.

The degree of track efficiency which is desirable is dependent to a large degree upon the general condition and age of all the trackage and the financial position of the road. It is obvious that a road of poor earning power can hardly afford the standard of maintenance expense which would obtain upon a road which has an ample income.

Track maintenance costs, like track construction costs, are subject to many factors which control the expenditures. As an indication of how the cost of maintenance may vary it may be stated that an examination¹ of the expense for maintenance of way and structures on ten interurban roads in 1913 indicated a range of from \$800 to \$1,000 per mile of track operated. This range compares closely with the costs covering the electric railways in the State of Connecticut in 1912, as found in the annual report of the Connecticut Public Utilities Commission. The cost of this item on urban roads will range from \$1,000 to \$2,000 per mile of track operated, being influenced greatly by the amount of reconstruction done in any one season, for the reason that the greater part of the cost of reconstruction work is really extraordinary maintenance and is charged to regular maintenance accounts. These figures are more interesting when it is stated that in 1913 it cost, on an average for all main tracks on steam roads, about \$1,300 per year to maintain 1 mile.²

The maintenance expenditure for track and pavement on 100 miles of modern 7-in. girder rail track in Brooklyn, N. Y., having wood ties and grouted granite pavement on concrete and covering tracks from one to ten

¹L. E. Fischer, ELECTRIC RAILWAY JOURNAL, Sept. 6, 1913.
²Willard: "Maintenance of Way and Structures."

Electric Railway Power Plant and Its Personnel

The Technically Trained Man Must Be Held in the Power Plant, and Particularly in the Boiler Room—He Can Be Held If the Management Realizes What Economies Can Be Carried Out by Men of Scientific Training

By Hartley LeH. Smith

Engineer of Tests
Brooklyn Rapid Transit System

THE power supply of an electric railway comes either from an electric power plant devoted exclusively to the individual railway's use or from a power plant carrying railway load as a part only of its total load, the remainder being lighting load and industrial power load for manufacturing purposes. While slightly more than one-half of the electric railways today get their power from plants devoted exclusively to their own use, and in fact owned and operated by them, the tendency is very rapidly growing to forgo exclusive power supply and purchase from a power company.

The forms in which electric power is generated for electric railway use are direct current at 550 to 650 volts, direct current at 1200 volts, direct current at 2400 volts, alternating current, three-phase at high voltage with substation transformation, and alternating current high voltage single-phase with distribution to the overhead contact system without transformation. The single-phase distribution just mentioned is in reality single phase distribution from three-phase generators in practically all cases to-day.

Generation of three-phase current in this country is at 25 cycles or at 60 cycles per second. Other frequencies are so rare as to be altogether negligible. This is by no means true in other countries. In England, for instance, there are four or five frequencies in common use.

Until very recently alternating current for railway

(Concluded from page 360)

years old with an average age of nearly four years, was found to be \$460 per mile per year.³

It was also found that the expense for joint maintenance represented 52.1 per cent, pavement 34.8 per cent, and corrugation 12.8 per cent of the total maintenance expenditure. Incidentally it was noted that about 26 per cent of the pavement expense was for repairs to pavement following joint repairs, and also that 65 per cent of the total expense was confined to 11.4 per cent of the mileage, having been due mainly to a particular type of rail joint.

It will be apparent from the foregoing figures on maintenance costs that the engineer of maintenance of way needs to keep closely in touch with the expenditures of his department. Through careful analysis of expense and comparison with similar items on other roads as well as comparisons of different parts of his own road, he may search out the weak points and take steps to overcome them.

use, whether transmitted to converter substations or distributed to high-voltage, single-phase trolleys, was invariably generated at 25 cycles. Lately, however, the 60-cycle, 550 to 650-volt railway converter has been developed and large amounts of power are now being generated at 60 cycles and transformed to direct current for railway motor use. It is indeed the 60-cycle railway converter operating at 550 to 650 volts which is making possible the movement away from exclusive railway power generation, and the substitution for it of power purchased from the general power company. The general power company generates at 60 cycles, since its load has been lighting and industrial power, and 60 cycles alone is a frequency suitable for lighting. Stations generating at 25 cycles are therefore either those devoted to electric railway load or they are stations situated in those very large cities where the congestion is so great as to make feasible the entire transformation to direct current form before distribution of light and power to consumer's circuits.

An Efficient Plant Is a Specialized Plant

So much for alternating-current generation and distribution. Of the forms of direct-current power, those at 550 to 650 volts, 1200 volts and 2400 volts, it may be said that they are generated in power plants devoted exclusively to railway use, the amounts of such power sold as a general supply for industrial purposes being so slight as to be quite negligible.

Classifications of course cannot be made too rigid. There are, for instance, very many electric power plants in this country with entirely distinct groups of generators devoted to the specific purposes for which they are exclusively fitted. Such plants constitute, so to speak, two or more generating stations under one roof; they are not typical of modern practice. They are examples neither of the specialization which spells economy, nor of the well nigh universal adaptability of the extremely modern stations which also spells economy.

Direct One-Man Management Is Rare

Of the organization of the personnel of electric power plants it may be said that there is very wide variation when considered in any detail; standardization of such organization even along very general lines has as yet by no means come. It is doubtful whether any distinction could be substantiated between the organization of personnel in railway power stations and that in others. One very broad and significant generalization can however be made; the division by a sharp line between electrical and steam (engine and boiler room) responsibility. The four walls of a power station but rarely house an official fully responsible for both classes of

³See ELECTRIC RAILWAY JOURNAL, March 17, 1917.

apparatus and service. Of course responsibility for these two cardinal services merge always somewhere in the company organization in one man. Very nearly always, however, he is a man stationed among the other company executives. In all but really large companies, where complexity and differentiation of organization naturally multiply, he is almost sure to bear other executive responsibility also. Very often he bears very many other responsibilities, as general manager. Very often, too, in companies somewhat larger he is electrical engineer and is in charge of electrical distribution and often indeed of rolling stock also, although this last is certainly less common than formerly. Really large companies organize quite differently, with much specialization as size increases.

As for companies of average size, and even much less than average size, so sharp a distinction runs between immediate first-hand charge of steam and electric operation and maintenance control there is no answer but one. Men considered capable of ambidextrously handling both are scarce. The thin ranks of such men are growing nevertheless visibly larger. Why so? Well, it is a fact that the boys from the technical schools of fifteen years ago are boys no longer now.

An electric power station has its chief engineer; it has also its chief electrician. These are not responsible one to the other. That is the point I have been making; responsibility merges above. A consequence is that chief engineer and chief electrician have their own separate organizations. It is largely so that this dualistic responsibility perpetuates itself. Power stations are manned largely by men who grow up in power stations. A man grows up as a steam man or as an electrical man. After a while he gets to the top of the steam or of the electrical department. Do I know that the water tender in the boiler room reads in his technical paper the circuit connections of a three-phase generator? I do know it. I am not writing of the power station a bit in the future but of the present-day power station.

Organization Varies with Plant Characteristics

Of the detailed organization inside an electric power plant no standardized scheme can be drawn up. Certain very broad distinctions are however fairly clear. In all but very small plants there are electrical operators and electrical maintenance men. Rarely do electrical operators do repair work. On the steam side, however, a watch engineer and a monkey wrench are much together; likewise a boiler room engineer and a tube cleaner. In quite large power stations it is true there is apt to be considerable distinction between plant operation and maintenance with sometimes an assistant chief engineer responsible for maintenance under the chief engineer, while the watch engineers, operating men, remain responsible directly to the chief engineer.

A very important phase of the steam plant organization bears upon the relationship between engine or turbine-room force and the boiler-room force. At one end of the scale, that of the small plant, there is the engineer and the fireman or firemen, with nothing dubious as to who gives and who takes orders. But at the other end of the scale, the very large plant, the question of unity or cleavage of organization is sometimes decided

one way, sometimes another. The question is whether the chief engineer deals directly with the boiler-room force or more or less through the ranking man or men of the engine room. Very rarely probably does the engine-room man find himself unconcerned with certain features of boiler-room operating practice, such as banking and starting up of boilers to suit the changing number of engine-room units in operation, the maintenance of uniform steam pressure, etc. Very often, however, no engine-room man is held in any way responsible for boiler repair work.

A vast deal is written nowadays about the superior significance of talent, real engineering talent, in the boiler room; that it is in the boiler room that plant economy is made or lost. We are told that in the boiler room is the opportunity for the big operating man; that there a man's work from hour to hour is worth amounts of money to his company so vast compared with his pay that his pay might be anything at all. We are told also



"Our job is to make this pile go farther"

that the increasing, very rapidly increasing, introduction of individual boiler units of very great size is rapidly putting this claim upon the basis of actual practice. We are told that the really technical man is demanded; that this company or that company is going after graduates of engineering schools of rank and that in the boiler room such young men will do the thing as it should be done. This sounds well. The scheme is grounded in very excellent logic; but does it really work? Would such men stay, and if they stayed would they do what is expected of them? In the first place there are a lot of things a technical man, a technical graduate, doesn't know. He knows boiler operation, or if he doesn't he learns it very quickly and well. But maintenance he doesn't understand because a whole lot of it consists of "tricks"; in other words, it is a trade. He can learn that, too, but life is short and the American technical graduate rises all too quickly to wait for that. Before you can very well get track of some of them you find that they are running power stations themselves. If that is so they must bluff it just a bit for a while, you say? Well, yes, but then we said above that they are Americans, did we not?

Technical Men the Hope of the Boiler Room

What then is the hope of the boiler room? I really think it awaits the day of the thoroughly technical chief engineer. That day hasn't come, but it is coming. If a man knows the field intimately at present he knows that the full advent of the day is distant even yet. And the reason for this is simple, it will not be here until the older men have left the field. Even that will not be enough; men must be graduated in larger numbers than at present, and a greater proportion of those graduated must continue working as engineers. The young fellows who are in power stations now in capacities more or less vague and nondescript, and there are many of these but many more are needed, must stay and grow up and find themselves eventually in charge by a sort of inevitable inheritance. Then, too, certain fast-vanishing prejudices which now exist must be banished forever.

And when the day comes when power plants, in

practically all cases, are in charge of trained technical men, will economy have improved and if so how will it have been improved? After all, the technique of power station operation is not of great complexity. Compared with a scientist's field the day's work of a power plant engineer may be arduous, but it is not complex. Indeed, its very simplicity is a handicap, for it can hardly attract the ablest men. Scarcely any of the essentially technical features of power generation are entirely outside the knowledge of men operating power stations to-day. They have heard of them at least, although their grasp upon the underlying principles may not be of the firmest. The chief difference is that in that future day the men running power stations, technically trained men, will more truly believe in these principles. They will believe them to be more worth while; they will believe them to be more practical. Then, too, we must not forget that their task of execution will be easier. If the chief takes to knowledge and "drinks" it, what will the "boys" be doing?

Station Duties Differentiate into Boiler, Steam and Electrical

But to come back to the power station of the present. On systems of size there is almost sure to be, on the electrical side, some sort of system operator or chief operator, distinguished from the chief electrician and his direct organization in that they deal with electrical operation inside the station while he deals with the relation of the station to its external load, so to speak.

On the steam side under the watch engineers and possibly turbine engineers in large stations there are oilers for the main units and often engineers and oilers for the steam auxiliaries. The details of organization depend very largely upon the design of the turbine or engine room, that is, the proximity and accessibility of the auxiliaries from the engine or turbine floor. An important class of men, distinct in a large station, are those who take care of the maintenance of the auxiliaries of the main units. The need of such men is particularly urgent where very high vacuum is maintained in turbines provided with surface condensers and reciprocating dry-vacuum pumps.

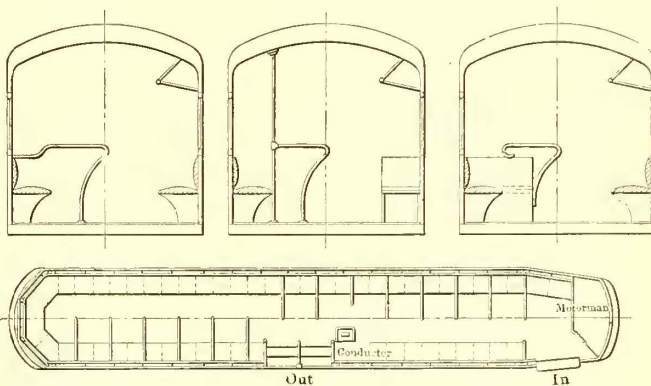
In the boiler room the simple organization of a small station changes considerably to a complexity in stations of very large size. Beside firemen there are sometimes head firemen who see that instructions are observed and the general level of skill maintained. Often the water level is not controlled by the firemen but by water tenders. Over water tenders or head firemen, or both, there are sometimes boiler-room engineers, responsible as a general thing as operating men to the watch engineers of the turbine room or engine room. Of course, size of the plant is the chief factor. In many fairly large plants the chief engineer exercises directly many functions which in plants of very great size he exercises through subordinates.

To discuss organization broadly is to note that it deals in simple manner or complex, depending on size of plant, with the sorts of energy transformation and the apparatus by which the transformations are accomplished. In a steam-operated plant there is one beginning but there are two endings. The beginning is the coal handling. One ending is the removal of the ashes, the other is the delivery of the electric energy to the transmission lines. Many sorts and kinds of apparatus make up the total. To enumerate briefly the

principal links we find coal hoists, coal crushers, coal storage plant, facilities for coal delivery to the boilers, coal feeding into the boilers, coal-combustion appliances and aids, the stacks, flues, economizers and other appliances for caring for the products of combustion, the ash-dumping and ash-removal facilities, boilers for steam generation, superheaters for the increase of efficiency, feed-water pumps and heaters, feed-water purifiers, steam piping, main engines or turbines with their auxiliaries, condensers, condensing-water pumps, air pumps, oil pumps, electric generators, oil switches, switchboard control, electric measuring instruments, outgoing feeders. All of these present their problems for organization aside from their problems of operation.

Stanchions for Longitudinal Seat Cars

THE interest in the front-entrance, center-exit car renders timely a reference to patents granted to George C. Wing and Lewis P. Lipps, of Cleveland, Ohio, on a car interior arrangement designed to insure comfort and safety of passengers. In brief, the points covered are an arrangement of a passageway to one side of the center line of the car and stalls separated by stanchions or hand rails. Several possible forms of rail are shown in the accompanying diagrams.



ARRANGEMENT OF RAILINGS FOR SUBDIVIDING CAR INTERIOR INTO COMPARTMENTS

Although not primarily intended as a support for standing passengers, the rails would perform this function to a certain extent. They also would serve to insure equitable division of seating space among passengers and also of standing space. In addition they are designed to provide assistance to passengers when rising and sitting down.

Constructive Co-operation at East St. Louis

A committee of business men appointed by the East St. Louis (Ill.) Merchants' Association to confer with the officials of the East St. Louis & Suburban Railway has published a report of their conference in which they urge the people of the territory served by this company to co-operate with the officials in making the service satisfactory. They emphasized the importance of this in view of the fact that war conditions and greatly increased costs of production make operation of an electric railway a trying and a hazardous task. The report of the committee was published at length in East St. Louis papers and is a full and frank discussion of problems underlying the operation of the "East Side Electric Lines," as they are called.

The Forces Which Act Upon a Transmission Line

Data Are Given by Means of Which the Factor of Safety of a Pole Line Can Be Calculated The Transmission Line Is Shown to Be One Link in the Transportation Chain

By Charles R. Harte

Construction Engineer The Connecticut Company, New Haven, Conn.

THE present-day tendency to broad publicity shows that at last electric railway operators are realizing the fact that they are merchants, their wares being transportation, and that if they are to be successful they must follow modern methods of salesmanship. Transportation, however, is only the last step; before the goods can be sold they must be produced. The complications of this process and the opportunities which it affords for losses or economies all along the line are hardly appreciated except by those most intimately connected with the details. An investigation of the process from the time when the raw material—the fuel—is delivered to the plant to the time when a ride is delivered to the customer, however, shows that it consists of a number of steps. The investigation will disclose also at least one, and in the majority of cases two, interruptions in the manufacturing procedure while the principal “material” of the ride is being shipped from one shop to the next.

Let us start with the coal pile. The chemical energy locked up there must be transformed in the power station first to heat; then through the agency of steam and the turbines or engines to rotary motion; then in the alternators to electrical energy, and finally in the step-up transformers to an entirely different variety of current for “shipment” over the transmission line. At the substation the incoming energy is again changed to an entirely different form of alternating current; then by the rotaries or motor-generators to direct current, to be shipped over the distribution system to the car, wherein the motors convert it first into rotary motion and then, by the aid of wheels and track, into straight line car motion. The electric railway business involves, therefore, not only retailing the transportation, but producing it in three manufacturing plants and providing two transportation systems to carry the product of each to the next in order.

In the case of a small property, generation, transmission, conversion and distribution may all come under one department, but in larger systems each will have its own more or less complete organization. In a discussion in any detail each step will require individual treatment in many respects.

It is proposed in the series of articles on transmission and distribution lines, of which this is the first, to set out in some detail the purpose and requirements of the several elements, and to describe some of the

materials and practices which have come under the writer's observation. It is hoped that their appearance “once in a while” will result in comment, criticism and additional information; that the sum total of the discussion will form a helpful contribution to the art by indicating what to do or, perhaps, that which the late Dr. Thomas Egleston of the Columbia School of Mines always said was equally important to know—what not to do.

In the transmission of power from the power station to the car it passes in general over the high-tension line, through the substation, over the low-tension feeders and finally through the overhead contact line or third-rail to the trolley wheel or shoe. In the present article we shall concentrate attention largely upon the transmission line, and particularly upon that important element, the pole.

The transmission line is a transportation line pure and simple, with the one function of transmitting high-tension current from generating station to substation. Electrically this requires construction which will keep the current on the wire and

lightning off it. Mechanically there must be strength to resist storm and decay or corrosion, and supports must be provided to keep the wires out of mischief to themselves or others. In theory apparently these are very simple matters; in practice they are often surprisingly complicated, particularly in the case of the long-distance high potential heavy-power lines. Such lines, however, are a whole subject in themselves, and indeed are more apt to be part of a big general-service power system than part of an electric railway.

The moderate-voltage transmission lines which make up the large majority of those actually a part of “trolley” systems have much in common with distribution lines, and to a considerable extent are combined with them. The greatest difference arises from the fact that while the transmission line serves merely as an industrial carrier between two fixed terminals the distribution line must deliver power to a rapidly moving car at any point along the line. In addition to carrying the current it must provide a satisfactory track for the collecting device. This fact gives the transmission line designer a considerable advantage, his mechanical problems differing only in degree from those which the older telegraph line practice had pretty well solved. Naturally the desire of not a few of those entering the new field to impress the stamp of their originality on the art led to some outrageous construction. The one thing that refused to lend itself to “freak” treatment



Overhead linemen hastening to repair a link in the transportation chain

was the form of support which probably for some time to come, as heretofore, will carry a good majority of the lines, namely, the wood pole.

The Pole Must Be Considered as a Beam

The line poles have three mechanical functions. They must support the dead weight of the line, withstand the tendency of the line and the wind to overturn them sideways, and hold the line sufficiently above the ground to provide adequate clearance.

In its direct effect the dead load is of comparatively little importance as regards the pole itself. Crossarms and other attachments, even though relatively numerous, do not weigh much. The pole top shown in the

of the loading in conjunction with wind, or in the unhappy case of unbalanced stresses due to some form of failure on either side, is a more serious matter. Before considering this, however, it is well to see what are the forces which must be overcome.

Estimating Maximum Stresses on Transmission Lines

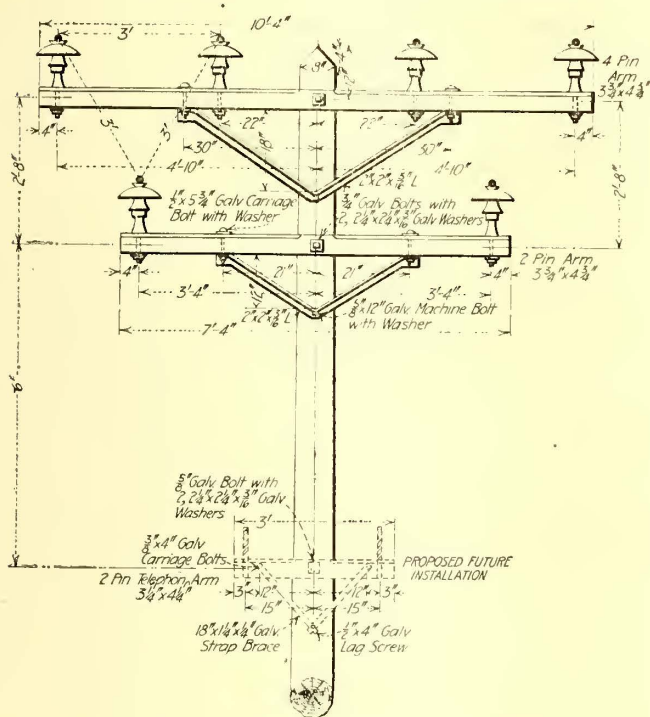
The two forces which may tend to overturn a pole are those due to the wind and to the unbalanced pull of the conductors. The assigning of proper values to these forces in designing a line was the subject of bitter discussion until the appearance in 1911 of the "Specifications for Overhead Crossings of Electric Light and Power Lines." This work was prepared by a joint committee of the National Electric Light Association (at the instance of whose committee on overhead line construction, and particularly of Farley Osgood, chairman of the committee, the work was undertaken), the American Institute of Electrical Engineers, the American Electric Railway Association, the Association of Railway Telegraph Superintendents and the American Railway Engineering and Maintenance of Way Association (now the American Railway Engineering Association). The interests of the telephone companies, which have no corresponding national organization, were represented by F. L. Rhodes and H. S. Warren of the N. E. L. A. and A. I. E. E. respectively.

This committee selected the following as reasonable maximum pressures upon sleet-covered structures: 8 lb. per square foot of area of conductors with a coat of sleet increasing the diameter by 1 in. (1/2 in. of sleet) and 13 lb. per square foot "on the projected area of solid or closed structures and one-and one-half times the projected area of latticed structures." These pressures correspond to an "indicated" wind velocity of about 70 m.p.h., or an actual velocity of about 60 m.p.h., the difference being due to the fact that the usual cup anemometer gives readings higher than the actual velocities.

Velocities higher than those specified do occur, but almost never with sleet. In the case of large towers in exposed positions such higher velocities against the uncoated surfaces may require special consideration, but as a rule, on the rare occasions when such velocities occur the reduction in area by the loss of the sleet more than offsets the higher pressures.

A Few Peculiarities of Sleet

The production of sleet on transmission lines requires a peculiar condition, namely, a temperature below freezing on the ground with one above freezing higher up so that the rain or wet snow does not freeze until it strikes the line. A very little temperature change fortunately stops the process, but altogether too frequently for the engineer's peace of mind the critical conditions endure long enough to do serious damage. The thickest sleet coat is much of the same class as the biggest trout caught; details are best remembered long afterwards. At the time of the occurrence the sentiment of all involved is apt to be that of a lineman whose failure to get some actual measurements in view of the previous specific requests for facts was mildly commented on by the writer. In this case



TYPICAL TRANSMISSION LINE POLE TOP

illustration, which is for two No. 00 copper circuits with 150 ft. normal span insulated for 45,000 volts but to operate at 33,000, has a dead load made up as follows:

Six insulators, 11 lb. each.....	66 lb.
Six pins, 5 lb. each.....	30 lb.
Crossarms, 58.5 + 41.5 lb.....	100 lb.
Braces, 14.5 + 11.5 lb.....	26 lb.
Bolts, etc.....	10 lb.
Conductors, 6 x 150 ft., 0.403 lb. per ft.....	363 lb.
Total	595 lb.

With the conditions specified in the National Electric Safety Code as "heavy loading," a dead load of 1230 lb. is produced. This provides for a coat of sleet 1/2 in. thick, making the diameter of each wire practically 1 1/2 in. The specified wind pressure of 8 lb. per foot, which is also a considerable part of the heavy loading, is assumed to act horizontally, and so does not affect the vertical load. The sleet increases the loading by 535 lb., to which must be added probably 100 lb. due to the ice on the arms and the pole itself. This 1230 lb. is far below the capacity of any ordinary pole acting simply as a strut, but its effect on the arm is quite a different story.

Considering the pole as a beam, however, the effect

the prompt "come-back" was "It bust the line; what the h— more do you want!"

Sleet ranges from a porous white and comparatively light form through all grades up to a beautifully clear ice. As a rule the white ice, some of which is almost as heavy as the clear ice, occurs with heavy winds. The clear ice is apt to form in quieter times, and to be followed promptly by clear cold weather with high wind. However, there seems to be no certainty in the matter and either form of sleet may do great damage.

The severe storms of 1909, one of which "assisted" in the inauguration of President Taft, were of the frozen-snow type. The storm of Dec. 13, 1915, was chiefly one of clear ice. The latter was notable in that, although it left the "overhead" practically uninjured it put the New York division of the New Haven Railroad out of business for several days by wrecking its communication lines. In these particular storms the damage was chiefly due to the weight of the accumulations. It occurred very largely on communication lines, the heavy leads of light wire afforded a particularly good opportunity for trouble.

How Geography Affects the Sleet Question

The evidence collected since the work of the joint committee was completed has shown the fairness and wisdom of its standard, and the 1/2-in. ice and 70 mile, zero-degree wind have been adopted by the federal Bureau of Standards in the new National Electrical Safety Code, the last word on the subject. In the code, however, the pressure against supports has been taken at 12 lb. instead of 13 lb. per square foot and lighter loading is prescribed for those sections of the country in which heavy sleet storms do not occur.

The district of heavy loading comprises all territory north of a line starting at the mouth of the Potomac River, passing east of Raleigh, N. C., along the line of the southern boundary of Tennessee to the Mississippi, in a southerly direction to Dallas, Texas, and thence northward in curve cutting off the northeast corner of New Mexico, through the northwest corner of Colorado to a point on the Canadian border about 100 miles east of the northwest corner of Montana.

The region of medium loading lies between this line and one which starts near Beaufort, N. C., runs south of Aiken, S. C., parallels the heavy-load region to a point near Waco, Texas, and thence sweeps west, passing into New Mexico at the Pecos River, through the south corner of Nevada and the valleys of the San Joaquin, Sacramento and Klamath Rivers to the Pacific. In the territory between this and the heavy loading area the maximum loading of the conductors is assumed to occur at a temperature of 15 deg. Fahr., and to be two-thirds of the value of the resultant of the wind and ice loads in the heavy loading district unless, as is the case with large conductors, this reduced value is less than one and one-fourth times the weight of the bare conductor. Under such circumstances one and one-fourth times the weight of the bare conductor is to be used, while for the supports the pressure is taken at 7 lb. per square foot. In the district lying south and west of this medium-loading area sleet is practically unknown, and for this section the maximum load is assumed to occur at 30 deg. Fahr., and to be four-ninths of the value of the resultant of the wind and ice loads in the

heavy-loading district, but in no case less than one and one-fourth times the weight of the bare conductor. For the supports the pressure is taken at 4 lb. per square foot.

Some Examples and Applications

Let us now get down to the practical application of all of this. The several forces pushing on the pole tend to break it off at the ground line if it is well set. The fibers of the pole resist this tendency, and the problem is to pick a "winner" for the pole.

The force against the pole is practically as follows:

$$\text{Force}_1 = \frac{\text{butt diameter} + \text{top diameter}}{2} \times \text{length}$$

above ground \times wind pressure per square foot. The pole dimensions are all in feet.

The effect of this force over the entire length is as if it was all applied at a point midway between top and ground. The force resulting from the wind against each ice covered conductor is:

$$\text{Force}_2 = \frac{\text{conductor diameter} + 1 \text{ in}}{12} \times \frac{1}{2} \text{ length of}$$

each adjacent span \times wind pressure per square foot. The conductor diameter is in inches and the span length is in feet.

In the case of the pole top previously considered the average pole is 35 ft. long, with 6 ft. in the ground; the top diameter is 8 in., and the ground-line diameter is 13 in. For the heavy loading region we have:

$$\text{Force}_1 = \frac{1.08 + 0.67}{2} \times 29 \times 12 = 304.5 \text{ lb.}$$

$$\text{Bending moment at ground line} = 304.5 \times \frac{29}{2} = 4414 \text{ lb.-ft., due to the pole itself.}$$

For each wire:

$$\text{Force}_2 = \frac{0.42 + 1.0}{12} \times \left(\frac{150}{2} + \frac{150}{2} \right) \times 8 = 142 \text{ lb.}$$

For the upper set:

$$\text{Bending moment} = 4 \times 142 \times 29 = 16,472 \text{ lb.-ft.}$$

For the lower set:

$$\text{Bending moment} = 2 \times 142 \times (29 - 2.67) = 7478 \text{ lb.-ft.}$$

$$\text{The total bending moment} = 4414 + 16,472 + 7478 = 28,364 \text{ lb.-ft.}$$

The moment of resistance of the pole in pound-feet is equal to 0.0002638 times the fiber stress in pounds per square inch times the cube of the circumference at the ground line in inches. If we make this equal to the pound-feet bending moment due to the wind we get the fiber stress as follows:

$$\text{Fiber stress} = \frac{0.0002638 \times 41 \times 41 \times 41}{28,364} =$$

$$1560 \text{ lb. per square inch.}$$

As the breaking strength of chestnut, cypress, Southern pine and Western red cedar is 5000 lb. per square inch and of Northern white cedar 3600 lb. per square inch, sound poles of the first-named woods 41 in. in circumference at the butt would provide, under the conditions given, a factor of safety of 3.2. For Northern white cedar the safety factor would be 2.3. A factor of safety as low as that for Northern white cedar would

Railroad Electrification and Conservation of National Resources*

In the Author's Opinion Electrification Offers the Most Immediate and Practicable Means for Increasing Our Transportation Capacity—And "The Way to Electrify Is to Electrify"

By E. W. RICE, JR.

President, The General Electric Company, Schenectady, N. Y.

WHILE electrical science and industry are fundamentally devoted to the products and conditions of peace electricity plays also an important part in the grim business of war. We are in the midst of an extraordinary coal famine, due to causes which it is perhaps undesirable for us to attempt to outline. However, the situation might have been much worse were it not for the contributions of the electrical engineer. Furthermore, our condition might have been much better if the contributions of the electrical industry had been more extensively utilized.

Suppose we assume that the present serious situation is due to a lack of production of coal. It is comforting to consider to what extent conditions surrounding such production have been improved and how the output of our coal mines has already been increased by the use of electrical devices in connection with coal mining. I think it is a fair assumption that the output of coal mines should have been increased at least 25 per cent on the average by the employment of such electrical devices. If this estimate were cut down to 10 per cent it would still leave a possible increase of something like 50,000,000 in the tonnage of coal produced during the last year.

If on the other hand our situation is not due to a shortage in the production of coal but rather to the

failure of the distributive agencies of the country, which is more probable, this difficulty would have been largely removed if the railroads of the country had been operated by electricity instead of steam.

TRACK CAPACITY INCREASED BY ELECTRIFICATION

Where electricity has been substituted for steam in the operation of railroads, fully 50 per cent increase in available capacity of existing tracks and other facilities has been secured. This increased capacity has been due to a number of causes, but largely to the increased reliability and capacity of electric locomotives under all conditions of service. They thus permit a speeding up of train schedules by some 25 per cent under average conditions. Of course, under the paralyzing conditions which prevail in extremely cold weather, when the steam locomotives practically go out of business, the electric locomotives make an even better showing. It is well known that extreme cold (aside from the physical condition of the traffic rail) does not hinder the operation of the electric locomotive, but actually increases its hauling capacity. At a time when the steam locomotive is using up all of its energy by radiation from its boiler and engine into the atmosphere, leaving practically no useful power available to move the train, the electric locomotive is operating under its most efficient conditions, and may even haul a greater load than in warm weather. It may there-

*Abstract of address delivered at the Midwinter Convention of the A. I. E. E., Feb. 15, 1918.

(Concluded from page 366)

make close attention to pole condition desirable and necessitate prompt renewals later on.

It is always desirable by calculation to test the probable strength of the poles used. For the average line "Class B" poles will almost always serve, but definite figures made at the time the line was built are

Circumference of Pole at Ground Level in Inches	Breaking Moment in Pound-feet for Fibre Stress in Pounds per Square Inch of		Circumference of Pole at Ground Level in Inches	Breaking Moment in Pound-feet for Fibre Stress in Pounds per Square Inch of	
	5000	3600		5000	3600
30	35,620	25,650	46	128,400	92,450
31	39,300	28,300	47	136,940	98,600
32	43,220	31,120	48	145,830	105,030
33	47,400	34,130	49	155,200	111,740
34	51,840	37,320	50	164,880	118,710
35	56,560	40,720	51	174,960	125,970
36	61,540	44,310	52	185,460	133,530
37	66,820	48,110	53	196,360	141,380
38	72,380	52,110	54	207,700	149,540
39	78,240	56,330	55	219,450	158,000
40	84,440	60,800	56	231,640	166,780
41	90,900	65,450	57	244,270	175,870
42	97,720	70,360	58	257,350	185,290
43	104,860	75,500	59	270,890	195,040
44	112,360	80,900	60	284,900	205,130
45	120,200	86,540			

often of great value in later discussions with regulative bodies.

The following table gives the maximum resisting moments of poles for fiber stresses of 5000 lb. and for 3600 lb. The former is a conservative *breaking* value for sound chestnut, cypress, Southern pine and Western red cedar, and the latter for Northern white cedar. The actual stresses should in no case exceed one-half of the values of the table.

It is the general practice to assume that any ordinary unbalanced pull in the direction of the line will not exceed that resulting from a cross-line wind against iced conductors. Pulls resulting from angles, long spans, and possible conductor failures are almost invariably met by special guys or braces. Occasionally, however, it becomes necessary to meet the stress with an un-guyed pole, in which case a more careful analysis must be made. This will be considered later in connection with special structures. For the general line the assumption that the weakest point of the pole is at the ground line is sufficiently accurate.

fore be said that cold weather offers no terrors to an electrified road. On the contrary, cold weather is a stimulant to better performance instead of a cause of prostration and paralysis.

But this is not all. It is estimated that something like 150,000,000 tons of coal was consumed by the railroads in the year 1917. Now we know from the results obtained from operation of such railroads as are already electrified in this country that it would be possible to save at least two-thirds of this coal if electric locomotives were substituted for the present steam locomotives. On this basis there would be a saving of more than 100,000,000 tons of coal in one year. This is an amount three times as great as the total amount of coal exported from the United States during 1917.

The carrying capacity of our steam roads is also seriously restricted by the movement of coal required for hauling the trains themselves. It is estimated that fully 10 per cent of the total ton-mileage movement behind the engine drawbar is made up of company coal and coal cars, including in this connection the steam-engine tender and its contents. In other words, the

power could be so employed and as to the amount of coal which could be saved by its use. There is no doubt that a very considerable portion of the coal now wastefully used by the railroads could be released, to the great and lasting advantage of the country.

The terrors of these "heatless days" will not have been without benefit if they direct the attention of the people and of our legislators to the frightful waste of two of our country's most valuable assets—our potential water power and our wonderful coal reserves. The first is being lost largely because most of it is allowed to run to waste—undeveloped, unused. The second asset is wasted for exactly the opposite reason. It is being used, but in an extravagant and inefficient manner.

While the amount of coal in this country is enormous, it is definitely limited; when once exhausted it is gone forever. It is really terrifying to realize that 25 per cent of the total amount of coal which we are digging from the earth each year is burned to operate our railroads under such inefficient conditions that an average of at least 6 lb. of coal is required per horsepower-hour of work performed.

It is not too much to say that if the roads of the country were now electrified no breakdown of our coal supply due to failure of distribution would now exist. What this would mean for the comfort of the people and the vigorous prosecution of the war can readily be imagined.—E. W. RICE, JR.

useful or revenue carrying-capacity of our steam roads could be increased about 10 per cent with existing track facilities by eliminating the entire company coal movement.

I have not mentioned the consumption of oil by the railroads. This we are told amounted in 1915 to something like 40,000,000 barrels, nearly 15 per cent of the total oil produced. This fuel is far too valuable to be used in a wasteful manner. It is important for many reasons that such a wonderful fuel as oil should be most economically used, if for no other reason than that it will be needed for the ships of our forthcoming merchant marine, for the tractors that till our fields and for the motor trucks that serve as feeders to our railroads.

ELECTRIFICATION PERMITS THE USE OF WATER POWER

The possible use of water power should also be considered in this connection. It is estimated that there is not less than 25,000,000 hp. of water power available in the United States. If this were developed and could be used in driving our railroads, each horsepower so used would save at least 6 lb. of coal now burned under the boilers of our steam locomotives for each horsepower-hour developed. It is true that this water power is not uniformly distributed in the districts where the railroad requirements are greatest, but the possibilities indicated by the figures are so impressive as to justify careful examination as to the extent to which water

The same amount of coal burned in a modern central power station would produce an equivalent of three times that amount of power in the motors of an electric locomotive, even including all the losses of generation and transmission from the source of power to the locomotive. Where water power may be utilized, as in our mountainous districts in the West, all of the coal used for steam locomotives can be saved. In the Middle and Eastern states, however, water powers are not sufficient and it will be necessary in a universal scheme of electrification for the locomotives to be operated from steam-turbine stations. However, as already stated, the operation of the electrified railroads from steam-turbine stations will result in the saving of two-thirds of the coal now employed for equivalent tonnage movement by steam locomotives.

It is therefore not too much to say that if the roads of the country were now electrified no breakdown of our coal supply due to failure of distribution would exist. What this would mean for the comfort of the people and the vigorous prosecution of the war can readily be imagined.

Of course, this picture which I have briefly and inadequately sketched of the great benefits which our country would have received if the roads had been electrified does not improve our present situation and it may be claimed that any discussion of such a subject at this time is of an academic nature. This is true, in a sense, but I think that we can properly consider it on account of the effect which it may have upon our

future efforts. The picture is not merely an inventor's dream but is based upon the solid foundation of actual achievement.

We have had enough experience upon which to base a fairly accurate determination of the stupendous advantages and savings which will surely follow the general electrification of the railroads. In fact I think that we can demonstrate the fact that there is no other way known to us by which the railroad problem facing the country can be as quickly and as cheaply solved as by electrification. The solution of the railroad problem would also "kill two birds with one stone" by solving the fuel problem at the same time.

KEEPING PACE WITH THE COUNTRY'S DEVELOPMENT

If it is a fact, as has been stated, that the steam railroads of the country have failed to keep pace with the country's productive capacity, with the increase in output of manufacturing industries, and the extension of agriculture and other demands for transportation, then it is obvious that if the country is to go ahead the railroad transportation problem must be solved, and it must be solved at the earliest possible date. It becomes a matter of national importance that the best solution should be reached in the shortest possible time. That solution is best which will give the greatest amount of transportation over existing tracks in the most reliable manner and, if possible, at the lowest operating cost. As electrical engineers we are confident that we can make good our claim that the best solution is to be found in a general electrification of the railroads. That such a solution would be of great advantage to our profession and to our industry is important.

But this is not as important as the great advantage which it would be to our country, freeing it as it would from the present threatened paralysis of business, possibility of untold human suffering and incalculable financial loss. It should give us courage and optimism for the future of our profession to contemplate the service which we may render in this direction and which it seems to me is immediately at hand.

It should arouse in all of us, and particularly in the younger engineers, an enthusiastic confidence in the present and future stability and value of our profession and of the electrical industry. It should satisfy the young engineer that the opportunity for him to render important service is as real and great to-day as it has been in the past for those of us who have seen and participated in the marvelous growth of the industry up to the present time.

ELECTRIFICATION IS NO LONGER EXPERIMENTAL

We would not be justified in being so confident of the benefits of electrification of railroads if every element in the problem had not been solved in a thoroughly practical manner. The electric generating power stations, operated either by water or by steam turbines, have reached the highest degree of perfection, efficiency and reliability, while the transmission of electricity over long distances with reliability has become a commonplace. Electric locomotives, capable of hauling the heaviest trains at the highest speeds over the heaviest grades, have been built and have been found in practical operation to meet every requirement of an exacting service. There is, therefore, no element of uncertainty, nothing experimental or problematical,

which should cause us to hesitate in pressing our claims upon the attention of the country. Electrification of railroads has progressed with relative slowness during these many years, waiting upon the development and perfection of all of the processes of generation and transmission and of the perfection of the electric locomotive itself. When all of these elements had been perfected, as they now have been for several years, the railroads found themselves without the necessary capital to make the investment.

I realize that the task of electrifying all of the steam railroads of the country is one of tremendous proportions. It would require under the best of conditions many years to complete and would demand the expenditure of billions of dollars. The country, however, has clearly outgrown its railway facilities and it would require, in any event, the expenditure of billions of dollars and many years of time to bring the transportation facilities up to the country's requirements.

ELECTRIFICATION NEED NOT BE UNIVERSAL

It is not necessary that electrification should be universal in order to obtain many of its benefits. It is probable that the most serious limitation of our transportation system, at least in so far as the supply of coal is concerned, is to be found in the mountainous districts and it is precisely in such situations that electrification has demonstrated its greatest value. Electrification of a railroad in a mountainous district will in the worst cases enable double the amount of traffic to be moved over existing tracks and grades.

If a general scheme of electrification were decided upon the natural procedure would, therefore, be to electrify those portions of the steam railroads which would yield the greatest results and give the greatest relief from existing congestion. Electrification of such sections of the steam railroads would have an immediate and beneficial effect upon the entire transportation system of the country.

It may be said that the present is not a propitious time in which to deflect any of the country's money into railroad electrification. In spite of the enormous advantages of which I have spoken, I should be inclined to agree with such a point of view if it were not for the recent unpleasant demonstration of the failure of our railroad transportation systems to meet the demands which have been placed upon them by the industries, aggravated it is true by the war conditions and also by the unkindness of the weather. After all, the question for the country to decide is whether we dare to limp along with the present conditions of restricted production, due to limited transportation, at a time when the world demands and expects from us the greatest possible increase in our efficiency and total production.

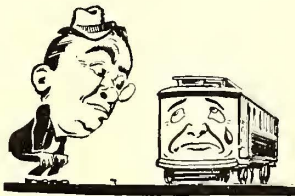
What assurance have we that the present conditions are temporary, and even if they improve as they surely shall with the coming of warm weather, what are we going to do next winter? Of course, even if we should start electrification at once we could not have all our railroads electrified by next winter, but we could have made a good start, and as Sherman said about the resumption of specie payments—"The way to resume is to resume," so we may say in this connection "The way to electrify is to electrify."

Classifying Passenger Cars for Given Conditions

A Different Car for Each Railway Unnecessary—Weight Provision Against Collisions Unimportant in Slow-Speed Service—Six Categories of Service Outlined

By Norman Litchfield

THE business of transporting passengers successfully requires the co-ordination of many mechanical units, the development of any one of which forms a subject whose history would be of interest to trace. No single one of these can be said to be more vital to the operation of the railroad than another, but from the rider's standpoint it is the car, together with the character and conduct of the employees on the car, that determines his estimate of the road and its management. The power house may contain the most marvellously efficient generating machinery, the track may be of most modern construction, the thousand and one other details may be covered flawlessly, but if the car does not provide the means for transporting him to his destination in safety, comfort and speed, whether he be bent on business or pleasure, the passenger rightly criticises the management and if possible withdraws his patronage. In fact, it may be said for the average rider that the car and its crew typify the railroad.



Existing cars should be analyzed for evidence of unnecessary weight

The Car Is a Tool for Producing Mileage

In view of the above conditions operating officials and car designers have joined hands to produce types which their combined judgment and experience have shown to be necessary to meet the rider's needs. Within the last few years the increasing use of steel has made it possible to fulfill requirements which otherwise would have been unattainable and has served as an impetus in the design of many interesting types of car developed to meet different conditions.

The railway operator may be considered as the manager of a factory whose output is transportation, and the cars as machine tools for the production of mileage. The more mileage the car produces, the higher the efficiency of the investment in track, power station, etc., and of the car itself and the employees on the car.

The efficiency of the car itself, or its ability to produce mileage consistently and without attendant losses from damage claims, etc., depends upon the arrangement and construction of the car and its running gear, and also upon its motive equipment, brakes, and other auxiliary apparatus. The studies covered by these articles will, however, deal only with the design and construction of the car itself.

It is evident that the broad field of electric passenger transportation cannot be covered by one type of car. It is difficult to draw absolutely certain lines of demarcation, defining groups in which different types of cars should be used, but it may be said that these fall

roughly into six main divisions into one of which any given set of conditions may be placed. Probably no phrase has been more misused than that of "local conditions," for while it may be possible to use a car 6 in. longer and 2 in. wider than some one else can, it does not necessarily follow that it is wisest to do so.

The six groups referred to follow:

1. Car for towns and cities up to 100,000 population.
2. The large car for the heavy industrial lines of cities in excess of 100,000 population.
3. The two-car city train, where the extreme conditions of loading great factory crowds is met.
4. The subway-elevated car for multiple-unit train operation.
5. The car for light, frequent inter-urban service.
6. The car (motor and trailer) for long-distance high-speed interurban operation, large enough to include smoking, toilet, baggage and mail compartments.

It has been rightly said that any art goes through three broad stages, namely, invention, development and refinement. Electric railroading may be considered to have passed fairly well through the former two periods and to be, generally speaking, in the period of refinement. It is not that invention and development have ceased or will cease, but that they are no longer the outstanding feature of the art. The time was, and at a period not far distant, when the electric manufacturers designed an individual motor for every new set of conditions presented to them, even sometimes despite the wishes of the user. In fact, it is said of one official that he felt that the only safe specification for him to draw up was one reading, "I want a motor the exact duplicate of those now operating on the A. B. & C. Railway." But that time is passing. The tendency is toward a smaller number of types of motors, each of which will cover a number of conditions. So it is fair to say that very nearly any set of conditions may be said to be included in one of the six groups enumerated.

Different Conditions to Be Satisfied According to Service

We may then ask ourselves, what do we demand of each class of car? In general, it may be said that in city surface cars there are four prime essentials, namely, capacity, facility for passenger interchange, ease of fare collection and freedom from boarding and alighting accidents.

These features are equally desirable for the town or city of less than 100,000 population and for the larger city, the difference being of degree rather than of essentials. It is axiomatic that the number of cars a road must operate on any given line depends first upon the total number of passengers at the peak period and secondly on the interval that must be maintained in

order not to lose patrons. The second item is often controlling in the small town throughout the entire day, just as it is in the large city during the non-rush hours. In other words, a service giving a succession of small cars at frequent intervals is obviously more popular than one with large cars for which the patron has to wait, even though in neither case are the cars crowded. It therefore follows that the small cities have been turning more and more to the smaller car. But with the increase in frequency of the service comes an increased platform charge and power consumption per passenger carried or nickel received, and when it is remembered that the platform charge under the best

duties of the crew to the minimum. It therefore follows that fare collection and the quick loading and unloading of passengers become of prime importance.

Since the earliest days of electric railways considerable attention has been paid to the platform arrangement with the idea of facilitating the handling of passengers. In 1901 a long platform car was operated in Detroit with a railing dividing it into two passageways, the idea being that some passengers would always insist on riding on the platforms, and that by requiring them to keep behind the railing a passage could be kept clear. This naturally required an exceedingly long platform, and as city cars are limited in length, it sub-

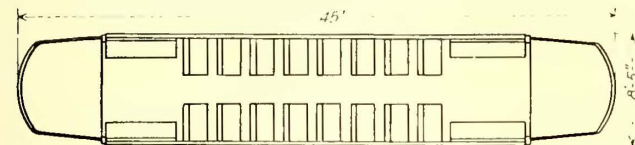


Fig. 1

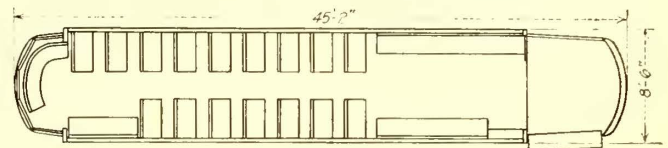


Fig. 2

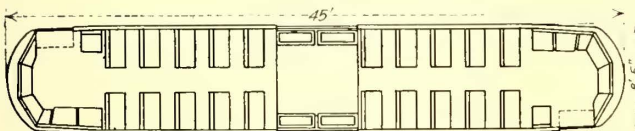


Fig. 3

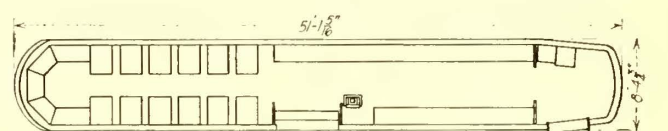


Fig. 4

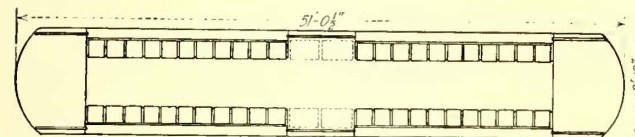


Fig. 5

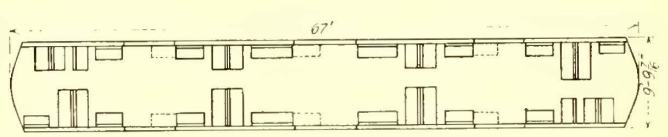


Fig. 6

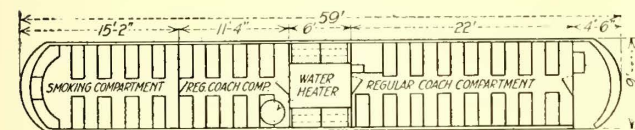


Fig. 7

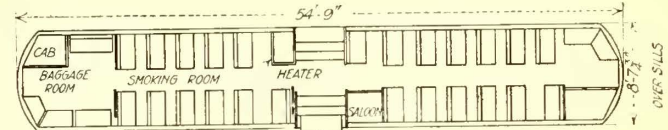


Fig. 8

FLOOR PLANS OF CARS FOR VARIOUS CLASSES OF SERVICE

of circumstances amounts to a third or more of the total operating expenses, it is evident that this feature is of great importance.

For the above reasons the one-man or so-called safety car has been developed. This type has been described in recent issues of the JOURNAL. We have designated it for cities under 100,000 in population except on lines of unusually heavy travel. This at once provides the prepayment fare-collection features, reduced weight and platform charges and reasonable facility of passenger interchange for the conditions under which it is supposed to operate.

Where the Biggest Car Is Needed

For the larger cities, the congested conditions require the use during the rush hour of as many cars as can be accommodated on the tracks, each of as great capacity as can be operated safely under the conditions of track curvature. In this case, therefore, the platform charge cannot be reduced by the elimination of the conductor. In fact, special aids must be provided to reduce the

traced that much from the desirable seating space in the body of the car.

The problem of easy passenger interchange is closely bound up with that of fare collection, the solution of which was first successfully made by Duncan McDonald and W. G. Ross in the first Montreal pay-as-you-enter cars in 1906. In a description of these cars Mr. McDonald pointed out that up to that time there were four systems of fare collection in vogue, namely, the register, the portable fare box, the receipt system, in which each passenger was given a receipt (the receipts being checked occasionally by inspectors) and the prize system, in which prizes were drawn for by the holders of receipt coupons. He concludes that the task imposed upon the conductor under any of these systems is well-nigh impossible of fulfillment, and that the only ideal system is that in vogue on the elevated and subway systems wherein passengers have to pay before entering the car on which they desire to travel.

While there have been many variants on Mr. McDonald's car, the essential soundness of his views has been amply demonstrated, and the fundamentals are em-

bodied in every surface car now being built. This keeps the conductor close to the point where passengers embark and leave the car and has gone far in the reduction of that exceedingly troublesome and wasteful feature of old-time surface car operation—the boarding and alighting accident.

More latterly has come the use of platform doors and folding steps controlled by either the conductor or the motorman, and interlocked with the motors and control so that the car cannot be started until the doors are closed, and in some cases also arranged so that the doors cannot be opened until the car has come to a dead stop. These features have to a large extent eliminated the boarding and alighting accident.

The final factor in facilitating passenger movement has been the elimination of steps by careful design, dropping the car floor to a minimum distance above the street level. All of these factors have brought the remarkable results of handling passengers at the rate of about one second each, reducing the lost fares to a fraction of 1 per cent, and the practical elimination of boarding and alighting accidents. There are to-day four distinct types of large city cars, as follows:



Stress diagrams meant little to the old-time car builder

Rear-entrance, front-exit, or ordinary pay-as-you-enter car, Fig. 1.

Front-entrance, front-exit, or near-side car, Fig. 2.

Center-entrance, center-exit, Fig. 3.

End-entrance, center-exit, or "pay-as-you-pass car," Fig. 4.

Each of these types has its advocates, and all possess certain distinctive features, but nevertheless have in common the fundamentals which have already been outlined.

We have already pointed out that in large cities it is necessary during the rush hours to run as many units as is physically possible, each of which must be of maximum capacity. A practical limit in the size of the car is finally reached at a length of from 45 ft. to 48 ft. When a larger unit is demanded for use under conditions such as the home-going of the employees of one of our large industrial plants, all at the same hour, it becomes necessary to employ the two-car train. This is sometimes composed of a motor car with a trailer, but this combination has a number of disadvantages; and the development of a light, inexpensive type of multiple-unit control and a semi-automatic air brake has made possible and economical the use of two motor cars. The latter arrangement is rapidly coming into favor. The remaining feature to be thoroughly developed is that of the automatic electric coupler, and it is reasonable to expect that this will be accomplished in the near future.

Door Location Vital in Subway Cars

In city cars operated in subways fare collection disappears, but passenger interchange increases in importance, and there is added the feature of protection against damage from collision. For the interchange of passengers it has been found desirable to make the proportion of doorways to passengers carried as large as possible and to minimize the distance of any passenger from a door. The size of car is largely controlled by

existing conditions of track curvature, length of station platform, and by the determination of the most economical unit for combining with trains of different lengths at various hours of the day when the density of traffic varies. Two examples of this type are shown in Figs. 5 and 6.

In interurban cars the comfort of the passengers becomes a controlling factor, requiring the introduction of features not demanded or even desired by the public, on the other class of car. (See Figs. 7 and 8.)

City Cars Need Not Be Weighted to Be Collision Proof

It may be noted that the feature of protection against collision begins to enter with the high-speed car. By this it is not meant that reasonable precautions against damage from collision should be overlooked in the city car but that city cars do not need to have weight put into them to make them, as it were, collision proof. The speed at which they operate is so low as to make them ordinarily controllable with the modern brakes. There is no need to prepare them for blows unattainable except at speeds they will never be called upon to reach. A close analogy may be

found in the Ford automobile, which, admittedly not designed to withstand collision, wends its way through the most dense traffic in safety due to its ease of control. Mr. Ford himself has pointed this out in his recent criticism of certain steam car weights, that it was like using a 75-lb. basket to carry 25 lb. of groceries.

From 1250 Lb. to 500 Lb. per Seat

Considerable advance has been made in recent years along these lines, as may be evidenced by the instance of a city surface car built some years ago weighing approximately 50,000 lb. and seating forty passengers, making a dead weight of 1250 lb. per seated passenger; whereas cars now available for similar service weigh 35,000 lb. and seat fifty passengers, or 700 lb. per passenger. In fact, smaller cars are in use whose dead weight is not over 500 lb. per seated passenger. These reductions are due partly to the improvement in materials and design of motive apparatus forming a part of the car equipment; and partly to the use of steel in the car and truck construction disposed along scientific lines at the points where it is needed. The methods by which the proper proportioning of various parts may be arrived at will be reviewed in a future article.

Every former employee of the Toledo Railways & Light Company, Toledo, Ohio, who is now in military service, is to receive letters from the associates he has left behind him in Toledo. A schedule has been arranged whereby everyone now working for the company will write to each of the 170 former employees who are in camp. In this way it is believed that each soldier will in time get a letter from every one of his associates in Toledo. This scheme was suggested by Frank R. Coates, president of the company, who on his visit to the cantonments at Montgomery, Ala., and Chillicothe, Ohio, saw that nothing pleases the soldiers more than a letter from someone "back home."

Patriotism and Science at A. I. E. E. Mid-Winter Convention

President E. W. Rice, Jr., in Two Notable Addresses Analyzed the War Situation and Showed How Electrification of Railroads Would Help

THE American Institute of Electrical Engineers held its sixth mid-winter convention in New York City on Feb. 15 and 16 with an attendance of about 400 at the meeting and 225 at an informal dinner on the evening of Feb. 15. In recognition of the state of war in which the country finds itself there were no entertainment features in the program, and the papers were short and scientific in character.

The opening remarks by President E. W. Rice, Jr., president General Electric Company, Schenectady, N. Y., dealt almost entirely with steam railroad electrification and what it could do in preventing a recurrence of the recent freight congestion. His remarks are given in extended abstract elsewhere in this issue.

President Rice was the only speaker after the informal dinner, and he took this occasion to correct the misapprehension on the part of those who feel that we could have done much better in our recent war preparations. After mentioning some of the events which superficially appear discouraging, he raised the question: "Is it true that we are making a failure of the job?" In answering this question he expressed among others the following convictions:

"It seems clear to me that we have not made a failure and that everything is moving along as well as we had

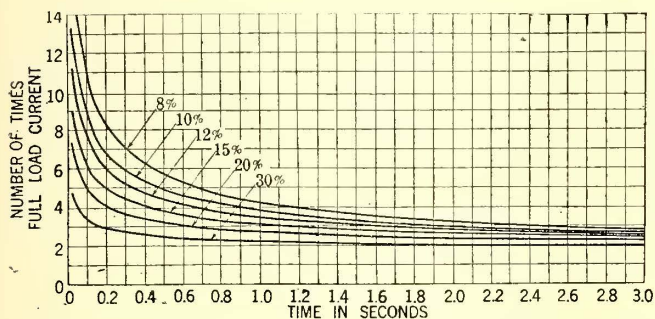
'coalition government'; why cannot we do something similar?"

"After all, in my opinion the exact form of any organization is relatively unimportant. Its effectiveness in value is largely dependent upon the men who are on the job. Every organization must demonstrate what it can do to help the country in its hour of need. Every organization, whether of capital, labor, manufacture or business, and every individual, must be subjected to the test of whether each is doing the best and most effective work to win the war.

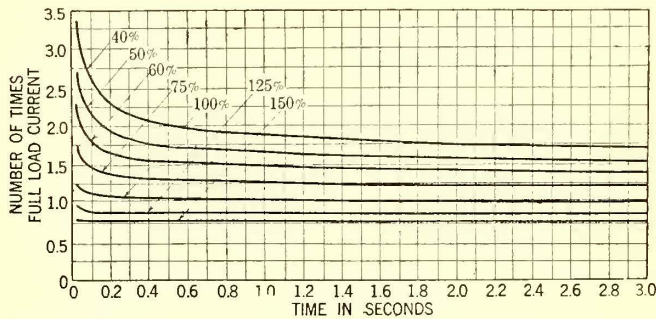
"The test of patriotism will be the willingness to work, each in his sphere, to the absolute limit. We need the maximum output of brains, labor and material. The country demands this, and the country will see that it is obtained. Any man or organization standing in the way of the purpose which this country has set for itself will eventually be crushed.

"It takes time for us to get over our ideas and practices based upon our competitive conditions and education. We are now to forget our competition and education and think of nothing but co-operation; in other words, of what is best to increase the country's production as a whole, for that is vital in winning the war.

"I believe that the problem facing us will be successfully solved in time, but we need more co-operation, more of the spirit of accommodation, all of our patience and wisdom, and, above all, a willingness to work to the limit. We must discipline ourselves until a shirker in any field of useful effort will be regarded with the same contempt as a shirker in the military service of the



These curves, plotted between duration of short circuit and root-mean-square current in terms of full-load current, show the current which must be interrupted in a circuit of given total per-



centage reactance at any time after the short circuit has occurred. Initial load at 80 per cent power factor is assumed. Reactance is based on total kva. rating of synchronous machines.

CHARACTERISTIC CURVES FOR SHORT-CIRCUITS ON ENTIRE POWER SYSTEM

a right to expect under all the circumstances. In spite of eminent authority, a million men cannot spring to arms overnight; nor can dreadnoughts, destroyers, submarines, anti-submarine devices, heavy ordnance, and all the great mechanism of war be produced in a day, in a month or even in a year, no matter how much we pray, 'cuss' or work. Our fundamental mistake was that we waited until war was thrust upon us before we started to get ready.

"This is a people's war, a war for democracy. This fact being recognized, we should not attempt to handle the job on the basis that it is to be run exclusively by the party in power. All of the people must be represented. It seems quite probable that the questioning attitude of the country to-day is due more than anything else to a growing fear that the full ability, wisdom and experience of the country are not being properly utilized. England has met the situation by a so-called

country, for there is no difference; or if there is any difference, a shirker behind the lines is worse than one in the trenches."

Of the nine papers presented at the technical sessions, most were of a theoretical character or were in fields remote from electric railway practice. That on "Rating and Selection of Oil Circuit Breakers," by E. M. Hewlett, J. M. Mahoney and G. A. Burnham, of the General Electric Company, Schenectady, N. Y., which was read at the Feb. 15 morning session, was a practical one and of electric railway interest.

The object of this paper, as stated by the authors, was threefold: (1) To discuss the interpretation of the A. I. E. E. rules covering the rating of oil circuit breakers, (2) to discuss the factors involved in the proper selection of oil circuit breakers, and (3) to suggest average system short-circuit characteristics useful for selecting oil circuit breakers for certain systems.

Annual Report of Association

Secretary-Treasurer Submits Report to Executive Committee—Comparison Is Published with Figures of Last Year

USUALLY the report of the secretary and treasurer of the American Electric Railway Association is contained in the printed proceedings of the association. As the proceedings will not be issued this year, this paper is publishing the following abstract of the report submitted to the executive committee by Secretary-Treasurer Burritt. The period is for the year ended Oct. 31, 1917, and the publication is made with the permission of the association. The figures for 1916 are included for reference:

INCOME STATEMENT

	Revenues	
	Year Ended Oct. 31	
	1917	1916
1. Admission fees:		
Railway companies	\$70	\$240
Manufacturing companies	70	2,320
Total	\$140	\$2,560
2. Annual dues:		
Railway companies	\$46,093	\$46,148
Manufacturing companies	9,574	6,142
Individuals	3,307	3,979
Total	\$58,975	\$56,270
3. Miscellaneous income:		
Contribution from Hotel Men's Association	\$32	\$3,451
Interest on deposits	519	606
Sale of advance papers, year books and proceedings	377	509
Sale of Engineering Manuals and binders..	199	285
Sale of "Cost of Urban Transportation Service"	195	614
Sale of Bibliography on Valuation	20	151
Sale of other pamphlets	247	369
Sale of dinner tickets	5,230	.....
Rent of convention exhibit space	19,968	.....
Convention exhibit donation	375	.....
Total	\$6,823	\$26,332

(Concluded from page 373)

The opinions and data given were the result of an extensive study of circuit-breaker operation under practical conditions in various parts of the country. It was pointed out, however, that the securing of such data is very difficult owing to the fact that large power plants cannot be obtained for research purposes. Hence it is necessary to depend upon reports of accidental short circuits, and such reports are very considerably affected by the personal element.

However, it was possible to digest the results of observations, and to produce sets of curves between the duration of a short circuit in seconds and the magnitude of the short-circuit current (in terms of full-load current) for different percentages of total circuit reactance. Such curves were termed "system short-circuit characteristics."

The principal contribution of the paper to the knowledge of the subject consists in the furnishing of the characteristic curves, and in the solving of typical problems illustrating their use. The complete set of curves is reproduced on page 373.

The subject of the rating of circuit breakers was very fully discussed and the consensus of opinion seemed to be that the data shown in the curves were conservative, and therefore safe. It was evident that even with the aid of these curves it will not be possible to select circuit breakers without the advice of manufacturers. The state of the art is not yet such to permit this degree of independence on the part of the customer.

Revenues—(Continued)

	Year Ended Oct. 31	
	1917	1916
4. Aera:		
Advertising	\$17,091	\$19,098
Subscriptions:		
Railway companies	3,844	3,820
Manufacturing companies	1,405	855
Individuals	2,202	2,658
Company-section members	1,990	2,320
Non-member	128	167
Sale of extra copies	47	11
Sale of binders	17	6
Total	\$26,725	\$28,937
TOTAL REVENUES	\$92,665	\$114,100

Expenses

American Association	\$49,935	\$74,917
Accountants' Association	1,336	1,153
Engineering Association	4,848	8,480
Claims Association	1,727	1,727
Transportation & Traffic Association.....	2,334	3,034
<i>Aera</i>	25,683	26,071
Total	\$85,866	\$115,385

EXPENSES BY ASSOCIATIONS

American Association

	Year Ended Oct. 31	
	1917	1916
Salaries of general office staff.....	\$18,793	\$16,049
Salary and expenses of Washington representative	2,046	416
Rent of office and storeroom	4,542	4,130
Stationery and printing	2,632	2,820
Postage	1,851	2,866
Repairs to furniture and equipment	12	51
Office supplies and expenses	1,168	1,224
Telephone, telegraph and messenger service..	1,664	814
Express, freight and cartage	623	627
Exchange	109	103
Traveling expenses of secretary	803	207
Miscellaneous general expenses	1,347	1,169
Advance papers, annual reports and year book.	1,526	2,211
Mid-year meeting	618	1,203
Mid-year dinner	5,865	.....
Annual dinner .....	.....	506
Bureau Fare Research .....	.....	870
Engineering Manual	1,659	814
Cost of transportation service .....	.....	1,382
Bibliography on valuations .....	.....	693
Accountant course .....	.....	1,256
Miscellaneous pamphlets	368	18
Annual Convention expenses:		
1915 Convention .....	.....	1,742
1916 Convention	253	5,497
1917 Conference	449	.....
Installation of exhibit, 1916 .....	.....	18,203
Entertainment 1916 Convention	177	.....
Committee expenses	3,389	10,033
Total	\$49,935	\$74,917

Accountants' Association

	1917	1916
Advance papers and annual report.....	\$524	\$787
Miscellaneous expenses of secretary.....	28	1
Committee expenses	783	365
Total	\$1,336	\$1,153

Engineering Association

	1917	1916
Advance papers and annual report.....	\$1,645	\$4,994
Committee expenses	3,193	3,486
Total	\$4,848	\$8,480

Claims Association

	1917	1916
Advance papers and annual report.....	\$436	\$681
Miscellaneous expenses of secretary.....	158	150
Hooper-Holmes Bureau	1,063	532
Committee expenses	69	362
Total	\$1,727	\$1,727

Transportation and Traffic Association

	1917	1916
Advance papers and annual report.....	\$780	\$1,409
Committee expenses	1,554	1,625
Total	\$2,334	\$3,034

"Aera"

	1917	1916
Salaries of <i>Aera</i> staff.....	\$9,955	\$8,244
Rent of office	678	398
Telephone, telegraph and messenger service..	191	157
Postage and express	251	657
Traveling expenses of <i>Aera</i> staff.....	978	982
Miscellaneous expenses	31	289
Discount on <i>Aera</i> advertising.....	203	53
Cost of binders.....	123	.....
Magazine expenses:		
Cost of printing	6,758	11,150
Cost of paper	4,344	2,012
Cost of cuts for text	597	951
Express, freight and cartage.....	536	470
Mailing charges	693	428
Envelopes for mailing.....	338	273
Total	\$25,683	\$26,071

Replacing Downtown Special Work

Procedure Followed in Denver to Meet Unfavorable Traffic and Weather Conditions and Complete Work in Shortest Possible Time

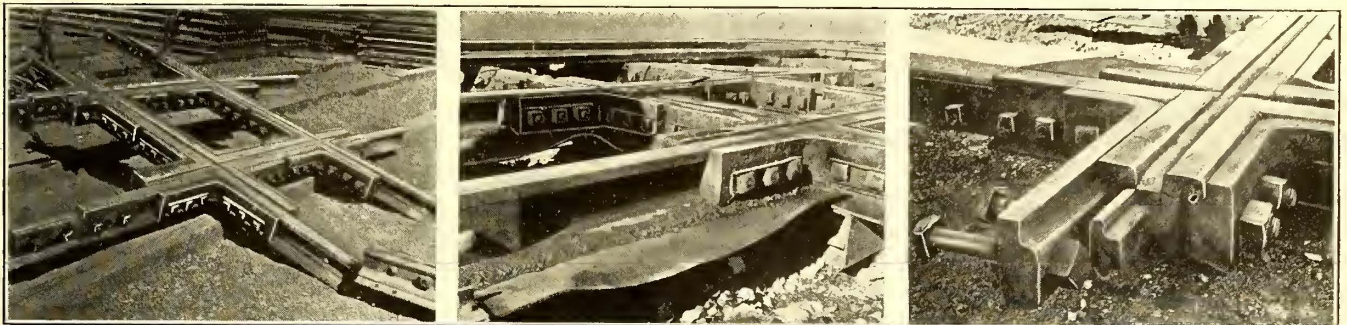
BY W. L. WHITLOCK

Office Engineer Denver (Col.) Tramway

THE recent work of the Denver Tramway in replacing a grand crossing special work layout at Curtis and Fifteenth Streets, one of the most important corners of the city's business district, called into play the genius of the engineering department in order to cope with the difficulties of the work itself and special problems brought on by unfavorable weather conditions. The work had been delayed because of slow delivery on special work, so that plans laid for doing the work last spring could not be executed until this winter, with the consequent danger of freezing the concrete construction. The fact that the traffic at this intersection averages 176 cars per hour on one street and ten cars per hour on the other during eighteen hours of the day gave rise to a very carefully planned arrangement for

means of 1½-in. Myria heat-treated bolts which made a driving fit. Each one of these squares weighed 5000 lb. and was handled by a special crane car. They were laid on a crossing foundation of a special type built by the International Steel Tie Company, which was supported on crushed rock ballast with a 12-in. concrete slab above the ballast. The rails and the special work construction were electrically welded to the steel ties and to the steel crossing foundations. Continuous rail joints were employed. The entire special work layout was incased in a 1:2:3 mixture of concrete, and Master Builders' hardener was used for the wearing surface which formed the finished paving.

After the special work was assembled in place, surfaced and aligned, the concreting was completed within



HEAVY BOLTED SQUARE CROSSING WITH MANGANESE SIDE BEARINGS—SPECIAL WORK WELDED TO STEEL FOUNDATION—END VIEW SHOWING MANGANESE RISER BETWEEN RAILS FOR FLANGE BEARING

handling each detail of the work so that it might be done as speedily as possible.

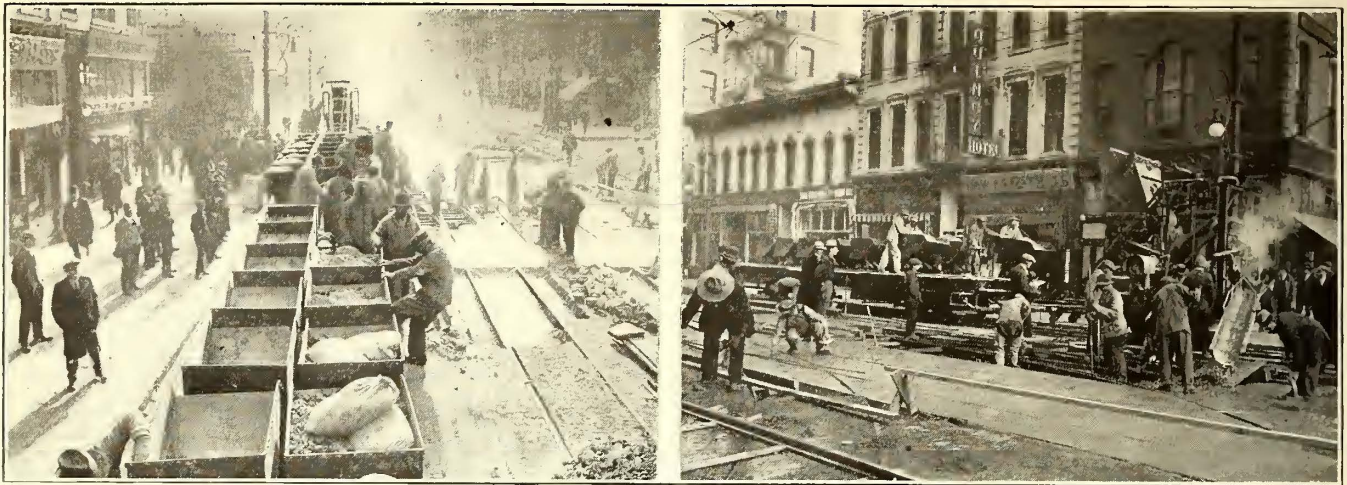
It was deemed impractical to attempt to replace the crossing under traffic on account of the frequent headway and the importance of allowing the concrete base for the special work to set thoroughly before placing it in use. For these reasons a special type of temporary track made up in sections was laid along each side of Fifteenth Street, so that this heavier traffic might be continued without rerouting. The cars on Curtis Street were rerouted to avoid this corner.

The old special work was a bolted construction consisting of 72-lb. rail laid on wood ties with approximately 2 ft. of pit run gravel ballast on top of the old cable concrete, which formed the sub-base, and with a top paving of basalt stone block. In the new layout a special bolted construction, using 100-lb. rail, was used. Second-hand 72-lb. rail was cut to length and used in place of wood ties. A few of these ties were drilled for rail clips to hold the track to gage during the preliminary work. The outstanding feature of the special work was the type of square crossing used. It was made up with 100-lb. rail and manganese flange-bearing risers, and exceptionally heavy knee irons bolted together by

eight days, during three days of which no work could be done on account of a heavy snowstorm. In this work the tramway concreting train, which was described on page 628 of the *ELECTRIC RAILWAY JOURNAL* for Oct. 6, 1917, came in for very effective use by making it unnecessary to store materials along the street, and thereby also avoiding to a certain degree the unsightliness of such a large construction job. The total amount of concrete poured measured 96 cu. yd., and this was accomplished by means of the concreting train in a period of thirteen hours.

The first attempt to concrete the layout was defeated by a heavy snowstorm three hours after the work had begun and the job was promptly called off. The concrete already poured was finished and protected by canvas covering. Unusually cold weather accompanied the storm, and to prevent the concrete from freezing four ten-light clusters of 16-cp. lamps were placed underneath the canvas and energized from the trolley. These gave off sufficient heat to keep the concrete above the freezing temperature.

The weather moderated somewhat in two days and it was planned to complete the concrete work in one shift. To make this possible despite the cold weather a hot-



TRANSFERRING MATERIAL FROM CONCRETING TRAIN TO SERVICE CAR, AND MIXER IN OPERATION, DENVER TRAMWAY

water connection was made in an office 300 ft. from the job and a 1¼-in. iron pipe run to the street intersection with a hose from this point to the concrete mixer. No trouble was experienced in finishing up the concrete and although the temperature dropped to 32 deg. Fahr. the surface water on top of the concrete, where it stood because of the rough finishing did not freeze. Thermometer readings taken of the concrete showed it to be approximately 15 deg. warmer than the air. These were taken at 2 o'clock in the morning and the temperature rose with the coming of daylight. The run of concrete on this occasion began at 1 a. m. and was completed at 10 a. m., with thirty minutes out for breakfast. After the hardener used on the concrete surface had set, a coating of 1 in. of sand was covered over the concrete to protect it from frost. Wetting down was found necessary only once, three days after the concrete was poured.

TAKING CARE OF THE TRAFFIC OFFICER

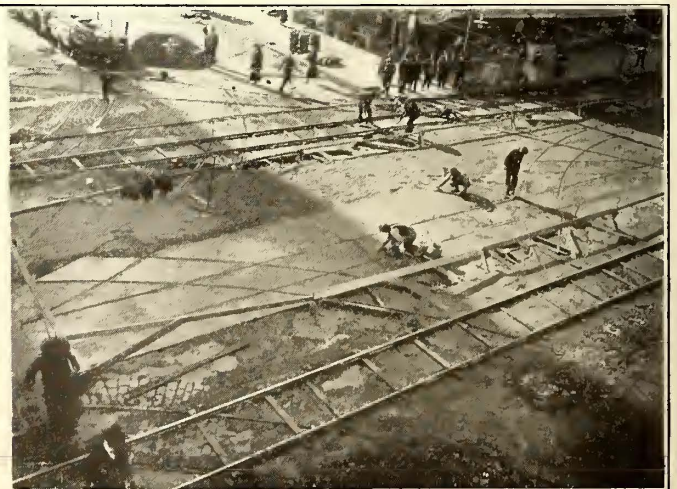
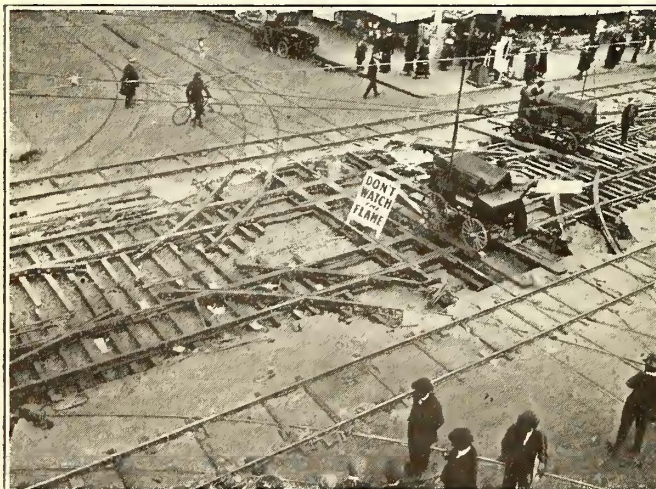
Previous to concreting, a conduit was run from a pole on the corner to the center of the intersection and an electric plug connection placed there for connecting a portable electric heater. An electric switch was installed on the pole and a heater furnished for the convenience and comfort of the traffic officer at the company's expense.

The publicity department of the tramway company created a great deal of interest in this construction work and succeeded in forestalling criticism because of the delays to traffic and the torn-up condition of the street, by running a series of advertisements in the daily papers at the time this construction work was going on. This publicity work was described in an article in the *ELECTRIC RAILWAY JOURNAL* for Dec. 22, 1917.

Good Results from Coke for Car Heating

The Public Utilities Company of Evansville, Ind., is well pleased with the results obtained in using coke instead of coal for car heating. It is said that the coke keeps the cars well heated, and the trainmen like it better than hard coal, owing to the fact that a coke fire is much easier to start and they get a quicker fire with better results.

During the winter of 1915-1916 the company used 149.94 tons of hard coal at a cost of \$993.08. Last winter the same number of cars were heated with coke at a cost of \$683.84 for 170.92 tons, although the winter was more severe and lasted longer in the spring. No figures are available to express the experience of the company in this regard during the present winter.

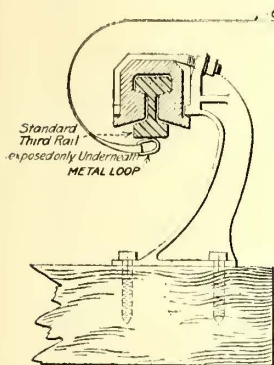


STEEL-RAIL TIES AND SQUARE CROSSINGS IN PLACE AND PAVEMENT AROUND SPECIAL WORK BEING HARD-SURFACED

Even Cloth Tapes Must Be Used with Care on Third-Rail Track

IT IS obvious that the use of metallic tapes along lines using third-rail is dangerous, due to the possibility of contact between the third-rail and the tape, thereby endangering life and possibly causing interruption to service.

Probably it is not as clearly realized that the ordinary cloth tape is nearly as dangerous as the metal. The cloth is not only strengthened by means of wire insertion which becomes exposed with wear, but there is also a metal loop at the end of the tape. Even the cloth forms a good conductor when wet.



The accompanying diagram shows how an accident actually occurred with a cloth tape. In winding up the tape it was jerked from the hands of the man holding the loop end. The free end curled up as it was jerked by the reel and the metal loop came in contact with the third-rail. The tape and the ground were slightly wet, and the result was a 550-volt shock.

CONTACT BETWEEN CLOTH TAPE AND THIRD RAIL

Steel Underframe for Montreal & Southern Counties Railway Interurban Cars

IN the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 16, 1918, page 331, J. A. Wilson, superintendent car department Ottawa Car Manufacturing Company, Ltd., described a new car which has been built for the Montreal & Southern Counties Railway. At the time the article was printed details of the underframe construction were not available, but through the courtesy of the author of the article it is now possible to show

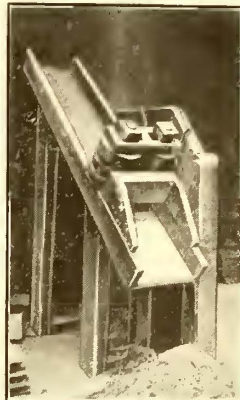
an outline of this construction, as is done in the accompanying drawing.

Sufficient detail is contained in the drawing to render unnecessary further explanation than that given in Mr. Wilson's article.

Magnetic Separator for Screws and Filings

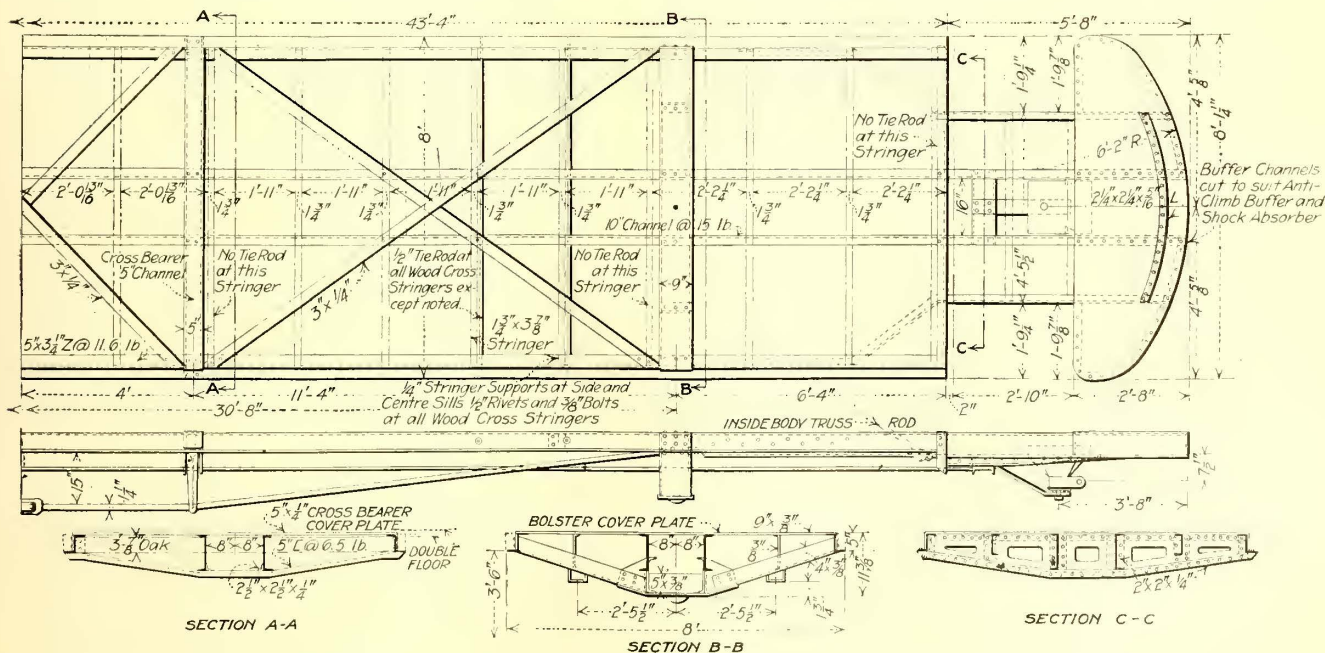
IN THE Wolf Street shops of the New York State Railways, Syracuse, N. Y., a home-made magnetic separator has been giving good service in connection with reclaiming filings and screws. The filings are much more salable when iron and steel are separated from brass, and iron screws can be separated from brass screws much more rapidly with this device than by hand.

The separator consists of a zinc-lined wooden chute of the proportions shown in the half-tone, mounted on the standard at an angle of about 45 deg. with the floor. Suspended over it are two contactor magnets placed so that the poles are about 2 in. from the floor of the chute. The operation of the device consists simply in shoveling the filings or screws into the top of the chute with the magnets energized, when all magnetic material will be held firmly to the poles. By rapping the chute lightly, any brass particles which may have a tendency to be blocked by the iron held fast by the magnet will be allowed to go on their way.



HOME-MADE MAGNETIC SEPARATOR FOR FILINGS AND SCREWS

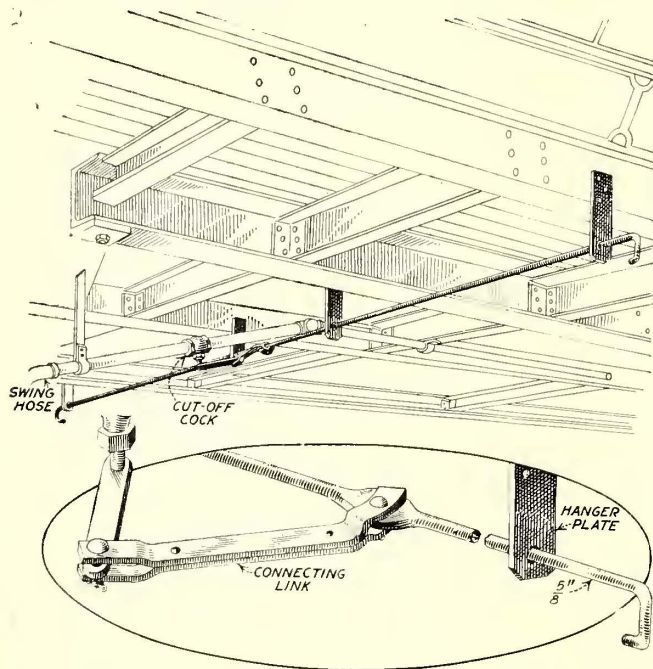
The device has been in use for some months, and has fully demonstrated its practicability. It was built under the direction of F. L. Hinman, master mechanic of the Syracuse lines of the company.



DETAILS OF UNDERFRAME OF INTERURBAN CAR FOR MONTREAL & SOUTHERN COUNTIES RAILWAY, MONTREAL, QUEBEC, CANADA

Mechanism for Operating Air Cut-Off on Existing Equipment

THE Ohio Electric Railway, Springfield, has equipped several of its interurban cars in train service so that the cut-off cocks can be operated by pulling on a rod from either side of the car. This is both convenient and safe. The valve is placed at some distance in from the end of the car near the center where it will not interfere with



DETAILS OF REMOTE COCK CUT-OFF MECHANISM

the trucks, and to the cock handle is connected a link which is actuated by the cross-rod.

The accompanying sketch shows the details needed. The operating rod used is 5/8 in. in diameter, flattened at one point and bored for attaching the connecting link, and has a length such that the rod handles when pulled over come to within a few inches of the side of the car. The rod is suspended from the car sills by three or four hanger plates as required, made of 3/8-in. x 2 1/2-in. straps and fastened with screws or lags. No general dimensions of the apparatus can be given, because different types of cars would require different material. This device has been approved by the safety committee of the Ohio Electric Railway.

Concrete for Pavement Between Tracks

AFTER an exhaustive investigation for the best type of pavement to be placed between street car tracks, the San Diego Street Railway decided on plain concrete. The chief features of this pavement which led to the decision were that it did not require a large plant for the preparation of the material and that it could be laid by inexperienced labor, thus simplifying the work and making an economical pavement. Consideration was also given to the fact that as this type of pavement supports the head of the rail it tends to eliminate vibration and insures a more permanent pavement.

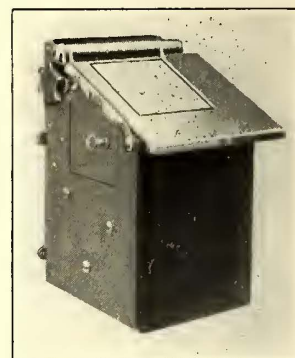
The pavement used is of 1:2:4 concrete with 1/4-in. expansion joints placed 30 ft. apart. The tie spacing is 2-ft. centers, which allows 16 in. between ties, thus giving a block of concrete of 5 in. in the clear below the

base of the rail for a length of 16 in. With this construction, should the ties fail through decay or other causes, there will still be a good support for the rail.

This type of pavement has proved so satisfactory to the railway and to the city in general that the company is completing 2.3 miles of it.

Improved Train Order Register for Interurban Roads

THE Standard Register Company, Dayton, Ohio, has on the market an autographic train-order register known as the "Kant-Slip" register, the operation of which is quite similar to that of other registers made by that company for purposes where accurate duplicates of records are desired. The distinguishing feature of this register, as expressed in its name, is a provision for very accurate alignment of all the copies made. This consists of holes, punched in the edge of the paper ticket, which are engaged by pins on the feed roller to prevent the tickets from slipping with respect to each other as they are issued.



TRAIN ORDER REGISTER DESIGNED FOR WALL MOUNTING

The register is made for wall mounting and is used either in telephone booths or in the car vestibules. It issues tickets 5 3/4 in. wide and 6 1/2 in. long, which are brought out with one revolution of the feed wheel by turning the knob on the left. Three copies of all dispatches are made, two for the trainmen and one which is rolled up in the register as a permanent record. Each

MICHIGAN RAILWAY CO.				
		SERIAL NO		
TO CONDUCTOR AND MOTORMAN:		50771	191	
Train No.	Motor No.	At		
Train No.	Motor No.	At		
No.	Motor	Meet No.	Motor	At
No.	Motor	Meet No.	Motor	At
No.	Motor	Meet No.	Motor	At
Dispatcher		Train Order No.		
CONECTOR	MOTORMAN	TRAIN	COMPLETE	TIME

SAMPLE "KANT-SLIP" TICKET

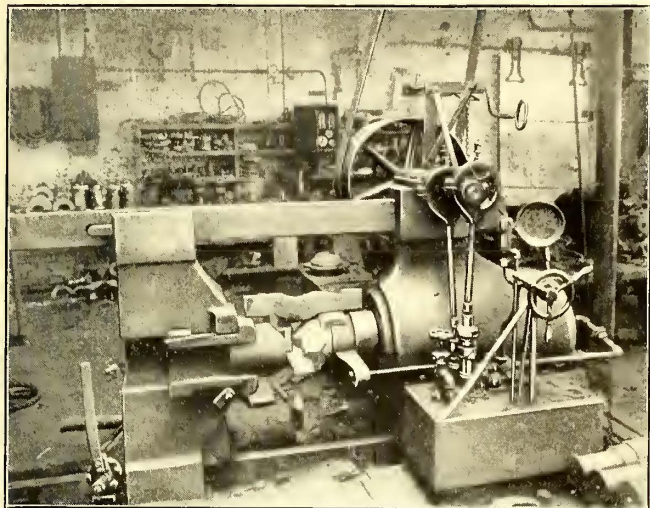
ticket has a serial number stamped on automatically when the ticket is printed.

Among the companies using the register is the Michigan Railway, which has a total of seventy-two installed, and it is said that the registers are giving satisfaction.

Many models of this improved style of register issued in different sizes of forms, for desk use in train dispatcher's office, are also manufactured by the above concern.

Brake Levers Made in Wheel Press

IN THE shops of the Washington Water Power Company, Spokane, Wash., brake levers are shaped in a wheel press which has been provided with cast-iron heads which act as dies. The brake levers are made of 1-in. x 4-in. old iron cut to correct length and heated



WHEEL PRESS USED FOR SHAPING BRAKE LEVERS

to a cherry red heat in a forge before being pressed. The illustration shows the shaping operation and a lever after the shaping has been completed. This practice is not quite as good as the use of a forging machine, but where the latter is not available, the work is done much more quickly than by hand.

Inter-Departmental Co-operation

IN THE present struggle to get the maximum use of every piece of material and equipment and the most efficient management in every respect, co-operation between department heads is essential more than ever before. Frequent conferences at which all the department heads come together and discuss the numerous questions of more than intra-department interest which are constantly arising have proved very helpful.

A number of companies have been following this practice more or less consistently, but perhaps nowhere has it been made a greater success than in Denver. Every Monday General Manager F. W. Hild of the Denver Tramway and all his department heads gather around a big table at the Denver Athletic Club for luncheon. As they eat Mr. Hild addresses the men in turn with the remark, "Well, Dave, what have you today?" or "Ed, your turn next; what have you to bring up?" etc. Very frequently the department heads bring up matters for the decision of the general manager which they were unable to bring to his attention during business hours. When a request of one department head, if granted, would be unfavorable to another department, a plan is found which is mutually satisfactory. In this way not only is friction forestalled but advantage is taken of the judgment of all the men on any matter. When all the men have responded the general manager usually has a few suggestions to make or some pertinent questions to ask particular department heads. The meeting is then open for general constructive criticism.

Mr. Hild and his associates are very enthusiastic over the value of these weekly semi-social conferences. They do not involve much expense and the amount of real work disposed of within the two hours fixed as the duration of the conferences is surprising. The result is a splendid good feeling and a company working as a company instead of as a group of departments.

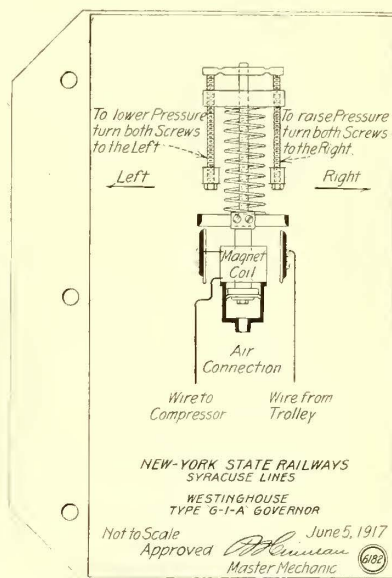
Instruction of Carhouse Inspectors

REALIZING the need for a better opportunity to discuss equipment troubles with inspectors, Frank L. Hinman, master mechanic New York State Railways, Syracuse, N. Y., conducted a very promising experiment during the year just closed. In brief, this consisted simply of a regularly scheduled meeting of the inspectors with the master mechanic once each week.

A special classroom near Mr. Hinman's office was fitted up with blackboards, operating motor, air-brake and miscellaneous equipment, and facilities for handling and operating the apparatus before the group of men, or class if they could be called such. The men reported at the classroom every Friday morning for a period of two hours, for which they received regular pay. It happened fortunately that the men were obliged to come to the neighborhood of the shop to receive their pay at this time, hence were in a position to attend the class without delay. They were all on night duty and lost no working time during instructions.

Each man was furnished with a pocket book of blue-prints, from which a sample is reproduced. These prints formed a partial basis for the instruction. A more important basis, however, was the actual trouble experienced by the men in their routine work. The details of this trouble were presented directly by the men and in addition queries which came in through question boxes placed in the several carhouses were also taken up and discussed. The instructor, Mr. Hinman himself for this first year, also laid out a simple but comprehensive general program to insure the covering of all essential parts of the car equipment.

The 1917 class comprised twelve men, who were all enthusiastic in regard to this practical kind of instruction. The draft early in the fall considerably interfered with the work toward the close, but not until enough had been done to prove the value of the plan. Mr. Hinman found the work very strenuous and hopes when it opens up again to be able to secure assistance. He finds that enthusiasm and conviction as to the importance of the work are essentials to its success.



SAMPLE LEAF FROM POCKET BOOK FURNISHED TO CARHOUSE INSPECTORS NEW YORK STATE RAILWAYS, SYRACUSE

Portable Electric Drill and Grinder

PORTABLE electric tools which save time and labor by replacing hand operation increase the output of a given working space. The drill illustrated in Fig. 1 is designed for this purpose. It is equipped with gears to give two speeds and these are changed by means of a knob on the bottom of the gear case. The gears themselves are made of chrome nickel steel and run in grease. Ball bearings are used throughout and

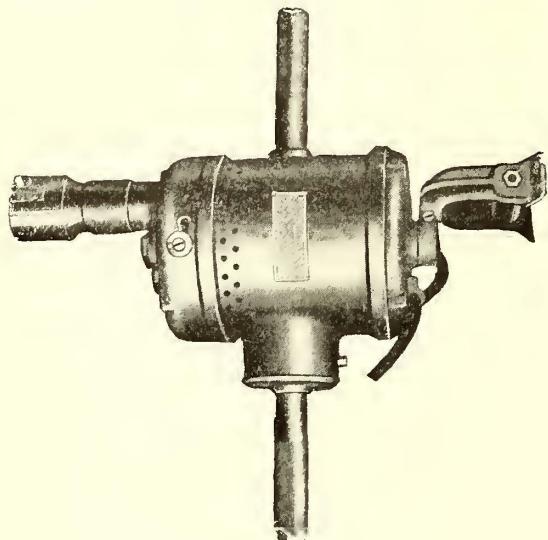


FIG. 1—PORTABLE ELECTRIC DRILL

a $\frac{1}{2}$ -in. Standard chuck and a sturdy electric switch are provided. The speed is 400 r.p.m. on low gear and 700 r.p.m. on high. Westinghouse motors are used in the drills.

The tool post grinder, illustrated in Fig. 2, is adapted for use on lathes. The angle plate can be clamped around the tool post and there is a vertical adjustment on the grinder. The grinder is equipped with a Westinghouse $\frac{1}{4}$ -hp. motor running at 3400 r.p.m. and is

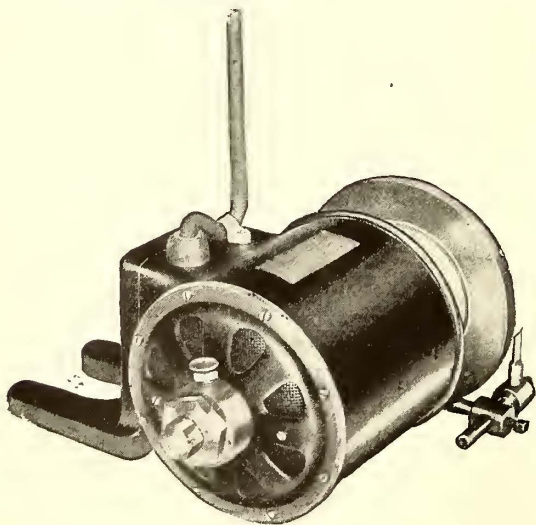


FIG. 2—TOOL POST GRINDER

provided with a 6-in. x $\frac{3}{8}$ -in. grinding wheel, an extension mandrel for internal grinding fitted with a $1\frac{1}{2}$ -in. x $\frac{3}{8}$ -in. wheel, a tooth rest for cutter grinding and an electric attachment plug with $7\frac{1}{2}$ ft. of cord. These two portable electric tools are manufactured by Gillfillan Brothers Smelting & Refining Company, Los Angeles, Cal.

LETTER TO THE EDITOR

Axle Failures Are Not All Due to Defects in Manufacture

CAPITAL TRACTION COMPANY,
WASHINGTON, D. C., Feb. 18, 1918.

To the Editor:

The articles by Norman Litchfield, appearing in the last three issues of the JOURNAL, on the subject of car axles, have been very interesting and instructive.

The question of satisfactory axles is so important that it will be unfortunate if these articles fail to bring out valuable discussion from men in charge of equipment on some of the large roads.

The design of axles, as Mr. Litchfield points out, is a most fundamental matter. Considerable work was done along this line by the equipment committee of the American Electric Railway Engineering Association in 1915 and 1916 in an effort to have certain sizes adopted as standard by the Association. It was very unfortunate that so little discussion was brought out at the convention.

While some of the heat-treated axles first put on the market were anything but satisfactory, the treated axle to-day is used very generally. However, to be satisfactory the heat-treated or quenched-and-tempered axle must have good material in it to start with, and the manufacturer must have the facilities properly to do the work. In addition there must be careful inspection to eliminate as far as possible defective material.

As Mr. Litchfield has said further: "The heat treatment merely adds one more step in the production of a high-quality axle." This means that the treating must be properly done, with careful inspection, for if steel is not properly treated it is worse after treatment than if treatment had not been attempted.

The proper method of testing axles has been the subject of much discussion and it is a matter that should be definitely settled. The inspection should be governed by the service in which the axle is to be used, and the program could very properly vary.

The manufacturer is not responsible for all the ills an axle may fall heir to; hence some of the inspection should be done in the railway shop. Furthermore, the importance of care of axles in service cannot be too strongly emphasized. Even after the axle has been received in good order from the manufacturer unless pains are taken in turning it, a well-made axle might become a potential source of danger. This fact cannot be impressed too strongly upon the mind of the lathe man.

Another point is to keep the motor wires away from the axle. I have seen axles that have failed due to spots burned from the motor leads.

Finally, periodical inspection of axles in service is essential. Such inspection should be made with scrupulous care as it is very difficult at times to locate defects that might easily result in ultimate failure of the axle.

R. H. DALGLEISH, Electrical Engineer.

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has completed the work of painting white bands around poles where cars will stop in the future.

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

Federal Strike Board Named

Secretary of Labor Wilson Announces the Appointment of Representatives of Capital and Labor

Announcement was made on Feb. 17 of the personnel of the joint conference of employers and union leaders, who will lay down a basis of relations between capital and labor during the war. The first session of the conference will be held in the office of Secretary of Labor Wilson on Feb. 25. The five members chosen to represent each side by the National Industrial Conference Board and the American Federation of Labor will choose two other representatives of the public, making twelve conferees to share in the deliberations, which will cover all phases of the situation.

REPRESENTATIVES OF EMPLOYERS

The representatives of the employers are:

Loyal A. Osborne, New York, vice-president of the Westinghouse Electric & Manufacturing Company and chairman of the executive committee of the National Industrial Conference Board.

Charles F. Brooker, Ansonia, Conn., president of the American Brass Company.

W. J. Vandervoort, East Moline, Ill., president of the Root & Vandervoort Engineering Company.

L. F. Loree, New York, president of the Delaware & Hudson Railroad.

C. Edwin Michael, Roanoke, Va., president of the Virginia Bridge & Iron Company.

REPRESENTATIVES OF WORKERS

The representatives of the workers are:

Frank J. Hayes, president of the United Mine Workers of America, Indianapolis.

William L. Hutcheson, president of the United Brotherhood of Carpenters & Joiners of America, Indianapolis.

J. A. Franklin, president of the Brotherhood of Boilermakers & Iron Shipbuilders of America, Kansas City, Kan.

Victor Olander, representative of the International Seamen's Union of America, Chicago.

T. A. Rickert, president of the United Garment Workers of America, Chicago.

QUESTIONS TO BE CONSIDERED

Among the questions to be considered by the conferees will be the basis for wage determination, strikes and lockouts, piecework prices and price-fixing, method of eliminating improper restrictions on output of war materials from whatever cause, discrimination against union and non-union men, ad-

mission of union agents to plants, method of promptly adjusting disputes at their source through boards containing equal representation of employers and employees, and right of workmen to organize.

Prevention of disturbances, rather than the cure of them, will be the central doctrine of the government's entire policy. Reorganization of the Labor Department will seek to eliminate duplication of effort and conflicting action by various departments in an effort to obviate friction. Where friction arises, the department's adjustment service will endeavor to remove the cause before interruption of production results.

Settlement Conferences Continue

St. Louis Board of Public Service Going Over Terms of Franchise Settlement One by One

The Board of Public Service at St. Louis, Mo., has held two sessions recently at which it discussed the proposed agreement for the settlement of the differences between the city and the United Railways. At the first session the sections ratified by the board were those extending the grant to April 12, 1948, and authorizing the United Railways to lease or purchase the lines of other companies at any time during the term of the proposed franchise; giving the company the privilege of using any present or better method of operating with electric power; authorizing a capitalization of \$60,000,000; compelling the company to submit financial reports to the comptroller and creating the Board of Control.

At the second session the time was given over to an explanation by C. E. Smith, city engineer, of how he had set a valuation of \$60,000,000 on the property of the company. Mr. Smith is reported to have said that the figure was fixed after city officials had heard that the company could be reorganized on a capitalization of \$60,000,000. The company claimed a valuation of \$77,000,000 and Mr. Smith's first estimates placed the valuation at \$70,000,000. The company's total capitalization is about \$104,000,000. Mr. Smith compared his valuation of the United Railways at \$122,000 a mile with the Kansas City valuation of \$112,000 a mile in 1914 and the Chicago valuation of \$107,000 a mile in 1907, when the Kansas City and Chicago systems were in poor condition; with the Chicago valuation of \$150,000 a mile to-day and with an average mile valuation for Chicago, Kansas City, Philadelphia, Milwaukee, Cincinnati, Los Angeles and Denver of \$131,000.

Train Operation for Brooklyn

Commission and B. R. T. Compromise on Car Order Under Discussion Two Years

The Public Service Commission for the First District of New York and the Brooklyn Rapid Transit Company, after public hearings and court appeals, extending over a period of two years to determine whether the company should obey the commission's order to put 250 new surface cars in operation, announced a settlement of their differences on that subject on Feb. 15. The company has agreed to buy fifty trail cars of the "largest practical seating capacity" for use on Flatbush Avenue, Fulton Street and other lines of heavy traffic. The company has also agreed to buy 100 new steel cars for its dual subway lines, and to convert 100 of its center-entrance surface cars for multiple-unit operation, and fifty four-motor cars to serve as leaders for the trailers. Two-car trains are to be in operation in Brooklyn streets within a month.

The original order compelling the operation of 250 more cars said nothing about trail cars, and the dual subway contract required the company to furnish all cars necessary for operation.

A public hearing was set for Feb. 15 on the company's application for a rehearing on the 250-car order, but instead of Timothy S. Williams, president of the Brooklyn Rapid Transit Company, taking the stand as a witness, William L. Ransom, counsel to the commission, described the terms of the compromise. The pending proceeding was adjourned until October, the commission reserving all its rights.

About \$500,000 will be spent for surface cars and \$2,500,000 for other rolling stock.

Short Strike at Alton

The lines of the Alton, Granite & St. Louis Traction Company, Alton, Ill., controlled by the East St. Louis & Suburban Railway, were tied up for about twenty-four hours recently when the employees went on strike. The strike was called as a protest against changes in the schedules which the men thought would work to their disadvantage. After going out, the men added a demand for an increase in pay from 33 to 40 cents an hour. D. E. Parsons, general manager of the company, in announcing the settlement, said the company could not increase the men's pay, but that the old schedule would be kept in force pending an adjustment of the runs, which the company would try to make as satisfactory as possible to the men. The provisions of the settlement agreement were not made public.

Minneapolis Arbitration Award Announced

Summary Is Presented of Findings of President's Mediation Commission in Case Which Caused Sympathetic Strike

The President's mediation commission appointed to adjust labor troubles affecting the Twin City Rapid Transit Company, Minneapolis, Minn., handed down its findings on Feb. 15. The recommendations of the commission are as follows:

1. While competent former employees are available the company should not take men from the farms or war industries.

2. The company should not employ men now engaged in other industries while available and competent men just as skilled are idle.

3. The company should prefer for employment men skilled in the particular line of work over others who have had no training in such line.

4. The company, in returning to work the men who deemed themselves locked out by the company's order, should not discriminate against any of the men because of union affiliations.

5. All the men when put back to work should go back with their old standings.

6. The former employees should offer themselves for reinstatement as rapidly as vacancies occur.

THE COMMISSION'S STATEMENT

The commission states in its report:

"The President's Mediation Commission called the attention of the representatives of the company to the fact that their policy was opposed to the government's war needs that men employed in war industries and in the farming districts should not be removed to non-war industries and that the nation's man power must be used fully and economically by preferring for employment men with training and experience which makes them competent to fill vacancies.

"The company had been previously informed of the effect of local labor disturbances upon industries essential to the prosecution of the war, both in the vicinity and at a distance."

The trouble between the Twin City Rapid Transit Company and its men started in August and September, 1917, over the right of the men to organize. The company conceded this right but, the union men claim, discharged fifty-seven men for alleged activity in the union. The trouble spread until a sympathetic strike in the Twin Cities was called on Dec. 13. This strike lasted only three hours, being called off after information had been received from Washington that the Secretary of War had requested the president of the Mediation Commission then in Seattle to stop off in Minneapolis to investigate the situation there informally. The history of the controversy was followed briefly in the *ELECTRIC RAILWAY JOURNAL* at the time.

Foster Hannaford, general manager of the company, was quoted on Feb. 16 as saying:

"On receipt of the official copy of the report and recommendations of President Wilson's mediation commission this company will give the same most careful consideration, and in the meantime we will be glad to talk with any former employees who are still out of employment and who may come under the scope of the commission's recommendations as reported in the newspapers, and who may offer themselves for employment as vacancies occur. In the absence of President Lowry, who is out of the city, we can make no further statement at this time."

HOW THE REPORT IS REGARDED

The Minneapolis *Tribune* says the report is mainly noteworthy for what it does not contain. For instance, there is not a word on the subject of the right or propriety of the men wearing union or association buttons while on duty. According to the *Tribune*, the whole affair seems to be thrown back on the company, the union and the State for adjustment, the report being essentially a friendly call for harmony and for such employment of available labor as will serve best the interests of the community and the nation.

Praise for Mr. Newton

Constructive Efforts of Railway Manager at Huntington Gratefully Acknowledged by Local Paper

H. S. Newton has resigned as general manager of the Ohio Valley Electric Railway, Huntington, W. Va., to become manager of railways of the Monongahela Valley Traction Company, Fairmont, W. Va. Mr. Newton's four years at Huntington have been unusually successful from the standpoint of better public relations, and his record in this respect has resulted in very candid expressions of appreciation of his work by the newspapers. The *Huntington Herald* said:

ANTICIPATED PUBLIC DEMAND

"Mr. Newton has been general manager of the company for nearly four years, and it is the general public impression that he has performed the functions of his office capably and well. He is an apostle of the best creeds of modern corporations, and he would not tolerate any policy that did not give sufficient consideration to the demands of the public. That attitude won for him much favor with the patrons of the company. He soon became widely acquainted and attained an influential position in leading organizations of the city, such as the Chamber of Commerce and the Rotary Club, in both of which he is a director.

"In all possible ways he has been on the alert to anticipate and meet public demand, whether in the small items

of local service, or in the broader matters of civic development. During his tenure of office the company successfully negotiated a new contract for extension of the lines to southwest Huntington along a line other than Washington Avenue, and for an extension of the company's lines to the Galliaville district. Mr. Newton has done much to bring about mutually satisfactory feeling as between the people of Huntington and the company. At the same time the interests of the company have been served in a season when public utilities, particularly electric railways, are having extremely hard sledding."

Elevated Plan for Cleveland

Prominent Business Man Has Advanced Ideas on Rapid Transit and on Fares

J. P. Brophy, vice-president and general manager of the Cleveland (Ohio) Automatic Machine Company, contributed to the magazine section of the *Cleveland Leader* of Feb. 3 an article on how an elevated system would solve the traffic problem in that city. Mr. Brophy said that there was no question that a subway to the city limits was in the distant future. On this account he suggested an elevated road and presented designs of his own for the structure.

He said that the road suggested by him would not cost more than 50 per cent as much as the type of elevated structure in use in other cities and he thought that the design which he advocated would prove more substantial and quieter in every respect. The article was illustrated with line cuts of the suggestions made by Mr. Brophy.

CHEAP FARES BEGET CHEAP SERVICE

Mr. Brophy does not think that all is well with the Cleveland railway situation. He said that the only good thing about the much-lauded 3-cent fare was a little advertising for the city. Three cents from passengers was not enough money to maintain good service. The fact was that the car rider in many instances now tolerated things that before the cheap fare would have been roundly condemned. He said, however, that the 3-cent fare seemed to have the people in its grip notwithstanding the fact that the difference in fare was insignificant compared with the loss of time to people, "waiting, swearing, praying and hoping" for a car to arrive to take them to their destination.

According to Mr. Brophy, service at 5 or 6 cents would be infinitely better for the morning and evening army of riders than an almost intolerable service at 4 cents. Mr. Brophy felt that if a vote were taken it would be found that most of the people favored real accommodations regardless of any slight increase in price. Under the Tayler franchise the service of the Cleveland Railway is under the control of the city through its street railway commissioner.

Favor Municipal Ownership

Senators Advocate Taking Over District Lines for Period of War at Least

Senator Jones of Washington, a member of the special committee which investigated the strike of the employees of the Washington Railway & Electric Company last spring, said on Feb. 8 he would frame a resolution calling upon the Public Utilities Commission to inform the Senate just what is being done, and what, in its opinion, should be done, to relieve the local surface railway situation in the District of Columbia. Senator Jones said that with the report of John A. Beeler to the commission as a basis upon which to work Congress will be able to go ahead with any legislation that may be necessary. He is quoted as follows:

"The railway companies must act to better conditions or the government must act. The companies must provide more cars, or more tracks, or the government must take them over, perhaps only temporarily, just as it has taken over the railroads of the country. The government could take the electric railway lines of the District just as it has the railroads, and guarantee to the owners a fair return for the use of their properties during the period of government control."

Senator Jones pointed out that the problem of municipal ownership of the lines could be settled later. He said that the main thing now was to obtain relief.

Senator Norris of Nebraska vigorously advocated that the government take over the local lines. He is reported to have said:

"It may be necessary to operate a number of large motor buses as auxiliaries to the electric railway lines while you are building more car tracks and buying more cars. Some steps should be taken without delay to relieve the congestion of travel. Plans are being made to handle the housing problem for the thousands of newcomers to Washington, and it is high time that radical steps be taken to make it possible for these people and residents of the District to obtain transportation from their homes to their offices."

Increase for Interurban Men

The Ohio Electric Railway, Cincinnati, Ohio, has issued notice of an increase in wages to motormen and conductors on its interurban cars amounting to 4 cents an hour a man. The increase is made in the form of a war bonus, and it is understood will be continued as long as the conditions justify. The wage scale which has been in effect is as follows:

First year, 26 cents an hour; second year, 27 cents; third year, 28 cents; fourth year, 29 cents; fifth year, 30 cents; sixth year, 31 cents; seventh year, 32 cents; eighth year and after, 33 cents.

The new rate will be as follows:

First year, 30 cents an hour; second

year, 31 cents; third year, 32 cents; fourth year, 33 cents; fifth year, 34 cents; sixth year, 35 cents; seventh year, 36 cents; eighth year and after, 37 cents.

It is not contemplated at the present time to make any changes in wages of motormen and conductors employed on the various city lines of the company as they received an increase in wages last fall.

Beyond the Tunnel

San Francisco Is Considering the Advantages of Taking Over Private Lines West of Twin Peaks

On Feb. 8 a meeting was held in the office of Mayor Rolph of San Francisco, Cal., of all the city officials interested in the transportation problem west of the Twin Peaks tunnel. At present cars of the Municipal Railway run through the Twin Peaks tunnel to Sloate Boulevard. Beyond this point buses have been provided as a temporary expedient. The Municipal Railway stops short of the most thickly populated area. The United Railroads has lines beyond the tunnel, but is handicapped by lack of direct connection downtown. As a result of the meeting it is expected that the United Railroads will be asked to set a price on its lines beyond the tunnel. In commenting on the result of the meeting Mayor Rolph is reported to have said:

"We decided to approach the United Railroads with a view to having a price set on the part of its system beyond the tunnel. That this was the wisest move just now was the opinion of everybody at the meeting. Engineer O'Shaughnessy for the city was instructed to meet with representatives of the United Railroads and try to work out a method of arriving at a physical valuation of the property involved. To do this would be to apply the principle of the McNab plan, which was the purchase of the entire system. We need only a part of the system. A few months ago the United Railroads indicated a willingness to sell to the city. Whether it still is of the same mind we will now ascertain."

Public Utilities at U. of C.

The University of California is giving an extension course on the subject of public utilities, under the direction of Paul Sinsheimer, formerly stock and bond expert of the California Railroad Commission. The speakers who are to discuss various phases of the public utility problems include George Weeks, president of the National City Company; John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company; Paul Sinsheimer, vice-president of the Union Trust Company; State Railroad Commissioners Thelan, Edgerton, Gordon, Devlin and Loveland, and the following members of the commission staff: Richard Sachs, chief engineer; L. R. Reynolds, chief auditor; Fred O'Brien, recorder, and Douglas Brookman, attorney.

News Notes

Time Extended for Rhode Island Report.—A resolution was introduced in the Legislature of Rhode Island recently, granting an extension of time from Feb. 15 until March 8 to the special commission which was appointed a year ago to investigate the Rhode Island Company.

Increase in Wages for Interurban Men.—Trainmen in the employ of the Galveston-Houston Interurban Railway, Galveston, Tex., have received an increase in wages of 2 cents an hour. The schedule provides a scale ranging from 32 cents an hour for men in their first year's service to 36 cents an hour for men in their fifth year's service.

Hudson Tubes Under Government.—Much ado was made in the newspapers in New York over the discovery on Feb. 20 that the Hudson & Manhattan Railroad, operating tunnels under the Hudson River between New York and New Jersey, had been taken over by the government at the first of the year, under President Wilson's railroad proclamation. The *Times* said that "no official announcement of the move had been made."

Guarantees Minimum Wage.—The United Railroads, San Francisco, Cal., has posted in its carhouses a notice stating that hereafter the company will guarantee extra platform men an average monthly wage of \$75, the adjustment to be made once every three months. The new wage is for extra men who report regularly and accept such runs as are offered them. Platform men on regular runs are not affected by this order.

Increase in Wages in Dallas.—The Texas Electric Railway, Dallas, Tex., has increased the wages of its trainmen. Under the new schedule, interurban trainmen will receive a minimum wage of 27 cents an hour and a maximum of 38 cents an hour, graduated according to length of service. The trainmen on the local lines in Sherman, Denison, Waco and Corsicana will receive a minimum of 22 cents an hour with a maximum of 26 cents an hour.

Car Service Through Twin Peaks Tunnel.—Regular service was established on Feb. 3 by the Municipal Railway through Twin Peaks Tunnel in San Francisco, Cal. The first car left the city hall with Mayor Rolph acting as motorman and T. A. Reardon, president of the Board of Public Works, as conductor. Ceremonies were held when the car reached the west portal. Traffic for several days following Feb. 3 was heavier than is expected to obtain under normal conditions.

Franchise Agreement Approved.—The Legislature of the Province of

Quebec has sanctioned the agreement between the city and the Montreal Tramways as prepared by the Tramways Commission. As suggested in the agreement the Lieutenant Governor in Council will name a special tramways commission of three members to supervise and see that the conditions of contract are carried out as agreed. The terms of the franchise were reviewed in the *ELECTRIC RAILWAY JOURNAL* for Feb. 9, page 288.

Freight Handling Discussed in Chicago.—Freight handling on the surface and elevated lines in Chicago was again considered on Feb. 12 at a meeting of the local transportation committee of the City Council. The preceding session was noted in the Feb. 16 issue of this paper. The truck gardeners showed a special interest in the proposed plan for getting their produce to the central market. The committee referred the whole subject again to the railways to secure their views on the location of terminals, the hours for handling freight and the classes of merchandise to be provided for in an ordinance.

Increase in Wages in Wheeling.—The Wheeling (W. Va.) Traction Company on Jan. 1 increased the pay of its trainmen to the following rates: First year, 32 cents; second year, 33 cents; third year, 33½ cents; fourth year, 34 cents; fifth year, 35 cents; sixth year, 36 cents; seventh year and over, 37 cents. The old rates were: First year, 26 cents; second year, 28 cents; third year, 30 cents; fourth year, 31 cents; fifth year, 32 cents; sixth year, 33 cents; seventh year and over, 34 cents. The new rates are to be effective until the expiration of the present working agreement on April 30, 1918.

Will Discontinue Park.—Owing to war conditions and the high cost of operation, due to increased values of both material and labor, it has been deemed advisable by the West Virginia Traction & Electric Company, Wheeling, W. Va., owners of Wheeling Park, and Messrs. Griffiths and Crane, the lessees and operators, to discontinue the operation of the park. Wheeling Park has been in operation for more than forty years and this will be the first season it will not be used. It was originally the estate of the late Thomas Hornbrook, who later sold it to the railway.

Bill to Take Over Lines to Shipyards.—A bill providing for the taking over of street and interurban railways serving shipyards or plants engaged, or that may hereafter be engaged, in the construction of ships or equipment for such plants, has been favorably reported to the Senate by the committee of commerce. The measure was introduced by Senator Duncan U. Fletcher, Florida, chairman of the Senate commerce committee. The text of the bill is being sent out by the American Electric Railway Association War Board, which adds the comment that there seems to be strong probability that the bill will be enacted into law.

Jersey Commission to Be Increased.—Both the New Jersey House and the Senate have passed the bill to increase the membership of the Board of Public Utility Commissioners of that State from three members to five. When the bill was urged for passage in the House it was pointed out that the commission was deluged with work. There were 441 formal hearings before the board in one year recently. Last year the members were called upon to pass on bond applications for issues representing more than \$200,000,000. In its last annual report the board recommended the passage of a law empowering it to refer some of the cases to examiners to take evidence and report to the main commission.

Urges Franchise Settlement.—An appeal was made recently by Daniel Carmichiel, chairman of the central franchise committee of the Joint Improvement Associations of Minneapolis, Minn., for an early franchise settlement by the city with the Minneapolis Street Railway on a fair and equitable basis to prevent "a period of warfare between the public and the company." Mr. Carmichiel said: "During the fight figures and terms are proposed by both sides which are merely intended to fool, browbeat, scare or confuse the other party, and usually both sides to the conflict fight through to the point of exhaustion. Meanwhile service becomes demoralized, the equipment is allowed to deteriorate, necessary extensions and additions to equipment and service are refused, and in the end the public as usual pays the price of all the delay."

Short Strike in Kansas.—The trainmen of the Joplin & Pittsburg Railway, Pittsburg, Kan., suspended work at midnight on Feb. 13. They took this action following a lengthy conference with the officials of the company and of the State and federal government, at which efforts failed which had been made toward an adjustment of the differences between the men and the company. J. J. Barrett, federal commissioner of conciliation, attended all meetings between the men and the company, as did P. J. McBride, State labor commissioner of Kansas. The men returned to work, however, after a few hours on the suggestion of Mr. Barrett. The men contended that they were quietly leaving their work and that they would not object to other men taking their places. They are said to have asked for an increase of 18 cents an hour.

Chicago Rapid Transit Ordinance Progressing.—Further discussion of the proposed ordinance for extension of rapid transit facilities in Chicago was carried on before the local transportation committee of the City Council on Feb. 13 and 16. There was considerable debate on the question of giving broad powers to a board of regulation and control. Several of the aldermen agreed with President Busby's suggestion that charges for paving and maintenance of paving, and reconstruction of tracks disturbed for sewer re-

moval, should be eliminated. There has been considerable demand for the removal of the restriction in the present ordinance against the use of trailers on surface lines, and the new ordinance may leave this detail to the board of control. It is expected that when the committee meets again a new draft of an ordinance will be ready for consideration. Many chapters have already been agreed upon by both sides.

Programs of Meetings

Illinois Electric Railways Association

The annual meeting of the Illinois Electric Railways Association has been postponed to a date to be set later. The necessity for the railway members giving their undivided attention to their properties and the pressure of business of many supply men made it inadvisable to hold the meeting at this time. The present officers and members of committees will hold over until the postponed meeting is held.

New England Street Railway Club

The regular monthly meeting of the New England Street Railway Club will be held on Feb. 28 at the Hotel Brunswick, Boston, Mass., at 6 p. m. The subject, "Power Production in War Times," will be discussed by H. H. Stinson, manager of transportation of the New England Fuel & Transportation Company; George E. Wood, mechanical engineer of the Connecticut Company, and W. C. Slade, superintendent of power and lines of the Rhode Island Company.

Central Electric Railway Association

The program has been announced for the annual meeting of the Central Electric Railway Association at the Miami Hotel, Dayton, Ohio, on Feb. 28 and March 1. The session on Feb. 28 will convene at 3 p. m. C. N. Wilcoxon, president of the association, will deliver the annual address. The business session and the presentation of the reports of committees will follow. The other speaker at this session will be Charles A. Bookwalter, former mayor of the city of Indianapolis. His subject will be "The War."

The session on March 1 will convene at 9 a. m., with the consideration of business and the presentation of the reports of committees first to receive attention. There will follow an address by Charles R. Gillies, Dayton, on "War Savings," and a paper by A. C. Van Driesen, president of the Central Electric Railway Accountants' Association, on "The Work of the Accountants' Association." The annual report of the secretary and treasurer will then be presented and new officers will be elected and installed. Incidental patriotic songs will be sung during both sessions by a quartet composed of members of the association under the direction of J. F. Starkey, general passenger agent of the Lake Shore Electric Railway, Sandusky, Ohio.

Financial and Corporate

Pittsburgh Bondholders Act Representative of First Mortgage Bond Holders Files Bill Against Phil- adelphia Company

A bill in equity, on behalf of Benjamin C. Allen, acting for himself and other holders of the first mortgage bonds of the Union Traction Company, Pittsburgh, Pa., was filed on Feb. 15 against the Philadelphia Company, the Pittsburgh Railways and the United Traction Company, Pittsburgh, in the District Court of the United States in the Western District of Pennsylvania. The plaintiff in the suit is a holder whose bonds have been deposited with the committee, of which Thomas G. Gates is chairman, and whose interests are friendly to them.

The bill, after reciting the manner in which the different railway properties in Pittsburgh came under the Philadelphia Company, sets forth in detail the manner in which the Philadelphia Company enjoyed the financial advantages which it derived therefrom and the credit which it thus acquired.

UNDERLYING PROPERTIES NEGLECTED

The bill avers that under the Philadelphia Company the underlying properties have been operated as one system, having a common treasury into which all receipts have gone and from which all payments have been made. The plaintiff states that while thus enjoying the advantages of ownership the Philadelphia Company has failed to keep the underlying properties in proper operating condition or to set aside any fund for replacement, but, on the contrary, has contracted an enormous floating debt, diverting a large amount of revenue to itself by its control in the matter of the purchase of power, etc.

WHAT THE COMMITTEE SAID

A statement by the committee, after reviewing the charges just mentioned, says in part:

"After having dealt with the property and franchises so as to destroy their value apart from the rest of the Philadelphia Company's system, the Philadelphia Company has now failed to provide funds for the payment of coupons, seeking to obtain the benefit of the condition which it brought about, without any liability on its part to the innocent investors whose money originally built the roads.

"The plaintiff, therefore, demands that the Philadelphia Company shall be held by the court liable to pay the interest accrued and hereafter to accrue upon bonds issued by corporations whose property has thus been appropriated, and that the principal shall be decreed to be an obligation of the Philadelphia Company and be charged as a

lien on all of its property until they are fully paid. The bill further asks the court to restrain the Philadelphia Company from permitting further defaults to occur on bonds secured by mortgages upon any of its electric railway properties which might threaten to dismember its system and unfit it for public service by impairing its value as a whole.

"The responsibility for the principal and interest on underlying bonds of the companies which go to make up the Pittsburgh Railway system is thus squarely placed at the door of the Philadelphia Company, and the court is asked to recognize and enforce the liability which the Philadelphia Company, by its recent defaults, has sought to avoid."

Reorganization Operative

The reorganization committee of the Petaluma & Santa Rosa Railway, Petaluma, Cal., has announced that the reorganization agreement of Oct. 25, 1917, has been declared operative and that the trustee for the second mortgage has been instructed to start foreclosure proceedings.

L. B. Mackey, of E. H. Rollins & Sons, Boston, Mass., secretary of the reorganization committee, has addressed a circular letter to the holders of the first and second mortgage bonds and to the stockholders of the company, advising them that all but \$11,000 of the \$655,000 first mortgage bonds and all

Lehigh Transit in 1917 Sixteen Per Cent Increase in Operating Revenue but Slight Decrease in Net Income

In view of the large increase in gross business, in both the railway and the power departments, which had to be cared for at the prevailing high costs of operation, the results of the Lehigh Valley Transit Company, Allentown, Pa., for the year ended Nov. 30, 1917, are said to have been satisfactory. The details of operation for the last two years are given in the accompanying statement.

The revenue from transportation in the last year increased \$304,847, or 15.4 per cent. Power sales gained \$97,411, or 19.7 per cent. The total operating revenue, therefore, increased \$403,201, or 16.3 per cent.

GAINS OFFSET

These gains were slightly more than offset, however, by the increase of \$416,806, or 29 per cent, in operating expenses. Furthermore, the taxes advanced \$19,728, or 23.3 per cent. As a result of maintaining the property at the usual standard, notwithstanding the increase in cost of labor and materials, there was a slight decrease in net income of \$14,939, or 3.1 per cent.

Beginning with 1911 there has been credited each year to maintenance, renewals and depreciation an amount equal to 22 per cent of the gross earnings of the railway lines. All items of maintenance and renewals are charged to this account. The balance is set up to accrued depreciation reserve, which showed as of Nov. 30, 1917, a credit of \$312,279.

The freight and the express business of the company showed a decrease in

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Passenger revenue	\$2,131,596	74.2	\$1,852,505	74.9
Other transportation revenue	140,759	4.9	115,002	4.7
Revenue from other railway operations	602,718	20.9	504,363	20.4
Total operating revenue	\$2,875,073	100.0	\$2,471,871	100.0
Operating expenses (actual)	\$1,709,326	59.4	\$1,283,339	51.9
Provision for equalization and accrued depreciation	141,145	4.9	150,325	6.1
Total	\$1,850,471	64.3	\$1,433,665	58.0
Net operating revenue	\$1,024,601	35.7	\$1,038,206	42.0
Taxes	104,173	3.6	84,445	3.4
Operating income	\$920,428	32.1	\$953,761	38.6
Non-operating income	144,755	5.0	145,209	5.8
Gross income	\$1,065,183	37.1	\$1,098,970	44.4
Deductions from gross income	611,646	21.3	630,493	25.5
Net income	\$453,537	15.8	\$468,477	18.9

of the \$217,000 second mortgage bonds have been deposited in accordance with the reorganization agreement.

In March, 1917, Rollins & Sons addressed the holders of the first mortgage bonds of the railway, calling their attention to the fact that the sinking fund provisions of the trust deed were in default and recommending that the bonds be deposited with the Mercantile Trust Company, San Francisco, Cal., under a plan which looked to the cancellation of the \$250,000 of second mortgage bonds on condition that the sinking fund payments on the first mortgage bonds be waived.

surplus on account of the inability of the income to meet the rapid rise in operating costs. The surplus of the freight business decreased \$3,206, or 17.5 per cent, and the surplus from the express business fell off \$107, or 1 per cent. The five-year contract with the Adams Express Company, whereby it operated over the company's lines and used equipment furnished by the company, expired on Dec. 12, 1917. The contract was extended for ninety days in order to determine whether or not it would be to the best interest of the railway company to renew the agreement for a fixed period.

Reorganization Fails

Road Between Mexico and Santa Fe, Mo., Not Now in Operation, Likely to Be Junked

The directors of the Mexico Investment & Construction Company have rejected the proposal made to them on Jan. 26 for the reorganization of the company, which operated 16 miles of electric railway between Mexico and Santa Fe, Mo. It was planned to have new interests take stock in the company, and to elect a new personnel to include three of the former directors and then to make a new trial of operation of the road. The proposal was rejected by the present owners for the following reasons:

1. It takes care of only one-third of the debts now due to outside parties, payment of which is being urgently demanded.

2. It makes no provision for the \$30,000 advanced by the stockholders for building the extension from Molino to Santa Fe.

3. It is unreasonable that the owners of an \$80,000 investment should be called on to surrender control to unnamed parties who propose to furnish only \$5,000 of the capital.

It has been decided that in case the railroad is dismantled and the material sold all cash donated for the extension of the line from Molino to Santa Fe, whether legally collectible or not, be repaid in full, or at least in the same proportion that the stockholders are repaid, out of the proceeds of such sale.

Last November it was noted in the ELECTRIC RAILWAY JOURNAL that W. W. Botts, secretary and treasurer of the company, had issued a statement in which he said that the stockholders were "forced to the conclusion that unless the road should be wanted as a part of a through line from Hannibal to Mexico, the enterprise is a failure and ought to be abandoned."

Financing Policy Outlined

Chairman of Capital Issues Committee Says Encouraging Support is Being Received Throughout Country

The chairman of the capital issues committee of the Federal Reserve System, on Feb. 17 stated that the support received from all parts of the country was most encouraging. This committee was appointed to act upon voluntary application for permission to issue new or refunding securities.

In dealing with applications thus far submitted, the committee has adopted the policy that whenever the application involves the renewal of maturing obligations, such renewal should be favorably considered unless there are particular reasons to the contrary. A similar policy is being adopted in dealing with the funding of banking debt incurred prior to Feb. 1, 1918.

In dealing with bonds to be issued for the purpose of new road construction, the committee has been moved primarily by the consideration of whether or not these roads are of im-

portance either from a military or economic point of view and whether or not results, through the new construction, may be expected to be obtained approximately within the present year.

In passing favorably upon certain projects involving the production of electric power, the committee was guided by the fact that the amount involved was small as compared with the funds already hazarded in such undertakings, and by the fact that the power to be produced was required primarily for purposes connected directly with the successful prosecution of the war.

The advisory committee of the capital issues committee has been in close touch with all local committees established by the twelve Federal Reserve Banks, and all personal presentations of applications are being made to them.

Receivership Denial

Summary of Defense of United Railways, St. Louis, Mo., to Recent Application

The application for the appointment of receivers for the United Railways, St. Louis, Mo., has been denied. Judge Dyer of the United States District Court concluded that the defense was correct in its contention that the allegations contained in the application did not justify a receivership and showed no cause for action. These facts were noted briefly in the ELECTRIC RAILWAY JOURNAL for Feb. 16, page 338. The answer, filed by attorneys for the United Railways and others interested, maintained that the facts as outlined in the bill of complaint did not constitute a valid cause for action and that the United States District Court seemed to be without jurisdiction. Another allegation was that the complainant did not state who were the directors of the defendant company, nor that he ever appealed to the directors to give him redress for his alleged wrongs. Seven grounds on which dismissal of action was asked were as follows:

1. The bill of complaint does not state facts sufficient to constitute cause of action.

2. The United States Court appears to lack jurisdiction.

3. The bill of complaint is multifarious, and violates the equity rules, in that it does not assert that all the defendants are equally liable.

4. The bill combines alleged causes of action in equity with alleged causes at law.

5. The bill does not show that the plaintiff has complied with the rules of equity, in that he has not exhausted his rights within the corporation to correct his alleged wrongs; the bill does not show who the company's directors are, or that the plaintiff ever applied to the directors for redress, or that such an appeal, if made, would have been without result.

6. Plaintiff's right of action appears to have lapsed, if any such right existed.

7. The causes of action are barred by the statute of limitations.

Financial News Notes

Authorized to Junk Part of Line.—The Public Service Commission of Indiana on Feb. 15 authorized the holders of the bonds covering that part of the Gary & Interurban Railroad connecting Gary and Valparaiso to dismantle the property and to dispose of it as junk.

Sale Set for March 14.—The property of the Selma Street & Suburban Railway, Selma, Ala., will be sold on March 14 under foreclosure to satisfy a mortgage for \$125,000 said to have been executed to F. M. Abbott, J. Waters and D. L. Gerould, Warren, Pa.

Danbury & Bethel Street Railway, Danbury, Conn.—J. Moss Ives, receiver for the Danbury & Bethel Street Railway, has petitioned the Supreme Court for permission to borrow \$75,000 on receiver's certificates to liquidate outstanding obligations and provide for improvements, including new cars.

Several New Directors Elected.—At a recent meeting of the Philadelphia & Western Railway, Upper Darby, Pa. W. Barklie Henry, Edward F. Beale and Charles H. Bean were elected directors to fill vacancies caused by the death of Edward B. Smith and the resignations of G. R. Sheldon and G. T. Hollister.

Reserve Board Asked About B. R. T. Notes.—The Brooklyn (N. Y.) Rapid Transit Company has applied to the capital issues committee of the Federal Reserve Board with respect to the steps to be taken by it looking toward providing for its \$57,735,000 of secured 5 per cent notes, which mature on July 1.

New Officers for Fort Smith.—New officers have been elected for the Fort Smith-Oklahoma Light & Traction Company as follows: R. E. Ballard, formerly auditor of the company, president and general manager, to succeed W. J. Parker; George Sengel, Jr., formerly treasurer of the company, secretary, to succeed J. F. MacGilvray, and R. D. Beard, treasurer.

New Officers for Selma.—New officers have been elected for the Selma Street & Suburban Railway, Selma, Ala., as follows: Robert Wetheril, president, to succeed Joseph S. Keen, Jr.; W. H. Roth, secretary, to succeed H. B. Hodge, who has been appointed treasurer to succeed George M. Bunting, and A. H. Knean, general manager, to succeed James H. Dawes. The proposed foreclosure sale of the property is noted elsewhere in this column.

Directors Absolved.—The Court of Appeals at Albany, N. Y., on Feb. 5 affirmed the decision of the Appellate Division dismissing the suit brought against August Belmont. The decision in effect holds that Mr. Belmont and others did not enter into a conspiracy with the original directors of the Interborough Rapid Transit Com-

pany to issue \$1,250,000 of stock in order to divide the same among themselves.

Upset Price of \$1,700,000 Fixed.—The court has fixed \$1,700,000 as the upset price for the property of the Northern Electric Railway, Chico, Cal., at foreclosure sale. It is said that the question still remains of settling the matter of priority of certain bonds of the Chico Electric Company. A special master will be appointed by the court to conduct the sale as soon as the question of the rights of the holders of the securities of the Chico Electric Company has been passed upon.

Appeal of Abandonment Case Dismissed.—The Ohio Supreme Court has dismissed the case of the village of Bellbrook and citizens of Green County against the Dayton, Springfield & Xenia Railway. The case involved objections to the abandonment of the company's branch to Bellbrook, which the Public Utilities Commission approved some time ago. The ground for the dismissal was the fact that the objectors did not ask for a rehearing before the commission, as provided by law.

Preferred Stock Being Offered.—Thomas C. Perkins, Inc., Hartford, Conn., is offering at par, \$100, with a bonus of 20 per cent in common stock, a new issue of \$375,000 of 7 per cent cumulative preferred stock of the Southern New York Power & Railway Corporation, Cooperstown, N. Y., of which \$500,000 is authorized and issued. The common stock authorized and issued is \$774,900. The company has authorized an issue of \$5,000,000 of bonds, of which \$1,133,000 is outstanding at the present time.

Court to Confirm Dan Patch Sale.—It was announced that a court order would be issued on Feb. 23 by Judge Booth of the federal court confirming the sale of that portion of the line of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company extending from Auto Junction to the Luce line junction, to a committee representing the collateral note holders. The sale was made on Dec. 18 to C. T. Jaffray, A. B. Jackson and R. B. Marchant, the committee, at the upset price of \$100,000, with the privilege of dismantling and selling the physical property and right-of-way.

1917 Seattle Municipal Loss.—The Seattle Municipal Street Railway was operated during the fiscal year 1917 at a net loss to the city of \$34,958, according to the annual report of Superintendent of Public Utilities, A. L. Valentine. The report shows that the loss on Divi-

sion A was \$26,458 and on Division C \$8,480. Passenger revenue on Division A amounted to \$25,097, and the total revenue obtained from the line was \$28,081. The operating expense for the year was \$54,539, this including an item of \$19,125 as interest on the funded debt. Revenue on Division C amounted to \$24,521, and the operating expense totaled \$33,001.

Tax Tender Rejected.—The finance committee of the City Council of Seattle, Wash., recently recommended the rejection of the offer of the Puget Sound Traction, Light & Power Company to pay about \$74,000 of gross earnings tax for 1917 under the same conditions that a tender for 1916 was made one year ago. The offer to pay the amount was made by the company with the understanding that it would be returned in the event the company is successful in the litigation started to obtain relief from certain franchise obligations, including the payment of 2 per cent tax on gross earnings and the paving of rights-of-way.

Detroit Net Falls Off.—At the annual meeting of the Detroit (Mich.) United Railway the report for the year just ended was made public. The statement shows that gross earnings from operations for 1917 were \$17,427,940, an increase of \$1,391,270. The operating expenses, however, increased to \$13,259,791 in 1917 by an amount of \$2,043,988. Income from other sources increased from \$351,335 in 1916 to \$411,737 in 1917, making gross income \$4,579,886, compared with \$5,172,202 the preceding year. The net income was \$2,175,531 in 1917 and \$2,880,792 in 1916. R. W. Martin, of New York, was elected to the board of directors.

Little Rock Company Issues Notes.—The Interstate Trust & Banking Company, New Orleans, La., is offering at 97½ and interest to yield more than 7¼ per cent \$600,000 of two-year 6 per cent gold notes of the Little Rock Railway & Electric Company, Little Rock, Ark., dated Jan. 1, 1918, due Jan. 1, 1920. The notes are a direct obligation of the company issued to provide for the payment of \$400,000 of notes, which matured on Dec. 1, 1917, temporarily refinanced by banks, for extensions and equipment, and to provide for the contract with the government for light and power purposes at Camp Pike, about 10 miles from Little Rock.

Reprints of Bond and Tax Tables Ready.—First National Bank, Cleveland, Ohio, is distributing reprints of the tables on liberty bond and federal income tax data, prepared by C. H.

Hubbell, formerly auditor of receipts, Illinois Traction System, and mentioned on page 256 of the issue of this paper for Feb. 2. Upon request, the bank will mail copies to any address without charge. The bank also announces that if and when new issues of Liberty bonds are offered, the tables and statements will be revised to cover such new issues and copies of the revised circular will be mailed to a list made up of the names of those persons who may have asked to be supplied with copies of the original circular.

San Francisco Municipal Earnings Summarized.—The total receipts of the Municipal Railway, San Francisco, Cal., for the period from Dec. 28, 1912, to Dec. 31, 1917, were \$7,421,551. Of this total, the operating revenues were \$7,397,643. These figures are from a statement just issued by the bookkeeping department of the Board of Public Works. The disbursements during the period above mentioned amounted to \$5,567,354. After miscellaneous transfers of \$599,367 and reserve fund transfers of \$767,061 for depreciation and \$25,396 for injury insurance, there remained a surplus of \$462,371. Of this, \$144,279 is said to be available for future use, the remainder being intended for the completion of certain new construction. The depreciation fund at the end of 1917 contained \$547,643 of bonds and \$274,581 of cash, and the injury insurance fund had \$25,396 of cash.

Nashua Lease Rejected by Receiver.—John A. Fisher, president of the Nashua (N. H.) Street Railway, has been notified by Receiver Donham of the Bay State Street Railway that he will not adopt the lease of the Nashua Street Railway, but will turn the property back to its stockholders. In 1900 the Nashua Street Railway conveyed all its property to the Lowell & Suburban Street Railway under lease for ninety-nine years. The lessee agreed to pay as a rental all operating and general expenses, interest on debt and the present 3 per cent net semi-annual dividends. This lease has been owned by the Bay State Street Railway for some time, but on Jan. 1 that company defaulted in the payment of the dividend. In a statement to the stockholders, Mr. Fisher says that he has been informed by counsel that a receiver has the power to turn leased property back, but he is likewise informed that the company will have a claim for damages. He expects shortly to receive more definite information and will then call a special meeting of the stockholders for their consideration and action.

Electric Railway Monthly Earnings

**ATLANTIC SHORE RAILWAY, SANFORD, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '18	\$10,832	\$12,994	†\$2,162	\$484	†\$2,646
1 " " '17	22,902	23,974	†1,072	668	†1,740

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$586,540	*\$280,350	\$306,190	\$218,153	\$88,037
1 " " '16	550,125	*229,796	320,329	215,656	104,673
6 " " '17	3,159,044	*1,541,200	1,617,844	1,307,077	310,767
6 " " '16	2,947,133	*1,313,980	1,633,153	1,290,789	342,364

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1m., Jan., '18	\$2,468,899	\$1,574,727	\$894,172	\$813,677	\$80,495
1 " " '17	2,427,787	1,385,416	1,042,371	813,804	228,567
7 " " '18	17,499,357	10,391,914	7,107,443	5,681,042	1,426,401
7 " " '17	16,284,933	9,089,236	7,195,697	5,701,037	1,494,660

*Includes taxes. **On May 1, 1917, the Atlantic Shore Railway was divided east and west of York Beach, Maine, the western end passing to the operating control of the Portsmouth, Dover & York Street Railway. Figures for the first four months of 1917 are for the entire system. Beginning with May 1, figures for the Atlantic Shore Railway, as at present constituted, are given. †Deficit.

Traffic and Transportation

Portland Case to Court

Council Appeals to Circuit Court for Relief from Six-Cent Order of Oregon Commission

The complaint of the City Council of Portland, Ore., against the recent 6-cent fare order of the Public Service Commission to the Portland Railway, Light & Power Company has been filed in the Circuit Court. The first point in the complaint is based on the technicality that the State was not a party to the order of the commission setting aside the 5-cent fare. The second point sets forth that the people of Portland in 1913 enacted the commission charter, in which are minute provisions pertaining to the regulation of public service companies, including machinery for fixing the fares, and that the public service commission act exempts from the jurisdiction of the public service commission laws and regulations enacted by the voters in communities under the initiative. The third contention is that the commission order violates the constitution of the State and of the United States by impairing the obligations of the franchise contract. The fourth point contends that there was no allegation in the complaint of the railway and nothing in the proceedings in the case to show that the city's regulation of rates has become unreasonable. The fifth contention is that the order of the Public Service Commission violates the home rule amendment of the State Constitution. The complaint asks that the Circuit Court vacate and set aside the order of the commission.

ANOTHER APPRAISAL PROPOSED

The City Council has passed an ordinance providing for an immediate and independent appraisal of the property of the company used in the railway service, to determine the amount the company has invested and the return derived under the 6-cent fare. The sum of \$30,000 was appropriated to cover the cost of the appraisal. This will be the third appraisal of the company's properties. The first was made by engineers and accountants employed by the company. An appraisal by the State followed, in which the company's figures were cut down materially.

A signed statement has been issued by members of the committee representing the various civic organizations of the city protesting against the city's action in taking appeal from the ruling of the Public Service Commission. The members take the view that such an action will be futile. Instead of resorting to litigation, the committee proposes constructive relief.

Frank J. Miller, chairman of the Public Service Commission, in a recent statement, pointed out that the City

Council should bear in mind that the Council has two remedies of its own for the solution of the 6-cent fare problem, viz., the enactment of an ordinance fixing the fare for Portland and municipal ownership. He states that the law provides that "no ordinance or other municipal regulation shall be reviewed by the commission under the provisions of this section, which was, prior to such review, enacted by the initiative or which was, prior to such review, referred to and approved by the people of said municipality, or while a referendum thereon is pending."

Chairman Miller expressed the opinion that under the provisions of this section the city of Portland can pass an ordinance fixing fares within the city limits, thus removing the matter from the jurisdiction of the commission.

Fare Request in Kansas City

Kansas City Railways Seeks Increase in Fares to Meet Extraordinary Conditions

The Kansas City (Mo.) Railways has filed a petition with the Public Service Commission of Missouri asking a readjustment of fares. The company is not making a specific request for a 6-cent fare, but is pointing out the necessity for a larger income in order to maintain service at the desired standard.

The company's petition is divided into four sections. In the first it recites its ownership of the properties. In the second it reviews how the new franchise under which the company operates is of mutual advantage to the public, the city and the company. In the third it refers to the starting of the war and then takes up the burdens which that conflict has inflicted upon the company.

INCREASED EXPENSE OF \$1,300,000

In the third section the company says that for the year which will end on July 14, 1918, solely on account of extraordinary war conditions, there will be at present prices an additional expense to the company over the previous year of more than \$1,300,000. Of this increase \$400,000 will be accounted for in the advance in the price of coal. The company says that "at a fare limited to 5 cents it will be impossible so long as such extraordinary conditions obtain to give to the city and those interested the full advantages of the franchise provisions of an up-to-date electric railway in a rapidly growing community." It says that "the relief now sought is, therefore, temporary in nature, to continue only so long as the commission shall determine to be necessary to meet the present abnormal situation."

In the fourth section the company re-

fers to the clauses of the franchise that expressly provide for preserving the rights of the State, and then makes its plea as follows:

"To the end, therefore, that neither the company nor the public may be crippled by the said unforeseen and extraordinary increase in expense, an appeal is hereby made to the commission to make a reasonable increase in fares upon such conditions as may be fair and just in view of the changed conditions aforesaid, retaining control and supervision of any additional revenue collected, to the end that it shall be applied solely to the payment of the increased expense hereinbefore mentioned, necessary to be paid to render first-class service."

City of Trenton Answered

Trenton Company Places Blame On the City for Any Deficiencies in Its Service

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has filed an answer with the Board of Public Utility Commissioners of New Jersey to the application of the City Commission of Trenton, asking that the company be required to improve its system by making certain of the changes suggested in the recent report of Peter Witt.

The company states that there is very little the matter with the rolling stock, trackage and service furnished. It makes another appeal for the abolition of the six-for-a-quarter tickets in the city of Trenton.

OPPOSED TO ONE-MAN CARS

The recommendation of Mr. Witt that the company purchase fifty one-man cars is declared by the company to be impractical. The company contends that the type of car recommended requires greater time to load and unload, and that its seating capacity is only 70 per cent of that of the double-truck cars now in use. The company denied that cars are not kept in good repair. In its plea for relief from the six-for-a-quarter tickets the company points out that a straight 5-cent fare is the rate obtained by electric railways elsewhere in the State.

The city is cited as being responsible for doubling the taxes of the company and for securing the indictment of the directors for maintaining poles and lines of wires necessary for the operation of its property under franchises granted by predecessors of the City Commission. Other acts of the city are reviewed to show how the company has been hampered in giving the service which it hoped to give at the time it leased the local system and began the work of rehabilitation and improvement. The company says that to make the improvements asked for in the petition of the City Commission would cost more than \$800,000. It denies that the commission has power to direct the company to make the changes and improvements prayed for by the city.

Navy Yard Traffic Problem at League Island

Philadelphia Rapid Transit Company Beset by Conditions Beyond Its Power to Control

Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, assisted by Herbert G. Tulley, superintendent of transportation, and a corps of assistants, was at the terminus of the League Island Navy Yard, Philadelphia, on Feb. 12, at 6.15 p. m., when the greatest number of workmen leave the yard for their homes. Their purpose was to study at first hand the problem involved in transporting the 9000 workers. The cars arrive on two tracks, so that men taking one line all enter on one track and those going in another direction enter the cars on the other. On the evening of Feb. 12 the experiment was tried of having a conductor or extra fare collector at the rear door, which was opened as each car arrived, as well as the front doors, so that fares were collected at either end as the men entered. It is said that the double-end loading proved a success, and is to be permanently established during the rush hours.

Mr. Mitten stated very frankly to the newspapers that the problem involved is not entirely within the power of the company to correct. The company is handicapped greatly by delays to its cars caused by traffic on the streets and is also beset by the vicissitudes of securing delivery of materials from the manufacturers upon whom it depends for equipment and supplies. Mr. Mitten is reported to have said:

SOME OF THE COMPANY'S PROBLEMS

"The only help that the company can give is to see that the cars are operated upon a schedule that can be maintained. We do not object to criticism, but when every line in the country is affected by the bad weather, on top of our inability to get materials, so that we have 350 cars tied up in the car-houses, the company feels that it ought to have a chance. Mayor Smith has ordered that the police see that teamsters do not drag or delay cars, and I feel that the service this evening already shows the effect. When the weather was severe, teams could not turn out of the car tracks with ease, and this caused much trouble.

"We have had priority orders for equipment for months, but they do not help us to get materials. Ammunition is the priority order. We as a public service corporation are classed as 'B-3,' and there are classes ahead of us that claim priority orders. What I want the government to do, and will ask Admiral Peoples to get for us, is to order a plant making wheels, axles and other equipment for trolley cars, to fill our orders. Then we can put 350 cars back on the streets. They are now laid up for repairs.

"We got our wheels from the Midvale Steel Works, but the company dismantled its car-wheel plant and is making war materials. The Carnegie Steel Company has our order for axles and wheels. But we cannot get it filled

without an order from the government. We have been buying axles at a St. Louis plant, when we found that they had them, and they forward a few at a time by express, so as to hurry them, but we could only get a few. If we can get the materials we will have the men to put them on the cars."

As noted recently in the ELECTRIC RAILWAY JOURNAL, arrangements have been perfected by which 100 large cars are under construction for the railway at the works of the J. G. Brill Company in Philadelphia. This has been done through the instrumentality of the United States government, as the cars are to be used for Hog Island service.

I. T. S. Ad Campaign

600-Mile City and Interurban System Tells the Public About Its Problems

The Illinois Traction System, Peoria, Ill., is running in the various daily papers of towns and cities served by the companies that it controls a series of advertisements headed, "Our Problems Are the People's Problems." The company is showing how the increased costs of production and operation in all lines of business weigh especially heavily upon the utilities, inasmuch as

I. T. S. Fare Hearing

Report of Comptroller of Currency Quoted to Prove Need of Utilities for More Revenue

After an all-day session on Feb. 19 the hearing before the Public Service Commission of Illinois on the petition of the Illinois Traction Company, Peoria, for increased rates for city railway service as well as for electric lighting and gas service, was adjourned until March 5. Henry I. Green, attorney for the fourteen petitioning companies, presented exhibits consisting of financial statements taken from the monthly reports of the companies. He also reviewed increases in rates granted elsewhere with opinions of the various commissions.

The figures which were presented were compiled especially to avoid the necessity of an extensive investigation to determine the need for more revenue so that emergency relief could be obtained. The company said it faced ruin unless such relief were obtained. The annual report of the Comptroller of Currency, referred to in the ELECTRIC RAILWAY JOURNAL for Feb. 9, page 292, was cited to show that many utilities need immediate help. Evidence was introduced to show that materials used by utilities cost at present four times pre-war prices.

H. E. Chubbuck, vice-president executive of the company, testified to the effect of increased costs for supplies on operation and efficiency.

Our Problems Are The People's Problems

Introductory to a frank statement of fact from your street railway company

This company believes in the policy of informing the public of the facts and conditions concerning its operation.

Recent events of world-wide importance with which all of us are familiar have produced an abnormal condition in every avenue of trade and endeavor.

This is especially noticeable in the public utility industry, where remedies for existing extraordinary conditions have not been readily available as in other lines of trade.

The situation confronting the public utility companies in Illinois, and particularly in this immediate territory warrants the necessity of our present concern.

The prosperity and well-being of a city depends upon the success of its individual enterprises.

We believe the people of this community are interested in the problems of public service and the endeavors of its public utilities to solve these problems to the best interests of all.

With the thought in mind that OUR PROBLEMS ARE THE PEOPLE'S PROBLEMS we will in succeeding issues of this newspaper point out the effect of present day conditions upon one of your important industries.

Peoria Railway Company

they cannot increase their revenue without sanction from the regulatory bodies appointed by the state officials elected by the public direct. Two recent examples of advertising by the company along the lines just mentioned are reproduced herewith. These advertisements were published in the name of the Peoria Railway Company. Since the advertising campaign was started the company has carried its case for some of the properties to the commission, with the results noted elsewhere on this page.

Our Problems Are The People's Problems

The high cost of living is a serious matter for all of us

Time was when the "high cost of living" joke was a favorite theme for the cartoonist and professional jester. It seldom failed to produce a laugh from those of us who thought that somehow, sometime, things would change, the advancing cost of commodities would cease, the cost curve would start downward again and normal prices would be restored.

Then came the world war, with accompanying increase in demand for all commodities, congestion in all trade channels and resultant added increases in prices.

The high cost of living has ceased to be a joke. It is a serious matter. It is a serious matter for the housewife, for the merchant with whom she trades, for the wholesaler, the jobber, the manufacturer, and for everyone all along the line who has to do with making and distributing the things that enter into the daily life.

This era of high prices is a serious matter for your utility company. This is particularly true because to date there has not been afforded the advantage of protection from mounting costs that has been provided in other lines of business.

Today your street car company faces a problem more important than any it has ever had to contend with. This problem is not ours alone. It is likewise of vital importance to this community.

In succeeding articles we will show what the high cost of living is doing to this company.

Peoria Railway Company

Objectors urged against a blanket order and suggested that each company receive a separate hearing. Some, however, asked only that the present rates be resumed when conditions again became normal. To this the companies are willing to agree.

To avoid delay the commission will make a short investigation and if the proposed rates seem to be justified some measure of relief will probably be granted, such approval to be for a definite time and the commission to keep the case under its jurisdiction.

Appeal for More Revenue

Application Made to the Commission by the United Railways, St. Louis, for Fare Advance

The United Railways, St. Louis, Mo., has appealed to the Public Service Commission of Missouri for an increase in fares. Among the suggestions of the company are that it be permitted to curtail the present transfer privileges or charge for transfers. In a statement which he issued, Richard McCulloch, president and general manager of the company, reviewed the problems that confront the electric railways in war time and pointed out some of the measures of relief extended to companies elsewhere in the United States by the regulating bodies. In conclusion he said:

"At the present time a nickel will buy only one-fifth to one-half of what it would purchase in railway supplies two years ago. The history of the nickel car fare is virtually the same all over the country. The electric railways have constantly installed better cars, made faster and longer trips, and issued more and more transfers. In the old horse-car days companies made a profit on the 5-cent fare. At present not 10 per cent of the electric railways in the United States show a profit."

It is said that the commission will take no action in the matter until counsel for the company and the city authorities have agreed upon a date for a preliminary hearing on the application.

The city is expected to oppose the application of the company through City Counselor Daues.

More Service for Munition Workers

Co-operation of Federal Authorities With Electric Railways Reported in Several Cities

In at least four cities departments of the federal government have recently taken an active interest in the service of the local electric railways. This interest is based on the desire of the government to improve the service for workers in munition plants or other factories engaged on government work, and is in addition to one or two other instances reported earlier, as at the Fore River Ship Building plant with the Bay State Street Railway.

In Philadelphia arrangements have been perfected through the instrumentality of the United States government by which 100 large cars are under construction at the Philadelphia works of the Brill Company to be used by the Philadelphia Rapid Transit Company in its Hog Island service. This statement was made officially by President Mitten on Feb. 7. The details of the financing have not been made public. In the meantime, Rear Admiral Tappan, commandant of the Navy Yard, has asked the Mayor of the city to have the jitney ordinance rescinded so that jitney service may be restored along Broad Street to relieve the congestion at League Island.

Another city in which the government is interested through the needs of munition plant workers is Pittsburgh. According to the daily papers one or more conferences on the subject of more transportation in Pittsburgh have been held by federal officials, and Secretary of the Navy Daniels is reported to have declared to a committee representing the Pittsburgh Commercial Club at a meeting in Washington that if necessary the navy and war departments, acting jointly, would commandeer enough cars to give the service desired. Much of the complaint of inadequacy was made during the severe weather of the first week in February.

Another company with which the government is reported to have arranged for an increase in service is the Tri-City Railway & Light Company, Davenport, Ia., and East Moline, Ill., in connection particularly with concerns engaged on government contracts in the latter city. The additional service is said to have been arranged through the Housing Committee of the Ordnance Department.

In Buffalo a survey was recently made of the possibilities of additional service to some of the plants engaged in airplane construction. An account of this investigation, conducted by B. J. Arnold, was mentioned in the *ELECTRIC RAILWAY JOURNAL* for Feb. 2.

Agree on Beeler Stops

Washington Operation Shows 3 M.P.H. Improvement in Schedule Speed of Capital Traction Lines

Measures have already been taken at Washington to put into effect the recommendations in the second traffic report by John A. Beeler presented to the Public Utilities Commission on Feb. 7 and abstracted in the *ELECTRIC RAILWAY JOURNAL* for Feb. 16.

Raised platforms at stopping places of the Capital Traction Company's cars on New York Avenue near Fifteenth Street and on Pennsylvania Avenue near Fifteenth Street were in use successfully by Feb. 19, and it is expected that more will be installed soon along Pennsylvania Avenue between the Peace Monument and the Treasury. Service through the throat of the Capital Traction system already has improved since the first Beeler recommendations went into effect.

The Capital Traction Company is reported to have agreed to all of the skip-stops proposed in the second report, and the details were to be settled on Feb. 20 at a joint conference of the commission and the railway.

The change in operation at the throat was first tried out Sunday, Feb. 17, but the real test did not come until the following day. During non-rush hours cars moved over Fifteenth Street at 10 m.p.h., an improvement of about 3 m.p.h. During the rush-hour cars were loaded rapidly and sent away in pairs without the congestion that occurred when the cars stopped on Fifteenth Street just south of the Pennsylvania and New York Avenues junction.

Jurisdiction Argued

This Question Before Pennsylvania Commission in Cases Involving Six-Cent Fares

Representatives of municipalities and electric railways attended a hearing before the Public Service Commission of Pennsylvania at Harrisburg on Feb. 19 to hear arguments on the question of whether or not the commission has jurisdiction in connection with the applications of electric railways asking for 6-cent instead of 5-cent fares in cities and boroughs that granted franchise rights with the understanding that the fares were not to exceed 5 cents. While there were thirty-three complaints bearing on this question of municipal rights, the argument centered about the situation in Pittsburgh and adjoining boroughs.

CONTENDS BOARD IS WITHOUT JURISDICTION

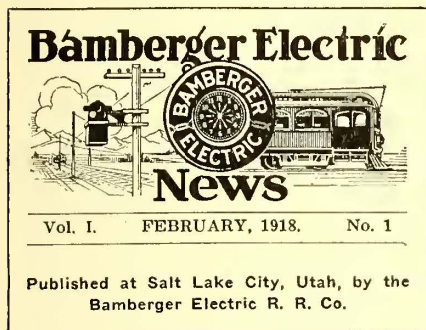
M. W. Acheson, Jr., Pittsburgh, who, with David L. Starr and Lee C. Beatty, solicitor of Allegheny County, represented the boroughs of Allegheny, was the principal speaker for them. He asserted that the commission had no jurisdiction, contending that the Constitution gave to municipalities the right to regulate rates of fares in granting franchises. He said that this right was vested neither in the Legislature nor the courts. Mr. Acheson said the Legislature, by the creation of a commission, could not abrogate that right and, if the right was conceded, the railways did not have authority to raise fares and violate the agreement they had made with a municipality. He argued that if such action was taken the violation of the municipal rights was a matter for the courts to decide.

CASE FOR THE COMPANIES

John C. Bane, representing the Pittsburgh Railways, spoke on the validity of the company's application for the right to increase fares in the Pittsburgh district to 6 cents. He argued two points in particular: Has the commission the right to approve the application and would the approval of the rates as asked be violation of the State Constitution? He said the contention of the complainants that the commission did not have the right to increase fares where municipal franchise agreements interpose was not founded in the law or Constitution and that such granting of a reasonable increase would not violate the Constitution. Asserting that the municipalities and companies have the right to make an agreement regarding rates, he said that conditions could so change that these rates would have to be changed to be reasonable and adequate. It was Mr. Bane's opinion that the commission had the right to fix reasonable and adequate rates, and that this meant not only that it could reduce rates, when they are found to be exorbitant, but that it could increase rates when it is found that rates in effect were so burdensome because of their lowness as to work a material hardship.

Another Company Publication

The Bamberger Electric Railroad, Salt Lake City, Utah, has established *Bamberger Electric News* to keep its patrons more closely in touch with the details of operation of the railroad, to call attention to changes of time-table, reduced rates and special service, and to help to spread the doctrine of safety. The company has asked the co-operation



MASTHEAD OF NEW PAPER

of its patrons and has requested them not to be too hasty in making complaints, though it says that constructive criticism is welcome at all times. The first issue of the new paper contains four pages. It is 3¼ in. wide by 9 in. high. The masthead, slightly reduced in size, is shown in the accompanying illustration.

Transportation News Notes

Skip Stop Extended in Syracuse.—Skip-stop operation is now in effect on three full lines of the New York State Railways, Syracuse lines.

Passenger Advance Suspended.—The Public Utilities Commission of Illinois has suspended the proposed advance in passenger rates of the Joliet & Eastern Traction Company. The commission permits the company to file a schedule of fares predicated upon a 2-cent-a-mile basis.

Experimental Jitney Service by Railway.—The Portland Railway, Light & Power Company, Portland, Ore., has re-established its jitney service between Oswego and Oregon City, and will give it another month's trial. If the line does not pay expenses the service will be definitely suspended.

Three Ohio Roads Ask for Increased Rates.—The following roads have asked permission to increase their schedules to a basis of 2½ cents a mile: Dayton, Springfield & Xenia Southern; Mansfield Public Utilities & Service Company, and the Interurban Railway & Terminal Company, to apply on the Cincinnati & Lebanon division.

New Rates on Ohio Electric Become Operative.—The new rate schedule of

the Ohio Electric Railway, Cincinnati, Ohio, formulated on a basis of 2½ cents per mile, went into effect on Feb. 1. Reductions in this rate were made by the Public Utilities Commission on a few short runs near Columbus, but through fares are all to be estimated on the new schedule.

2037 Women Employees in New York.—It was estimated on Feb. 15 that 984 women are working as guards and conductors on the transit lines in New York, 489 on the Brooklyn Rapid Transit cars, 470 on New York Railway lines, and twenty-five for the Hudson & Manhattan Railroad. Including five matrons, 1000 ticket agents and forty-eight car cleaners working for the Brooklyn Rapid Transit Company, New York traction lines employ 2037 women.

Rehearing Denied in Salt Lake Fare Case.—The Public Utility Commission of Utah has denied the petition of E. A. Walton for a rehearing in the case in which the commission recently authorized the Utah Light & Traction Company, Salt Lake City, Utah, to charge a straight 5-cent fare and make other charges in its tariffs. The finding and opinion of the commission in this case were reviewed in the ELECTRIC RAILWAY JOURNAL of Feb. 16, page 340.

New Auto Ordinance in Effect.—The jitney ordinance recently passed by the City Commission of Dallas, Tex., imposing restrictions on all automobiles, but aimed particularly at the jitneys, is now being rigidly enforced and as a result the number of jitneys in operation has been reduced by more than one-half. The jitney drivers have filed application for an injunction restraining the city in the enforcement of the ordinance, and the petition has been set for hearing.

New Rate for Ohio Line.—The Dayton, Covington & Piqua Traction Company, West Milton, Ohio, filed a new schedule of rates with the Public Utilities Commission of Ohio, calling for 2½ cents per mile, to take effect on Feb. 19. A hearing was set for Feb. 7. Thomas J. Brennan, general superintendent of the company, met with the commission. After going over the matter thoroughly as to operating expenses and the company's need of more revenue, the new schedule was allowed. It became effective on Feb. 19.

Interurban Seeks Fare Increase.—The Buffalo, Lockport & Rochester Railway, Rochester, N. Y., operating between Rochester and Buffalo and in the city of Rochester, has filed an application with the Public Service Commission for the Second District for permission to increase its rate of fare on commutation books from 1 to 1½ cents a mile on its interurban division, and from 5 to 6 cents within the city of Rochester. It is proposed to have the new schedules go into effect on March 1. No date for a hearing has been set by the commission.

Employment of Women a War Measure.—Richard McCulloch, president of the United Railways, St. Louis, Mo.,

issued a statement recently in which he declared it was not the intention of the company to replace men with women. Mr. McCulloch said the company had been employing every well-qualified man who applied, and had even advanced money for his pressing needs, allowing him to pay back in installments. He said no man had lost his place because of a woman and that none would, but that the employment of women was a war measure.

Fare Action Moving Slowly.—At Frankfort, Ky., the question of raising fares to 6 cents is proving an interesting problem. The Kentucky Traction & Terminal Company has asked the Council to amend its franchise so that a 6-cent fare may be charged. The Council has postponed taking action until the railway files a fuller report on the reason for taking such action. In the meantime the newspapers have been asking for expressions of opinions of the citizens relative to the increase. The Board of Commerce has been keeping out of the matter.

Joint Rates.—The Kansas City, Clay County & St. Joseph Railway (Missouri Short Line) and the Quincy, Omaha & Kansas City Railway (Steam) have adopted joint rates for the benefit of passengers who use both lines. The roads will place extra cars in service from Avondale, on the line of the Kansas City, Clay County & St. Joseph Railway, to Thirteenth and Walnut Streets, Kansas City, in order to relieve the congestion of passengers at the junction of the Kansas City, Clay County & St. Joseph Railway with the Quincy, Omaha & Kansas City Railroad.

Legislation to Help One-Man Cars.—On Feb. 4, 1917, the Board of Alderman of Salisbury, N. C., passed an ordinance requiring the North Carolina Public Service Company to require all colored passengers to leave the cars by the rear door. This ordinance was carried out until in the fall of 1917 the Public Service Company placed in operation its new light-weight safety cars. With this car it was impossible to live up to the ordinance as passed. As a consequence, representatives of the company, on Feb. 7, 1918, appeared before the board and asked that this ordinance be repealed. This was promptly done.

Women Meet the Test.—Col. Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, in discussing the problems of the company in the current issue of the *B. R. T. Monthly*, had this to say about the employees: "Our men have met this test. They have stood at their duty manfully. They have shown the grit that makes heroes. And our new women! Those who in this great emergency have volunteered to do men's duty! What praise shall we not give to them? Subjecting themselves to a public curiosity from which the feminine nature instinctively shrinks, enduring taunts and insults from society's ruffians, these plucky women have rendered a great public service and are proving their ability to fill a man's job."

Personal Mention

J. W. Lowrie has been appointed traffic manager of the Bamberger Electric Railroad, Salt Lake City, Utah.

W. M. Mills has been appointed auditor of the Glendale & Montrose Railway, Glendale, Cal., to succeed W. S. Easton.

W. L. McKinley has been elected president of the Monterey & Pacific Grove Railway, Monterey, Cal., to succeed Charles N. Black.

J. P. McKinney has been appointed master mechanic of the Durango Railway & Realty Company, Durango, Col., to succeed Thomas D. Wheeler.

E. E. Pateman has resigned as claim agent of the United Traction Company, Albany, N. Y., to enter the military service as a major of infantry.

N. L. Chase has been appointed chief engineer of the power station of the Bridgeport Division of the Connecticut Company to succeed W. H. Goodrich.

Eric Swanson has been appointed chief engineer of the power station of the Danbury & Bethel Street Railway, Danbury, Conn., to succeed O. J. Richmond.

Norman Macbeth has been appointed secretary, treasurer and general manager of the Glendale & Montrose Railway, Glendale, Cal., to succeed W. J. Bohon.

H. W. Fuller, of H. M. Byllesby & Company, Chicago, Ill., has been appointed vice-president in charge of operations of the Northern States Power Company, with headquarters at Minneapolis.

S. G. Shaw has been made supervisor of safety of the Denver (Col.) Tramway to succeed W. C. Swisher, resigned. Mr. Shaw has been connected with the legal department of the company for several years.

Charles B. Hill, Buffalo, has been nominated by Governor Whitman for appointment to the Public Service Commission of the Second District of New York to succeed Chairman Seymour Van Santvoord, resigned.

C. B. Hudson, formerly superintendent of the power plant of the Ithaca (N. Y.) Traction Corporation, has become connected with the Strathmore Paper Company in charge of its power plant at Woronoco, Mass.

George Merriam, heretofore supervisor of service of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., has been appointed superintendent of the Waukegan North Chicago division of that road.

W. R. Lyon, secretary and auditor of the Los Angeles & San Diego Beach Railway, San Diego, Cal., has also been appointed vice-president, purchasing agent and chief engineer of the company to succeed W. J. Gough.

A. M. Linn, one of the officers of the American Water Works Company, the holding company controlling the West Penn Power Company, Pittsburgh, Pa., has been elected president of the latter company to succeed Samuel Insull, Chicago, resigned.

W. J. Parker, formerly purchasing agent of the Fort Smith Light & Traction Company, Fort Smith, Ark., is now connected with the City National Bank, Fort Smith, as assistant cashier. Mr. Parker was in the employ of the local railway and light company for eighteen years.

Alfred C. Jordan, for two years commercial manager for the Cumberland County Power & Light Company, Portland, Me., has been appointed superintendent of its electric railway, succeeding G. Sabin Brush, resigned. Mr. Jordan was born in Casco, Maine, thirty-nine years ago. He attended the Deering schools and was graduated from



A. C. JORDAN

Deering High. He then attended the University of Maine, from which he was graduated in 1904. Mr. Jordan then entered the service of the Westinghouse Company at Pittsburgh, Pa., with which company he remained seven years. He next became connected with the Elmira Water, Light & Railroad Company, Elmira, N. Y. Mr. Jordan entered the service of the Cumberland County Power & Light Company, Portland, in 1915, on the power end of the commercial department, and in March, 1917, took up the duties of commercial manager, succeeding George T. Fisher, resigned.

Harley L. Swift, assistant engineer of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been commissioned first lieutenant in the Sixteenth Regiment of Engineers (Railway) United States Army. Mr. Swift has been in France since August, constructing railroads, warehouses, hospitals, shops, etc.

A. Swartz, as assistant manager of the railway department of the Toledo Railways & Light Company, the Toledo, Ottawa Beach & Northern Railways & Light Company and the Maumee Valley Railways & Light Company, Toledo, Ohio, has been charged with direct supervision over operation, instruction and schedules. This will be in addition to Mr. Swartz's present work as vice-president of the Toledo & Western Railroad.

Harry L. Brown, formerly western editorial representative of the *ELECTRIC RAILWAY JOURNAL*, with headquarters at Chicago, who recently accepted a temporary appointment as radio engineer in the office of the Chief Signal Officer, United States Army, Radio Division, Washington, has been commissioned a first lieutenant in the aviation section of the Signal Reserve Corps and has been assigned to duty in the training section of the land division, office of the chief signal officer.

V. F. Fabian, for nearly three years superintendent of transportation of the Springfield (Mass.) Street Railway, has resigned. Mr. Fabian has been in the employ of the Springfield system for about eight years. He was superintendent of the Westfield division of the company from 1912 to 1915. Before that he was engaged in office, traffic and power plant work with the New England Investment & Security Company's interests and earlier was engaged in steam railroad service in the West. Mr. Fabian's resignation takes effect on March 1. He has not yet announced his future plans.

G. Sabin Brush, superintendent of the railway department of the Cumberland County Power & Light Company, Portland, Me., since 1915, has been appointed superintendent of transportation of the Springfield (Mass.) Street Railway, succeeding V. F. Fabian, resigned. Mr. Brush's previous experience, following an engineering course at the Massachusetts Institute of Technology, includes varied service in the transportation departments of the Middlesex & Boston Street Railway and the Boston Elevated Railway. At Portland he has had direct charge of the operation of about 107 miles of city and suburban trackage and also has been instrumental in the development of rebuilt and new rolling stock, installation of signals and other equipment which have put the service of the property on a very high plane. Mr. Brush has been actively identified with the Cumberland County company section of the American Electric Railway Association and is one of the best regarded of the younger operating executives in New England electric railway circles. A biographical sketch and a portrait of Mr. Brush were published in the *ELECTRIC RAILWAY JOURNAL* of Dec. 11, 1915, page 1193.

P. T. Philips, who has been superintendent of distribution of the Little Rock Railway & Electric Company, Little Rock, Ark., has been appointed general superintendent of both the electric and heat departments and will have

full authority over power-house operation. This appointment is incidental to the merging of the heating business with the other departments in the course of which Commercial Manager Smith takes over the commercial affairs of the heating department, and W. J. Tharp, secretary and auditor, will handle the auditing and statistical records of the company.

W. C. Austin, auditor of the Eastern Pennsylvania Railways, Pottsville, Pa., has been elected assistant secretary and assistant treasurer of that company. In 1917 Mr. Austin was transferred from the staff of traveling auditors of the J. G. White Management Corporation, New York, N. Y., to the accounting department of the Eastern Pennsylvania Railways, which is being operated by the management corporation. For a number of years Mr. Austin was treasurer and auditor of the Otsego & Herkimer Railroad, now the Southern New York Power & Railway Corporation, Cooperstown, N. Y.

L. A. Pettit, Jr., who has been associated with the Albert Emanuel Company, Dayton, Ohio, for the last nine years as general manager of this property and also as an officer of the companies controlled by it, including the Kansas Electric Utilities Company, has severed active connection with the company to engage in the business of controlling and managing public utility properties. Mr. Pettit will remain a director in companies operated by the Albert Emanuel Company. Mr. Pettit also intends to engage in consulting engineering work on utility rates, developments, reports, etc.

William F. Bellmer, who was connected with the Eastern Wisconsin Railway & Light Company at Fond du Lac, Wis., and its successor, the Eastern Wisconsin Electric Company, for eighteen years, has become assistant general manager of the Evanston (Ill.) Railway. Mr. Bellmer was reared on a farm in the town of Friendship, Fond du Lac County, Wis. In June, 1900, he entered the employ of the Fond du Lac Street Railway & Light Company, a successor of the present company in that city, as a trainman, and served in that capacity and as lineman helper, repair man, dispatcher on interurban and city lines, and at the time of his resignation to go with the Evanston Railway he had charge of the roadway and track, the repair shops and the trainmen.

Arthur A. Ballantine of the law firm of Goodwin, Proctor & Ballantine, Boston, Mass., and for many years prominent in electric railway rate and arbitration cases in Massachusetts, has been nominated solicitor of internal revenue by President Wilson. Mr. Ballantine has been serving upon the legal advisory board of the Treasury Department and will continue this work. Mr. Ballantine is thirty-four years of age. He was educated at Harvard College and at the Harvard Law School. He has been closely identified with the movement for increased fares on the Middlesex & Boston Street Railway from the begin-

ning of this work, and has represented electric railway interests in a number of wages arbitration proceedings. In his new service he will make his headquarters in Washington.

H. S. Newton, whose appointment as manager of railways of the Monongahela Valley Traction Company, Fairmont, W. Va., was noted briefly in the *ELECTRIC RAILWAY JOURNAL* for Feb. 16, has been general manager of the Ohio Valley Electric Railway, Huntington, W. Va., since March, 1915. Previous to that he was general manager of the Mesaba Railway, Virginia, Minn., and before that was general manager of the Hartford & Springfield Street Railway, Warehouse Point, Conn., for nine years. Mr. Newton was graduated from the Ohio State University as an electrical engineer. His first commercial work was with the General Electric Company in its Lynn shops. Later he was transferred to the Thomson-Houston Company at Cincinnati and supervised the installation of apparatus on properties throughout the Central West. Mr. Newton next became electrical engineer for the Wheeling (W. Va.) Railway. He left Wheeling to accept the position of electrical engineer for the Syracuse (N. Y.) Street Rail-



H. S. NEWTON

way. He afterward assumed the same duties for the Syracuse Consolidated Street Railway, and finally was employed in the same capacity with the consolidated company, the Syracuse Rapid Transit Railway. He remained at Syracuse six years and combined for a part of the time the office of superintendent of transportation with his engineering duties. Mr. Newton was appointed general manager and chief engineer of the Syracuse, Lakeside & Baldwinsville Railroad when the road was projected, and remained with the company in the capacities named during its construction and for the first two years of its operation. Mr. Newton next became general manager of the Beaver Valley Traction Company, which consolidated four small roads near Pittsburgh. After leaving the Beaver Valley Traction Company Mr. Newton was placed in charge of the Hartford & Springfield Street Rail-

Obituary

W. F. Dillon, president of the Shreveport (La.) Traction Company, is dead. His body was recovered from Caddo Lake near Shreveport on Feb. 8. Mr. Dillon left Shreveport on Jan. 10 for a hunt on Caddo Lake. When he failed to return it was thought that he had been drowned in the lake and persistent search was finally rewarded by the finding of his body. The supposition is that Mr. Dillon was caught in a blizzard in a light boat and drowned when the boat was overturned.

Henry H. Hodell, president of the Cleveland Galvanizing Works Company and the Van Dorn & Dutton Company and a director of the Van Dorn Electric Tool Company and the Equity Savings & Loan Company, Cleveland, Ohio, is dead. Mr. Hodell was born sixty-eight years ago in Alsace-Lorraine, France. He became a pattern maker and in the early eighties went into the custom galvanizing business for himself. He was one of the pioneers in the weldless wire chain business, and helped to found the Van Dorn & Dutton Company and the Van Dorn Electric Tool Company, Cleveland, Ohio.

Porter Norton, a director of the International Railway, Buffalo, N. Y., and a member of the law firm of Norton, Penney, Nye & Brown, counsel for the company, died on Feb. 2. Mr. Norton was sixty-five years old. Soon after being admitted to the bar in 1875 he became associated with Henry W. Box, attorney for the Buffalo Street Railway. He married the daughter of the late S. V. R. Watson, founder of the horse railway in Buffalo, which has developed into the International Railway. Mr. Norton was also a director of the Crosstown Street Railway, now a part of the International Railway, and was a director of the Frontier Electric Railway, under construction, between Buffalo and Niagara Falls.

Augustine W. Wright died on Feb. 3 in Los Angeles, Cal., at the age of seventy-one. Mr. Wright was consulting engineer in connection with the building of the first city railroad in New York and in the early seventies he helped to design the cable railway established in Chicago by the late Charles T. Yerkes, and was chief engineer for this system for a number of years. In 1889 and 1890 he helped to build the first cable railway in Los Angeles. In his early twenties Mr. Wright had charge of much of the construction of the Union Pacific Railway across the plains of Kansas, Nebraska and Colorado. Later he was for five years chief engineer of the Northern Pacific Railway. Mr. Wright retired from active railroad work in 1890 and went to California. At the time of his death he was a member of the Los Angeles Board of Public Utilities.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Recent Incorporations

Alabama Interurban Corporation, Birmingham, Ala.—The Alabama Interurban Corporation, which was previously reported as having been incorporated, has been incorporated under the laws of Delaware to build its proposed line from Birmingham to the Warrior River. It is planned to construct only 17 miles of line, entrance to Birmingham to be over an existing road. Capital stock, \$5,000,000, half common and half preferred. Incorporators: Thomas L. Cannon, president; Job Going, H. M. Cassman, Roy McCullough and O. P. Board, all of Birmingham, and James Tracy Hill, New York. [Dec. 8, '17.]

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—Incorporated to operate the electric railway line between Lewisburg and Ronceverte. Capital stock, \$50,000. Incorporators: J. J. Echols, J. W. Dwyer, J. B. Laing, H. B. Laing, H. B. Moore, E. L. Bell, H. F. Hunter, R. M. Bell and S. P. Preston, all of Lewisburg.

Franchises

Marion, Ohio.—The Columbus, Delaware & Marion Electric Company, the successor to the Columbus, Delaware & Marion Railway, has asked the City Council for a twenty-five year franchise in Marion.

Track and Roadway

Birmingham Railway, Light & Power Company, Birmingham, Ala.—A new line will be built by the Birmingham Railway, Light & Power Company linking the South Bessemer line at Vinesville with the Tidewater and South Ensley lines at Fairfield.

Little Rock Railway & Electric Company, Little Rock, Ark.—Work will be begun at once by the Little Rock Railway & Electric Company on the double-tracking of its Pulaski Heights line and the extension of the line to St. Mary's Convent. The company will also extend its East Ninth Street line from Ninth Street north on Thomas Street to Sixth Street, and thence east to the Weil packing plant.

***Okanagan Lake, B. C.**—It is reported that an electric railway will be

built from Okanagan Lake to Oroville in connection with the development of the West Kootenay Power & Light Company in the Copper Mountain district.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway has acquired all rights-of-way and has asked the Railway Commission of California for permission to extend its line from Glendora to San Dimas, about 9 miles.

Municipal Railway, San Francisco, Cal.—Construction of outer tracks for the Municipal Railway on Market Street from Van Ness Avenue to Third Street will soon be under way. The contract was awarded on Feb. 6 to the Western Construction Company for \$130,808, with a bonus of \$7,000 for completion within 120 days. The contractors signed an agreement not to make a claim for breach of contract against the city within that period should the work be delayed by the non-arrival of special track work from Eastern mills. When this work is completed the Municipal Railway will have a line the entire length of Market Street extending from beyond the Twin Peaks Tunnel to the ferry.

City & Suburban Railway, Brunswick, Ga.—It is reported that the City & Suburban Railway will begin immediately the construction of an extension to several industrial plants.

Macon Railway & Light Company, Macon, Ga.—This company will extend the tracks of its Bellevue car line, now terminating at Broadway and Cherry Streets, to the terminal station as soon as the weather permits.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—Street cars are now operating on the Tannery Spur, Waukegan, Ill. The cars are able to run from the corner of Washington and Genesee Streets to the hospital, thence north on North Avenue, thence east on Glen Flora Avenue to Sheridan Road. For the present the tracks will not be extended east of Sheridan Road, at least not until the work of opening up Glen Flora Avenue extension has been completed.

Evansville, Suburban & Newburgh Railway, Evansville, Ind.—Members of the United Mine Workers of America in southwestern Indiana coal fields have petitioned the Public Service Commission of Indiana to supply adequate service between Evansville and Boonville.

Hutchinson (Kan.) Interurban Railway.—This company reports that it will build $\frac{3}{4}$ mile of new track this year.

***Middlesboro, Ky.**—The business men and coal operators of Middlesboro have taken up plans for operating an electric railway, it being planned to extend the lines to the principal mines in order

to carry the hundreds of workmen who are now employed in the mines, which are busy the year around. A mass meeting of business men and mine operators was held on Feb. 11, and the following committee was appointed to devise ways and means: J. M. Rogan, chairman; E. S. Helburn, William Walbrecht, E. G. Sheaffer and others.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—Plans have been prepared by this company for an extension of its terminals on Pratt Street, Baltimore.

Boston, Mass.—The Boston Transit Commission has recommended in a letter to the Legislature that a downtown subway loop be constructed, with stations on its circumference, to relieve the present congestion of traffic. It advises this instead of a single terminus to the Boylston Street subway as contemplated by the act of 1911, or a double or forked terminal, as it recommended in its report in May, 1914. While it does not propose a route, it offers as an illustration the extension of the Boylston Street subway through Boylston and Essex Streets to the vicinity of the South Station, there passing under or over the Dorchester tunnel; under Federal Street to Post Office Square; under Water and School Streets to Tremont Street, and then under the present Tremont Street subway to Boylston Street.

Boston (Mass.) Elevated Railway.—Tracks for the extension of the Boston Elevated Railway from Summer Street Extension to the South Boston Fish Pier and the 200-ft. freight shed for use by electric freight and express cars of the Boston & Worcester Street Railway and the Bay State Street Railway, have been completed, and it was expected that cars would be operated on the new line by Feb. 16. The line was built by the state and will be leased to the Boston Elevated Railway for operation.

Butte (Mont.) Electric Railway.—Plans are being considered by the Butte Electric Railway for the construction of double-track on Main Street from Galena to Quartz Street and a single track east on Quartz Street to intersect with the present Centerville line.

Public Service Railway, Newark, N. J.—Operation has been suspended by the Public Service Railway on its line from the Lackawanna Station to Hamburg Place and Gotthardt Street owing to the lack of patronage.

Union Railway, New York, N. Y.—Application has been made to the Bronx Borough authorities and the Department of Parks of New York City by the Union Railway, controlled by the Third Avenue Railway, for permission to extend the track facilities at Van Cortlandt Park and 242d Street. Plans have been made, awaiting the sanction of the authorities, by which it is hoped to relieve the great congestion at the subway. The company has in view the lengthening of the siding at the Van Cortlandt terminus by means of a

double cross-over to the Spuyten Duyvil Parkway as well as the erection of a shelter over the siding at the foot of the subway.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—It is reported that the construction of an extension on Atlantic Avenue and North Liberty Street, Newcastle, is being contemplated by the Mahoning & Shenango Railway & Light Company.

***Tulsa, Okla.**—It is reported that plans will be prepared this year by the Chamber of Commerce of Tulsa for the construction of a line from Tulsa north-eastward to Oologah, about 25 miles. Clarence B. Douglas, secretary.

Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont.—It is reported that it is proposed to utilize hydroelectric power on the Chatham-Wallaceburg section of the Chatham, Wallaceburg & Lake Erie Railway. Owing to coal shortage the company has been unable to generate sufficient power at its own plant to keep the line going.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.—It is reported that the City Council of Windsor plans to construct a crosstown line on Erie Street, Windsor, and will rent it to the Windsor, Essex & Lake Shore Rapid Railway for operation.

Ottawa (Ont.) Electric Railway.—A special committee of the Ottawa City Council will take up with officers of the Ottawa Electric Railway the question of an extension of the company's line to Ottawa East.

Dallas (Tex.) Railway.—The first step toward the expenditure of \$1,000,000 for improvements by the Dallas Railway began on Feb. 10 with the work of double-tracking the Columbia Avenue line from Collett to Beacon Street. Rails for this work arrived some time ago. Richard Meriwether, general superintendent, said the work would cost about \$76,000. Other improvements outlined by the company in its statement recently approved by the supervisor of public utilities and by the City Commission will be carried out as rapidly as possible, Mr. Meriwether said. The company is also improving the Oak Cliff lines. New trolley wire is being strung the entire length of Jefferson Avenue at a cost of \$13,000, and the tracks are being overhauled and new ballasting placed where needed. Other improvements in the traction lines to be carried out as soon as material arrives are the double-tracking of Colonial Avenue from Cooper Street, where the double track now stops, to the city limits, and building of the Second Avenue line from Parry Avenue to the city limits.

Eastern Texas Traction Company, Dallas, Tex.—Fire of undetermined origin destroyed 10,000 ties with an approximate value of \$20,000, the property of the Eastern Texas Traction Company at Garland, Tex. The ties had been cut and were stacked over a space about the size of a city block for seasoning.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.—J. N. Shannahan, general manager of the Newport News & Hampton Railway, Gas & Electric Company, is reported as having stated that its line will be extended north of the city to the point recently purchased as a site for \$1,200,000 worth of homes for shipyard employees only on condition that the government provide the funds to finance the extension.

Seattle (Wash.) Municipal Railway.—The extension of the Seattle Municipal Railway into Ballard was opened on Jan. 27.

Tacoma (Wash.) Municipal Railway.—An ordinance has been introduced in the City Council authorizing \$25,000 to be transferred to the light and water reserve fund to pay for the double-tracking of certain places on the municipal car line. C. D. Atkins, head of the public works department, asked that the plans for the improvement of the car lines be approved by the City Council before the final passage of the ordinance.

Monongahela Valley Traction Company, Fairmont, W. Va.—The board of directors of the Monongahela Valley Traction Company has approved the issue of \$3,000,000 of one-year notes, the proceeds to be used for improvements, including a considerable amount of new construction work.

Chops and Buildings

Kansas City, Mo.—A certified check for \$10,000 has been filed with Eugene E. Blake, city comptroller, by the Interurban Central Station Company as evidence of good faith that the new interurban station will be built. The company has until March 8 to file a bond of \$50,000 to be approved by the city comptroller, when it can withdraw its check. The new station will be built on McGee Street, between Ninth and Tenth Streets.

Toronto & York Radial Railway, Toronto, Ont.—The Metropolitan division carhouse of the Toronto & York Radial Railway, together with six interurban cars, was destroyed by fire on Feb. 5.

Philadelphia, Pa.—Bids were opened on Feb. 14 by the Department of City Transit of Philadelphia for contract No. 541 covering plumbing installations in station buildings at Torresdale Avenue and Tioga Street and contract No. 542, covering electric installations in the same buildings. The low bidder for contract No. 541 was Walters, Purks & Mellon, Philadelphia, at \$4,508, and for contract No. 542, Keller-Pike Company, Philadelphia, at \$4,220.

Charleston-Dunbar Traction Company, Charleston, W. Va.—Plans are being made by the Charleston-Dunbar Traction Company to construct a terminal station on Kanawha Street, Charleston.

Power Houses and Substations

Tri-City Railway & Light Company, Davenport, Ia.—Announcement has been made by this company that a new feeder cable of 750,000 circ. mils capacity is being installed in Davenport to meet new requirements of the downtown circuit.

Ottumwa Railway & Light Company, Ottumwa, Ia.—A new 1250-kw. turbine has been completed and placed in operation by the Ottumwa Railway & Light Company. Included with this improvement is a new intake from the river, settling tanks, condensing equipment, boiler feed pumps, water softener and service pumps. The enlargement of the company's station capacity was necessary to supply energy for the increasing business of the company, including Fairfield and other communities in that vicinity.

Cincinnati (Ohio) Traction Company.—Walter A. Draper, vice-president of the Cincinnati Traction Company, has informed Mayor Galvin of Cincinnati that the extension of the North Norwood track to Kennedy Heights and Pleasant Ridge will necessitate the construction of an additional power house at a cost of \$70,000 or \$75,000. Residents of those places had sent a petition to the City Council asking for the extension. Street Railway Director W. C. Culkins will look into the matter further before a final decision is made.

Lake Shore Electric Railway, Cleveland, Ohio.—The power plant at Ballville recently taken over by the Lake Shore Electric Railway will be enlarged and improved.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Improvements, including the purchase of new cars and electric equipment to be used in its power plant, will be made by the Columbus Railway, Power & Light Company. The cost is estimated at about \$175,000.

Harrisburg (Pa.) Railways.—Plans are being made by the Harrisburg Railways for the immediate installation of three large new transformers in its substation to provide for the utilization of power from its York Haven plant through the plant of the Harrisburg Light & Power Company. It is planned to use the current from the substation for the operation of the Second, Third and Fourth Street traction lines.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—Plans have been completed by the Puget Sound Traction, Light & Power Company for the superstructure of its present coal-pulverizing plant, adjoining the power station on Western Avenue and Seneca Street, to cost about \$75,000.

Monongahela Valley Traction Company, Fairmont, W. Va.—It is reported that the Monongahela Valley Traction Company has under construction a new power plant at Rivesville.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Considerations in Government Work

Localities in Which Orders Will Not Be Placed and Effect of Other Government Orders

In the matter of placing contracts for goods for government use, the General Engineering Depot, Washington, D. C., in asking for bids is requiring of bidders, "because of the known shortage of power in certain manufacturing districts and in order to conserve this power for the rapid completion of government contracts already under way," to state on demand the localities from which the materials entering into the manufactured articles are obtained. The purchasing officer in this way reserves the right in making awards to discriminate against those bidders who are dependent for their materials upon the manufacturers in congested districts.

In addition, in order that there may be no congestion in factories and that there may be more equitable distribution of goods, bidders are required to state in writing upon the request of the purchasing officer, after proposals are opened, the total money value of uncompleted orders placed with them by the United States and the allied governments. In addition, bidders must also state at that time the class and number of principal and subsidiary priority orders which may have been issued on their manufactured goods affecting directly or indirectly articles upon which they are bidding.

Larger Sales of Self-Truing Brakeshoes

Manufacturers at Present Suffering from Freight Embargo—Increased Sales Due to Enforced Economies

The sale of self-truing brakeshoes was greater in 1917 than ever before. Prices of metal used in the manufacture thereof kept increasing and some trouble was had in getting deliveries from the foundries, but on the whole it was possible to keep customers pretty well supplied. During the year prices were increased slightly. At present the manufacturers are suffering from the embargoes on freight.

The 1917 increased sales seems to be a direct result of the enforced economies which electric railways have had to practice. In many instances it is known that worn and discarded wheels have been salvaged from the scrap pile and pressed into service. Through the use of wheel-truing brakeshoes this can be done in many instances safely and

economically. Then, too, these brakeshoes are used to advantage, when wheels are scarce, as they do the work while the car is in service, thus helping to reduce the non-earning period of a car to a minimum.

Brill Sales Rise 25 per Cent

War Conditions, However, Reduced Equipment Demand and Also Made Its Manufacture Difficult.

The sales value of the combined output of all the plants of the J. G. Brill Company, Philadelphia, Pa., amounted to \$7,706,099 for the calendar year 1917 as compared to \$6,180,895 in 1916 and \$4,403,116 in 1915. The increase for the last year was \$1,525,204 or almost 25 per cent, this comparing with a gain of \$1,777,779 or 40 per cent in 1916. The record of sales since 1907 follows:

1907.....	\$9,211,825	1913.....	\$9,154,433
1908.....	3,845,173	1914.....	4,903,510
1909.....	4,261,204	1915.....	4,403,116
1910.....	5,960,778	1916.....	6,180,895
1911.....	5,870,907	1917.....	7,706,099
1912.....	7,842,090		

The combined result of operation in 1917 was a profit of \$994,189, after deducting \$494,227 for depreciation and the cost of all maintenance and repairs for the year. From this profit there was set aside as a reserve for all federal taxes the sum of \$90,000, leaving a net profit of \$904,189. After further reserving \$100,000 for extraordinary depreciation of special machinery and equipment which may not be absorbed by future profits, and after paying dividends of \$183,200, the total net surplus as of Dec. 31, 1917, amounted to \$1,744,546.

At the beginning of the year, the report states, the management hoped for a continuation of the then existing demand for electric railway equipment. The war conditions of 1917, however, greatly reduced the demand for such equipment and also rendered the manufacture, except from materials on hand, extremely difficult. This was largely due to the inability to obtain raw materials or their transportation for other than government work.

The materials, raw and in process, showed the following totals at the close of recent years: 1914, \$1,516,787; 1915, \$1,739,319; 1916, \$2,242,563; 1917, \$4,234,705. The combined work on hand as of Feb. 6, 1918, amounted to an estimated total in excess of \$20,000,000 including the order for aeroplanes, in which the company is jointly interested with J. G. White & Company, Inc. These two companies organized the Springfield Aircraft Corporation for the manufacture of aeroplanes at the Wasson plant of the Brill company.

Railway Traffic Increased by Shipbuilding Activity

Sudden Demand for Rolling Stock and Slower Deliveries Feature Pacific Coast Trade Conditions

Shipbuilding activity, which has been a factor in transportation problems in all Pacific Coast cities, has increased suddenly and extensively in the northwest since the new year, and new traffic problems are being faced. Portland and Puget Sound have been affected by the increase of shipbuilding activity much more than other points along the coast, but in these cities the problem of handling large rush-hour crowds has become serious. In Tacoma, Seattle, Everett and Bellingham one-man cars have been put in service as rapidly as received in order that equipment of larger capacity could be released for handling shipbuilding crews. Moreover, cars that had been retired from active service have been brought out and repaired for the emergency demands and second-hand cars have been bought wherever this was feasible. Incidentally, the price of second-hand rolling stock has been very materially increased by this demand. The increased activity at the shipyards has come without warning, and there has been no opportunity for the company to secure new equipment under present delayed delivery conditions, even if financial conditions were such as to permit of such a solution.

It is notable that the increase to a 6-cent fare in Portland has caused no confusion or decrease in traffic. The Portland traction company has also pressed old rolling stock into service in order to accommodate the recent traffic increases. Not a little adverse comment has been occasioned by the failure to complete the four-mile stretch of track which would give the cantonment at American Lake electric railway service to Tacoma and Seattle. This cantonment, the largest yet built by the government, and which was planned for 48,000 troops, is still being served only by steam lines and automobile buses. The latter convey practically all of the local traffic and it is necessary to stand in line and sometimes wait long periods before securing accommodation, particularly since the ban on Seattle has been lifted so that large numbers of troops regularly visit that city.

A new angle of the situation on the coast is the question of securing federal aid in financing the need for additional rolling stock to take care of war industries. In the case of the steam roads the government has materially relieved conditions by loaning or inter-

changing equipment where necessary, and it is believed that even though this may not be feasible in just the same way in the case of electric railways, yet the local service which they are rendering is equally important in its way and must not be curtailed. It is suggested that if some plan can be worked out whereby the government will lend its support financially in the securing of such equipment as is urgently needed for emergency traffic requirements, not only would the railways be able to give service that would otherwise be impossible but priority orders could probably be secured to facilitate the prompt delivery of needed equipment.

Deliveries on electric railway supplies and equipment may be said to be worse than they have ever before been on the Pacific Coast. Not only is the delay in transit unusually long, but it is reported that since the government has taken over the direction of transcontinental lines it has been very difficult to

secure information about freight shipments while in transit. No satisfactory explanation of why this condition should obtain has been given except that there is no longer the incentive to the accommodation of shippers which formerly existed.

Practically no important changes in prices have occurred in recent weeks, although there is a tendency to increase all along the line. The rolling stock of nearly all companies seems to be taxed to the limit. The limiting factor on the delivery of new cars at present is the delay in securing car bodies, about one year being the best that can be quoted. Motors and, in fact, all other items, are quoted for better delivery.

Deliveries on standardized items, so far as the factory is concerned, are fair; in fact, better than they were some months ago, but on equipment which is not standard the deliveries are probably worse than ever before.

Shop Equipment in Steady Demand

Various Electric, Pneumatic and Machine Tools Advanced in Price—Shipments and Deliveries Uncertain

Evidence is not lacking that electric railway companies are beginning to buy, not only additional rolling stock, but also accessories and supplies for various purposes. As yet transactions reported are not on a large scale, but purchases represent growing activity. Shop equipment is also coming in for attention, although manufacturers of lathes, borers, grinders, tools of all kinds, jacks and other minor articles, state that while business in their line is steady still it is not brisk. As in other departments of traction properties, the greater part of the buying is to replace outworn machinery or to maintain the efficiency of the shops at a fair working average. Extensions are not being indulged in at present, but reports would seem to indicate that when the financial standing of the companies will permit appropriations for this purpose the repair and construction section will be better and more liberally equipped.

PURCHASES COVER NEED FOR MAINTENANCE AND REPLACEMENTS

A manufacturer of electric and pneumatic tools of nearly every type installed in railway shops, which includes drills, grinders, etc., said that sales had been keeping up fairly well, but just now a falling off is noted. Railways were buying only what they were obliged to for maintenance and replacements, he observed. While his plant was working overtime it was filling government and shipyard orders, and traction road requirements were taken care of in the ordinary course of business. The speaker's company had a special department devoted entirely to supplying railway needs, and as soon as a revival of trade comes along it was in a position to meet any demand. Prices had been advanced with the increased cost of material, metals mainly.

secure information about freight shipments while in transit. No satisfactory explanation of why this condition should obtain has been given except that there is no longer the incentive to the accommodation of shippers which formerly existed.

Practically no important changes in prices have occurred in recent weeks, although there is a tendency to increase all along the line. The rolling stock of nearly all companies seems to be taxed to the limit. The limiting factor on the delivery of new cars at present is the delay in securing car bodies, about one year being the best that can be quoted. Motors and, in fact, all other items, are quoted for better delivery.

Deliveries on standardized items, so far as the factory is concerned, are fair; in fact, better than they were some months ago, but on equipment which is not standard the deliveries are probably worse than ever before.

The last revision of from 3 to 5 per cent, averaging \$5 on a tool, was made on Jan. 1. Shipments are back about two months. Some lines could be delivered out of stock, when embargoes were lifted and priority permits granted. Orders for air compressors were back a year in delivery. On small orders deliveries were made by express and even parcel post.

BRISK ACTIVITY IN MARKET FOR PORTABLE ELECTRIC TOOLS

On the other hand, another manufacturer declared the demand for portable electric tools is brisk, but the production was seriously handicapped by the Fuel Administrator's order. One concern, which ordinarily produces 5500 tools of both electric and pneumatic types a month, produced last month only about 3200 tools. This large reduction was caused not only by the fact that the production of this particular plant was affected but also by the further fact that it was impossible to secure the necessary castings, because of delays the foundries suffered in getting raw materials, held up by the fuel order. This concern is about 10,000 tools behind on its orders of all kinds.

In lathes and car-wheel borers for railway repair-shops a leading manufacturer said some sales were being made. An advance of 10 per cent was made on the entire line of lathes and machine tools of this producer the first of the year. Since the fall of 1916 prices had been revised on higher levels of from 75 to 100 per cent. While this company was back on orders of from six to nine months, and even on certain large types of machines a year and a half, deliveries were subject to existing transportation restrictions.

Jacks of various kinds are in brisk demand, and in standard sizes shipments can be made promptly from stock. De-

liveries, of course, are uncertain, excepting when packages are sent by parcel post, which was frequently done. Prices have changed with the fluctuations in the metal market, but no further increase was anticipated.

On lanterns of the special type used by railways, a manufacturer said an advance of 25 per cent was made Jan. 1. Being a staple article the demand is steady. Shipments can be made in thirty days if conditions will allow. It is difficult to obtain glass, particularly red and green. Elsewhere it was learned that the demand for lanterns had been so active that jobbers have instructed their salesmen not to accept orders for several numbers. Deliveries from manufacturers are slow and very uncertain. Prices have advanced and are quoted as follows: tubular, \$7.50 per dozen; large size, cold blast, \$11.50 per dozen; tubular dash lantern, \$10.25 per dozen.

There is also a heavy demand for files, with stocks fair and prices unchanged, with jobbers' discounts as follows: Nicholson files, 50-10-10½; New American, 60-7½; Disston, 50-10-5. Black Diamond, 50-10. Other shop tools and accessories, as to prices and deliveries, range along the lines of the standard equipment referred to above.

Another Advance in Price of Window Glass

Factory Production Curtailed a Third—Priority Order Necessary for Shipment

Milder weather has favored manufacturers of window glass in the matter of fuel supply, but the freight embargo prevents both shipping and receiving, excepting under certain conditions. On some schedules an advance of 20 to 25 per cent in price was foreshadowed; but an increase of 15 per cent on car window glass was positively announced as effective Feb. 7. This is now the ruling figure, with orders in no large numbers or great quantities. From the size of the engagements booked glass manufacturers figure that what is now being bought is for breakage principally or for the reshipping of old cars and changes incidental thereto.

With several important orders for new rolling stock, either placed or pending, it is likely the demand for this class and grade of window glass will be more brisk. The factories, which usually go in blast in September or October, this year deferred the "fire" practically to Dec. 8 and later, consequently the production will total only a third of 1917. Manufacturers are not disposed to pile up stock unless the prospective demand is better.

Shipments can be made from factory stock promptly, but it requires a priority order for transportation. This is the newest restriction, under control of the "Domestic Division, Freight Traffic Committee, North Atlantic Ports," lately established in New York as an appendage of the governmental railroad control.

Rolling Stock

Columbus Railway, Power & Light Company, Columbus, Ohio, is reported to be in the market for new cars.

Manila Electric Railroad & Light Corporation, Manila, P. I., will order fifteen new passenger cars at an early date.

Los Angeles (Cal.) Railway has received twenty-four new car motors from the General Electric Company, Schenectady, N. Y. They have been on order seven months.

Harrisburg (Pa.) Railways Company announces it has ordered five new steel cars from the J. G. Brill Company, Philadelphia, Pa., for its suburban lines. The cars will be delivered early in April.

Danbury & Bethel Street Railway, Danbury, Conn., through J. Moss Ives, permanent receiver, has petitioned the court at Bridgeport for permission to buy at least four new cars, the consent of the bondholders having previously been obtained.

Brooklyn (N. Y.) Rapid Transit Company assured the Public Service Commission, First District, last Friday that it will immediately spend more than \$3,000,000 for new cars, of which 100 will be big steel cars for rapid transit lines and fifty will be surface car trailers of the largest practicable seating capacity. The company will also start in at once to convert 100 of its center-entrance surface cars for multiple-unit operation and fifty four-motor cars to serve as leaders for the trailers and the multiple-unit cars will be used in two-car train operation on congested surface lines. The commission has been urging the Brooklyn company to buy new rolling stock for a year or more. The original recommendation was for 250 cars and the foregoing is a compromise arrangement. While the matter was pending the Brooklyn company contested the commission's authority in many public hearings and in the federal and state courts, finally threatening to take its last defeat on appeal to the Supreme Court of the United States. With the above action all court and other proceedings have been voluntarily discontinued.

Trade Notes

Pittsburgh Wood Preserving Company, Pittsburgh, Pa., with the Ohio Wood Preserving Company, the Michigan Wood Preserving Company and the Acme Tie Company, have moved their general offices to the Century Building, Pittsburgh, Pa.

General Electric Company, Harrison, N. J., has commenced the erection of a large new plant on Cross Street for the manufacture of glass bulbs, and the work is progressing favorably. The company is also planning for the erection of an addition and alterations at its plant at 268 North Nineteenth Street, East Orange, and has taken out a building permit for this purpose.

Holden & White, Inc., Chicago, distributors of Miller trolley shoes and Wasson safety bases, have received orders from Col. Bion J. Arnold for complete equipment of the Elgin & Belvidere Electric Railway with Miller trolley shoes for use in connection with the Wasson safety base. An order has also been received from the Salt Lake, Garfield & Western Railway for twelve Wasson bases for use on new cars which are being built on this property.

Charles H. Keeling, after years of experience in the electrical field, has joined the selling forces of the Square D Company of Detroit, Mich., and will travel in the Canadian territory, with headquarters at Toronto. He was formerly connected with the Renfrew Electric Manufacturing Company, Ltd., Renfrew, Canada, being its first sales representative. In 1916 Mr. Keeling was appointed sales and advertising manager of that company.

Hickey & Schneider, Inc., New York, N. Y., manufacturer of transmission-line equipment, heretofore a partnership, is now to be continued as a corporation, capitalized at \$100,000, according to a statement made by Mr. Schneider, president of the concern. P. Kovac, formerly with the New York Edison Company, is sales engineer in charge of the company's sales and service departments. P. S. Houton, an engineer of broad experience, is to handle the design work.

New Advertising Literature

Cutter Co., Philadelphia, Pa.: A calendar with various interesting information and data regarding this company's line of circuit breakers are included in this calendar.

Railway Improvement Company, New York, N. Y.: A valuable transportation booklet entitled "Traffic Surveys and How They Are Made." The booklet explains the methods which have been successfully pursued by the company in analyzing the car operating conditions on electric railways as a preliminary to the most valuable application of the Rico coasting recorder. The method presented is extremely simple and logical, and one that gives results advantageous in many other respects than those relating to the saving of power. Copies of this publication are available on request.

Terry Steam Turbine Company, Hartford Conn.: Interesting applications of steam turbines in naval public utility and industrial service are illustrated in bulletin 242, just distributed by this company. In this twenty-eight-page publication the advantages of turbine drive for auxiliaries are featured, followed by a clear-cut description of the Terry wheel and principle of operation, with diagrammatic explanation of the action of steam, reasons for selecting this product and a condensed engineering discussion of eleven cardinal points in design. A full-page illustration of labeled turbine parts is included, and an interesting diagram is added showing the relative water rates with and without the use of partial nozzle control. The principal engineering features bearing upon turbine selection are set forth in simple terms easily understood by the industrial executive and sufficiently complete in detail to interest the technical reader. Shaft whipping, maintained alignment, handling fractional loads efficiently, low upkeep cost and reliability are a few of the points discussed. Applications of the vertical type of unit used for the past decade on United States destroyers, late advances in turbines giving various classes of pumping service handled by this equipment, are featured.

RAILWAY MATERIALS

	Feb. 13	Feb. 20
Rubber-covered wire base, New York, cents per lb.	30	27-34
Weatherproof wire (100 lb. lots), cents per lb., New York	28 1/4-34 1/4	28 1/4-34 1/4
Weatherproof wire (100 lb. lots), cents per lb., Chicago	33 1/2-38.35	33 1/2-38.35
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Lined oil (raw, 5 bbl. lots), New York, per gal.	\$1.31	\$1.33
Lined oil (boiled, 5 bbl. lots), New York, per gal.	\$1.32	\$1.34
White lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	48 1/2	47 1/2

NEW YORK METAL MARKET PRICES

	Feb. 13	Feb. 20
Copper, ingots, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	27	27
Lead, cents per lb.	7	7
Nickel, cents per lb.	50	50
Spelter, cents per lb.	8	8
Tin, Straits, cents per lb.	\$85.00	\$85.00
Aluminum, 98 to 99 per cent, cents per lb.	34-36	34-36

OLD METAL PRICES—NEW YORK

	Feb. 13	Feb. 20
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	17 1/2	17 1/2
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6	6
Zinc, cents per lb.	5 1/2	5 1/2
Steel car axles, Chicago, per net ton	\$42.42	\$42.42
Old carwheels, Chicago, per gross ton	\$30.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00

*Nominal.