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Inspecting Air Brakes

The record of train delays for 1910 on a large Eastern system operating multiple-unit cars in trains shows that 25 per cent of the total delays were due to air brake defects while control failures caused only 20 per cent of the delays and motors but 6 per cent. These figures emphasize the importance of inspection and maintenance of the brakes as well as the electrical equipment on the cars. The perfunctory test of applying and releasing the brakes from one or both ends of a train is not always an assurance that all of the apparatus on each car is in good operating condition. Dirt carried into the pipes through the compressor intake probably causes the most trouble, due to valves sticking or failing to close properly. A clogged inlet strainer may result in the compressor fuse blowing. Worn or rotten brake hose cause long delays on the road when they burst and leaky pipes or defective couplings and gaskets may result in the brakes applying and dragging the train while running. The action of the pump governors, brake valves, feed valves and triple valves should be carefully inspected, but the repair or cleaning of these delicate and complicated parts should never be intrusted to the inspectors or depot repairmen. Since each part is a separate unit which can easily be taken off and replaced it is a good plan to keep a small stock of one or more duplicate parts at each inspection point and to have all defective ones removed and sent to an expert in the main shop for such repairs, adjustment or cleaning as may be necessary.

A Revival of the Park Idea

There will probably never be unanimity of opinion as to whether it is desirable for a street railway company to establish and maintain a park. In fact, there is every reason why there should be a difference of thought on this subject, because while the plan might be profitable on some lines it would certainly be unprofitable on others. Some five years ago an expression of opinion on the subject of parks at the electric railway convention of that year was generally in favor of parks; but there has been a reversion of ideas and a great many companies which are now conducting parks are doing so because they can see no easy way of getting rid of them without serious loss on their original investment. The discussion on the subject of parks at the Syracuse convention last week is, therefore, of especial interest because it was on the whole favorable to the park idea, and showed that some managers at least are as enthusiastic on the traffic-yielding properties of parks as at any time in the history of electric railways. In this connection it is interesting to note that in the recent annual report of the Lehigh Valley Transit Company R. P. Stevens, president of that company, said that the development of the

park which that company controls midway between Allentown and Bethlehem had been the cause of a part of the increased passenger receipts. The park operated by this company caters to an estimated population of 100,000 people within a 5-cent fare zone, and the establishment of a good comic-opera company in the park last year proved successful.

The Use of Sand

At the Central Electric Railway Association meeting in Columbus last week the paper on the most commonplace subject, sand, brought forth a very animated discussion. Much to the surprise of no doubt the majority of the audience, the representatives of three roads told of their success in operating cars without the use of any sand on their cars, and the service given by these three roads ranged from that of 40-ton interurban cars and four-car freight trains to that of suburban and small city cars. Thus actual experiences were available to fortify the claim of the author of the paper, who said that ideal conditions would prevail if cars could be operated without the use of sand. A strong argument advanced in favor of this plan was that accidents might result from inoperative sanders; that is, a motorman, relying on sand which ordinarily would be available, might try to make a stop within a certain distance and find that no sand was available, whereas if he knew that sand could not be used he would have his car under better control. Arguments in favor of the use of sand centered around the desirability of having it available for making quick and unexpected stops to avoid accidents. To these the reply was advanced by the superintendent of one high-speed third-rail road that he had operated freight trains and passenger cars satisfactorily for six years without sand. In closing the discussion on his paper Mr. Evans rightly regretted the absence of reliable data on the subject. He thought that the general opinion in courts that sand was necessary for a perfect stop was not well founded and he rightfully voiced the statement that no fair-minded jury of technical men or of a court would refuse to change preconceived ideas on the use of sand if a representative association should place its approval upon a comprehensive series of tests that showed the inadvisability of using sand. These tests, we believe, should be made under the jurisdiction of some representative electric railway association.

The Syracuse Shops

The repair shops of the Syracuse Rapid Transit Company and the Oneida Railway, described in this issue, are interesting from several operating and constructional points of view, but perhaps their most striking feature is that they are used for the upkeep of rolling stock employed in two distinct kinds of service. The Syracuse company's cars are of the common city types, whereas those of the Oneida Railway are used exclusively for the high-speed service given over the electrified division of the West Shore Railroad between Utica and Syracuse. The comparative overhaul mileage standards quoted in the article show very clearly that while the equipments themselves differ materially the gap between them is not so great as to demand radical differences in the layout and apparatus of the shop. One of the commendable operating points is the use of forecast schedules in planning the maintenance program for groups of cars as they enter the shop. On the one hand, this gives the management exact information as to when cars will be available for transportation; on the other hand, it eliminates much guesswork when an attempt is made to estimate the

most economical time or mileage basis on which the work should be done. The systematic progress from track to track of a car under repair is another feature which tends to secure the most satisfactory use of the shop. The storekeeping and scrap-reclaiming methods in vogue are also different from common practice as regards the storage of supplies and their distribution and collection by a traveling storekeeper in order to keep the men at their assigned tasks. A great deal might be said in praise of the elaborate crane hoist and jacking equipment at this installation. The true worth of these facilities appears most in shops where their absence demands that men spend time in tugging, pulling and lifting rather than in the exercise of the special skill on which their wage rates are based. The shop building itself is quite as interesting in design as are the methods practised in it. Besides approved partitions, doors and stand-pipe systems, the fireproof construction is made a reality by an absolute rule forbidding the storage of combustibles in large quantities, whether as new material or as waste. The liberal lighting system is also worthy of attention inasmuch as it is so closely related to the well-being of the employees and to the quality of their work.

PITS AND TRESTLES

Mr. Prather's article in this issue on "Pit and Trestle Construction" recalls to mind some of the interesting developments which have taken place in this department of car maintenance. As the name still indicates, the original pit was merely an excavation which was dug in the dirt floor of the old horse car buildings. In some of the early electric railway structures an endeavor was made to avoid the cramped quarters of a pit by an absolutely open construction. This consisted of raising the cars on trestles about 4 ft. above the car floor, but the principle proved unsatisfactory owing to the loss of time in moving about in a place incumbered with low piers and breast-high tracks. All objection to the open type of pit has been obviated, however, by building up the devil strips either of iron checker plates or of reinforced concrete.

The first construction, that of checker plates, as developed in Buffalo, has the merit of permitting convenient side working simply by the removal of those checker plates which are nearest the truck. The second intertrack construction, as typified in the new Syracuse shops, is not so flexible, but it is more durable and safer for heavy work. Still another variety is the use, as at Baltimore, of pits having between them depressed aisles sloping to a depth of 18 in. below the head of the rail. This is an unusual design, but has been found especially convenient for the drawing down of the pedestal bolts of certain types of trucks.

Even at this date it is clear to those who have had the opportunity of looking over the pits in some recently built car-houses and repair shops that the designers of these buildings have not always had the guidance, or perhaps they have not followed the advice, of men who were familiar with the practical conditions of car inspection and repair. It is found that many closed pits are indifferently lighted and heated, that they are poorly drained and that they are often of insufficient depth to permit the pitman to stand erect when working under the trucks and motors. The rails of such pits are usually flush with the devil strip or else are only a few inches higher, so that the workmen must get on their knees whenever there is

anything to be done on the outer side of the trucks. Naturally, working conditions of this kind are very unsatisfactory to the men, and besides it becomes easier for them to shirk their labors because the foreman cannot readily see what is going on under the cars. These considerations should tend to make open pits with covered devil strips more generally used even if the first cost of such construction is higher. Pits of this design are not only lighter, but permit greater freedom of movement than the closed or excavated pits. They are also drained more readily, since the entire floor can be pitched toward the drains under the center line of the devil strip instead of having the gutters and drains in the pit itself. The satisfactory heating of open pits has been difficult in many places, but this condition frequently can be bettered if the track doors are kept open no longer than is absolutely necessary. At the worst, a cold pit is far from being as unhealthful and uncomfortable to the shopmen as a wet one.

There is something very attractive about the use of trestles, particularly for inspection, in view of the fact that the trucks and motors can be handled by men who stand in full daylight and whose every movement is under the eye of the shop foreman. Where trestles are used the work on car bodies is usually done from a suspended gangway. Mr. Prather does not consider the trestle practicable for wheel changing where the motors are of 75-hp or greater capacity. Nevertheless, some railways have overcome this handicap by building the trestle with removable portions on which wheel sets or trucks can be lowered to another track which is flush with the floor of the shop. This method is in successful use by the Mobile Light & Railroad Company for the medium sizes of motors standard on its system. The Hudson & Manhattan Railroad of New York does all inspection and maintenance on a trestle, although its motors are of 160-hp capacity each. In general, those who are entrusted with the design of pits and trestles should bear in mind that comfortable laboring conditions for the workmen form the best basis upon which a successful maintenance policy can be built.

MAINTENANCE IN CHICAGO

Two provisions in the ordinances under which the Chicago surface street railways operate have assumed new importance recently. Periods of three years from the acceptance of the ordinances were allowed for rehabilitation. This period expired on April 15, 1910, for the Chicago City Railway and on Jan. 28, 1911, for the Chicago Railways Company. During this period 70 per cent of the gross receipts was set aside in accordance with the ordinance to be used "so far as required" for "operating expenses, including maintenance and repairs," while the residue of this percentage was to be applied to the cost of renewals. All expenditures for renewals during this period in excess of the residue were charged to the capital account.

At the expiration of this period new conditions arose. The companies are now required by the ordinance to maintain the property in first-class condition and to this end (1) to expend for "maintenance and repairs" 6 per cent of the gross receipts annually, or set aside the unexpended balance, and (2) to set aside 8 per cent of the gross receipts each month to constitute a reserve fund for "renewals and depreciation." Upon the Board of Supervising Engineers, Chicago Traction, the respon-

sibility rests of authorizing all payments from the latter fund. Renewals are defined in the ordinance to be the replacement of any "principal part" and the board is required to determine by classifications made from time to time what items shall be considered renewals and what shall be considered as maintenance and repairs. As the percentages named, however, do not limit the obligation of the companies to maintain the systems in first-class condition, they are concerned as much as the city in the introduction of such methods as will best meet the requirements of the ordinances in this respect.

By virtue of the authority given in the ordinances, the board has passed rules defining renewals. The rulings have been accepted by the companies and were published in full in the issue of the *ELECTRIC RAILWAY JOURNAL* for March 4, 1911, page 374. They differentiate between property that has been rehabilitated and property that has not been rehabilitated and, in order not to draw the line too arbitrarily, define property that has been semi-rehabilitated. As the capital investment of the companies has been about doubled, these definitions touch some of the leading questions involved. While the value of the property of the Chicago City Railway was fixed at \$21,000,000 as of June 30, 1906, this has been increased by rehabilitation expenditures to over \$41,000,000. The value of the Chicago Railways property was fixed as \$29,000,000 on the same date, but this had been increased to \$57,000,000 on Jan. 31, 1910, and is greater now. In the case of property which has not been rehabilitated the traction valuation commission value shall be taken as the original cost; that is the value at which such property stands in the accounts and the ordinances. With rehabilitated property it appears that the amount of the new investment, not the new plus the old, is to be taken as original cost. Where the work of rehabilitation has been complete the cost of the work would probably represent substantially the value of the property. Where the rehabilitation work has been slight the larger part of the value would be the original value allotted by the valuation commission.

The board has also ruled that a limit of \$200 shall be fixed as the minimum charge of capital or renewals. This amount has been adopted by the Interstate Commerce Commission in its classification of expenditures for additions and betterment of steam railways. The interstate commission, however, provides that if the total amount chargeable is less than \$200 for any improvement considered as a whole it is optional with the carrier whether the charge is made to operating expenses or to the appropriate account in the classification of expenditures for additions and betterments. The option permits the charge of many small items to accounts in either classification and affords a flexibility that may be useful.

Except in special instances no addition is to be made to capital account in case of the "replacement of existing property by new property of similar general character and construction." The qualifying phrase may limit the application of this rule. If the board does not allow exceptions and the companies are obliged to pay higher prices for renewals than the "original costs," they will not be able to capitalize the increased expenditure made necessary by higher levels of cost.

It may be said concerning this subject that the words that are used to express the different elements of maintenance are of much less importance than the principle concerned. Good maintenance in its true sense comprises repairs and renewals and cannot ignore the obligation to conserve the property in

satisfactory operating condition. Repairs of parts must be succeeded, after natural wear and tear have done their utmost, by renewals of parts and finally, in turn, by the renewal of the whole. Although the "maintenance of the property" is an all-inclusive term which represents the obligation to conserve the investment, in actual practice there are various and somewhat conflicting uses of the words which denote the different elements of maintenance.

Repairs keep the different elements of property in operable condition. The renewal of a part of a machine, however, may be called properly the repair of the machine. Renewals are made for the purpose of restoring elements of property in the place of those which have been worn out in service or for other reasons are no longer in a condition in which they may be continued satisfactorily as part of the operable property. Whether the policy is to make good the ravages of depreciation through current repairs and renewals as far as possible or by the creation of a reserve fund for a part of the earnings, maintenance is an operating expense and should be so treated.

In the policy followed by a company in the repair of parts obvious opportunities lie for present economy and for ultimate saving. A low operating ratio to-day may imply nothing more than a short-sighted policy whose evil result will be seen when the charges for deferred maintenance can be deferred no longer. If repairs have to be made the question that should be considered is not how long they can be deferred, but how they can be made promptly at the lowest expense and before the excessive wear of a part in need of repair has gone so far that the expense will be double what it ought to be under normal conditions. The policy of a company respecting renewals is one that concerns the capital account partly because of the fact that betterments may be involved in replacements. The policy should be, however, to make pure renewals of property, in cost if not in kind, through the appropriate operating expense accounts.

It should also be the policy to keep the property account as near as possible to the fair value of the tangible and admissible intangible elements. With many companies the practice of the past has been to regard repairs as the single or the principal element of maintenance whose cost was chargeable to operating expenses and to consider renewals involving heavy cost as a sort of extraordinary maintenance, containing some element of betterment to the property, but chargeable in whole or in large part to the capital account. A wiser policy of treating the real maintenance costs as operating expenses will strengthen the position of a company in its own accounts, as a borrower and in its capability to deal successfully with the question of franchise relations where it operates.

As an immediate loss occurs in the realizable value of any item of property when it is used and as no going property, therefore, can be maintained at 100 per cent of its value, the best that any company can do is to maintain a fair average working condition of, say, 70 per cent. The ultimate economy will be conserved by the maintenance of the property in as good a condition as can reasonably be attained. The Chicago companies are fortunate in having definite conditions prescribed under which they must operate, but one of the critical tests of the effectiveness of the settlement ordinances lies in the conditions governing the various elements of maintenance which are herein discussed.

EFFICIENCY ORGANIZATION AT BOSTON

The recent inauguration of special efficiency organizations by the Boston Elevated Railway Company furnishes a suggestive example of the tendencies of large electric traction systems to turn to account every legitimate means of increasing the margin between the gross receipts and the cost of operation. In another column are given the essential features of the plans of campaign against waste to be followed by the efficiency club and committee of department heads in Boston. With respect to the former there is, of course, nothing particularly new in the periodical meeting of responsible employees and heads of departments to discuss problems of a distinctly economic character, but the project is none the less meritorious, and it is noteworthy that the Boston Elevated was one of the first to attack the problem of preventable losses by systematic methods of recording and analyzing failures of equipment in service and of improving the work of the rank and file of the transportation force. If the present plan of presenting a paper of value each month from the point of view of economic constructive criticism is followed there is no question that important gains in the efficiency of the company's business transactions will result. The opportunities for informal and free discussion of problems often overlooked in the mobile activity of department heads ought to be unexcelled, since the ordinary sources of their delayed consideration between heads of different branches of the service are eliminated at the meetings of the club. It is not easy to exaggerate the improved esprit de corps which results from the friendly association of groups of responsible employees at such meetings, divested as they are of the atmosphere of stress and strain so inseparable from usual business hours.

The work of the new efficiency committee at Boston carries with it unique interest. Composed of a small group of men having keen and highly specialized knowledge of department activities and having the widest range of discussion and recommendation, the possibilities in the line of economic progress appear most attractive. The committee's functions are advisory and are primarily designed to secure improved efficiency by the investigations and recommendations which the committee brings to the higher executive officers of the company. Not only is a large amount of detail work thus taken from the desks of the latter, but it appears that it can be handled without sacrificing the detailed consideration which is necessary to a correct disposal of each matter. The plan of forming the committee of men thoroughly familiar with the relation of various departments as well as with the conduct of affairs in each branch of the company's service is thoroughly commendable. It suggests also that in most large public service corporations it is possible to utilize combinations of ability inside the organization no less than to derive benefit from expert advisers retained on the outside. To some managers the amount of time expended in the work of the committee may appear formidable, but it must be remembered that in a large and complex system the opportunities for introducing economies are most attractive if the opportunity is given to carry forward adequate investigations.

Not the least advantage of the efficiency work at Boston is its influence upon the general character of service rendered by the company. Money legitimately saved at one point means that improved service can be given to the public for a fixed ex-

penditure at another, and while the public at large may not be directly interested in attempts to keep expenses down to the limit consistent with first-class transportation facilities, it is destined to be closely concerned with the results of such a campaign. A fixed fare unit means nothing else, and it is significant that none of the economies sought by the company is desired at the expense of good service.

PIECE WORK AND LOST MOTION

Much has been said recently about the work of efficiency engineers and the savings which have resulted in many industrial plants through the adoption of the methods proposed by them. While the efficiency engineer concerns himself with both men and material, there are greater possibilities in getting more and better work out of the men than in saving a little here and there in the cost of material. In every office and factory, in every industry where men work with their hands, there is a vast amount of lost motion and wasted time. Few men know how to work to the best advantage and those that do know seldom have sufficient incentive to make them exert themselves to the limit of their strength and endurance. The development of motion study as suggested by F. W. Taylor, the pioneer efficiency engineer, and the practical application of piece work and bonus systems in many lines of work have demonstrated in a large measure the claims that have been made that the average shop working on a day rate basis is less than 50 per cent efficient. An efficiency of 85 per cent or even higher is possible and practicable, yet there are very few shops in which this rate is even approached.

Certain operations, of course, are more susceptible than others to the methods proposed by efficiency engineers. The ideal conditions for introducing piece work or bonus systems and eliminating all waste of time and physical exertion are where the operations consist of precisely the same movements repeated in regular sequence. Winding armature coils, for example, is a class of work to which a piece rate or a bonus rate can be applied with little difficulty. The incentive to make more money by increasing the daily output under the piece rate plan leads the workers to follow unconsciously the fundamental theories of motion study. The time and exertion required for each movement are reduced to the minimum as the result of practice and trial. Sometimes, however, the most skilled operators fail to see many little ways of saving time or exertion in their work which are apparent to a careful observer who analyzes the complete cycle of the operations involved. Whether the work is done by piece rate or day rate, there are innumerable opportunities in every shop for studying and correcting lost motion with a consequent saving of time and money.

There are some valid objections to piece work and bonus systems which have deterred many companies from putting them into effect. The first and most important objection is frequently the real or expected antagonism of the men themselves, based in many instances on the establishment of piece rates which were too high and were afterward cut to a point where a man's earnings approximated the old day rate even though his output had greatly increased. Another is the difficulty and expense of determining fair piece rates for many operations, and a third objection is the lack of sufficient work of any one class to keep one or more men continuously engaged on it. Needless to say, no piece rate should be established

without the most careful study of existing methods and output under the day rates. The probable increase in output should be estimated and proper allowance made for it in the beginning and not after the workman has earned his higher pay by developing for himself some economical short cut. The determination of fair piece rates is largely a matter of observation and records, leavened with fairness in distributing the profit between the workman and the company.

The lack of sufficient work of any one class to keep one man engaged continuously on it is the cause of more waste time in a shop than anything else. Piece work tends to produce workmen skilled in but one operation, but there is no reason why any man cannot acquire reasonable speed on two or more kinds of work. Thus a machinist after some practice ought to be able to turn a pair of wheels or bore out a bearing with equal skill or a painter to apply a coat of varnish as well as a coat of color paint. There always must be some time lost in changing from one kind of work to another, but careful planning can cut this waste to the minimum. Under the day rate plan there is no inducement to hurry from one job to the next or prepare in advance for the next operation. The completion of one job is the signal for taking a little rest, gathering up tools, having a few minutes' conversation and moving on to the next job to look it over before getting down to work again. Or if the new job is not quite ready to begin on a wait ensues at the company's expense. But if the waiting time is at the men's expense a premium is placed on advance preparation.

Some of the classes of work into which it seems most difficult to introduce piece rate or bonus systems are those which are most in need of some acceleration. No class of workmen know how to putter along quite so well as carpenters. They cut and try and cut and try, take up and put down one tool after another and seemingly cannot be hurried. Yet a carpenter's work is no more accurate than a machinist's, nor does it require more dexterity than many other trades. Most of the carpenter shop operations are susceptible of standardization and rating.

The proper inspection of the finished work under a piece rate or bonus plan involves no new or difficult problems nor should it be an unduly expensive adjunct. Under day rate working the foreman is required to inspect both the performance of the men and, superficially at least, the quality of their work. With a piece rate system it is no concern of the company how fast or how steadily a man works. The inspection can be confined strictly to the finished product, which can be rejected if not up to a fixed standard. Instead of costing more the inspection should cost less and be more productive of uniformly good work.

We have pointed out above some of the advantages of piece work and bonus systems in eliminating waste time and improving shop efficiency. There are similar ways of accomplishing the same end under day work. The competitive spirit can be fostered in individuals or gangs working on the same job, and careful supervision of the shop as a whole with reference to the work carried on by each department will save much lost motion. After all it is primarily a matter of the management of men, of systematic study of conditions and of planning the work in advance. A capable shop superintendent can produce results under any system of paying the men if he has tact and patience in dealing with them as one of them.

Maintenance Shops of the Syracuse and Oneida Railways

The Operating Methods of a Combined City and Interurban Installation

IN the fall of 1909 the Syracuse Rapid Transit Company and the Oneida Railway completed a car repair shop on Wolf Street, Syracuse. The structure is located at the north-eastern end of the city opposite a large carhouse of the city railway and accessible for the cars of the Oneida Railway, which operates the electrified division of the West Shore Railroad between Utica and Syracuse. The general structural features of this layout were fully described in the *ELECTRIC RAILWAY JOURNAL* of Nov. 6, 1909. Hence the present article will be confined principally to the facilities available and the methods which are applied to maintain the rolling stock of both companies.

The Oneida Railway Company and the Syracuse Rapid Transit Railway Company, which use this shop jointly, are under the management of Vice-president and General Manager C. Loomis Allen and the electrical and mechanical departments are under Chief Engineer W. J. Harvie, under whose direction these shops were laid out and built. As assistants on the work were J. P. Barnes, electrical engineer, now in charge of the operation of the shop, and H. G. Throop, engineer of construction for the above-mentioned companies.

RÉSUMÉ OF LAYOUT AND CONSTRUCTIONAL FEATURES

The general dimensions and principal divisions of this instal-

but the north table is separated from them by a strip 74 ft. wide. This strip was left for extensions, but is in constant use for the shifting and temporary storage of cars.

While Fig. 2 presents the general arrangement of the several maintenance departments, it does not show how the natural slope of the ground has been adapted to use different floor levels. On the main level slightly below Wolf Street are located the general truck repair, carpentry and paint shops. The lower level, which is flush with Free Street, comprises a still unused basement under the paint shop; a storage space under the mill room, sash and door room and carpenter shop, which are arranged in an ascending level leading to the ground floor of the storeroom and which are accessible through the storeroom only. This makes these areas available for storage of apparatus under the control of the storekeeper. This lower level is traversed by a supply track which is carried from Free Street to the end of the general repair shop and beneath the level of the repair pits in that section.

The buildings are of fireproof construction throughout and, furthermore, are protected by hydrants, standpipes, fire extinguishers (in the paint shop) and sand pails. Twenty watchmen's alarm boxes are installed throughout the property. The general layout of the fire-protection and water system is



Fig. 1—Syracuse Shops—General View Looking Along Southern Transfer Table and the Wolf Street Side

lation are shown on the accompanying plan, Fig. 2. The plot on which the shops are erected slopes downward from Wolf Street toward Free Street so that a retaining wall of rubble concrete had to be built about the property. Entrance to the building via transfer tables is had either through Fifth or Sixth North Street, from either track on Wolf Street, as indicated by the track layout in the plan, Fig. 2. There is also a supply track connection from the New York Central & Hudson River Railroad on the Free Street side. Each transfer table extends the entire width of the installation and is 55 ft. wide in order to give room for the accommodation of the long cars of the Oneida Railway.

When the shops were designed it was feared that snow and ice might hamper transfer table operation more than special work. Therefore the pits were made 2 ft. deeper than the table runways so that a small amount of snow would not prove a hindrance. The experience of two winters has shown that the tables are perfectly reliable despite the fact that the operating current is taken from third rails in the pits. The shops cover an area of 381 ft. 9 in. x 176 ft. 8 in. between the two transfer tables. The south transfer table directly abuts the buildings,

shown in Fig. 3. The range and overlaps of the standpipes are indicated on this drawing by the segments of circles, which are of 50-ft. radius. Oil, paint, varnishes and other highly inflammable material are kept in an isolated building, the construction and equipment of which will be described later in this article.

The water supply for these shops is brought from two independent mains on Free Street and Wolf Street respectively. These sources are tapped at diagonally opposite corners and are interconnected by a valve in the 6-in. pipe line nearest to Wolf Street. Valves can be manipulated to cut off either source of supply in order to use the other exclusively. A rather interesting feature in connection with the water supply is the installation of enameled drinking fountains throughout the shop. These fountains are a convenience for the men and economize their time appreciably. All water used on these premises except for the fire lines is metered so that wastefulness in this direction can be easily checked.

In general, the shops are constructed of the following materials: Concrete for foundation walls up to the level of the main floor and for shop floors and exterior trimmings; brick

walls and partitions 12 in. thick; reinforced concrete for the roof, galleries and devil strips. All fire walls are extended about 3½ ft. above the roof. The partitions between the several departments, as clearly outlined in Fig. 2, indicate the

in the partitions that separate the several maintenance shops. A departure in the natural lighting of buildings of this character is the use of a number of small "Anti-Pluvius" skylights extending transversely across the bays instead of having

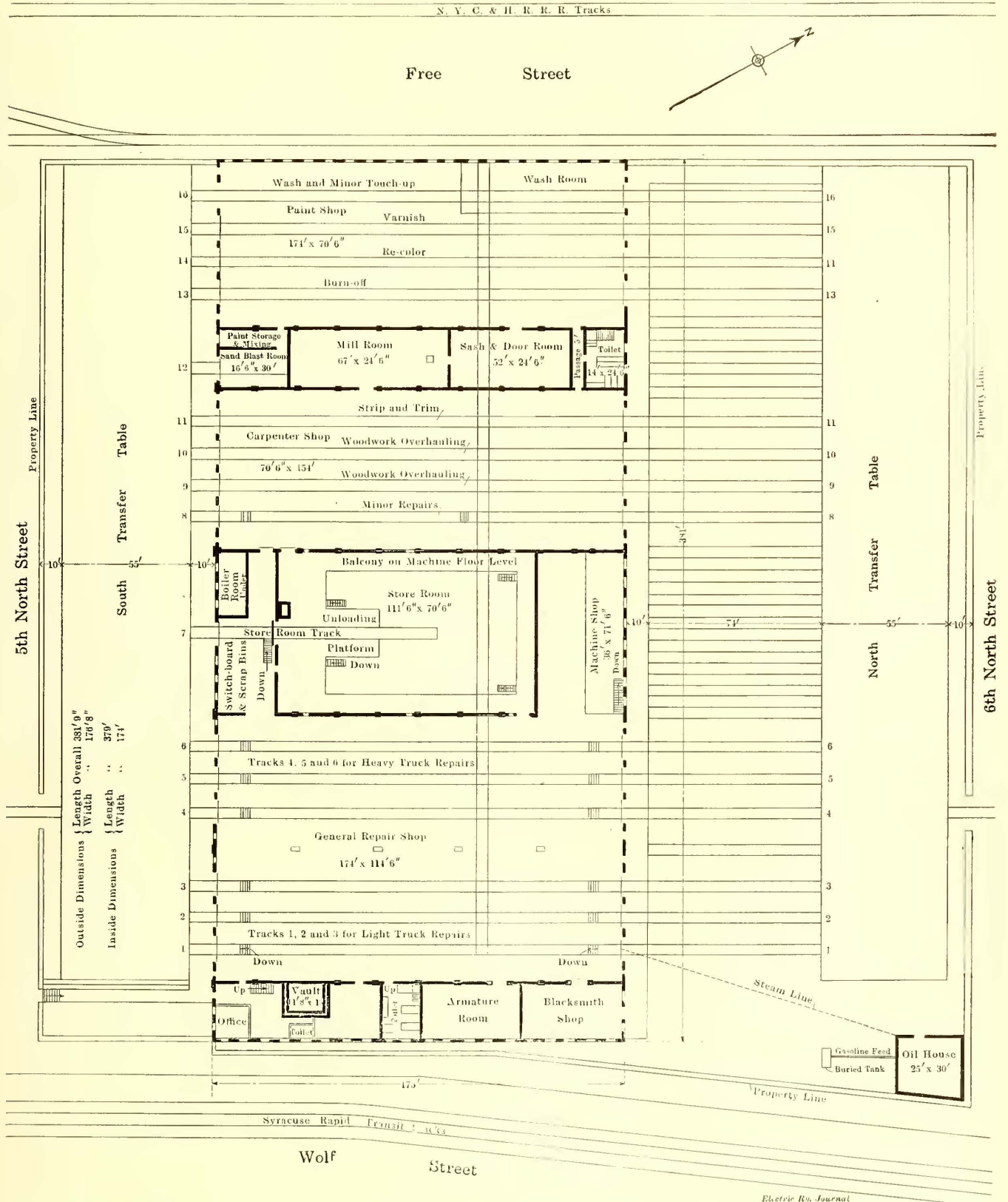


Fig. 2—Syracuse Shops—General Plan, Showing the Relative Location of the Several Departments and the Order of Overhauling Work on Successive Tracks

care taken to isolate such danger spots as the paint-mixing room, millroom and the sash and door rooms. All of the track openings are protected by Kinnear motor-operated steel rolling doors. Standard gravity fire doors cover all openings

long skylights parallel to the tracks. There is about 1 sq. ft. of skylight for every 6 sq. ft. of floor in all the shops. The efficiency of this lighting may be judged by examining the accompanying half-tones, which were made from non-flashlight photo-

graphs. Artificial illumination is furnished principally by Cooper Hewitt mercury-vapor lamps, which have proved entirely satisfactory and safe even in the paint shop. Some flexibly suspended incandescent lamps are also installed in the paint shop in order to give extra illumination for striping and lettering.

After the shops were placed in operation it was found desirable to add pit lights in the truck overhauling section. This

cold air can enter in large quantities. Direct steam heating is employed either through pipes carried along the wall or through radiators. The steam for this service is generated in a boiler plant, which will be described hereinafter.

STANDARD SCHEDULES FOR CAR OVERHAULING

Before describing the mechanical and electrical features of these shops, it is desirable to refer at length to the standard schedule which is followed in the overhauling of every car

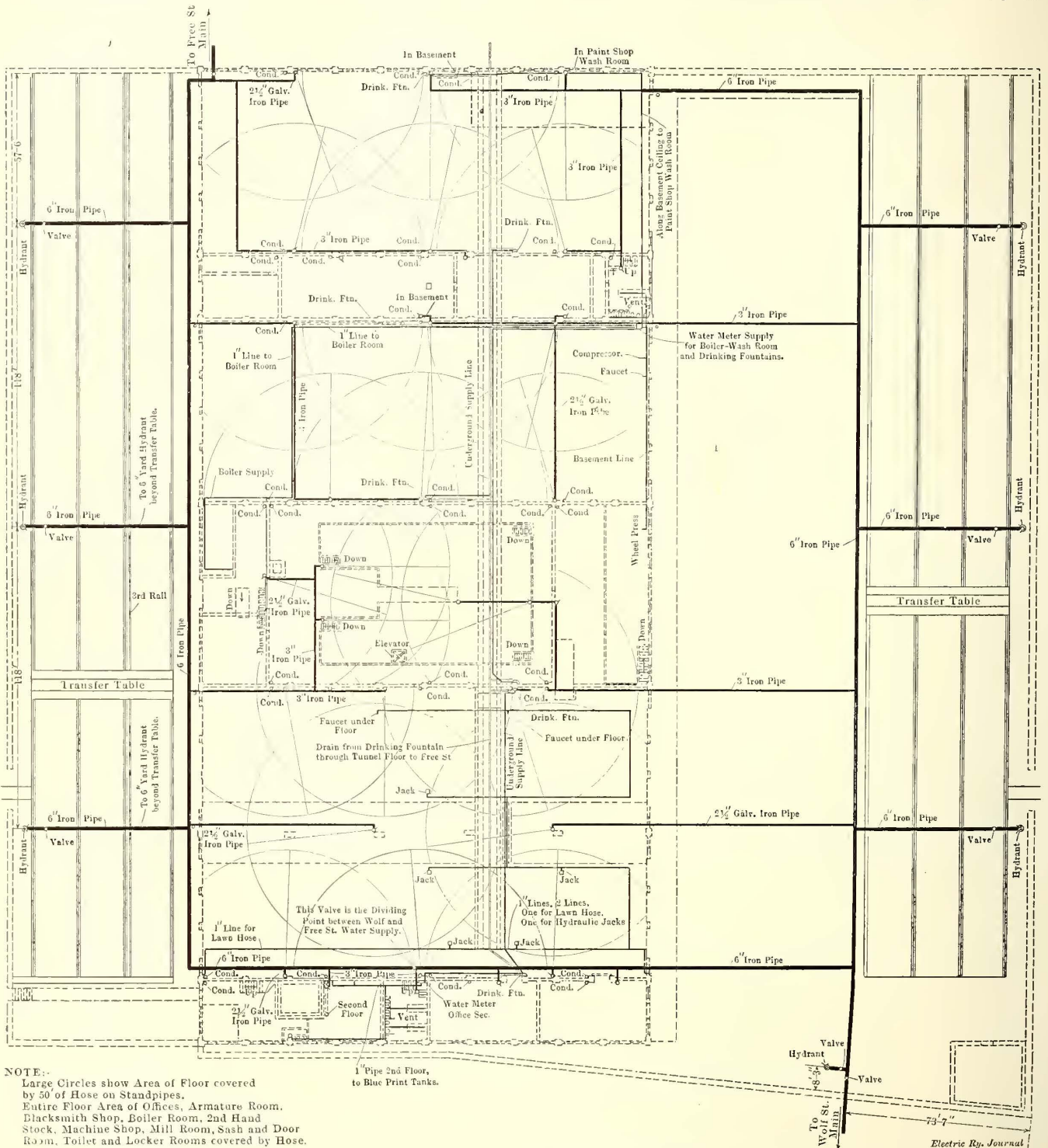


Fig. 3—Syracuse Shops—General Plan of Property, Showing the Water and Fire Protection Systems

addition presented no difficulty as it had been foreseen and provided for by a conduit runway in the concrete filler between the inner web of the pit rails and the adjacent channel of the devil strip. This pit lighting conduit construction is illustrated in Fig. 4.

The heating of these shops has not presented any troubles. In a measure this may be ascribed to the use of motor-operated track doors, which greatly diminish the periods during which

with regard both to the time required and to the order of the work. Every car brought in for attention is listed on a sheet, Fig. 5, which is ruled and marked to show the number of the car, the class of overhaul required and the kinds of maintenance work. When certain cars are due for overhauling the several foremen are promptly notified and are asked to estimate the dates on which they could release the equipment specified. The schedule of work on cars is based upon the paint

shop work. This labor is laid out first, so that some of the cars may be drying while other cars are undergoing other operations. The work in the other shops is then laid out to conform with the paint shop schedule.

The way this scheme works out appears in Fig. 5, previously noted. Thus, car No. 516, brought in for light overhaul on Jan. 2, was to be stripped on Jan. 3, washed on Jan. 4, sent to the carpentry shop on Jan. 6, ordered to the paint shop on Jan. 10, trimmed on Jan. 28, returned to the truck shop on Jan. 30, touched up on Feb. 1 and tried out on Feb. 2. The foremen have become so familiar

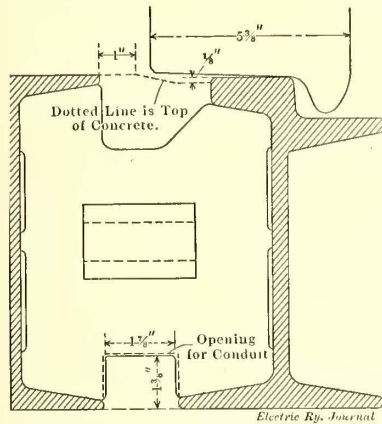


Fig. 4—Syracuse Shops—Section Through Pit Rail and Channel

with this routine that variations from the preliminary layout are rare exceptions. This practice has two conspicuous merits: The shop labor forces can be disposed to the best advantage and the transportation department can be advised to a day when given rolling stock will be available for service.

Once the car has entered the shop it is moved from track to track in accordance with a definite program. By referring again to Fig. 2 it will be seen that there are 16 shop tracks in

- Track 12, sand blast room.
- Track 13, burn off.
- Track 14, re-color.
- Track 15, varnish.
- Track 16, wash and minor touch-up.

A car brought in for overhauling is placed on track 5 or 6; idle trucks are put under the body and the trucks removed and shifted to track 4. Then the car body is sent to track 11 for strip and trim. After this it goes to track 16 for washing. When washing is completed the car is placed on track 9 or 10 according to the class of woodwork overhauling, the heavier jobs going to track 9. Following this the car is passed on to track 13, 14 or 15 in the paint shops according to the class of work required. Next the car is sent back to track 11 for trim, after which it goes back to track 5 or 6 for the return of its own trucks. It is then taken on the road for a trial run and finally is placed on track 16 for the last touch-up and clean-

Old No.	New No.	Class of Overhaul	Truck Shop	Strip	Wash	Carp. Shop	Paint Shop	Trim	Truck Shop	Toucu Up	Try-out
	516	Light Overhaul	Jan 2	Jan 3	Jan 4	Jan 6	Jan 10	Jan 28	Jan 30	Feb 1	Feb 2
	729	Complete Overhaul	Jan 4	Jan 5	Jan 6	Jan 7	Jan 13	Feb 2	Feb 6	Feb 8	Feb 9
	724	Varnish	Jan 5	Jan 6	Jan 7	Jan 9	Jan 12	Jan 23	Jan 26	Jan 27	Jan 28

Fig. 5—Syracuse Shops—Forecast of Progress of Cars in for Overhauling

ing preliminary to its return to service. The progress of cars through the shop is laid out to have the direction of movement always the same for the work on a given track, so that as the work progresses a car approaches the transfer table on which its next shift is to be made. Most of the car shifting is done before 7 a. m.

THE TRUCK SHOP

The truck shop is located in the second bay from Wolf

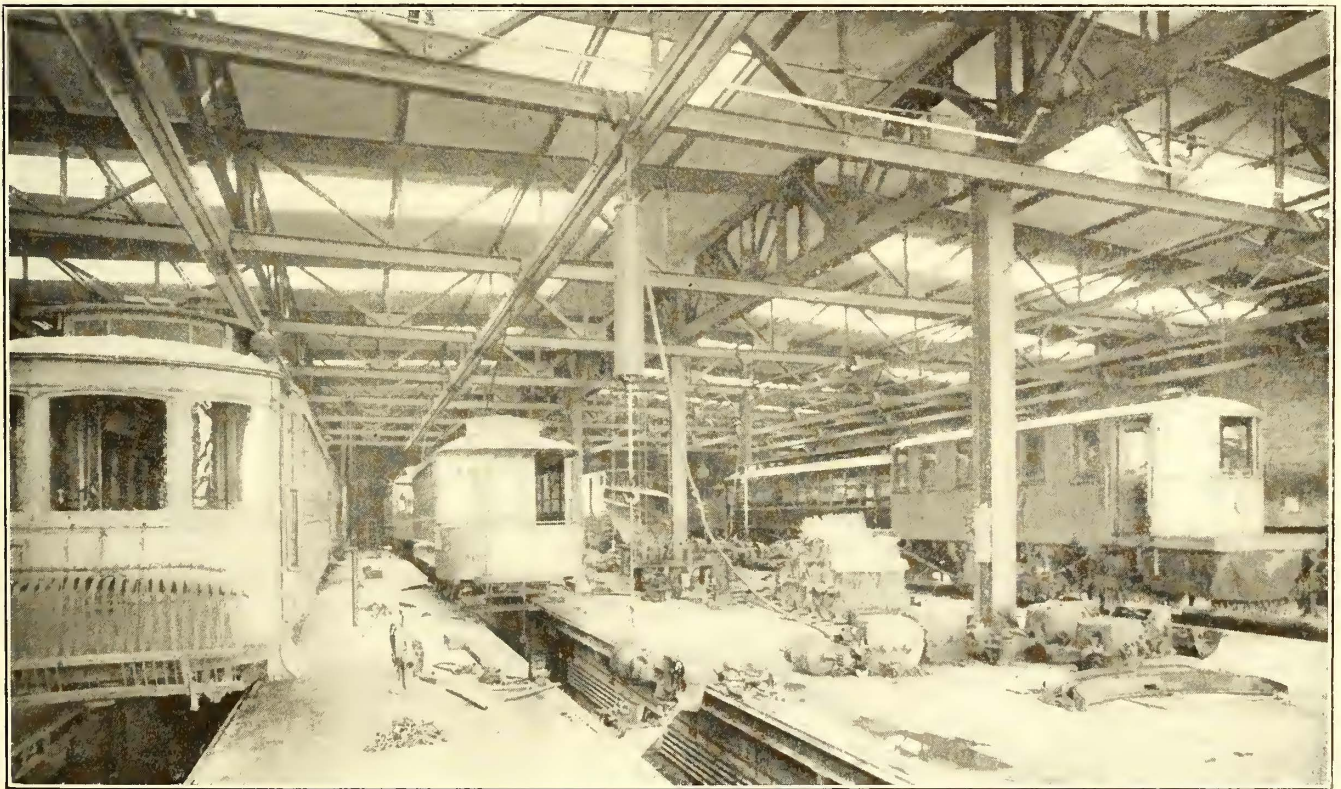


Fig. 6—Syracuse Shops—View in Truck Shop, Showing the Storage Aisle Between the Light and Heavy Overhauling Sections

all, 14 of which are used for some car overhauling purpose, as indicated on the drawing as follows:

- Tracks 1, 2 and 3, light truck shop repairs.
- Tracks 4, 5 and 6, heavy truck shop repairs.
- Track 7, storeroom track.
- Track 8, minor carpentry repairs.
- Tracks 9 and 10, woodwork overhauling.
- Track 11, strip and trim.

Street. It is 114 ft. 6 in. wide and contains six tracks. Tracks 1, 2 and 3 are for light overhauling, while tracks 4, 5 and 6 are for heavy work. The two groups are separated for the entire depth of the shop by an aisle floor space 25 ft. wide, as shown in Fig. 6. This area is used for overhaul of air equipment and affords a convenient place for the storage of parts

taken from trucks in progress of overhaul. The pipe fitters' bench is also located in this space and controllers, resistances, fenders, sweeper brooms, etc., which have been repaired and are ready to be placed on cars are stored here where they are readily accessible to the repairmen. The tracks in each group are spaced 14 ft. center to center to allow ample room for work

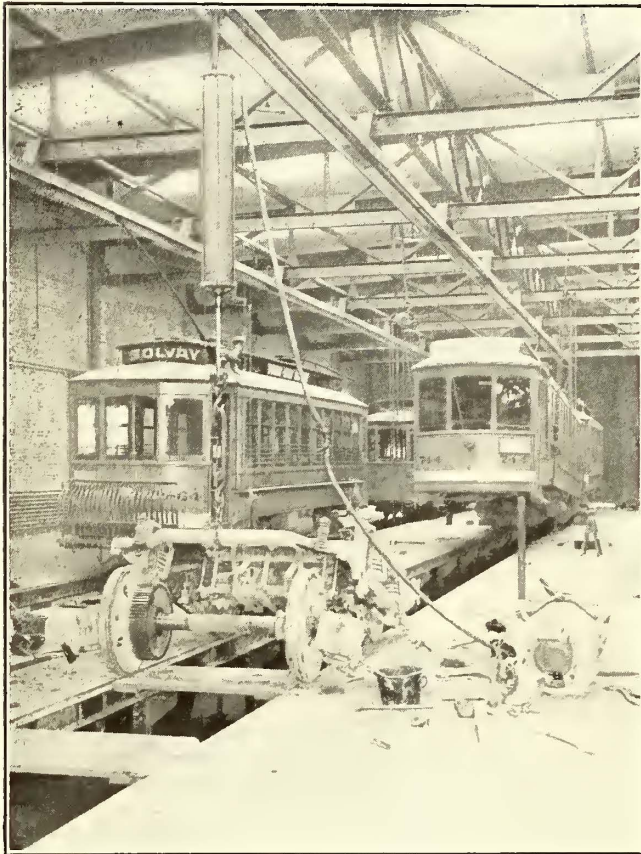


Fig. 7—Syracuse Shops—Air Hoist and Car Sling on Light Overhaul Tracks

on the sides of the cars. Room for work benches and light tools is provided by 10-ft. strips along both walls.

The pits of all the tracks are of the open type with reinforced concrete devil strips. The pit rails are of 9-in. girder section and are carried on offset brackets which are riveted to the sides of the pit posts. The extra pit width gained by these offsets is a great convenience in handling the larger size motors. The pits are sloped toward gutters under the devil strips and consequently are kept dry and comfortable at all times.

A T-iron overhead conductor is used for moving the cars in all the shop sections. A section of this conductor and its wooden trough is shown in Fig. 8. All screw holes in this trough are countersunk to avoid insulation trouble. The same drawing also shows a break in the trough to allow for the passage of the air hoist. This break occurs at each truss chord, the trusses themselves being designed so that the lower chord is an "I" beam in section and carries an ordinary "I" beam trolley. Supporting columns at the middle of the roof trusses are offset to allow the passage of these "I" beam travelers so that the load may be transferred from one track in the shop to any of the others without removal from the hoist.

Probably the most striking point about the truck shop and the adjacent departments is the elaborate system of hoisting and conveying work, comprising hand and hydraulic jacks, chain-block car slings, screw car lifts, pneumatic hoists and a jib crane. The transverse pit with its supply track is also an important aid in the conveyance of truck and electrical material from or to the lower level of this installation.

Typical chain blocks and Q M S pneumatic hoist equipments in service on the light overhauling tracks are shown in Fig. 7. The hoists are five in number, of 2 tons capacity each, and are carried directly from the lower chord to the roof trusses. Provision has been made for continuing the runways into the armature and blacksmith shops, but up to the present time it has not been found necessary to do this and the travel of the trolley ends at the doors of the armature and blacksmith shops. The hydraulic pit jacks are operated by a pipe line which carries city water at 70 lb. pressure.

The tracks marked 5 and 6 are furnished with motor-operated screw lifts, as shown in Fig. 11, to raise both ends of a

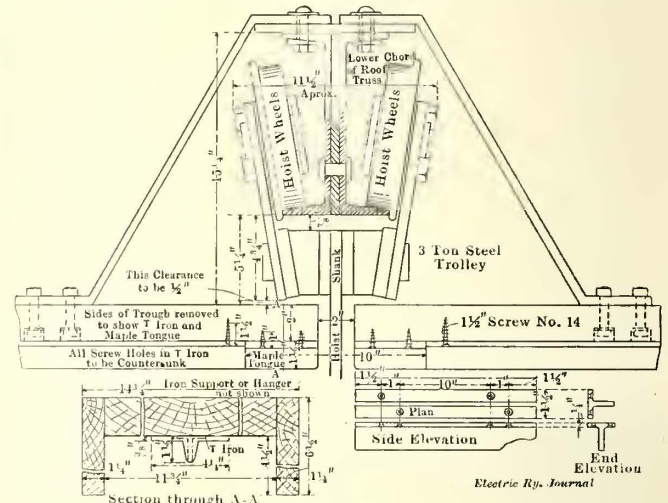


Fig. 8—Syracuse Shops—Overhead Trolley Track and Passing Device for Traveling Hoist

car body at the same time. Fig. 11 also presents one view of the 2-ton Q M S jib crane. It sweeps over an arc of 230 deg., extending all the way from the transverse pit to the machine shop, which is located in the rear of the third bay. The jib crane is arranged so as conveniently to handle wheels and

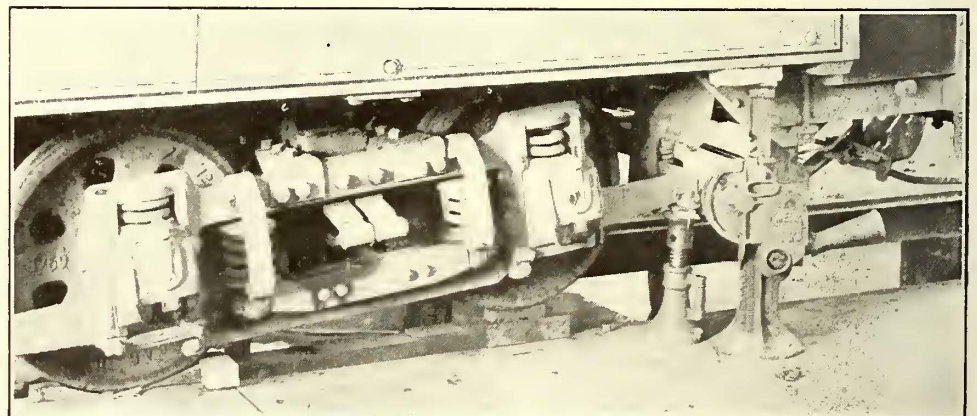


Fig. 9—Syracuse Shops—Grinding Out a Flat Spot by Spinning Wheel Against an Emery Block

other equipment from or to the transverse pit after raising a trap door alongside of track No. 6. It also serves the lower level of the machine shop floor, in which the wheel, press and tire-turning lathe are located. This crane is also of material assistance in dismantling trucks on tracks Nos. 5 and 6 within the radius of its movement. Fig. 10 shows the crane delivering a wheel set directly to a wheel press on the main floor of the

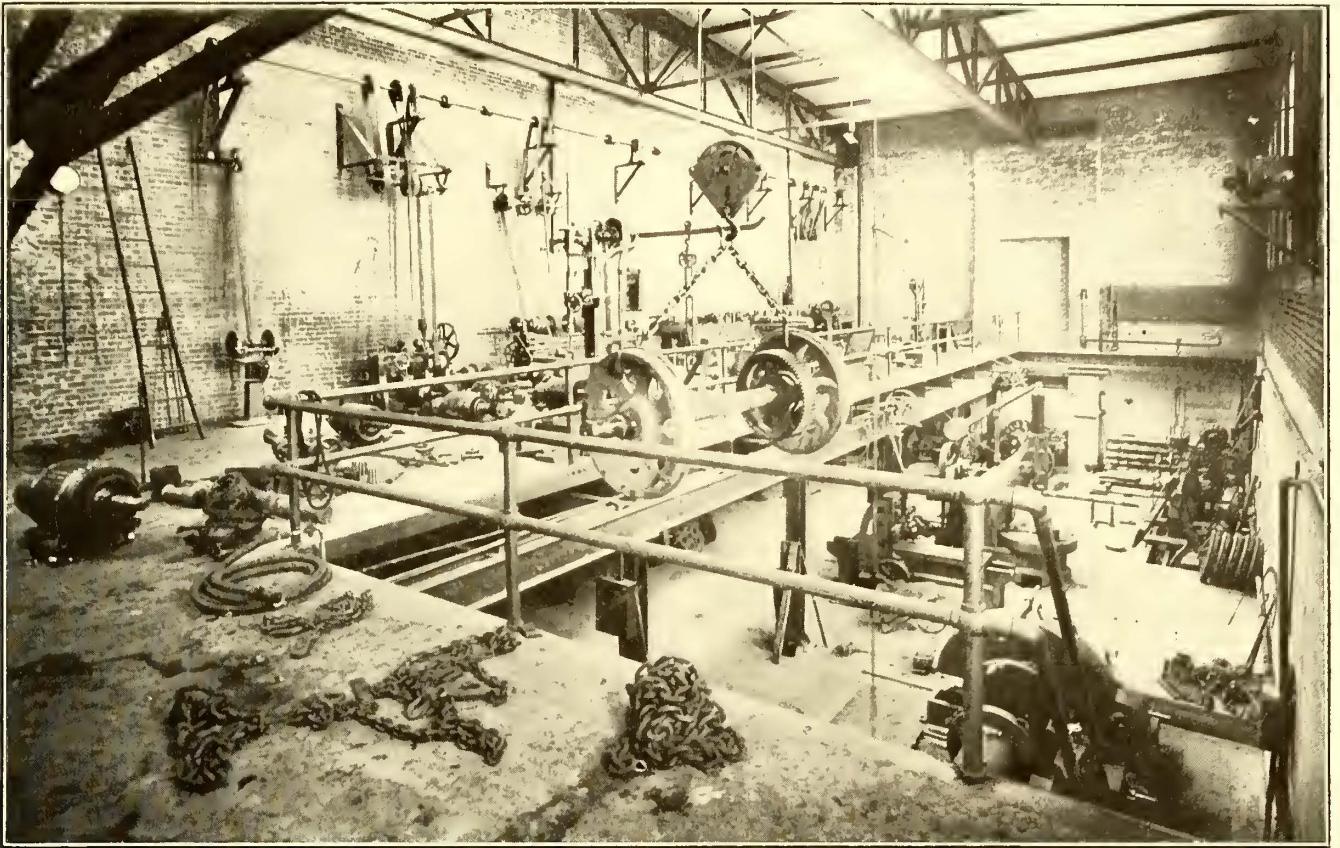


Fig. 10—Syracuse Shops—General View of Machine Shop and of Jib Crane Delivering a Wheel Set to Heavy Tool Department

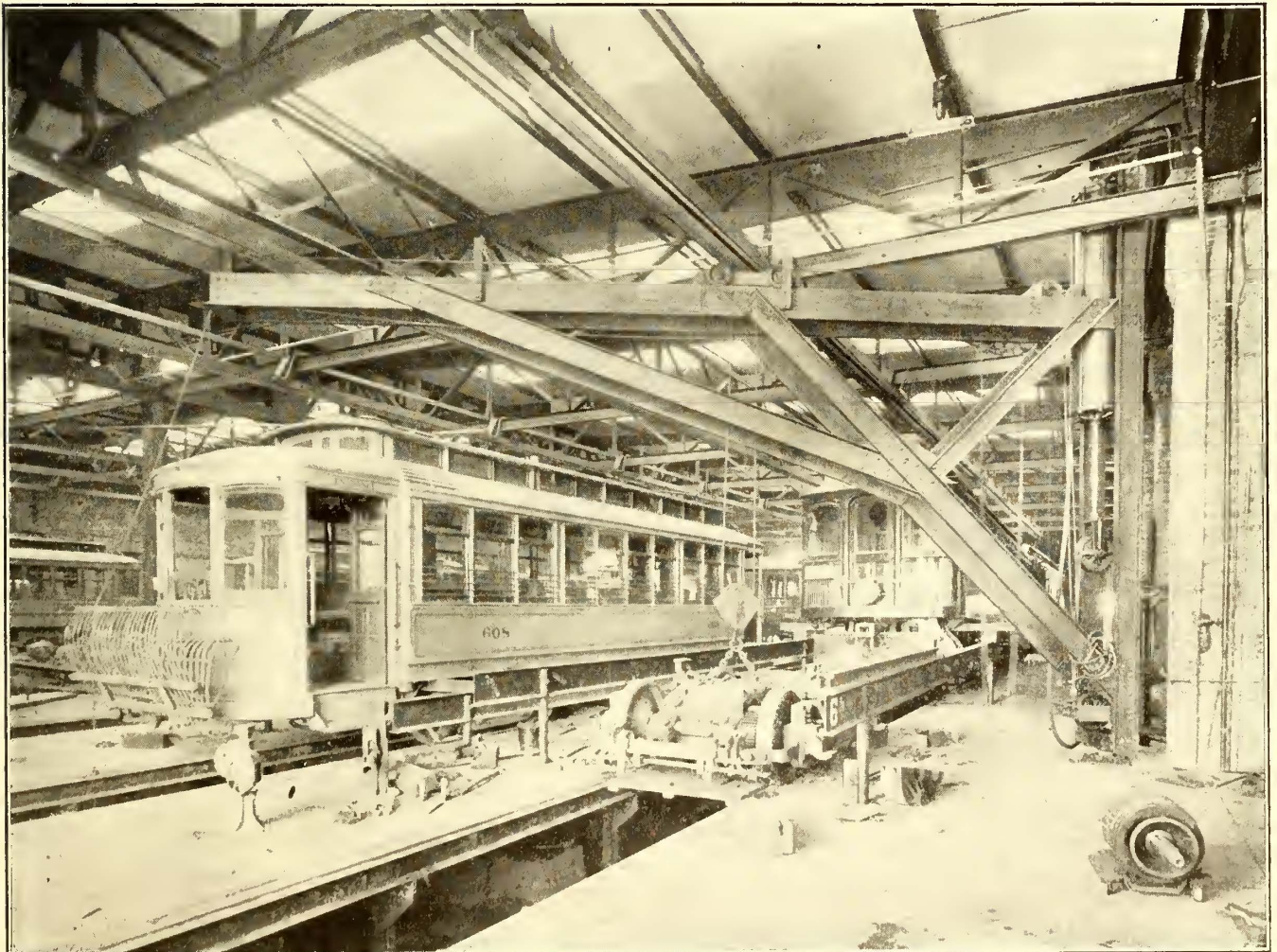


Fig. 11—Syracuse Shop—Jib Crane in Overhauling Section

machine shop. Such excellent transportation means as those described naturally foster thorough maintenance practice. To insure the inspection of every part trucks are entirely dismantled when wheel sets are exchanged.

A simple method for grinding out flats on wheels is illustrated in Fig. 9. One end of the car is jacked up so that while one set of wheels is blocked the other pair is lifted freely to be

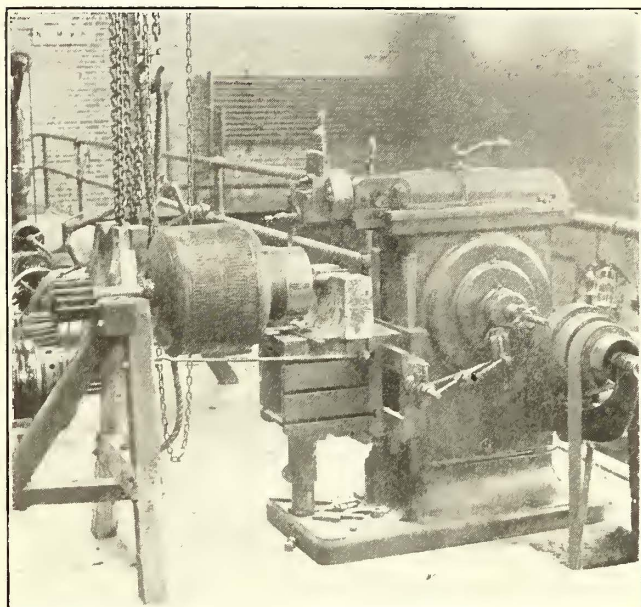


Fig. 12—Syracuse Shops—Slotting a Commutator on a Shaper

revolved by one motor. The flatted wheel is revolved against an emery block which is set under the wheel, as shown. Flats are also removed by spinning the wheel against emery brake shoes. The cooling water used during the grinding process is furnished through a pipe line from the pit.

It may be noted in passing that no welding is done in these shops, as there are not enough breakages of motor cases, etc., to warrant the employment of an expert. From time to time work of this character is sent to the Goldschmidt Thermit Company and the Davis-Bournonville Company for thermit and oxy-acetylene welding respectively.

ELECTRICAL AND BLACKSMITH SHOPS

The armature room and blacksmith shops are in the rear of the first bay; both are 23 ft. 6 in. x 42 ft. in size. These shops have side doors which open to the truck department alongside. In addition the blacksmith shop has a door at the rear. The armature-handling equipment includes an overhead track with chain hoist, two Columbia stands and one bander. Soldering is done very effectively with a combination gas and air torch. The air for this purpose is taken from the main 80-lb. air line through a small globe valve.

The management has not made any striking changes in its motor practice lately except to replace four-turn coils in the GE-800 motors by three-turn coils in order to increase the motor speed. The standard motor brush is the National Carbon Company's No. 15, but Le Carbone brushes are used in some of the motors. On the city cars the brush tension varies from 2½ lb. to 4 lb. per square inch on account of differences in the construction of the brush holders. All of the motors, in-

cluding even the oldest types, are being slotted. All motors have benefited materially from this treatment, and on the whole the combination of slotting commutators and soft brushes has eliminated all need for the keeping of flash-over records. Up to the present time it has not been found necessary to slot the commutators of compressor armatures.

The equipment of the blacksmith shop comprises one slitting shear with a capacity up to ¼-in. plate; one 150-lb. trip hammer; two open forges and one combination gas and air furnace for babbitt metal. All work done in this shop is strictly car maintenance business in conformity with the management's policy to refrain from carrying out jobs which can be secured for a lower net charge from outsiders.

THE MACHINE SHOP

The machine shop occupies an area of 36 ft depth x 71 ft. 6 in. width behind the storeroom. It has two levels, as shown in Fig. 10. The upper level or gallery, which is flush with the truck shop, extends out for about one-half the width of the machine shop. This gallery carries the lighter machine tools, all of which are set parallel to the rear wall of the storeroom. The lower level of the machine shop is 8 ft. below the truck shop. The open section contains all the heavy tools, the space under the gallery being used for wheel and axle storage. A ramp from this storage leads directly into the open pits of the truck shop tracks.

The tools mounted in the gallery of the machine shop comprise the following: Two 18-in. x 24-in. engine lathes; one bolt cutter; one emery stand with 14-in. wheels; two drill presses; one power hack saw and one shaper. All of these tools are driven from one motor, the group nearest the storeroom being driven from an overhead countershaft carried on the wall and those near the edge of the balcony being driven from a countershaft under the floor, from which the axle lathe and plane on the lower floor are also driven. Work is brought to these tools by means of a pneumatic hoist runway which extends the entire length of the gallery. Fig. 12 shows the shaper as adapted for slotting commutators of various sizes by the ad-

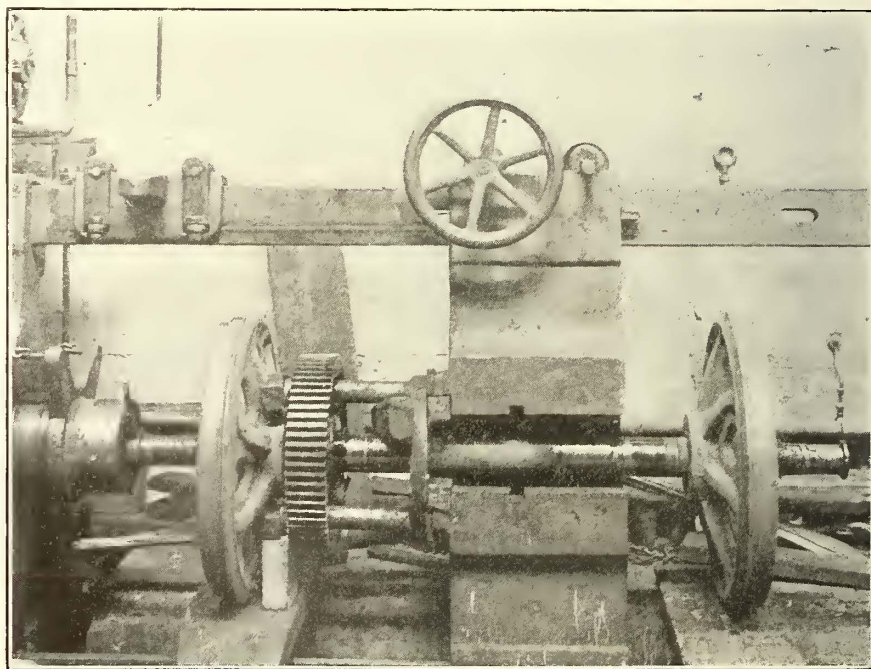


Fig. 13—Syracuse Shops—Pressing Off a Car Wheel Without Disturbing the Gear

dition of a stand. Armatures are brought to the shaper from a nearby lathe by means of a small swinging crane which is equipped with a Yale & Towne chain hoist.

All the heavy machine tools except the planer are separately driven by 220-volt, three-phase motors. They comprise the following: One 300-ton wheel press made by the E. R. Caldwell Company, Bradford, Pa.; one 36-in. engine lathe for axle

work and occasional wheel boring; one planer; one 42-in. Niles boring mill; one Pond tire-turning lathe. The planer and 36-in. lathe are driven from the light-tool countershaft.

Fig. 13 shows a method developed for pressing off a car wheel without interfering with the gear wheel. The extra apparatus required for this purpose comprises a yoke, which is integral with two bars, and a pair of curved wrought-iron blocks which fit over the spokes of the car wheel at a distance of 7 in. to 8 in. from the center-line of the car axle. A car wheel is pressed off in the following manner: By means of suitable spacing blocks the yoke is made to bear against the tail block of the wheel press and the yoke bars are passed through the gear to bear against the blocks which are fitted over the spokes of the car wheel. The operation of the press pushes the wheel off the axle but leaves the gear in its original position.

THE STOREROOM

The storeroom occupies most of the third bay, or 111 ft. 6 in. x 70 ft. 6 in. It is ideally located with reference to the shops which it serves and for receiving material. Like the machine shop it is built on two levels, as shown in Fig. 14. The upper level is an 8-ft., four-sided gallery on the same grade as the truck and carpenter shop floors and the machine shop gallery. This level has a track which is served by the southern transfer table and which extends over half way into the storeroom for the delivery of supplies for either level. The main floor is served by the transverse supply track which runs from Free Street under the paint and carpenter shop, through the storeroom and thence through the truck shop as a supply pit at right angles to the overhauling tracks. The transverse supply track running from Free Street under the

in bins. The means provided for transferring supplies from one part of the storeroom to another include the small elevator shown in Fig. 14, chain hoists and stock ladders which can be wheeled along the tracks in front of the bins. A chute is also provided for sliding brake shoes from the unload-

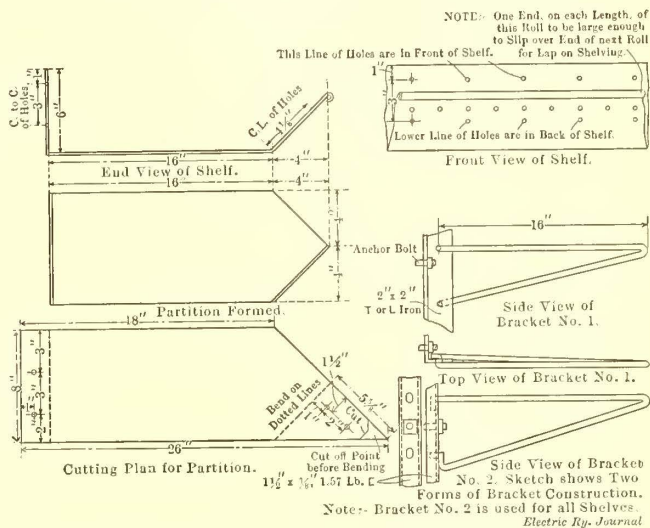


Fig. 15—Syracuse Shops—Details of Movable Bin Construction

ing platform to the storage under the gallery. The galleries are strong enough to carry racks and other suspended constructions on which are conveniently stored such articles as

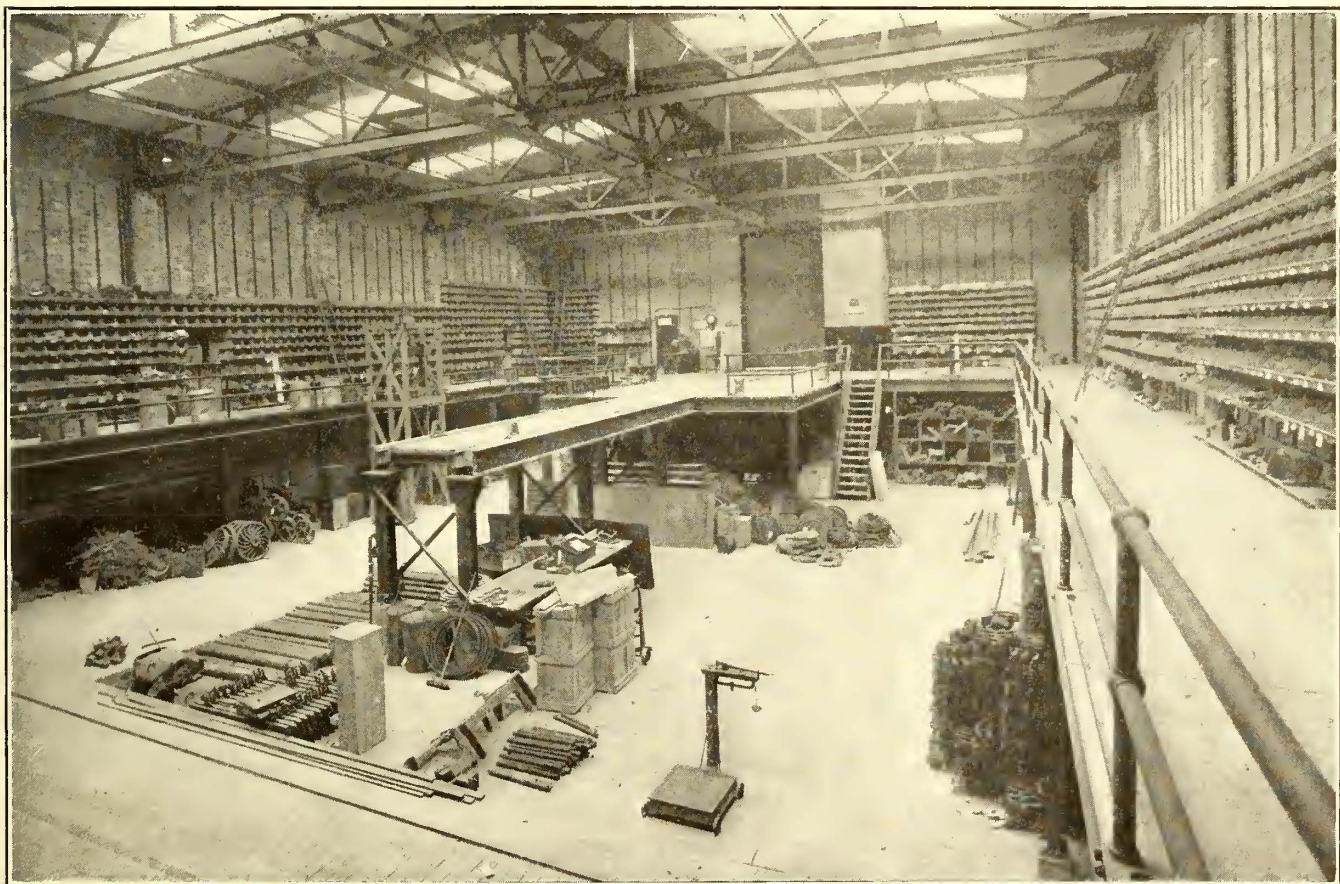


Fig. 14—Syracuse Shops—General View of Storeroom When Facing Forward, Showing Shelving on Gallery, Supply Tracks on Two Levels, Etc.

paint and carpenter shops is also used for the delivery of stock by horse-drawn wagons which may enter the storeroom proper along the supply track.

The storage scheme is to use the lower level for heavy material and the gallery floor for smaller articles which are placed

pipes, journal boxes, car signs and lead treads. These treads, by the way, are made from scrap metal. Such articles as gears, pinions, truck castings, reels of wire, brake shoes, lumber, etc., are stored on the lower floor.

The design of the storage bins and shelving merits special

attention because of the simple means provided to change at will the size of individual bins and the spacing between the shelves in accordance with changes in the character of the material stored. These bins are of galvanized iron and are built up as follows: Carrying channels are bolted vertically to the wall at 26-in. centers and are perforated for the insertion of the shelf brackets at any desirable intervals. The shelving consists of horizontal sections 12 ft. long which have a series of holes 4 in. apart so that the vertical partitions can be riveted to the shelf at intervals of 4 in. or multiples thereof.

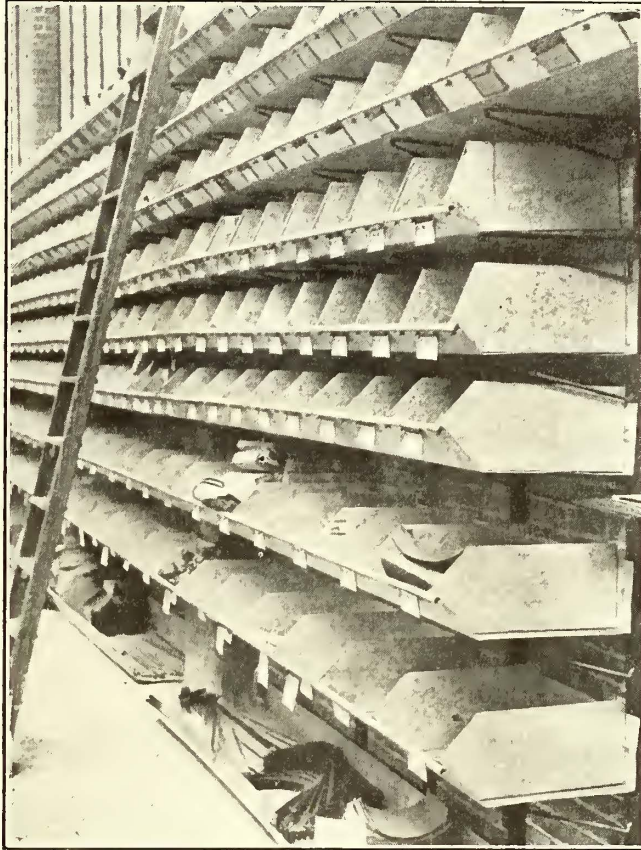


Fig. 16—Syracuse Shops—Galvanized-Iron Bins

The general construction details of the bins and brackets are presented in Fig. 15, which also shows how the front edge of the shelving is rolled up for lapping over the next 12 ft. length to secure an unbroken construction. A view of the completed bins is shown in Fig. 16. Each bin carries a holder with a printed card which gives the bin number, the name of the article and the catalog number.

As previously noted, the storeroom is centrally located with reference to all the shops which require its supplies. To secure the maximum benefit from this arrangement the materials on the gallery floor are stored in proximity to the shop which uses them. Three storeroom windows open to the truck shop, three to the carpenter shop and one to the machine shop gallery. Large articles may be passed out through fire doors at diagonally opposite corners of the storeroom. The paint shop has a small special storeroom for daily supplies. All articles are received by the traveling storekeeper, who delivers the supplies to the men who have submitted formal requisitions for them.

The subject of storeroom practice is intimately associated with the economical use of material and particularly as regards the reclamation of scrap. It is the duty of one man to collect all scrap and sort out that which could be made available for use again by re-threading, retapping, cutting or adjustment. This work done, the second-hand articles are placed in special bins which are reserved respectively for equipment parts of the Oneida and Syracuse Railway systems. These supplies are kept in front of the storeroom and may be taken without

formal requisition. In order that the workman may procure new stock it is necessary for him to consult the traveling storekeeper, tating to him what articles are needed. The storekeeper, after getting the approval of the forman upon the formal requisition, obtains the articles from the storeroom and delivers them to the workman who is to use them. By specializing the supply department in this manner much laxity is eliminated and important economies are effected in the time of the men.

CARPENTER AND PAINT SHOP PRACTICE

The carpenter shop occupies the fourth bay, which has an area of 174 ft. x 70 ft. 6 in. It contains four tracks, the uses of which are indicated on the general plan, Fig. 2. Only the track for minor repairs is furnished with a pit and this is of the closed type. The tracks are spaced 14 ft. centers and, furthermore, the entire bay is absolutely free from incumbering heavy machinery or supplies. Seating and car lumber supplies are stored in the basement, access to which, as mentioned above, may be had only through the storekeeper. This basement also contains the Ingersoll-Rand compressor of 300 cu. ft. capacity, which supplies compressed air to the entire installation.

The bay next to the carpenter shop is 24 ft. 6 in. It is divided by fire walls into the following sections for the purposes named: Sand blast room, 30 ft. x 16 ft. 6 in., with a track opening to south transfer table; paint-mixing room, 30 ft. x 7 ft., opening to the paint shop; mill room, 67 ft. x 24 ft. 6 in., opening to the carpenter shop; sash and door room, 52 ft. x 24 ft. 6 in., opening to the paint shop; fire-door protected hallway, 5 ft. wide, and employees' two-floor toilet and recreation room, 16 ft. x 24 ft. 6 in.

The sand-blast room is used for sanding glass and for cleaning the metal parts of cars, either loose or on cars brought part way into the room. Fig. 17 shows the two methods em-

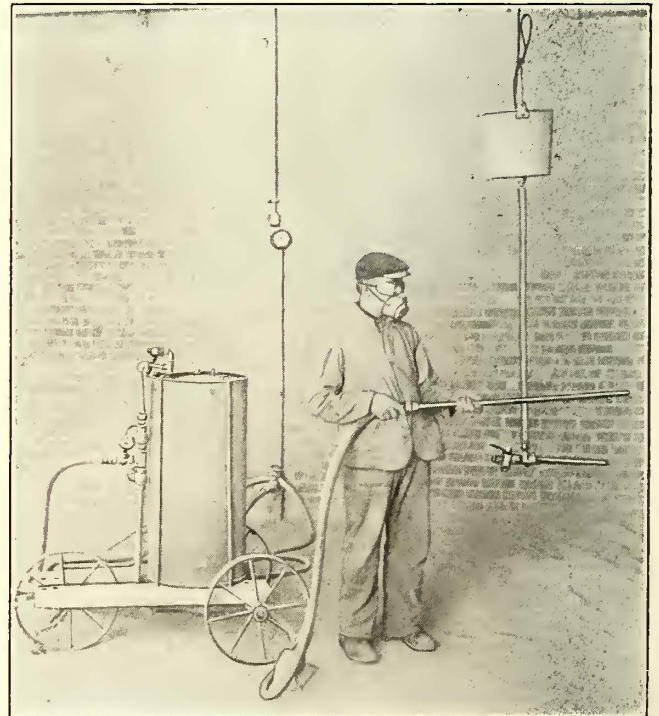


Fig. 17—Syracuse Shops—Two Equipments for Sand-Blasting Glass

ployed in this room for sand-blasting. The simpler method, which is applied to smaller jobs, calls for the use of a pail of sand and an air-line connection. The pail is suspended from the roof trusses. The sand flows through a hole in the bottom of the pail to the sand-blast pipe, where its momentum is accelerated by an 80-lb. air-line connection as illustrated. The operator has nothing more to do than to steady the pipe and manipulate the valve which controls the flow of compressed air.

The same view also shows the portable tank used for sand-

blasting. This first was operated on the injector principle alone. It was found necessary, however, to add an air line at the top of the tank in order to force the sand down toward the injector. There are three valves on this tank; the top valve controls the air which enters the top; the left-hand valve controls the injector action, and the bottom valve regulates the flow of sand.

To minimize the danger from fire the paint-mixing room carries only enough stock to last for one day, or in any event only the smallest package of each article. The main stock of oils, paints and varnishes is kept in an isolated building. The man in charge of the mixing room is notified in advance by the paint shop foreman what materials will be required for the day so that no time is lost by the painters in waiting for materials. As this storekeeper also prepares all painting mixtures more uniform results are assured than when each painter does this work. The men cannot get new paint or brushes unless they return the emptied cans and worn brushes.

The mill room equipment is driven from countershafting by a 10-hp, 220-volt, three-phase motor. It embraces the following tools, which were furnished by the American Woodworking Machinery Company: Variety saw, planer, joiner, two-spindle shaper, hollow chisel mortiser, band saw, jig saw, tenoner lathe, emery wheel and drill. The sash and door room contains several interesting devices for cleaning and varnishing sash, doors and signs, as well as for frosting glass and baking lacquers. A revolving table for handling sash is shown on the right in Fig. 19. The square top of this table is perforated with holes into which four rubber-tipped plugs are inserted at the distances required by the dimensions of the sash. The rubber tips of the plugs prevent the glass from sliding about. A revolving stand for handling panels and doors up to 30 in. width is shown on the left in Fig. 19. The top of this stand has holes to take the pegs of differently sized supports for door and sash. The illustration of the door stand shows two styles of these removable supports. Of course, in practice those pieces must be of the same length and inclination. Fig. 18 shows one of the door and sash racks.

Fig. 21 is a view of the galvanized-iron gas oven used for baking lacquer and frosting glass. The gas burner is set at the bottom under an asbestos shelf. When glass is to be frosted a door at the top of the oven is opened to keep the temperature below 110 deg. Fahr. The glass is carried on five pairs

ing oven. The glue will begin to flake off immediately, taking particles of glass along. The resultant pattern depends upon the coarseness of the sand blast and the thickness of the glue.

The following method is applied to make a frosted glass panel with a plain border and a bevel corner effect: With ordinary stationer's mucilage a piece of paper is pasted over the portion to be left plain (Fig. 20), but a diagonal slit is left between the corresponding corners of the plain and frosted areas to obtain the desired bevel effect. Then all of the exposed glass is sand-blasted and the glue and soda solution

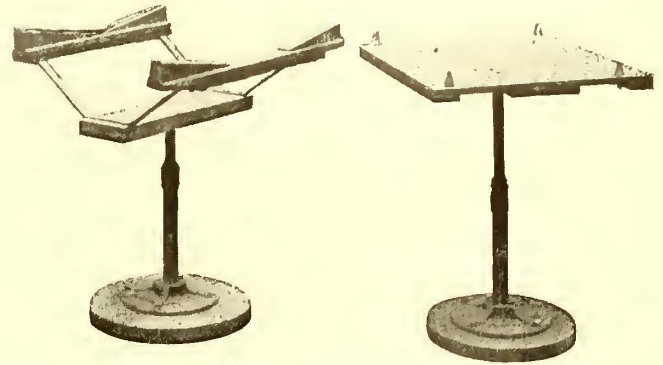


Fig. 19—Syracuse Shops—Revolving Stands for Sash and Door Work

applied over the same. Upon this the glass is placed in the oven and the job completed by immersion in a vat of water to soak off the paper.

The paint shop occupies the last bay, which covers an area of 174 ft. x 70 ft. 6 in. and contains four tracks respectively for burn-off, recolor, varnishing and washing and minor touch-ups, as indicated on the drawing, Fig. 2. An interesting feature is the isolation of the car-washing section (69 ft. 5 in.) of the last track by the erection of a glass partition. This partition

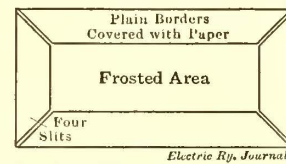


Fig. 20—Frosting Glass

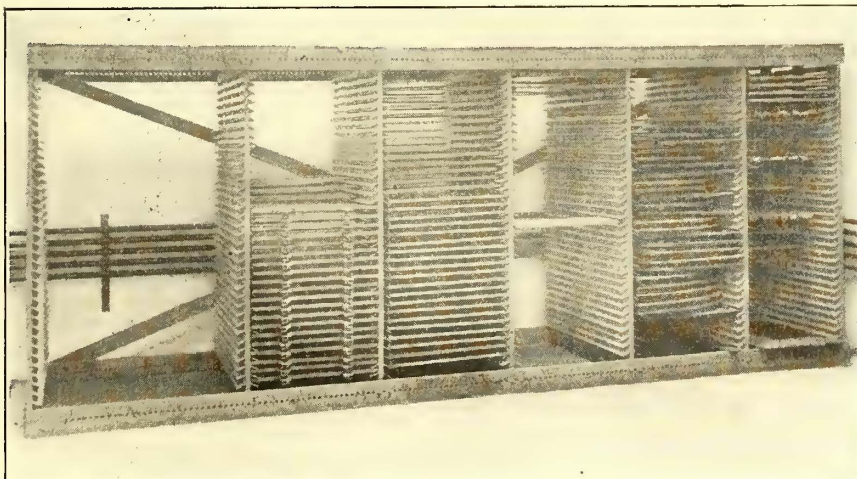


Fig. 18—Syracuse Shops—Sash Racks in the Painting Department

of crosspieces which are adjustable for any pane within the limits of the oven. As shown in the illustration the crosspieces have barriers formed of reversed nails.

Glass is frosted in the following manner: First, the glass is sand-blasted to get a ground surface and then the grounded side is covered with a solution of glue and soda. The soda is added in very small quantities to shorten the glue, that is, to take out its elasticity. After the glue has set so hard that it cannot be punctured by fingernails the glass is set in the dry-

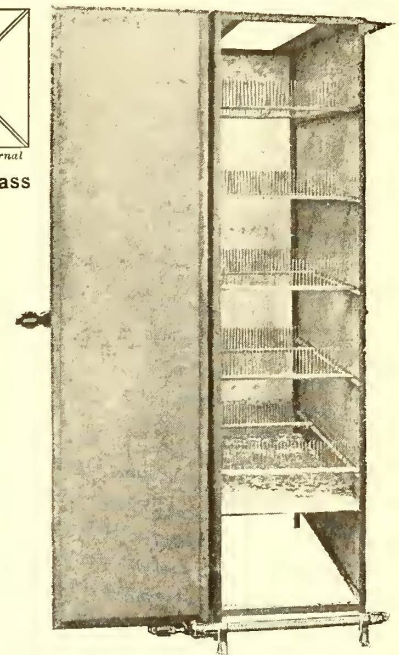


Fig. 21—Galvanized-Iron Oven with the Gas Burner Removed

is made up of 12-in. x 18-in. panes and extends from the lower chords of the roof trusses to the top of the 3½-ft. concrete wall which carries it. This partition makes it possible to use a hose in car washing without splattering water on freshly varnished cars near by. The washroom is supplied with gas for heating water.

The concrete wall on which the glass partition is supported also carries a group of steam pipes on the side adjacent to the varnishing track. During cold weather every effort is made to

maintain a proper uniform temperature in the paint shop. The ideal temperature is set at 68 deg. and it usually varies from 65 deg. to 70 deg. The night watchmen take temperature readings every hour.

The accompanying illustration, Fig. 22, is a view taken along one side of the paint shop. It shows the steam piping, part of a fire-hose reel and adjustable pipe racks for carrying seats and other fittings of various lengths. The lower rows of pipe brackets serve as convenient supports for painting long strips. The same illustration also shows a portable air-gasoline tank

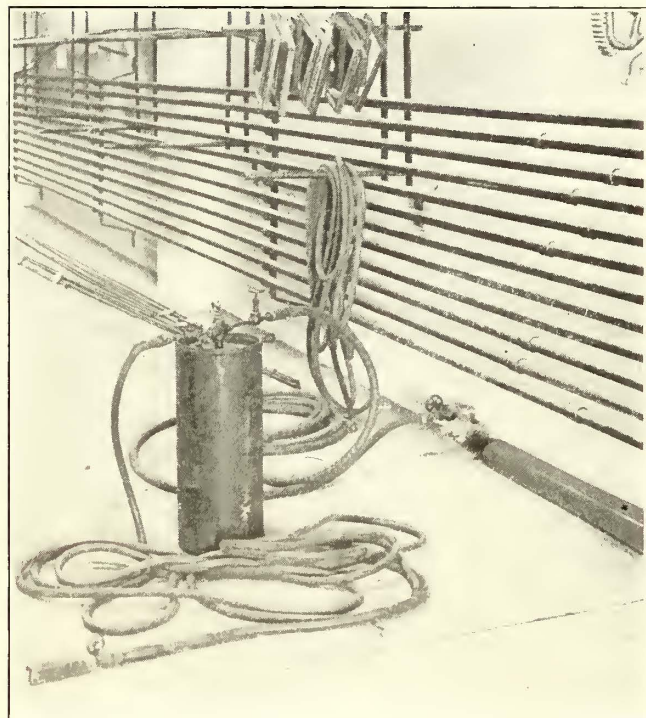


Fig. 22—Syracuse Shops—Combined Gasoline and Compressed Air Outfit for Burn-off Work

and burners. To one side of this tank there is connected an air line with a pressure ranging from 30 lb. to 100 lb. The air line is carried to within about 1 in. from the bottom of the tank, where the air is released through small holes in the pipe and allowed to bubble up through the gasoline so as to go to the nozzles in the form of a combustible mixture of air and gasoline vapor, the supply of which can be regulated at will by a valve at the nozzle. One and even two side valves or taps can be taken, so that three burners at various places may be supplied from one tank. There is no possibility of causing trouble by reversing the coupling connections, because the air line which fits into the top has a 3/4-in. connection, whereas all the nozzles have a 1/4-in. connection.

The work of the paint shop has been systematized by preparing schedules up to and including the year 1915 on which are reported the dates when certain cars are to be brought into the shop for burn-off, varnishing, cutting in, recolor or other attention. A portion of the schedule for the year 1911 is reproduced in Fig. 24. The basic theory of this schedule is that there should be 14 months between varnishings and 18 months between re-colorings. In practice, however, the averages are respectively 15 1/2 months and 20 months, owing to the fact that after re-varnishing a car is allowed to run 18 months before re-coloring. The trucks and electrical equipment are overhauled at the time the car is shopped for paint or varnish. The schedule is also affected by local conditions, such as the State Fair, which make it necessary to have the maximum amount of rolling stock in service.

It will be noted in the schedule that a column has been left for the carpenter shop. This space was left so that the class of body overhaul to be undertaken at the time of shopping may be determined and noted in advance. The cars marked "no record" are those shopped prior to November, 1908, when no painting chronicle was kept. This practice of forecasting the amount and kinds of painting required over several years is working out very satisfactorily.

MOTOR, LIGHTING AND HEATING EQUIPMENT

The power for operating the motors in the several shops

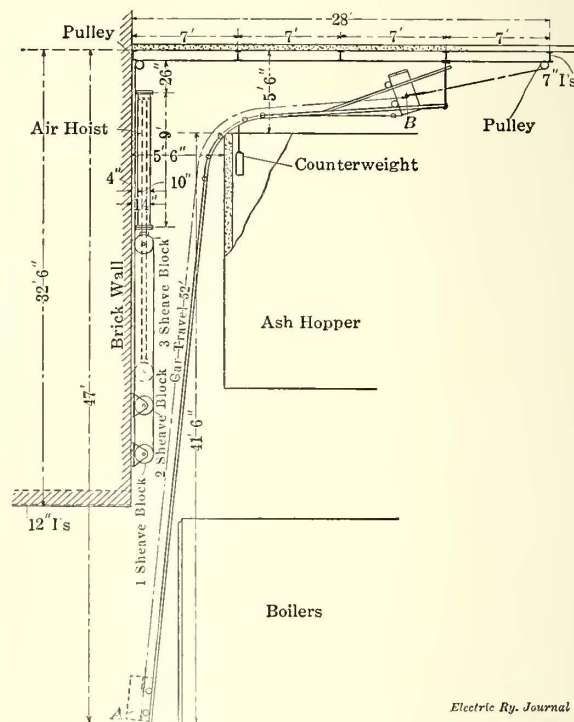


Fig. 23—Syracuse Shops—Operating Details of Ash Hoist and Dump

and for the lighting system is taken from an 11,000-volt, three-phase, 60-cycle circuit. The current for the motors is stepped down to 220 volts by transformers. A motor-generator set furnishes 550-volt direct current for the lamp circuits. The apparatus, which is controlled from equipment on a Crouse-Hinds slate switchboard, is placed in the third bay in front of the storeroom and adjacent to the bins for second-hand mate-

	JANUARY			FEBRUARY			MARCH					
	Car No.	Paint Shop		Carp't Shop	Car No.	Paint Shop		Car No.	Paint Shop		Carp't Shop	
		This Month	Last Shopping			This Month	Last Shopping		This Month	Last Shopping		
1	516	Var.	Cut in		705	Re-color	B. O.		730	Var.	New	
2	368	B. O.	No. Record		806	Var.	B. O.		371	B. O.	No. Record	
3	323	B. O.	No. Record		626	B. O.	Re-color		502	Var.	Cut in	
4	729	B. O.	Var.		514	Re-color	Var.		624	Var.	B. O.	

Fig. 24—Syracuse Shops—Part of Painting Schedule, Showing Heavy Numbers for the Syracuse and Light Numbers for the Oneida Cars

rial. For two important reasons this converter equipment was chosen in preference to tapping the railway circuit. The location of the shops at the extreme end of a feeder line would otherwise have required the erection of another feeder to insure good regulation; it was more desirable to operate the machine tools by three-phase instead of direct-current motors.

The shop heating plant is located in the basement in front of the storeroom. This installation is entirely surrounded by fire walls. The steam generating equipment consists of two 125-hp Ames return tubular boilers which supply steam on the

gravity return system at 10 lb. to 12 lb. pressure. The coal is delivered to the boiler room by gravity through a boiler-plate chute to a concrete hopper under the floor of the section in front of the storeroom.

The ashes from this plant are conveyed to an overhead bunker which is high enough to permit the contents to be dumped by gravity into ash cars brought in on the transfer table. The apparatus for raising the boiler room ash car,

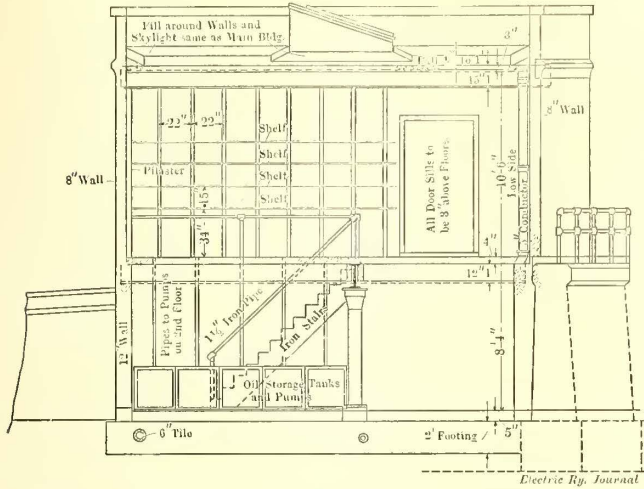


Fig. 25—Syracuse Shops—Cross-Section Taken Through the Paint and Oil House

dumping it automatically and returning it to the floor is very ingenious and effective. As shown in the accompanying drawing, Fig. 23, the ash runway is a ladder which rises almost perpendicularly to a height of 41 ft. 6 in. and then runs hori-

zontally to a branch-off over the hopper. The ash car has two pairs of wheels of different gages. The front wheels take the inner track and the rear wheels the outer track formed by the sides of the ladder. On reaching the branch-off over the ash hopper the leading wheels follow the narrow-gage track, which continues on the level, while the rear wheels move up on the wide-gage track. The car is so constructed that this tipping causes the dumping of the ashes. The car is pulled up the

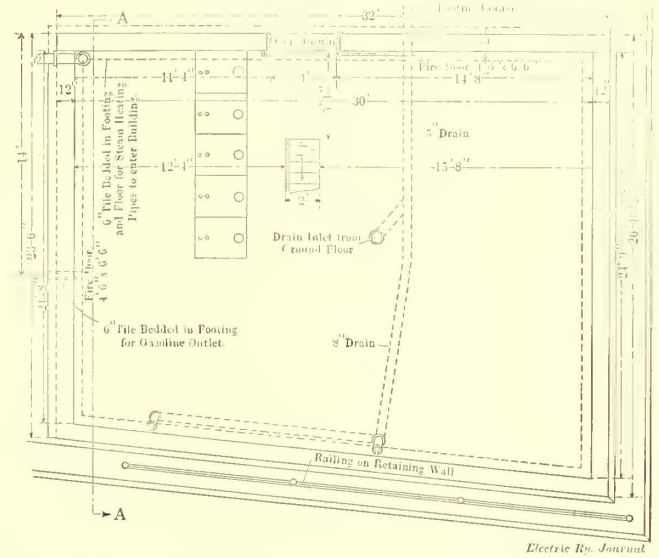


Fig. 27—Syracuse Shops—Plan of First Floor of Paint and Oil House

the curve, but releases it after the car has started to return. The ash car weighs 100 lb. empty and 500 lb. when filled.

GENERAL OFFICES

The general offices of the engineering and shop departments are located in the second-story section parallel to Wolf Street, which constitutes the first bay. The lower floor contains the office of the assistant electrical engineer and his staff; also thoroughly equipped toilet rooms and lockers. The second floor is divided into rooms for the record and drafting forces.

The records are stored on the first floor of a two-story vault. The second story of this vault is reserved for maps, tracings

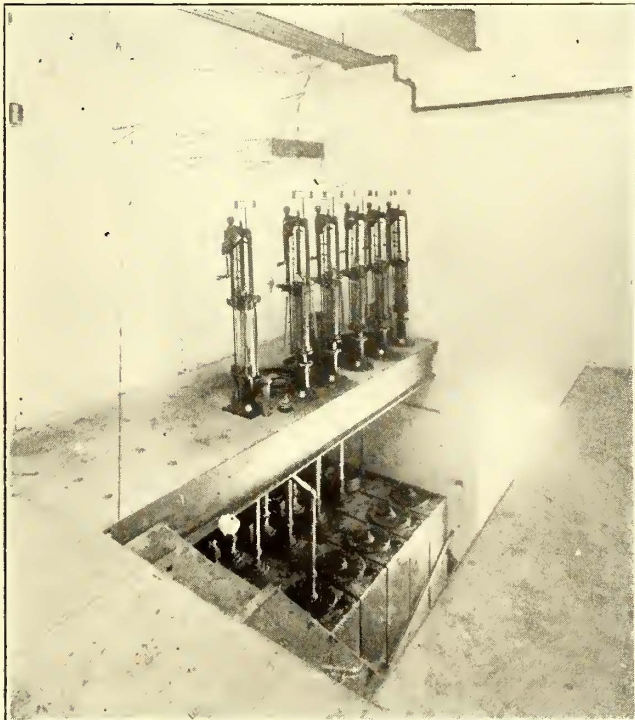


Fig. 26—Syracuse Shops—Oil Pumps and Tanks in the Oil House

and shop drawings. The facilities for filing drawings and for making blue prints are thoroughly modern. Tracings are filed in a cabinet in which they hang in small groups from horizontal rods supported on brackets, with engaging tabs, spaced at varying distances from the center. A pair of corresponding movable tabs is carried on the cabinet door, which is hinged at the bottom. The movable tabs may be set at any desired distance from the center by sliding a pointer at one side of the

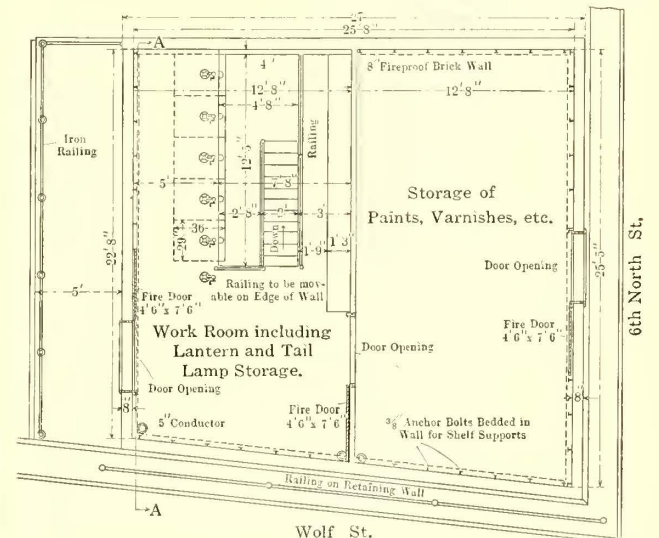


Fig. 28—Syracuse Shops—Plan of Second Floor of Paint and Oil House

and shop drawings. The facilities for filing drawings and for making blue prints are thoroughly modern. Tracings are filed in a cabinet in which they hang in small groups from horizontal rods supported on brackets, with engaging tabs, spaced at varying distances from the center. A pair of corresponding movable tabs is carried on the cabinet door, which is hinged at the bottom. The movable tabs may be set at any desired distance from the center by sliding a pointer at one side of the

case, connected to the cards controlling the movable tabs, and traveling over an index. When this block is set the cabinet door is opened and all groups of tracings back as far as the one desired are pulled down with the cabinet door so that the tracing desired is on the top when the door reaches a horizontal position, in which position it is supported by a swinging leg attached to the face of the door.

The tank in the blue-print room is fitted with a pair of rollers, like those of a wash ringer, to aid in drying the prints rapidly. The prints are hung over rods which are carried on angle irons set in the walls of a closet. Electric heaters are used for drying the prints placed in this closet. The blue-printing machine is of the Buckeye arc-lamp type.

THE OIL AND PAINT STORAGE

The fire risk of the installation as a whole has been greatly reduced by storing the bulk of all highly inflammable material in a separate structure about 150 ft. from the main building. This house is two stories high and covers an area of 33 ft. x 26 ft. 10 in. The walls are of brick and the floors of concrete, all framed with I-beams. The general interior view, Fig. 25, was taken during construction and shows a wooden stairway and some temporary light wiring on the wall. When the oil house is completed this wooden stairway will be replaced by an iron stairway. The general interior view, Fig. 26, does show a wooden stairway, but this, as well as the wires on the wall, was but temporary. Coburn fire doors protect the entrance on the ground floor and also the two doors, whose position is indicated on the plan of the second floor, Fig. 28. The building is well lighted by wire-glass skylights, of the same type as those used in the shop buildings. In addition there is a single 4-ft. x 7-ft. 6-in. door on the north side in the paint and varnish storage room. The south side has a 4-ft. x 7-ft. 6-in. door which leads to a railed concrete platform for handling stock. The view of the interior shows a portion of the steam heating piping which is supplied by means of underground duct lines from the boiler plant previously described. The drainage is carried off through tile ducts, as shown in the first-floor plan, Fig. 27. Ample provision also has been made for ventilation.

The ground floor is used principally for the storage tanks, which contain kerosene and different lubricating oils. The gasoline tank is placed underground at some distance from the oil house, so that the possibility of an explosion from this material causing great damage is remote. As shown in Fig. 25, the several tanks are controlled by six Bowser oil pumps which are located directly overhead. These pumps measure quantities from 1 pint to 1 gal. inclusive. Each pump carries a card showing the tank number and the kind of oil stored.

The second floor is divided into two sections by an 8-in. brick wall, as indicated in Fig. 28. Approximately one-half of this area is devoted to a room for the storage of paints and varnish. The doors of this room are locked, access being possible only to the authorized storekeeper. The rest of the upper floor has been fitted with shelves for tail lamps, signal lanterns, etc. The shelf brackets are adjustable for different sizes of supplies, as they are set in wall channels which are perforated at short distances like the channels installed in the main storeroom and the paint shop. Shelves of this type are also used in the paint and varnish room.

THE RECORD SYSTEM

All of the line, power and car maintenance records of the Syracuse Rapid Transit Company, the Oneida Railway and Utica & Mohawk Valley Railway are kept at the Wolf Street shops. The record forms of each company are of the same type, but to distinguish them from one another the Syracuse records are blue, the Oneida records pink and the Utica & Mohawk Valley records yellow.

Fig. 29 is a copy of the lineman's daily report as used on the Syracuse and on the Utica & Mohawk Valley systems. The form is used to show the work done either by individuals or wagon gangs. It will be noted that to each section are given a number and a letter in accordance with the job order system carried out by these companies. The letter signifies the class of work done. In this case, for example, the "D" means "over-

head trolley." The name or description of the work is written in only when it is not covered by a letter. These reports show exactly what material was used, the nature of the repairs and the names of the men employed. A report of this kind must be

signed by the superintendent of overhead lines before it can be transmitted to the general office.

Fig. 33 is a facsimile of a typical line trouble report. Such reports are made out by the emergency man answering calls and are intended to cover emergencies only, such as broken wires, limbs of trees down and fire calls near the lines of the company. They are not intended to include a record of work done, but simply to tell when the trouble was reported, when the crew arrived, when the line was cleared and when the crew returned.

LINEMAN'S DAILY REPORT

Wagon No. _____ Date 1/9 1911

Section 2504 D Arrived 7⁰⁰ A. M. Returned 12⁰⁰ M.
Work at Y
Repaired special work at Y

Material Used 25' 3/16" Span Wire
3 - 1/2" Chock Cars

Men Employed C. Otterbur, F. Fiske, J. Hall

Section 2517 D Arrived 1230 M. Returned 130 P. M.
W. Salena and Dimason Sts
Repaired broken trolley

Material Used 1 - 1/2" to 3/4" Splice Slens
1 - 1/2" Splice Slens

Men Employed C. Otterbur, F. Fiske, J. Hall

Section 2524 D Arrived 230 M. Returned 430 P. M.
W. Salena and Pearl Sts
Repaired trolley guard

Material Used _____

Men Employed C. Otterbur, F. Fiske, J. Hall

Signed T. D. Wilbur

Fig. 29—Syracuse Shops—Lineman's Daily Report

The description of shop forms used in connection with car maintenance properly begins with the daily shop report, Fig. 30. This form summarizes the work done in each department of the shop on different cars, the nature of the work done, which of the cars remained unavailable for service at 1:30 p. m. and other data. The necessary detail for minor repairs on a given

DAILY SHOP REPORT

CRIPPLER				O. K.		REPLACED		TROUBLE
A. J. A.	A. J. A.	A. J. A.	A. J. A.	NO. 1	NO. 2	NO. 3		
	620			520			FRONT STEP REPAIRED.	
S. R. T. RY. CO.								
	950		960				ATTITUDE, FIELD, AXLE BEARINGS, CONTROLLER, BRAKES.	
	900		900				CONTROLLER, COMMUTATOR, FENDER INSPECTION.	
	910		910				CONTROLLER, ATTITUDE, CHANNEL BOR, FIELDS, YOKES, BRUSHING.	
66			66				ATTITUDE MOTORS.	

CARS CHANGED SINCE 4:00 A. M.					
OFF	ON	LINE	TIME	REASON FOR CHANGE	REMARKS
760	758	Dudley	8:05A	Air	
608	908	Elmwood	8:35	Window broken.	
850	82E	Oak	9:08	Wire burnt off.	
950	94E	Greys	9:32	Broken window.	

CARS IN CARPENTER SHOP 63, 61E, 630, 76E, 823, 934.

CARS IN PAINT SHOP 2, 314, 323, 370, 516, 624, 64E, 706, 724, 729, 865.

CARS NOT READY FOR SERVICE AT 8:00 P. M. 60E, 736, 759, 809, 902.

CARS UNCALLED FOR AT 8:00 P. M. 66

DATE 1-6-11 SIGNED W. J. Bettye, Chief Eng'r.
 J. P. U.

Fig. 30—Syracuse Shops—Part of Daily Shop Report

car is recorded on a shop tag form, Fig. 31. One side of this shop tag gives the number of the car, when it was brought in and the trouble. That side of the tag which is reproduced shows what repairs were made and also gives the initials of the men who did each class of work shown.

The general daily report previously referred to is made up from the "cars changed" slips, Fig. 32, in addition to using the shop tags. The upper part of the "cars changed" slips showing the number of the car pulled off is made out by the dispatcher of the line, who forwards it to the carhouse foreman. The lower part of this form shows the number of the replacing car and under "Remarks" recites the trouble which was found

on the car pulled in. It should be understood that this form is used only for a record of car shifting in the car houses. If the trouble cannot be corrected at the carhouse the car must be sent to the shop, as noted on the "Cars Changed" slip.

The mileage of all cars is kept by the auditing department, which transmits this information to the shop. Mileage records are kept of wheels and axles, gears, pinions and armatures. It is also planned to keep truck records. The card record,

shops. If a car on the line is carrying one or more materials on tests its mileage is reckoned on a blue card.

All equipment is maintained on the mileage basis, but different intervals are in use according to the character of the apparatus. The carhouse inspection periods for the Syracuse Rapid Transit cars carrying Westinghouse 101 B equipments are as follows: 500 miles for controller, brakes, trolleys and general inspection; 1500 miles for oiling motors; 1000 miles for air equipment; 7000 miles for Whittemore gear lubrication; 25,000 miles for repacking bearings.

The following standards are in practice on cars of the Oneida Railway carrying GE-73 equipment: 1000 miles for general controller brake and miscellaneous inspection; 2000 miles for oiling motors and journals; 7000 miles for gears and pinions.

KEEP CLEAN

Shop Tag—Repairs

Car No. 750

REPAIRS MADE	BY
12 Armature Shimmied	
3 Axles & New field axle bearings changed	M. H.
#1 Controller Repaired	H. H. P.
Brake inspected	A. V.

Complete 10 A.M. 11/1 1911
P. R.

CARS CHANGED.

Jan 13 1911

Pull off Car No. 744
Line Dudley
Time due 7:02 P.M. at Long Dudley
Reason for Change Overload Switch

Signed John Binney
Notice Received 6:40 P.M.
Put out Car No. 774
Remarks Blowing heater no 2 Arm Striking Band off Inspected by J. Briggs Sent to Shop
Signed B. W.

SYRACUSE RAPID TRANSIT RAILWAY CO.

Mechanical Inspection Sheet

INSPECTION DATE 1911

USE "X" TO CALL ATTENTION TO REMARKS ON BACK OF THIS CARD

53	636	710	752	829	867
66	638	711	754	830	869
315	640	712	756	831	871
319	642	713	758	832	873
327	644	714	760	833	875
630	707	736	824	862	
632	708	748	826	863	
634	709	750	828	865	

INSPECTOR FOREMAN

Fig. 31—Armature Report Tag (Front)

Fig. 32—Shifter's Report on Pull-Offs

Fig. 35—Syracuse Shops—Mechanical Inspection Sheet

Fig. 34, shows the record of an armature, giving the dates when it was taken on and off different cars and trucks and what the nature of the trouble was in each case. This record does not show the mileage, but this can be obtained from the monthly mileage sheets prepared by the auditing department.

It should be mentioned here that no attempt is made to keep the packing of the journals on a mileage basis so far as the Oneida Railway is concerned. The journals on this company's heavy electric high-speed cars are always repacked whenever the wheels are changed and any other time when necessary.

LINE TROUBLE REPORT

LOCATION	RECORDED		Time	TROUBLE	TIME			REMARKS	Cleared by
	By	To			Arrived	Line Clear	Returned		
Salma & Union	Brant	Riley	11:35 A	Broken Trolley	11:45		12:00		Riley
Bureau Ave	Dot	Riley	12:25 P	" "	12:45	12:50	1:30		Riley
Scottland Ave	Leo	Southard	6:30 P	Broken Span	6:45		7:10		Southard
Fayette St	S. Barn	Southard	9:15 P	Car Off	9:25		9:55		Southard

Fig. 33—Syracuse Shops—Inspector's Report of Line Troubles

The mechanical inspection sheet, Fig. 35, checked daily by the mileage clerk, shows the numbers of the cars due for inspection, oiling, etc. On this sheet the carhouse foreman must check off the numbers of all cars which have been in-

The Syracuse Rapid Transit Company's standard car wheel is the National chilled cast-iron type. These wheels are bought on a 40,000-mile guarantee, but the general average is below this figure on account of flat wheels and other causes due to

Armature MILEAGE RECORD

TYPE 101 B NO. 496518 MARKER

IN	OUT	CAR	TRUCK	MILEAGE	TROUBLE
1/27/10	4/20/10	717	1-2		Flat Commutator
5/1/10	10/26/10	267	1-2		Grounded
10/31/10	1/13/11	267	2-3		Overhaul
4/17/11		714	2-3		

Fig. 34—Syracuse Shops—Armature Record

Car No. 646 Month JAN 1911

	Mileage	General Inspection	Oil Motors	Oil Journals	Repack Bearings	Air and Controller	Test Breaker	Gears
1	1751	X	X		2182.2	X X		5494.2
2	1553							
3	1839							
4	1829	X	X			X		
5	1942							
6	1829							
7	1829	X	X			X X		
Total	7602							

Fig. 36—Syracuse Shops—Inspection and Mileage Sheet

spected by his staff. Fig. 36 shows part of a record which has a line for each day of the month showing the mileage made by a given car and check marks indicating the work done.

purely local conditions. The average life in 1909 for 540-lb. wheels was 25,760 miles, and 27,000 miles for 425-lb. wheels.

One of the shop clerks keeps before him a series of cards, each accounting for a car which is in the shop or under special observation. Red cards are used for the cars in the different

During the same year the average life of several types of gears was 84,800 miles, and of pinions, 25,800 miles. The gear and pinion records covering the period of Jan. 1, 1908, to June 30, 1910, will give better aggregate averages than the fore-

going figures because they apply to equipments which were installed after a general overhauling of the system. The following table covers the records of Van Dorn & Dutton gears and pinions, as exclusively applied to the motors in the table:

Motor.	Gear Mileage.	Pinion Mileage.
Westinghouse 101	181,000	39,300
GE-1000	176,600	28,870
GE-67	144,900	24,740
GE-800	47,100	10,890
GE-54	34,500	21,210
Balanced average	102,000	24,230

A striking point in the foregoing table is the shorter life of most of the old equipments due to the fact that they were usually operated under overload conditions.

From July 1, 1910, to Oct. 1, 1910, all new gears and pinions, except the General Electric Company equipment for the GE-73 motors, were of Bliss manufacture. The Syracuse Rapid Transit Company now has made a contract with the Tool Steel Gear & Pinion Company, of Cincinnati, Ohio, to purchase gears and pinions on a mileage basis.

ONEIDA RAILWAY COMPANY Auditor's Office Copy

JOB ORDER

10-6-10 191

Mr. J. P. Barnes, A.E.E.

Please do the following work: Charge labor and material to Job Number 4318

Car #650 Overhaul trucks, air and electrical equipment
Overhaul body (Light) strip and trim
Preparatory work, touch up and varnish.

W. J. Harvie, Chief Eng'r.
B.

Fig. 37a—Syracuse Shops—Original Job Order

ONEIDA RAILWAY COMPANY Job Order Clerk Copy

JOB ORDER

10-6-10 191

Mr. J. P. Barnes, A.E.E.

Please do the following work: Charge labor and material to Job Number 4318

Car #650 Overhaul trucks, air and electrical equipment
Overhaul body (Light) strip and trim
Preparatory work, touch up and varnish.

W. J. Harvie, Chief Eng'r.
B.

	DATE IN	DATE OUT
Truck Shop		
Carpenter Shop		
Paint Shop		
Service		

Fig. 37b—Duplicate of Job Order for Job Order Clerk

The average life of trolley wheels on the Syracuse Rapid Transit System was 3500 miles during the year 1909. The wheels were of the Lumen "Ideal" type, 4-in. diameter. Some of the new wheels are 6-in. diameter and were furnished by the Star Brass Company. The usual trolley base tension of the Syracuse cars is about 25 lb. The Oneida Railway, which requires trolley wheels only when operating over connecting lines, uses 6-in. Lumen wheels at 40-lb. tension.

The Syracuse Rapid Transit System uses gray iron brake-shoes exclusively, whereas steel-back shoes made by the American Brake Shoe & Foundry Company are standard on the Oneida system.

The following table shows the average daily mileage of different classes of cars of the Syracuse Rapid Transit System for the year 1909:

Number of Cars.	Type.	July, Aug. and Sept.	Rest of the Year.
75	D. T. Closed	138	138
2	D. T. Open	63	0
34	S. T. Open	73	0
28	S. T. Closed, Brill	36	105
22-26	S. T. Closed, Barney & Smith	75	55

With regard to the foregoing table it should be stated that single-truck cars are used only for tripper service so far as possible. The Syracuse company has recently added 23 double-truck pay-as-you-enter cars in addition to the 75 double-truck cars mentioned in the table.

JOB-ORDER SYSTEM

The job-order system is used by these companies on all shop orders except straight maintenance which exceed \$5 in value for labor and material. Job orders are used to cover all overhauling, painting, varnishing, etc. Thus all repairs on a job order will be charged against the number of the order as the car goes through the shop. Departmental work is kept separate by letters, as is the practice in the forms of the line department; thus, job No. 4318-A means carpentry work; 4318-B, trucks and brakes; 4318-C, air equipment; 4318-D, electrical equipment; 4318-E, strip and trim; 4318-F, preparatory work such as getting the car ready for painting; 4318-G, painting and varnishing; 4318-H, clean off brass. The job order which describes

ONEIDA RAILWAY COMPANY

JOB ORDER

10-6-10 191

Mr. J. P. Barnes, A.E.E.

Please do the following work: Charge labor and material to Job Number 4318

Car #650 Overhaul trucks, air and electrical equipment
Overhaul body (Light) strip and trim
Preparatory work, touch up and varnish.

W. J. Harvie, Chief Eng'r.
B.

Date in 191 Date out 191

Description of work done

Note—As soon as the work called for on this order is completed it is to be properly filled out with detailed statement of work, signed and turned in to office.

Fig. 37c—Triplicate of Job Order for Foreman Doing Work

SYRACUSE RAPID TRANSIT RAILWAY COMPANY.
LABOR PERFORMED AND MATERIAL USED AT SHOPS ON SPECIAL JOB ORDERS.
November - 1910. 11 Mos. Ended Nov. 30 - 10. Year to Date.

JOB NO.	forward	LABOR	MATERIAL	LABOR	MATERIAL	TOTAL.
		789 88	24806 05	3007 64	151964.44	154972.00
4218A Reprs. to Body Car #650		7 96	7 01	14 40	8 28	22 68
B " " Trucks		88		15 65	16 43	21 08
C " " Air System		2 74	11 77	2 74	11 77	14 51
D " " Elec. Equip.		11 40	8 61	53 64	29 76	65 40
E Strip and Trim		9 17		10 62		10 62
F Preparatory Work				34	4 75	5 09
G Paint and Varnish		30	1 02	32 04	24 75	56 79
4319 Reprs. to Body Car #860		2 10	3 18	13 44	7 13	20 57
B " " Trucks		2 69	27	11 53	23 63	36 16
D " " Elec. Equip.		10 02	53 44	20 88	108 96	129 84
E Strip and Trim		5 18		5 71		5 71
F Preparatory Work				51	2 01	2 52
G Paint and Varnish		12		22 36	9 58	31 94

Fig. 38—Syracuse Shops—Monthly Summary of Job Orders

the work is made out in triplicate. The original copy, Fig. 37-a, goes to the auditor's office; the second sheet, Fig. 37-b, goes to the job-order clerk and is printed to show the name of the shops where the work is begun and completed. The third copy, Fig. 37-c, which goes to the foreman whose shop is to do the work, has space for the description of the work done when the foreman returns his slip to the job-order clerk. Each foreman gets a separate job-order slip so that no two descriptions are on the same sheet. The job-order clerk assembles the information shown on the several slips to close the job order on the books. The slips are then filed for reference.

The work on a given job order is entered in a monthly job-order book, which consolidates all labor and material items. The character of this record is shown by the accompanying reproduction of the costs of different classes of work done on job orders Nos. 4318 and 4319, Fig. 38. The completed jobs are listed separately in this book according to months. It is not necessary to give any more information than this, as any further details can be found by referring to the original slips.

New Shops of the Chicago Railways Company

These Shops Cover a Ground Area of More Than 6½ Acres and in Considerable Part Were Built During 1910

IN the last issue of this paper an account was published of the general plan and purpose of the new shop equipment of the Chicago Railways Company. A short description was also given of the carpenter and paint shop building and of the mill and erecting shop building. Particulars follow of the other departments with some details of the shop practice of the company.

SHOP EQUIPMENT AND PRACTICE

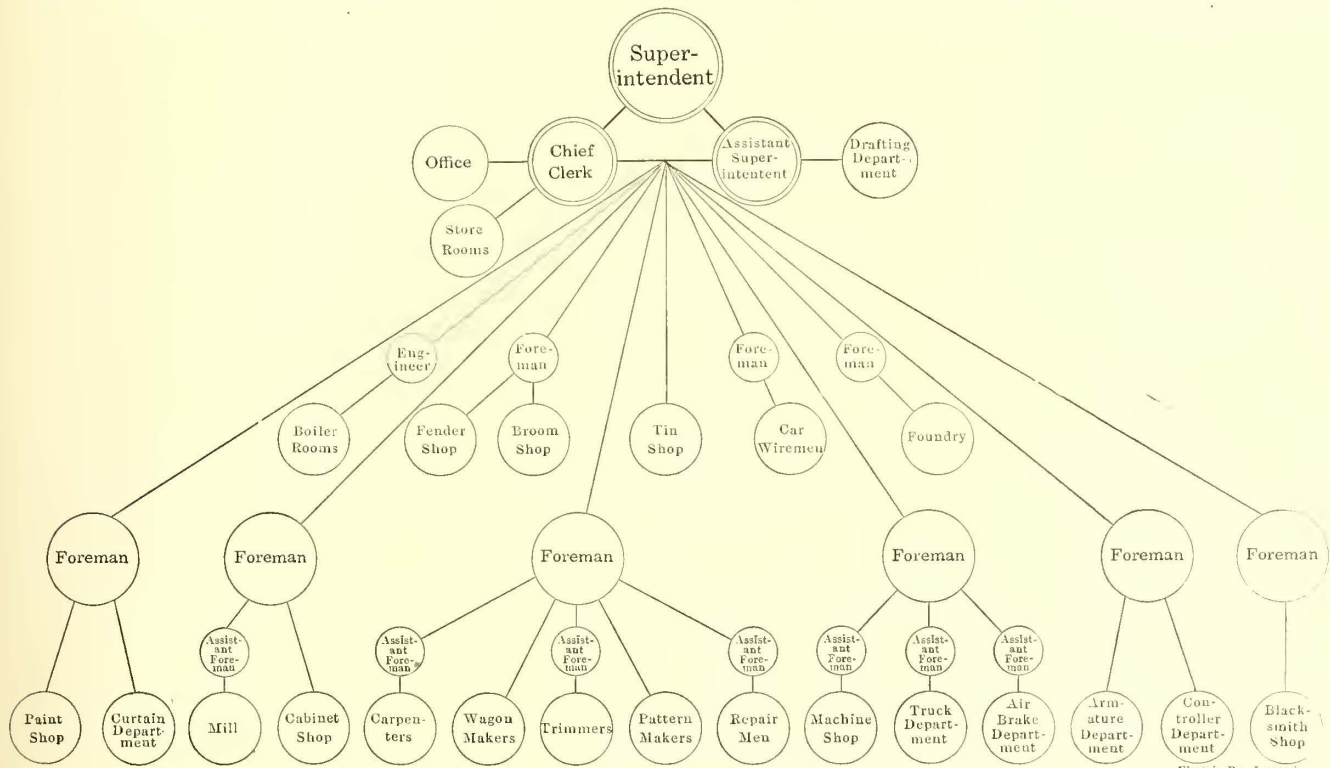
The new shops of the Chicago Railways Company have a most complete equipment of tools and shop fittings. During the past year more than 100 motor-driven machine tools have been purchased and installed in the machine and wood shops. Also, the shop forces have applied independent motor drive with push-button control to all of the older tools that were used

bay, and this is served by a 10-ton cage-operated Whiting crane and a 5-ton General Pneumatic Tool Company crane.

To systematize the repair work the floor space of the truck repair shop is subdivided about as follows: One-third storage and heavy running gear repairs, one-third wheel repairs, one-sixth truck repairs and reconstruction, one-twelfth motor repairs and one-twelfth air-brake repairs. The work is so arranged that parts may be handled progressively and, as completed, may quickly be delivered to the service track leading to the carpenter and erecting shop.

REBUILDING TRUCKS

In addition to regular maintenance work the truck and machine shops are completing the rebuilding of the trucks for 328 reconstructed double-truck cars. At present three trucks



Chicago Railways Shops—Diagram of Organization of Car Shops

Electric Ry. Journal

previous to the reconstruction period. The great variety of work which these shops are prepared to do not only in maintenance but in car construction makes a description of the shop equipment and practice of particular interest. Each of the important shop sections and its special equipment will be described.

TRUCK AND WHEEL SHOP PRACTICE

The truck repair shop is 332 ft. long, inclosing nine tracks extending from end to end of the building. All tracks are served by a transfer table at the middle of the shop. This transfer table passes beneath the runways for overhead traveling cranes.

Motors and trucks for rebuilding and repairing are received on the transfer table and then are distributed by electric cranes. The motor and truck bay has three cranes, two of Niles manufacture of 10-ton capacity each and one of Case manufacture, with two independent 5-ton trolley hoists. The Niles cranes are cage-operated. Wheel work is done in the center

are being rebuilt each day. This work of reconstruction includes the placing of new truck side frames of heavier design, new or reworked transom bars, new end bars and new brake beams and rigging. The old journal boxes are replaced with Symington boxes and the center bearings with the Symington ball-bearing centerplates, which are standard for this road. Carnegie rolled-steel wheels, 34 in. in diameter and weighing 525 lb., are standard for the Chicago Railways and are placed on the axles of the rebuilt trucks. Solid gears manufactured by the Tool Steel Gear & Pinion Company also are used on all new and rebuilt cars. Each week, as a part of its regular maintenance work, the truck shop repairs and strengthens eight trucks of the Pullman 150 type. This work includes the replacement of the wheel pieces with parts of heavier design, the replacement of the transom wearing pieces, installation of Symington ball-bearing center bearings, new bolster pins, new axle collars and the replacement of trussed brake beams with flat-brake beams and new hangers and springs.

The portable equipment of the shop includes three rivet heaters. Each heater comprises an oil furnace mounted on a two-wheel carriage carrying a 10-gal. fuel-oil storage tank. Air-hose connection is provided. The truck department uses three Keller air hammers for chipping and three Thor No. 9 air riveters. A row of stock bins 300 ft. long has been built along the wall of this shop, near the track repair pits. These bins hold stocks of small castings; bolts and other minor parts of the running gear are kept ready for use by the truck repair men near by. Two 16-in. twin-wheel Ransom grinders, each

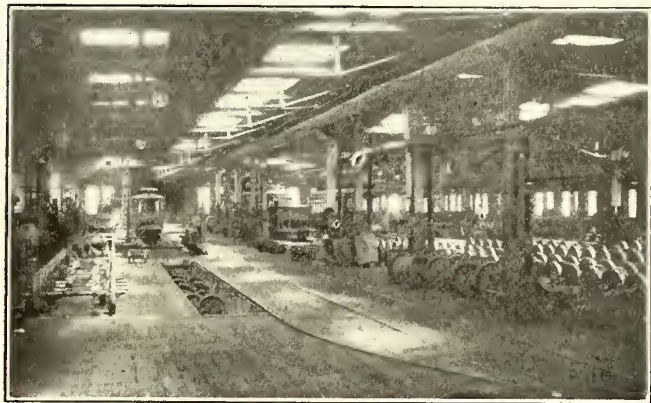
clearance is not at least $\frac{1}{8}$ in. on top and $\frac{5}{32}$ in. on the bottom, other pole pieces are put in to obtain these clearances. New commutator opening covers similar to those on the 216 motor but made in the Railways Company's shops are applied to all of the old GE-70 motors.

The motor-cleaning and testing section of the truck shop is located at the southeast corner and is provided with six work stands which support the motors at a height of about 18 in. above the floor. These stands are about 8 ft. long. Three of these stands are used for stripping motors and three for assembling. Each of the stands has two drawers, one on either side, in which scrapers and other tools are kept. The drawers are fitted with locks and the men are required to take care of their tools before leaving at night. Power cables and a controller are provided close to the assembly stands so that motors may be run for about five minutes before they are approved for mounting on the trucks. The circuit-breaker on this testing outfit is set at 60 amp.

WHEEL TURNING

The principal equipment of the wheel section is a William Sellers wheel lathe, direct-driven by a 35-hp Westinghouse variable-speed motor. This lathe is installed on a concrete foundation into which a sheet-iron trough has been built. This trough catches the tire turnings and furnishes a path by which they easily can be raked into a cart standing at the end of the lathe in a pit. When this cart is filled with turnings it is picked up by the crane and carried away to be dumped outside.

The large wheel lathe has two turret heads and its tail stock is moved by an independent motor. The control of the driving motor is governed by a reversing controller and also by two snap switches mounted on the frame of the lathe close to the operator's position. One of these switches serves to stop the lathe instantly and the other to reduce to half-speed while the lathe tools are passing through hard spots. The speed of the Sellers lathe is 16 ft. per minute and the wheels are turned with a $\frac{3}{8}$ -in. feed, using high-speed steel tools. One machinist and a helper turn about 10 pairs of wheels in a working day of nine hours. The wheels are brought close to

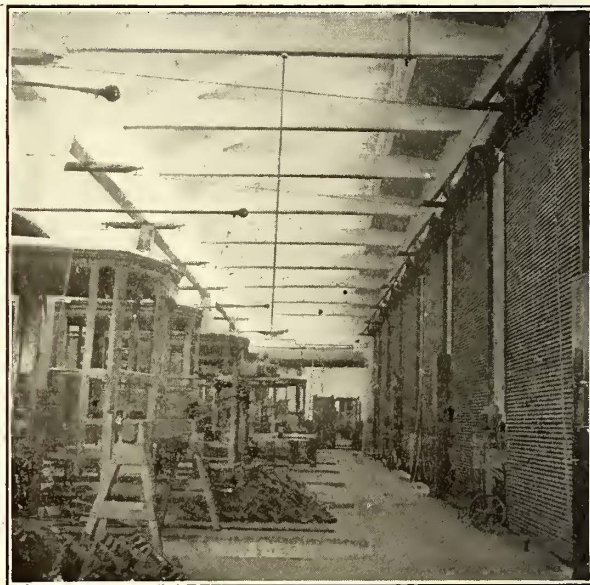
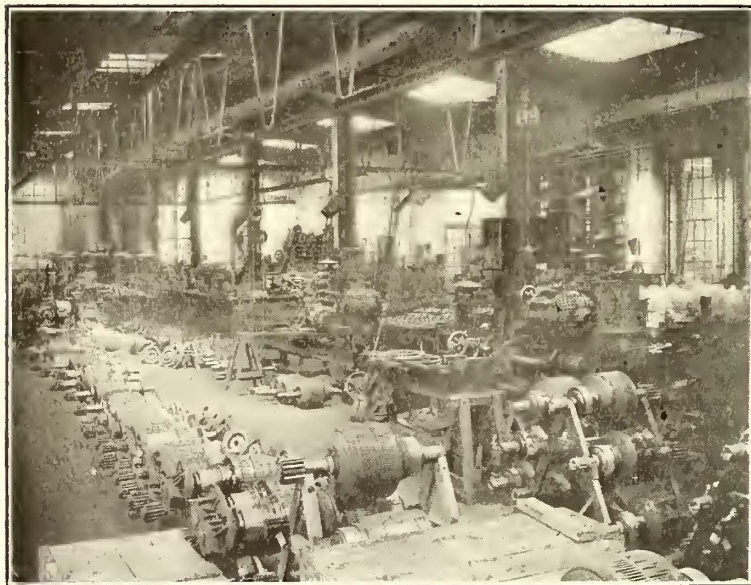


Chicago Railways Shops—Wheel Shop

driven by a 5-hp motor, have been installed at opposite ends of the truck shop to facilitate fitting truck castings and other parts.

CLEANING MOTORS

The motors on the trucks of the cars which are being rebuilt are given a most complete overhauling. They are the GE-70 and GE-80 types. The motor shells are entirely stripped and are cleaned with scrapers, steel brushes and kerosene. All cracked or worn-out parts are filled in with new steel applied by the oxy-acetylene process by the Chicago Welding Com-



Chicago Railways Shops—View in Armature Room and of End Aisle of Carpenter Shop, Showing Roof Design

pany. It is stated that 80 per cent of the GE-70 motor frames have been strengthened in this way. The axle-bearing housings on the GE-70 motors are rebored and new bearings inserted, particular care being taken to obtain the proper spacing between the gears and pinions. All field coils and armatures are sent in to the electrical shop for testing and repairing. Pole pieces are removed from the shell and all parts thoroughly cleaned. When the pole pieces are assembled they are first gaged to assure the proper clearance, and after assembly, if the

the lathe by one of the traveling cranes and are placed in the lathe by a pneumatic hoist mounted over the lathe frame. Three-part bushings are placed over the journals and centered in the stocks; then the driving dogs are adjusted to close contact with the sides of the wheel tires and next the motor-operated tail stock is moved inwardly until the spring clutch on its motor slips. This driving in of the tail stock sets the dogs firmly in the wheel.

The lathe has two turret heads, in each of which are four

tools. In the order of their application to the wheel these tools are: (1) tread roughing tool, (2) flange roughing tool, (3) forming tool which gives the tread or bevel of 1 in 16, and (4) a beveling tool for the outside edge of the tread which gives it a taper of 1 in 10. Records of the contour of all wheels are taken before and after turning. A strip of solder is used to get the contour and its outline is traced on a record slip which is given the foreman. Permanent records of the service given by wheels are kept on record cards of the forms illustrated. These cards are 7½ in. x 5 in. in size and will show data and measurements for four turnings.

AIR-BRAKE REPAIRS

The air-brake repair work is centralized within a railed inclosure at one end of the shop. The equipment here includes a double bench with fittings for making service tests. Brake cylinders also are inspected at this location. A car air-compressor outfit has been installed under the workbench so that an independent supply of air is available for testing valves and gages. Electrical connections to this compressor are so arranged that governors also may be tested. After engineers' valves have been reground they are tested by holding the outlet under water while the inlet is under air pressure and the valve in the lap and running positions. Careful records are kept by the repair men of work done on all air-brake parts. The air-brake and repair men make out a daily report to the foreman of the truck and of the machine shop. This report shows the number and types of compressors and parts received during the day and from what station they have been received. It also shows in detail the reason for making repairs, and it lists the work done on air motors, governors and compressor parts.

A row of stock bins about 20 ft. long has been built against the side wall close to the air-brake repair department. A supply of brake repair parts is kept in these boxes easily available for maintenance work. The man in charge of the brake repairing notifies the shop foreman when the stock in any of the bins is getting low.

The door tender of the truck shop has a bench close to his door and he assembles and reshapes worn controller fingers. This door tender also keeps track of the reserve supply of brake rods and rigging parts stored near him and in addition



Chicago Railways Shops—Pattern Storage Room with Steel Adjustable Shelving

gives the machine and truck shop foreman daily advice as to how many wheels of each kind are ready to be delivered to the carhouses.

The trolley-pole assembly and repair work is done at a bench on one side of the truck shop. This work requires all of one man's time. His working equipment includes a motor-operated drill press. He has stock supply bins for trolley wheels, harps, bases and miscellaneous parts.

MACHINE SHOP EQUIPMENT AND PRACTICE

The machine shop is centrally located between the armature, forge and truck shops. It has floor space 228 ft. x 72 ft. subdivided by two central rows of columns. This shop is of particular interest because of its very complete equipment of tools, all of which are driven by independent motors. A general view of the shop interior was published last week. The absence of overhead shafting will be noted.

A gear and casting cleaning tank has been installed between the machine and truck shops. This tank has a cage in which 10,000 lb. of dirty castings may be lowered into a bath of hot soda water.

The tools of this shop include those from the old shop, which

DESCRIPTION OF WHEELS		MILEAGE RECORD	
Turnings	Flange worn to	Upper Car	Lower Car
Before Turning	After Turning	No. Weights	Applied
First Turning	Flange worn to Cause of turning		
Second Turning	Flange worn to Cause of turning		
Third Turning	Flange worn to Cause of turning		
Fourth Turning	Flange worn to Cause of turning		

Chicago Railways Shops—Wheel Record

have been equipped with motors and control. In addition to these are a number of new tools purchased during the reconstruction period and designed for independent motor drive. Practically all of the shop tools are driven by Reliance motors and a large number of the units have the Monitor control. Each tool may be started or stopped with push buttons located at one or more convenient points on the tool frame within reach of the operator.

The following statement includes most of the machine tools, together with some notes regarding their use, characteristics and motor equipment:

Ten drill presses with independent motors. Three of the drills are radial, 2 ft., 4 ft. and 5 ft.; one multiple drill press (Moline), 1-hp motor, variable speed.

Gisholt horizontal boring machine with power-operated table, 5-hp motor.

Two 21-in. Gisholt turret lathes used most of the time for finishing bearings. Bearings are finished with Davis micrometer boring bars, one of which has been purchased for each of the turret lathes and two for the car-wheel boring mills. By the use of these bars a great deal of unnecessary calipering is avoided, since the cutters can accurately be set with the micrometer adjustment to any desired diameter. These tools do not need renewing when worn to a shorter length than the diameter of the bearing. Each of the Gisholt turret lathes has one 5-hp and one 1-hp variable-speed motor connected to the lathes by "silent" chains.

An 18-in. bearing lathe, 3½-hp motor.

Automatic tapping machine, maximum diameter ¾ in., 1-hp motor, and a six-spindle nut tapper, 3 hp. On front of the nut tapper is a group of Lyon sheet-steel compartments, 40 in number, into which the completed nuts are sorted as made. Each of the compartments in this sheet-steel case is 10 in. x 12 in. x 16 in. in size. At intervals the nuts are taken out with a shovel and carted to the stock room in a wheelbarrow.

Broaching machine, 3-hp motor. This company manufactures its own brush holders and yokes and uses the broaching machine to finish accurately the parts of these and other brass castings.

American planer with double head, 15-hp motor.

Two other planers, each with a 5-hp motor. Axle-bearing shells are finished on one of these planers. A cast-iron form has been provided for holding seven shells onto the bed of the planer so that both edges of all may be planed at one time by using two tools.

Cincinnati No. 4 milling machine, 10 hp. Kempsmith No. 5 milling machine, 5 hp. A similar machine is used in the tool-room. Two Pratt & Whitney hand-milling machines, 2-hp motors.

Stockbridge 18-in. shaper, 5 hp.; keyset cutter with 32-hp motor.

Hamilton 42-in. lathe, 15-hp motor, and nine lathes each with a 5-hp motor. Two axle lathes, equipped with 7½-hp and 10-hp motors.

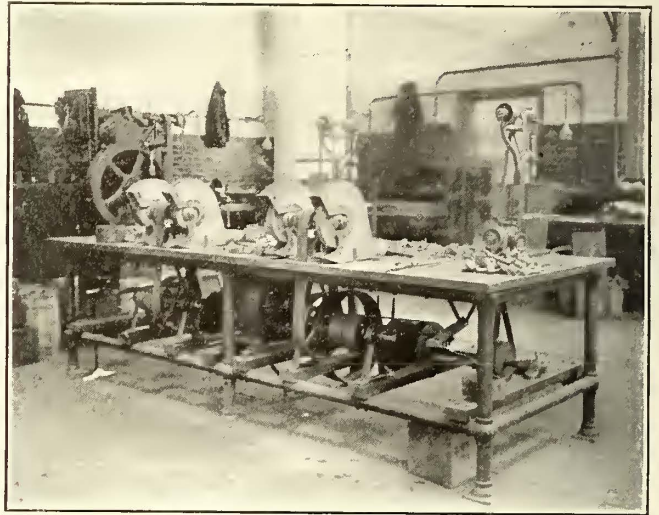
Two screw machines, 1-in. and 2¼-in. capacity, 2-hp and 3½-hp motors respectively.

Three bolt cutters, one with a double head, 5-hp motors.

Combination punch and shear, capacity 1 in. x 8 in., 7½-hp motor, and combination punch and shear, 3 in. x 3 in. billet capacity, 15-hp motor. Punch used for making controller-handle

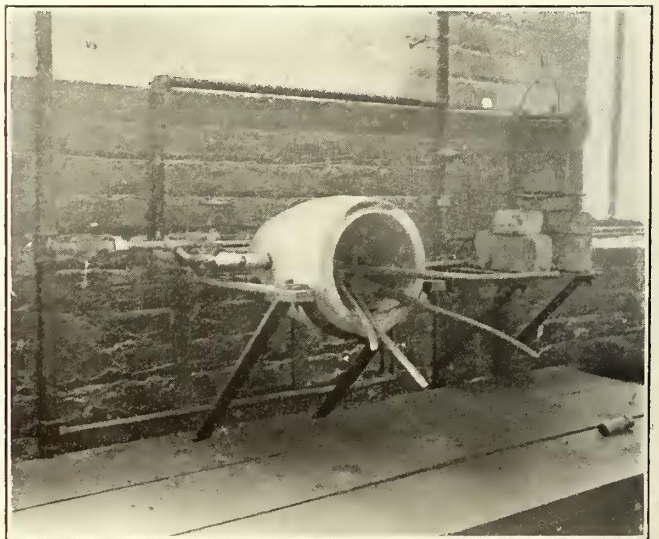
through the aisles. Also, at the time of the shop reconstruction benches were specially arranged according to the work required with hand tools.

Along the west side of the shop a bench 75 ft. in length is fitted with small tools and supply cases for the men who do the work of finishing controller parts, overhead fittings, brush holder parts and similar small work on soft metals. Opposite



Chicago Railways Shops—Group of Motor-Driven Tools for Brass Working

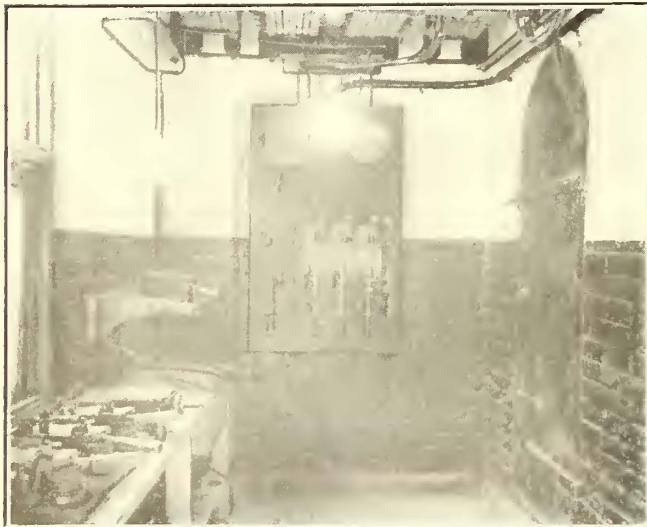
this assembly bench is a row of sheet-steel cases into which supplies and finished parts are sorted for use or delivery. All of the small copper and brass parts are made with jigs and templets. Tempered tool-steel jigs are provided for use in the manufacture of those details which are finished by filing. A proving jig is used for checking the assembly of brush holders before delivery. Near this assembly bench are the broaching machine, planers, milling machines, shapers and a buffing and polishing bench equipped with two emery and two polishing wheels and three small drill presses. A view of this bench is shown. The motor which operates the tools on this bench is placed underneath the bench. In connection with this bench



Chicago Railways Shops—Home-Made Furnace in Wood Mill Toolroom for Heating Tools

is a direct-connected exhaust fan which removes the dust from the grinding and polishing wheels.

The bearing department is located near the group of turret lathes and is provided with a wall bench about 100 ft. long. Five men are employed in finishing bearings and one man does all the fitting.



Chicago Railways Shops—Circuit Breaker Test Room

release springs and general work. Four punches with individual 5-hp motors.

200-ton axle straightener.

Burr key-way cutter.

Cold saw, 24 in., with 5-hp motor.

Water emery wheel, 5-hp motor. Two Ranson twin emery wheels, 5-hp motors.

Three car-wheel borers, driven by 7½-hp motors and having 1-hp motor-operated wheel hoists. Davis boring bars are used in these borers.

Fifty-ton hand-operated arbor press. One 200-ton and one 100-ton wheel press.

Two hack saws driven by one 5-hp motor. Band metal saw used for cutting off gates.

Rumbler for brass castings.

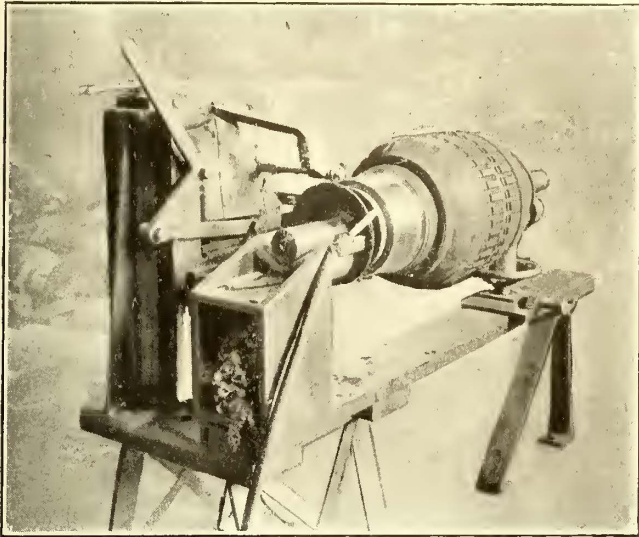
Portable stands for holding tools and small supplies are used in the machine, paint and carpenter shops. These stands have three shelves, each about 16 in. x 30 in., and are mounted on castors.

GROUPING OF MACHINES

At the time the machine shop was reconstructed and individual motors were applied the location of the machine tools was rearranged according to a definite plan of grouping, which permits the regular repair and manufacturing work to be conducted by this shop with a minimum movement of materials

MACHINE SHOP TOOLROOM

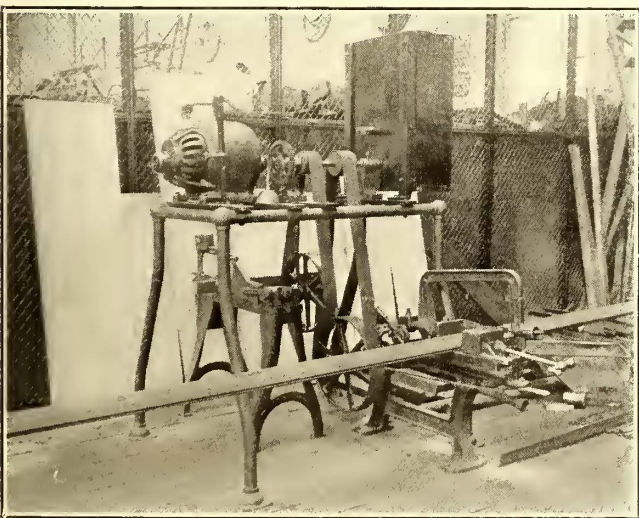
The toolroom of the machine shop is located near the middle of the building and is inclosed by a substantial steel cage reaching 20 ft. to the ceiling. The toolroom occupies a floor space of 70 ft. x 20 ft. and has a single entrance through a door that is kept locked. The fitting of this toolroom with sheet-steel shelving, drawers, counters and miscellaneous inte-



Chicago Railways Shops—Commutator Slotter

rior fittings was done by the Lyon Metallic Manufacturing Company, of Aurora, Ill.

The machine tool equipment of the toolroom includes a Universal milling machine driven by a Reliance 2-hp motor; Pratt & Whitney 16-in. toolroom lathe with a 5-hp motor; Yankee drill grinder; Universal grinder with 1¼-hp motor; sensitive drill press designed for four speeds driven by a 1-hp motor, and a Universal shaper with a 5-hp motor. The toolroom fittings include substantial benches of oak having locked drawers fitted with trays designed for storing different tools used in the toolroom. The tools which are kept in stock for distribution in the machine shop are stored in sheet-steel cases and drawers which were designed particularly for this use. A



Chicago Railways Shops—Motor Installation for Driving Two Hack Saws

system of brass checks is used to keep track of the location of each tool taken out of the toolroom.

Across one end of this room is a set of sheet-steel compartments for the storage of jigs and dies. This group of compartments is 20 ft. long by 6 ft. high and each section is about 2 ft. deep. The assortment of jigs and dies kept here for

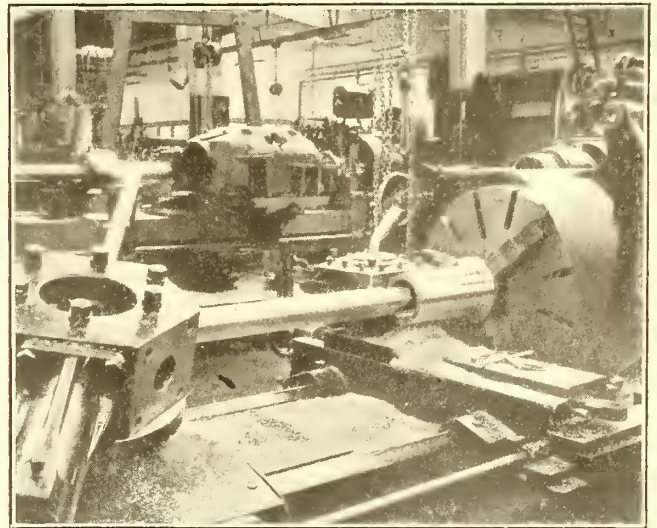
machine-shop use is very complete. It includes jigs for finishing brush holders on milling machines, for drilling brake levers, jigs for punching and cutting off controller finger springs with one operation, numerous dies for making all small parts of the electrical equipment and for general shop use. The jigs and dies have all been manufactured at this shop and with a view to averting accidents each die block is equipped with a spring trigger to throw out automatically the finished pieces.

ELECTRICAL SHOP EQUIPMENT AND PRACTICE

The electrical shop and armature room occupy a floor space 150 ft. x 50 ft. adjoining the machine shop. An industrial railway connects both of these shops with the shop storeroom, which is a three-story slow-burning building located near by. All of the principal tools in the shop and the intervening aisles are served with an equipment of Yale & Towne overhead trolley hoists provided with turntable junctions. A general view of the armature room is shown on page 566. Some of the more important tools in this room and their uses are as follows:

Hydraulic press for shaft and pinion work. The pump on this press is electrically driven, or, if desired, may be operated by hand. The latter method is used for the more delicate work, as in placing commutators. It is the practice to press on 2½-in. pinions at 10 tons and 2¾-in. pinions at 15 tons.

The banding machine in this shop is similar in design to those used by one of the motor manufacturers. It is con-



Chicago Railways Shops—Boring Bar Used for Finishing Bearings in Turret Lathe

trolled by a treadle operating a clutch which connects the 2-hp motor with a worm-driving gear.

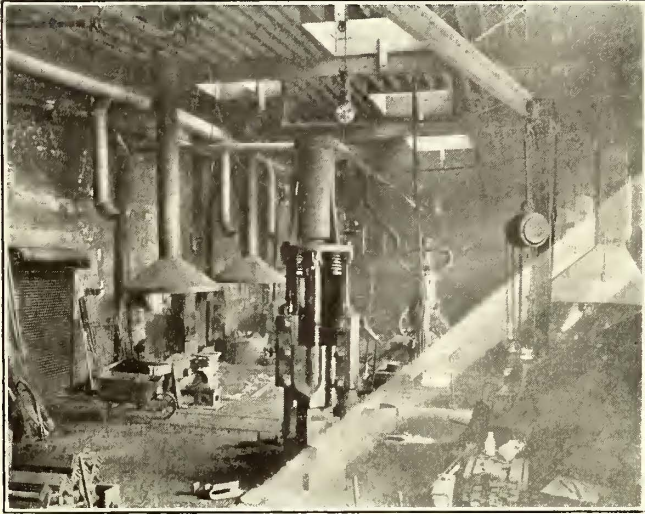
The commutator grooving machine has a 1¼-in. saw driven by a ½-hp motor. Beneath the saw is an adjustable horse for supporting armatures in the grooving position. The motor and saw are mounted on a carriage which may be moved backward and forward on a guide plate by a lever controlled by the operator. A small air nozzle keeps the dust away from the operator.

The lathe equipment of the armature shop includes one 20-in. and one 26-in. lathe, each with a 3½-hp motor. A Whitney milling machine driven by a 2-hp motor is used for general work and for cutting commutator segments and milling commutator fingers so that arcing pieces may be inserted. Contact fingers for controllers and circuit breakers are finished from copper castings made in the shop foundry.

Thirty-three men are employed in the armature shop. They do all the electrical car repair work for the entire equipment of the road, which includes approximately 2160 cars in daily service. All new coils are wound in the shop and before insertion in the slots are heated in electric ovens so that the insulation will be soft and pliable and may be forced into the slots without injury. Two electric ovens, which are small

portable devices, have been used for this purpose in these shops for a number of years. Each oven consumes about 2.75 amp at 500 volts.

When armatures are banded they are first put in the bake oven and thoroughly heated. After banding they are not returned to the oven. The banding wire when applied to a heated armature is more easily placed tightly around the slots, and when the armature cools the wire is put under additional tension. To this practice is attributed the great freedom from

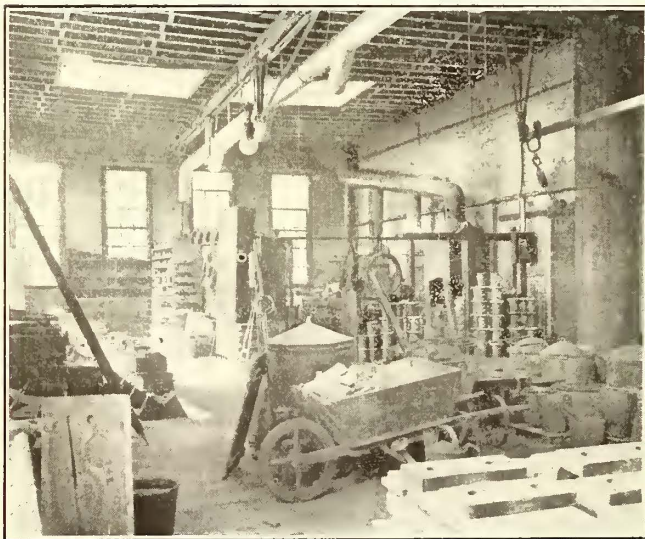


Chicago Railways Shops—Blacksmith Shop

band-wire troubles. A Century field tester is used in this shop and is said to give excellent results.

A reheating fixture is used for setting new insulation in reconstructed controller speed rolls.

Auxiliary contacts are being applied to all of the K-28 controllers used by this company. These are inclosed in iron hoods fastened to the back side of the controller cases and mechanically connected with the speed rolls. The contacts control the operation of independent contactors placed underneath the car bodies so connected as to break the arc on the first controller notch and at the transition point.



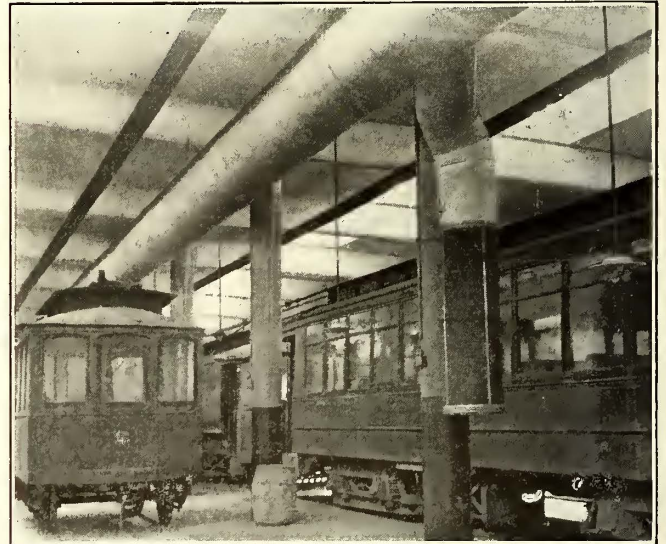
Chicago Railways Shops—Foundry

A special table with disappearing winding pins operated by a foot treadle has been built for rewinding strip-iron resistance.

Electrical heater coils are rewound on an attachment to the field-coil winding lathe. A chuck speeded to about 1500 r.p.m. drives a $\frac{3}{8}$ -in. steel rod which is 9 ft. long, and around which the heater wires are wound. To wind the coils automatically and smoothly a specially devised clamp for guiding the wire

onto the revolving rod has been made. This clamp is made of two pieces of $\frac{1}{2}$ -in. fiber about 3 in. x 6 in. in size. These pieces are hinged at the bottom, where a rod carrying a 5-lb. weight is attached. The hinged fiber pieces clamp over the revolving rod and have a thread groove cut in the opening between them. In winding a coil the wire is first given two or three turns about the rod and then the fiber clamp is screwed snugly in place about these few turns. Then, as the rod revolves, the coil adjusts itself to the thread grooves in the fiber pieces and acts as a screw, thus keeping the clamp moving along the rod at just the right winding pitch for additional coils. Bearings are inserted and removed from armature heads by a special screw press designed and built in these shops.

A circuit-breaker testing board has been installed in these shops. It is the practice to test breakers in their operation position before remounting on a car. The circuit-breaker testing equipment includes a master breaker, an ammeter and a series of load switches mounted on a slate panel. The switches are so connected with resistances that four different loads up to 450 amp may be obtained. Then by the use of an auxiliary switch an additional load varying by multiples of 15 may be applied up to 75 amp. The breakers to be tested are placed on a shelf mounted on trunnions, so that after connections have been made the shelf and the circuit breaker



Chicago Railways Shops—Outlet of Heating Duct in the Erecting Shop

bolted to it can be revolved into the position corresponding to that of regular operation.

BLACKSMITH SHOP AND FOUNDRY

The forging department has a floor space 114 ft. long by 32 ft. wide. A view of a portion of this shop showing the heating and ventilating pipes is reproduced. The equipment in the blacksmith shop includes nine forges, over each of which is a hood surmounted, above the roof, by a 16-in. Kernechen ventilator head. Two similar ventilators 12 in. in diameter exhaust the air from each of eight monitor skylights in the roof of this shop. In addition to this method of ventilation the blacksmith shop is furnished with hot air in winter and cold air in summer from a forced ventilating system having outlets near each forge.

The equipment of tools in the blacksmith shop includes three Ferguson oil furnaces, two No. 4 and one No. 2, supplied by the Railway Materials Company, and one home-made oil furnace which has openings on opposite sides, so that long pieces may be heated in the middle. This furnace is useful in straightening steel car sills. The oil furnaces in these shops consume about 1000 gal. of crude oil each week. The oil is stored underground outside of the shop. Other blacksmith shop tools include a No. 3 Acme forging machine and a

No. 6 Ajax forging machine. These tools are driven from line shafts extending across the blacksmith shop and through the partition wall into the machine shop, where independent motors are connected. It was thought that the motors might be damaged by the heat and dirt if installed closer to the forging machines. Two American steam hammers, one of 1500 lb. and the other 600 lb., and a 600-lb. Bradley hammer are installed near the center of the shop. Each of the larger tools in the blacksmith shop is served by a jib crane carrying a Triplex block. A steel locker is provided for each employee.

The foundry occupies a space 32 ft. x 75 ft. and its floor is paved with wooden blocks. One-quarter of the foundry is set off by a steel fence as a babbiting room. General brass and copper casting is done in the remainder of the foundry. A view of this department is shown. The equipment includes four crucible furnaces and four babbit melting furnaces, all supplied with induced draft, a crane for handling heavy ladles and a core oven.

CARPENTER SHOP

The design of the paint and carpenter shop building has been described. The equipment of the carpenter shop necessarily consists largely of the usual complement of hand tools, benches, horses, etc. In addition this shop has two twin Ransom motor-driven emery wheels, two benches equipped for assembling metal car fittings, a series of steel racks and boxes for a local stock of car hardware, six carpenters' benches and a warming table and gluing outfit for the cabinet makers. A view in one end of the carpenter shop showing the saw-tooth roof and reinforced concrete girders is shown.

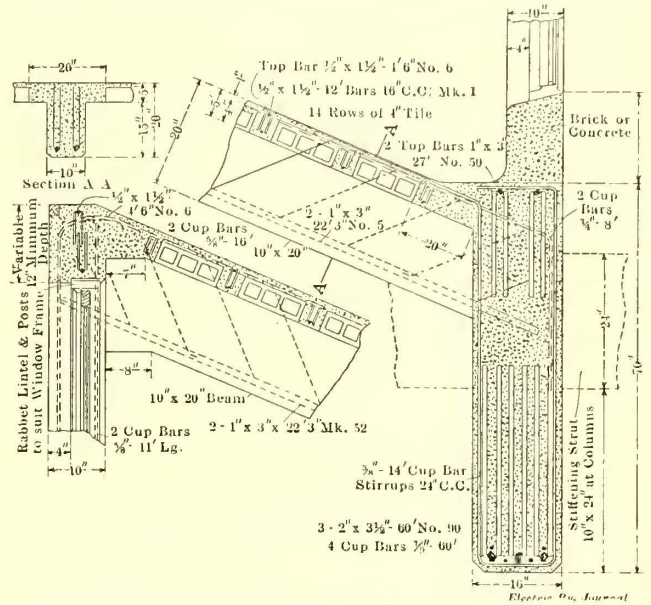
PAINT SHOP

The paint shop proper includes the building adjacent to the carpenter shop. This building has two annexes, each 158 ft. long, one of which is two stories high. More than 2000 cars were put through the paint shop during 1910. Of the company's equipment 650 cars have steel panels. Before paint is applied to these cars it is necessary thoroughly to clean the steel because of the rust action which sets in quickly. This is done with sand blast. When received in the paint shop steel-sided cars are first given a coat of steel preservative paint. This is followed with three or four coats of steel surfacer rubbed down to a smooth finish. With some inexperienced rubbers it is the practice to apply a black guide coat over the surfacer so that a definite indication will be had as to whether it all has been rubbed. After rubbing two coats of olive-green

above the trough and out onto a set of drying racks. The construction of the carpenter and paint shop building itself is shown in two sectional engravings on this page.

PAINT SHOP ANNEX

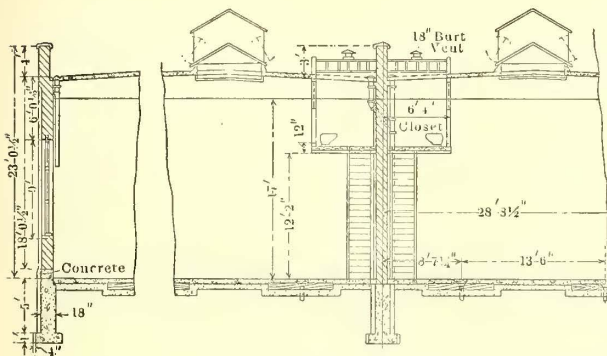
The two-story fireproof annex to the paint shop is used as a glass storeroom on the first floor and for curtain and sign rooms on the second floor. The curtain-room equipment includes two power-operated Singer sewing machines and one twin emery wheel. A special folding machine has been built for making four-ply canvas strap which is used in place of



Chicago Railways Shops—Detail of Roof Girder—Carpenter and Paint Shop

leather for supporting car cables. About 3000 ft. of this strap is used each month. Canvas is cut and folded into four-ply about 1 in. wide and then sewed with two rows of stitching. This material is said to be more satisfactory than leather because it has a longer life when subject to wheel wash.

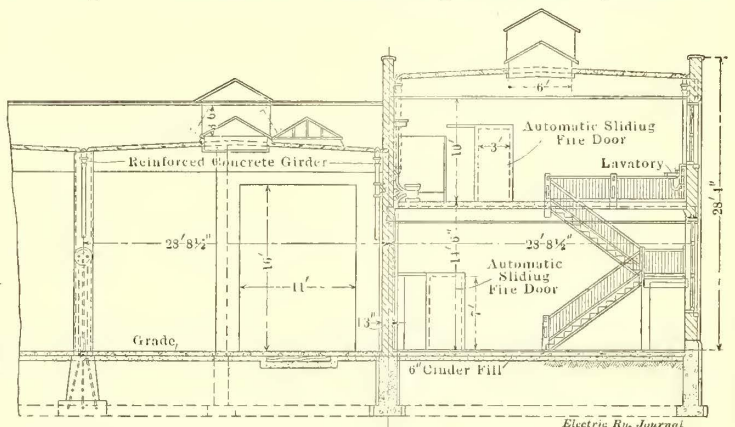
Two men are employed in the sign shop stenciling destination signs and run numbers. Very favorable results are obtained with destination signs made of white cloth glued over light wooden frames. The wording is indicated by white let-



Chicago Railways Shops—General

color are applied and the gold-leaf decorations are placed. Plain gold-leaf striping is applied with rollers. For all lettering and monograms on the cars duplex or double-paper Meyercord transfers are used. After the lettering and decorations have been applied two coats of body varnish are spread with 24 hours' time intervening. The interiors of the cars are cherry wood stained mahogany color and rubbed down to a dead finish.

In fitting up cars a large amount of beading is used because no old beading is put back. Before beading is placed it is dipped in a long trough, then pulled through a plush wiper



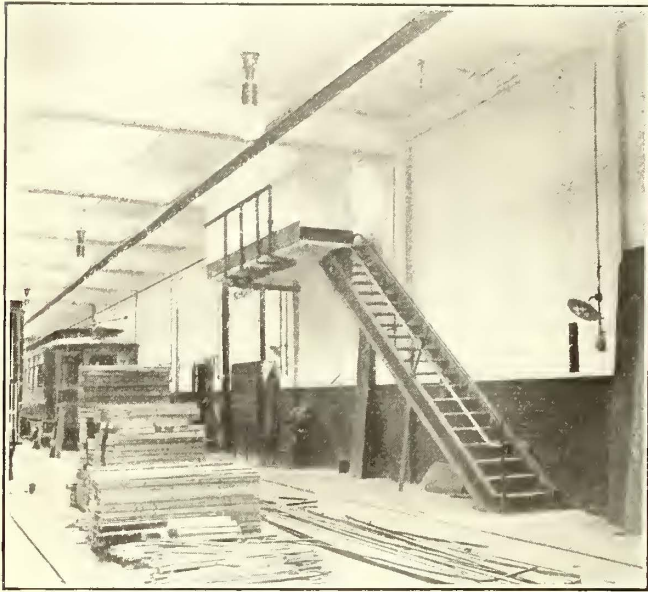
Cross Section of Paint Shop

ters on a black background. On a great many cars where the routes are not changed these destination signs are used in place of the roller signs and an economy in maintenance results. The transportation department requires nearly 5000 run numbers each year. These are iron disks about 6 in. in diameter painted black and showing a white number. They are carried on the front of a car.

In the second annex to the paint shop are the finishing room and the paint stock room. Entrance to these rooms is had through fireproof vestibules with double automatic fire doors. The finishing room is equipped with a large number of racks

designed to hold all the sash for one car. The racks are mounted on castors so that when the sash are ready for delivery a rack may be rolled into the paint shop.

A bake oven, 15 ft. x 7 ft. in floor area and built of hollow tile, forms a part of the finishing room equipment. In this oven, which is heated by steam, are placed all the small car



Chicago Railways Shops—Elevated Toilet Room

parts which have been enameled, so that they may bake under a slow heat.

PAINT STOCK ROOM

The paint stock room is 50 ft. x 55 ft. in floor area and is a thoroughly fireproof room open to the air on three sides. A series of steel cases and lockers extends around two sides of the walls. The lockers are fitted with shelves designed for the systematic storage of small or valuable stock.

The naphtha and gasoline supply is kept in two 400-gal. tanks

The stockroom is heated by hot air from the general heating system of the shop and also by a series of steam coils which are used in the fall and spring to keep the paint shop warm when the general hot-air heating system is not in operation.

Compressed air is used in the stockroom for a number of operations. Paint in barrels is stirred by means of forcing air through a hollow stirring rod; the delivery of air at the bottom of the barrel serves to mix the paint quickly and thoroughly.

Varnish, turpentine and oil are stored in seven tanks mounted on a raised platform. Each tank has a capacity of six barrels. The large tanks are filled by the use of the compressed air and special portable pipe fittings.

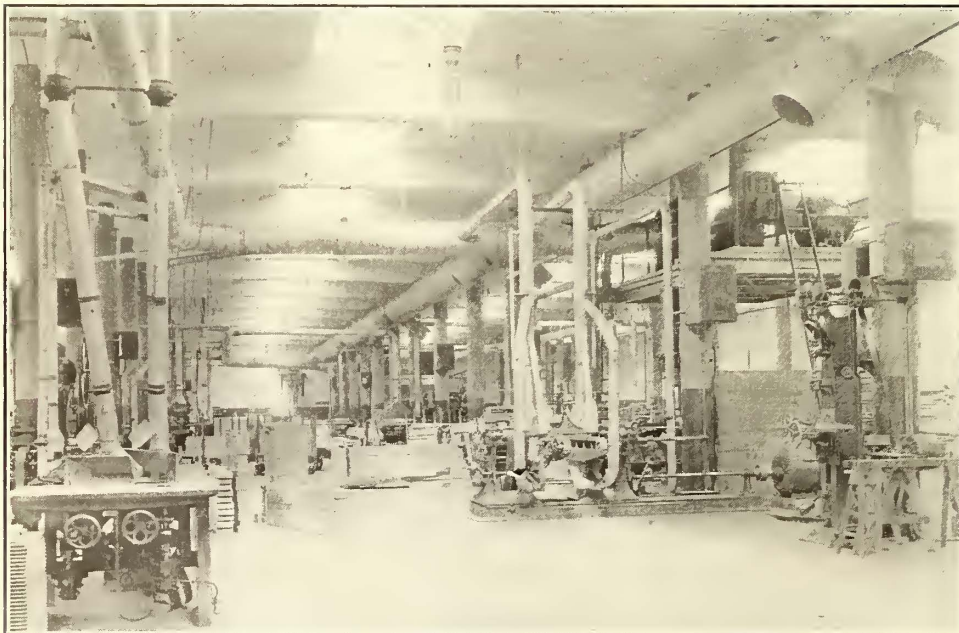
WOOD MILL

The wood mill of the new Chicago Railways shop occupies three-fourths of one bay in the newest building and is 114 ft. wide by 272 ft. long. This floor space is undivided except for a toolroom which has been partitioned off at one corner. The woodworking machinery in the mill includes fifty-six new tools, each with independent motor drive.

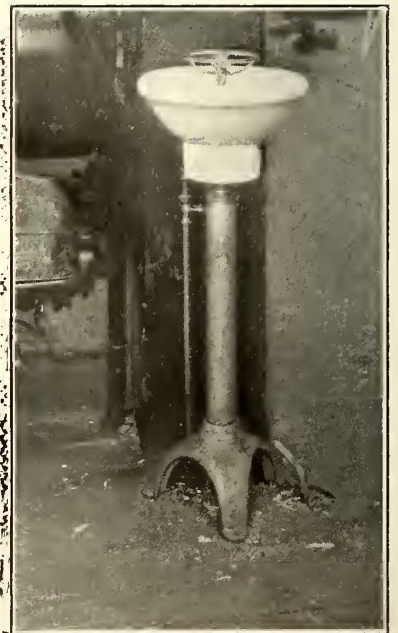
Exhaust piping with inlets at each of the woodworking tools keeps the shop floor free from shavings and sawdust. The system of exhaust pipes is subdivided into three parts, each with its separate fan and motor. The motors have capacities of 20 hp, 25 hp and 50 hp and are operated continuously throughout the day until the shop has been cleaned at night. The shop compressed-air system has outlets at every other post in the wood mill and hose and nozzles are attached so that all machines can easily be cleaned and the dirt blown into the exhaust system.

The accompanying view of the wood shop shows only part of the machines in one of the four aisles. In this mill all the machines are arranged for successively passing the work from one end of the shop to the other.

Timber for working in this mill may be delivered by running cars directly into the shop or by driving wagons among the machines. The timber is first cut up at the north end, then passed through the rip saw and planers to the tenoner and stickers and then to the sand-papering machine and miscellaneous smaller finishing machines. During its progress from one end of the shop to the other the material is carried from machine to machine on small wheel trucks, of which there



Chicago Railways Shops—Center Aisle of Wood Mill



Sanitary Drinking Fountains

buried underneath the concrete paving in the yard outside the building. Gages within the stockroom indicate the level in these tanks. Openings are provided in the pavement above the tanks so that wagons can drive directly over them and quickly transfer the oil to the tanks. Two hand pumps serve to draw the oil from the storage tanks into the stockroom.

are 36 in the wood mill. The finished product of the wood mill is delivered to the adjoining cabinet shop or across the street to the carpenter shop.

The equipment in the woodworking shop includes the following motor-driven machines: A carver and molder, 3½-hp motor; American door molder or sticker, 5-hp motor; Her-

mance 12-in. molder, 15 hp; combined ripping and molding machines, 12-hp motor (these machines are arranged with an intervening table so that fender slats may be cut and molded with one passage); a 9-in. molder, 10-hp motor.

Greenlee timber mortiser to cut square holes up to 2½-in., 15-hp motor; Fay & Egan hollow-chisel mortiser, 6-hp motor; H. B. Smith mortiser, 2-hp motor.

American Universal twin saw with tilting table, 5-hp motor; American tilting frame band saw, 8-hp motor; two smaller band saws, each with a 5-hp motor; double-head saw, 5-hp motor; Universal saw, 10-hp motor; self-feed rip saw, 6-hp motor; rip saw, 6 hp; rip saw capacity, 24 in., 12-hp motor; self-feed rip saw, capacity 8 in., 10-hp motor; cross-cut saw, 6 hp; Greenlee automatic cross-cut saw, capacity 12-in. timbers, 15-hp motor; McDonough resaw, capacity 26 in., 30-hp motor; cross-cut saw, 7½-hp motor; Fay & Egan jig saw, 2-hp motor.

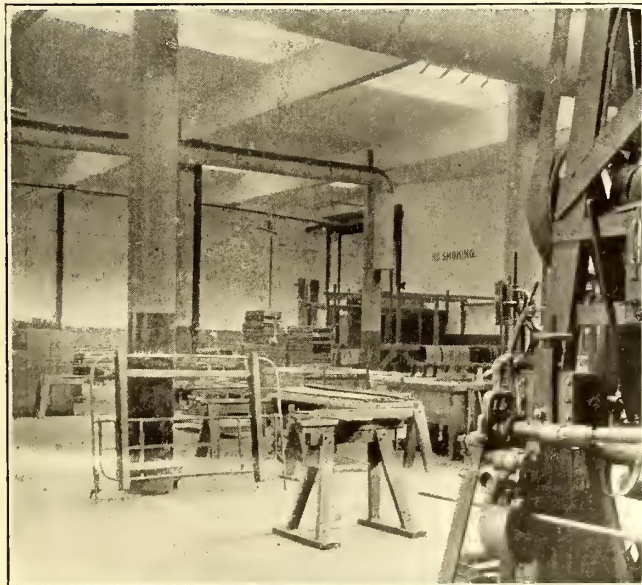
Greenlee boring machine, 3-hp motor; Greenlee gang boring machine, 10-hp motor. A special jig built in the shops and having centering plates is used for making broomsticks for snowsweepers in this boring machine. The jig is so arranged that the holes automatically are spaced correctly and the rows are staggered. Fay & Egan boring machine, 6 hp.

No. 1 Boss timber sizer, capacity 12 in. x 20 in., 40-hp motor; Baxter & Whitney 36-in. surface planer, 15-hp motor; 30-in. planer, 10-hp motor.

Greenlee Universal woodworker, 7½-hp motor; Porter jointer, 5-hp motor; 24-in. joiner, 3½-hp motor; Greenlee sash and door rabbeter, 7½-hp motor; dovetailing machine, 3-hp motor; doweling machine, 14 in. to 1¾ in., Fay & Egan, 5-hp motor.

Tenon and gaining machine, Greenlee, capacity 12 in., 15-hp motor; three tenoners, each with 5-hp motor; Hays double-head tenoner, 15-hp motor; three shaping machines, each with 5-hp motor; panel raiser, 5-hp motor; Columbia 48-in. 3-roll sander, 20-hp motor; upright spindle sander and small hand-feed sander, both with 2-hp motors.

The equipment of the wood mill tool room includes steel lockers and tool cases of Lyon manufacture, the group being 40 in. high and 34 ft. 4 in. long. At one corner of the wood mill a east-iron steam chest, 18 ft. long and 2 ft. in diameter, has been installed for use in bending wood. The steam chest is made of wrought iron and provided with two sets of interior supports, so that pieces for three separate jobs may be



Chicago Railways Shops—Fender Shop

steamed at one time. The steam chest has two live steam inlets placed on top at opposite ends and an outlet placed at the center underneath. The chest is made of three east-iron sections, each 6 ft. long.

WOOD MILL TOOLROOM

A toolroom, 30 ft. x 48 ft. in size, has been set off from one

corner of the wood mill by a steel grating. In this room are a number of automatic machines, including the following:

Power-driven tools for stretching large band saws preparatory to brazing; two grinders for planer knives; an emery wheel with independent motor; two automatic band-saw filers, and an automatic sharpener for circular saws.

The shop force has installed a gas furnace in which brazing



Chicago Railways Shops—Cabinet Section

tools used in joining band saws may be heated. This furnace consists of a crucible about 12 in. in diameter with air and gas connections to burners extending through holes cut in the sides.

MILL ANNEX

The annex to the wood mill is two stories high and includes the cabinet shop, about 325 ft. long, on the ground floor, and an equal space on the second floor subdivided into broom, tin and pattern shops and a pattern storage vault. The broom shop equipment includes steam tanks to soften the broom material and pipe racks of sufficient size to hold twenty broom sections at one time for filling. The broom sections are dipped and the ends are strengthened with through rivets.

Adjoining the broom shop is the tin shop, which is equipped with four workbenches, two cutters, one folder and a number of steel racks for storing small supplies.

The pattern shop is equipped with a wood lathe, planer and a band saw. Adjacent to the pattern shop is the pattern storage room, 96 ft. x 27 ft. in floor area, shown on page 567. This room is reached by a single entrance and is designed to provide the maximum protection against fire. Patterns are stored in ten steel racks, each 8 ft. high and 20 ft. long, having adjustable shelves. This storage equipment was built by the Lyon Metallic Manufacturing Company.

A view of the cabinet shop is shown. This shop has an equipment of steel storage cases for small parts, a gluing and drying section and five workbenches. One end of the cabinet shop is fitted with steel racks for the storage of window screens during the winter and storm sash during the summer. About 26,000 each of sash and screens have to be handled each spring and fall.

FENDER SHOP

A fender shop with a floor space of about 75 ft. x 90 ft. adjoins the wood shop. The equipment of the fender shop includes a number of motor-driven tools, among which are pipe reamers, pipe cutters, pipe threaders, an emery wheel and two drill presses. Three types of fenders are used by the Chicago Railways. The large new cars are equipped with the H. B. fender and older cars have pipe frame fenders with wood slats.

The shop adjoining the wood mill has a track capacity for 72 large double-track cars. At the present time this shop, which is subdivided into two bays, is used as an erection shop.

Adjoining the fender shop and close to the boiler house is a dry kiln, 16 ft. x 30 ft. in size. This kiln is connected with the wood shop by a system of industrial railway tracks, which also serves the adjoining ash-storage room.

New South Bend Shops of Murdock Lines

This Shop Does the Repair and Heavy Maintenance Work on the 100 City and Interurban Cars of the Chicago, South Bend & Northern Railway and the Southern Michigan Railway.

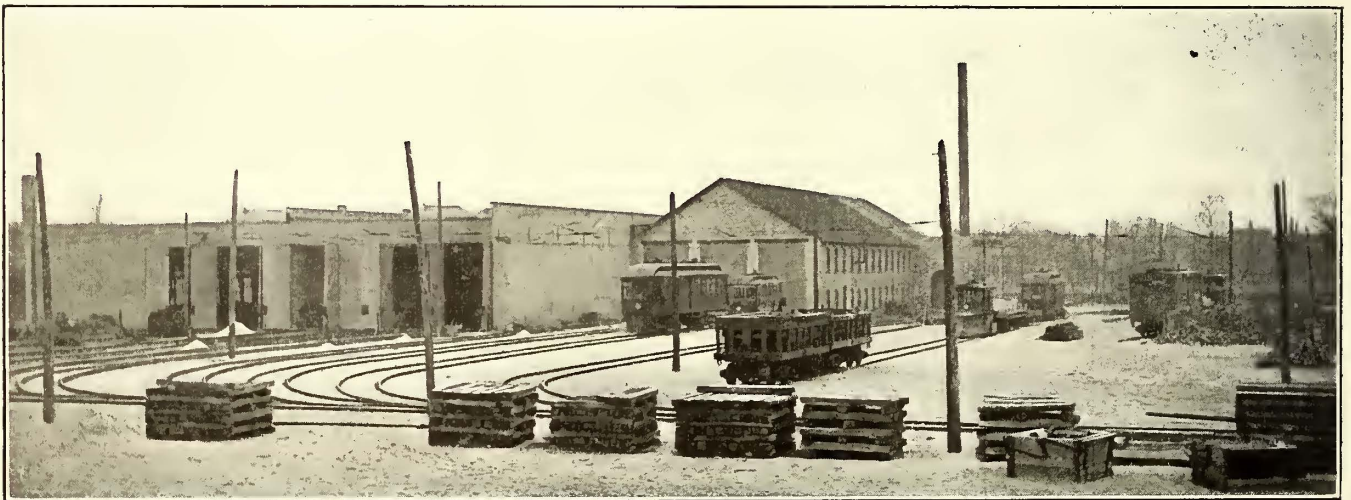
THE mechanical department of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway companies, which are jointly operated, has recently moved its equipment into a large new shop located close to the business center of South Bend, Ind. This shop does the repair and heavy maintenance work on the 100 interurban and city equipments of these two roads. The construction of the shop building was executed under plans prepared by Thomas R. H. Daniels, consulting engineer, Indianapolis, Ind. Several interesting features have been installed to provide for quick and economical handling of heavy car bodies, trucks and equipment. Fred M. Weld was master mechanic at the time these shops were designed and many of his ideas are incorporated in the building arrangement. Accompanying engravings reproduced from construction drawings illustrate the general features of design.

GENERAL ARRANGEMENT

The new shop consists of three principal bays subdivided according to the needs of the work. At the front end of two of

exception of the side walls and the roof, to suit the needs of the shop work.

The main shop and car-storage sections of the building are built with a steel roof structure supported by built-up columns inclosed in 13-in. brick walls. The floors and foundations are made of concrete, reinforced where necessary. The reinforced concrete is made of a 1:2:4 mixture of Portland cement, sand and screened gravel. The reinforced concrete floors were built by first putting down a 5-in. layer of 1:2:5 mixture of concrete. Then a top dressing, 1 in. thick with a sidewalk surface, was added and subdivided by semi-joints into squares containing not more than 20 sq. ft. each. The specifications for the cement used in the construction of these shops were carefully drawn and required that briquettes of neat cement 1 in. in section should develop a total strength of 400 lb. in seven days, having stood one day in the air and six days in water. A cross-sectional view shows the arrangements of the foundations for the steel work and the pit tracks. The side and end walls of the new shops are laid with first quality common brick in Port-



South Bend Shops—Portion of Storage Yard

the bays are sections of the buildings set off for an office, armature room, lavatory and stockroom.

The entire group of bays covers a ground space approximately 165 ft. x 225 ft. A repair bay incloses two tracks extending its full length and is 66 ft. 6 in. wide in the clear. The adjoining bay now is used as an interurban carhouse, but is available for shop purposes whenever the growth of the system may require it. It is 48 ft. wide and incloses four tracks. The third bay is 47 ft. wide and incloses three tracks. This bay is subdivided by a cross partition into two sections, one used as a paint shop and the other as a washroom. The stock room is 29 ft. x 61 ft. 4 in. in plan and has a second story. Adjoining the stock room and close to the main entrance to the shops is an office 12 ft. wide x 29 ft. long. The armature room, located at one corner of the building, to obtain daylight on two sides, is 14 ft. x 21 ft. in size.

TYPE OF BUILDING CONSTRUCTION

Because these several departments are installed in adjacent bays particular care was taken in designing the building to make the partition walls of fireproof construction. The section set off for the paint shop and washroom formerly was a part of the power house and has been entirely rebuilt, with the

land cement mortar, except the exposed faces both interior and exterior, which are laid with hard-burned brick. The window sills, cornices and the decorative parts of the exterior structure are made of Bedford limestone.

The roof trusses for the repair section are supported by the outside wall, an intermediate row of columns and the fire-resisting division wall between the repair and car-storage sections. The design of the roof trusses in the two sections is similar. These trusses are subdivided by skylights for daylight illumination of the center of the bays. The steel work over the smaller division of the repair shop section carries a runway for a 15-ton motor-operated crane.

The specifications for the structural steel work included the following test requirements:

"Tests: A copy of the chemical analysis of the finished material of every melt, determining the percentage of phosphorus, shall be furnished by the contractor and certified at the mill by the chief of the chemical department.

"Two test-bars for machine tests shall be cut from the finished material of each melt, and tested in their natural state, without annealing. These test-bars shall be of standard size and shape, and of at least 1/2 sq. in. section. The elongation

shall be measured on 8 in. of the original length, which shall include the break.

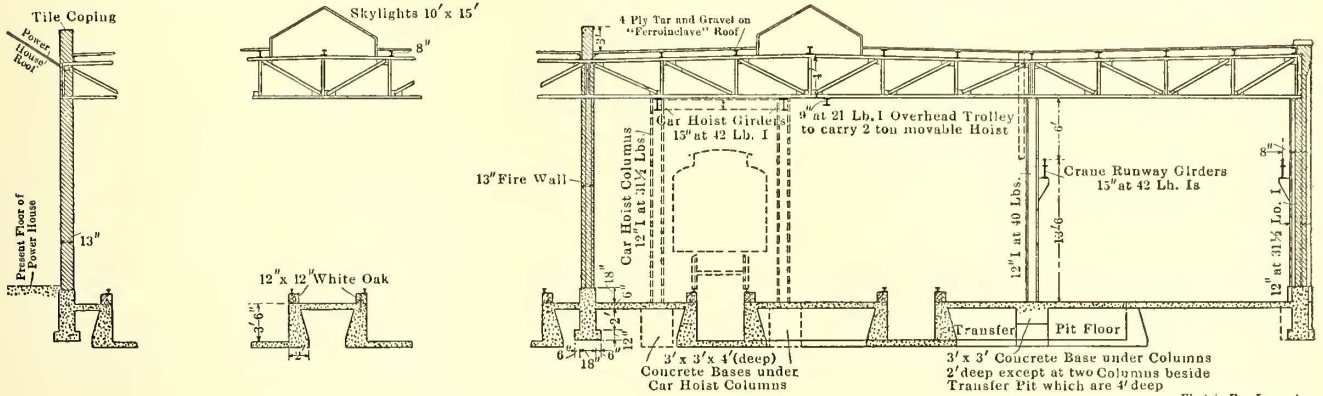
"Test-bars as above, broken slowly in the machine, shall meet the following requirements:

	Ultimate unit strength, lbs.	Elastic limit, lbs.	Elongation 26%	Reduction of area 52%
Rivet steel.....	48,000 to 58,000	$\frac{1}{2}$ ult. strength		
All other steel....	56,000 to 64,000	$\frac{1}{2}$ ult. strength	23%	46%

"The entire fracture shall be silky and of uniform color.

was covered in a thorough way with Dixon's graphite paint.

The roof is made with four-ply tar and gravel on Ferrocilave roofing. The specifications called for No. 24 Ferrocilave sheets coated on the upper side with a mixture of one part of cement and two parts of sand having a thickness of $\frac{1}{2}$ in. above the metal and coated on the under side with the same mixture, including as much hair as necessary to make it adhere properly and applied to a thickness of $\frac{3}{8}$ in. The total thickness of the concrete portion of the roof, including the

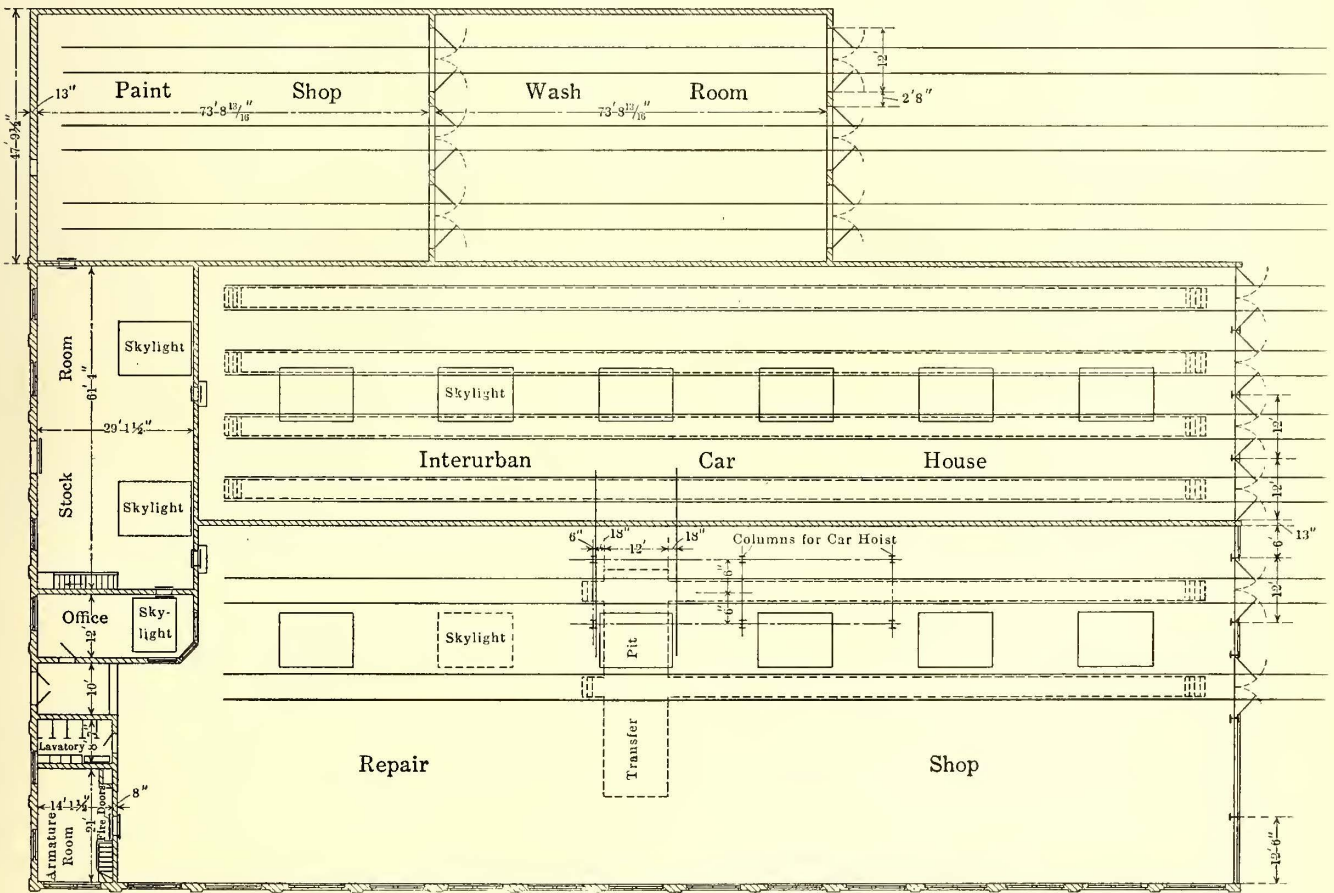


South Bend Shops—Cross Section of Car House and Repair Shop

"A piece of each test-bar, whose thickness is at least $\frac{5}{16}$ in. after being heated to a cherry red, and quenched in water at 80 deg., shall stand bending 180 deg. to a curve whose diameter is equal to the thickness of the piece without fracture. In the

material held within the folds of the reinforcing, is $1\frac{3}{8}$ in. The tar and gravel covering for the roof was applied under the following specifications:

"The tarred felt shall weigh not less than 14 lb. per 100



South Bend Shops—Plan of Car House and Repair Shop

case of rivet steel, the test-bar shall stand bending flat on itself without fracture.

"The material, labor and appliances required for the tests shall be furnished by the contractor."

Before erection the steel work was given one coat of protective paint and after the erection all of the metal work

sq. ft., single thickness. The pitch shall be the best quality of straight run coal tar pitch distilled direct from American coal-tar, and there shall be used not less than 200 lb. (gross weight) per 100 sq. ft. of completed roof. The gravel shall be of such grade that no particles shall exceed $\frac{5}{8}$ in. or be less than $\frac{1}{4}$ in. in size. It shall be dry and free from dust and

dirt. In cold weather it must be heated immediately before using. Not less than 400 lb. of gravel shall be used per 100 sq. ft.

"The construction shall be as follows: First coat the concrete with hot pitch mopped out uniformly. Over the above coating of pitch lay two thicknesses of tarred felt lapping each 17 in. over the preceding one, and mopping back with pitch the full width of each lap. Over the felt thus laid spread a uniform coating of pitch mopped on. Then lay two thicknesses of tarred felt, lapping each sheet 22 in. over the preceding one. When the felt is thus laid, mop back with pitch the full width of 22 in. under each lap. Then spread over the entire surface of roof a uniform coating of pitch, into which, while hot, embed the gravel."

The monitor skylights are constructed of copper framework inclosing wire glass. Each monitor has an effective area of 10 ft. x 15 ft. and has ventilators installed in each end. All the shop buildings are heated by the Webster vacuum heating system.

TRACK ARRANGEMENT

The tracks within the new South Bend shops provide space

a good job of tamping could not be done, and so after the track had been leveled the ties were slushed with concrete.

REPAIR SHOP

A row of columns lengthwise of the repair shop sets off a floor space 25 ft. wide x 210 ft. long, in which the machine tools have been installed. This floor space is served by a 15-ton crane. The equipment of tools now includes the following: Niles-Bement-Pond wheel press driven by an induction motor, wheel lathe, wheel boring mill, axle lathe, drill presses, planers, emery wheels, hacksaws and punch.

The smaller tools are now run from a line shaft driven by two motors, but it is the intention of the company's engineers gradually to equip all tools with independent motor drive. The heavy machine tools used in wheel and axle work are grouped at one end of the machine section. Close to the center of this group is a post crane with sufficient swing to admit of handling wheels and axles to and from any one of the tools by which they are regularly worked. Smaller bracket cranes with chain blocks are installed at each of the heavier tools.

The bearing department with its bricked-in babbitt furnace is installed close to the machine-tool section on the same side of



South Bend Shops—Machine Shop Section

for 26 62-ft. cars, and yard tracks have been installed to store 50 additional cars. The tracks in the yards have been so laid out that a large interurban car will completely clear all curves before entering the barn. The yard layout includes ladders on opposite sides of the property, two connecting tracks, one of which is located in a parallel street, four stub-end storage tracks extending across the yard and the nine tracks which extend into the shop buildings. A "Y" at the southeast corner provides for turning cars, and an industrial siding connecting with the main line of the Grand Trunk Railway permits the economical transfer of heavy materials from steam cars to electric cars.

This track layout for the shop and yards has curves with a minimum radius of 50 ft. The special track work was supplied by the Lorain Steel Company. The grading of the yards provides a 2½-ft. drop from the shop entrances to the ladder tracks. All the special work in this large yard layout was installed in concrete. In planning the work it was found necessary to put the ties so close together that the engineers thought

the building. Probably the most interesting feature of the bearing department is an air-operated mandrel, which is said greatly to cheapen the cost of babbit bearings. The air cylinder of this mandrel is placed below the work bench and by means of an air valve the mandrel, about which the babbit is cast, may quickly be withdrawn from the hot metal, leaving a smooth interior surface.

The general repair shop floor has two pit tracks extending throughout its full length. These tracks are 18 ft. apart on centers and the floor between them and toward the side walls is depressed 12 in. below the base of the track rails. This feature places the running gear of a car at sufficient elevation above the floor to facilitate comprehensive inspection and repair methods.

Special facilities are provided for handling car bodies and trucks. The car hoist installed over one track is supported by a row of 12-in. I-beams surmounted by 15-in. cross girders. These girders carry Yale & Towne triplex blocks with which a 62-ft. car body may easily be lifted from its trucks. A sys-

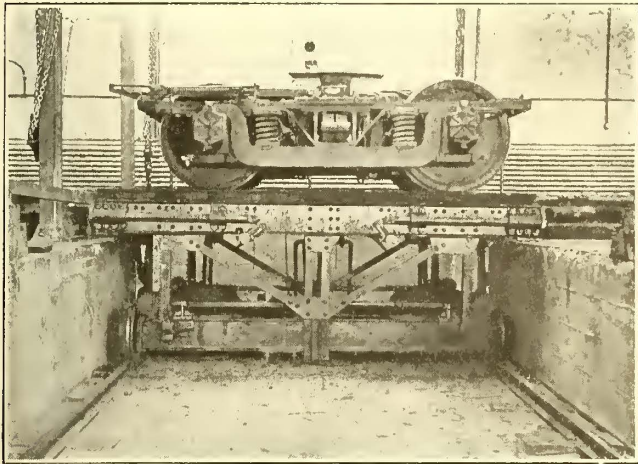
tem of overhead trolley hoists with two-ton movable blocks also has been installed. The runway for these trolley hoists consists of 9-in. I-beams supported from the roof trusses of the repair shop and machine section.

TRUCK TRANSFER TABLE

A specially designed truck transfer table serves to transport the trucks from their position on the pit tracks across the shop to adjoining tracks or to the machine section, where they may be handled by the overhead crane. This truck transfer table was designed and built by the Weir & Craig Manufacturing

small two-cylinder oscillating air engine geared to the axle. The design of this truck transfer table is said to have been based on a factor of safety of five and all pinions, gears and racks are cut from steel. While the truck transfer table is not in use its section of the pit-track rails is securely locked to the adjacent rails. Whenever these locks are withdrawn for the purpose of lowering a truck blocks are placed on the pit-track rails to prevent the accidental rolling of a car or truck into the pit.

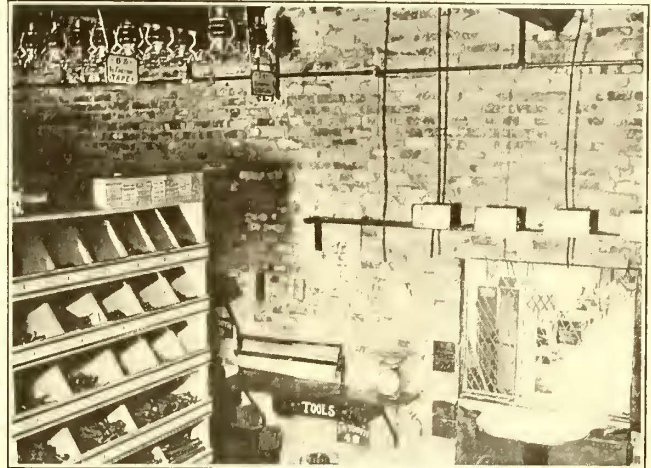
Within the repair shop the trolley wire is protected by



South Bend Shops—Air-Operated Truck Transfer Table

Company, Chicago. It operates in a cross pit 42 ft. long. The truck transfer table is so designed that when the weight of a car body has been taken off a pair of trucks the section of track supporting the trucks may be lowered into the pit and transferred across the shop to the parallel pit or to the machine floor.

The requirements to be met in the design of this table were a difference in elevation between the machine-shop floor and the repair-shop floor of approximately 17 in. and also that when the table was in the upper position cars normally would be run over it, throwing a weight of approximately 25 tons on the table; whereas, the trucks which it was designed to handle

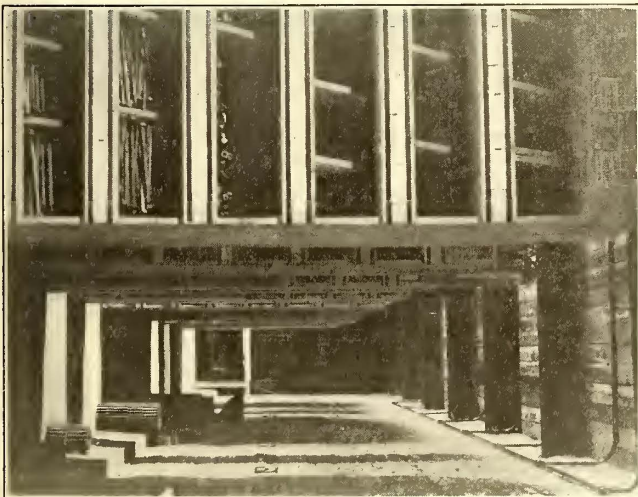


South Bend Shops—Delivery Window of Storeroom

wooden boxes supported on the steel cables which carry the wire. All lighting and other utility wiring within the building is inclosed in conduit.

ARMATURE SHOP

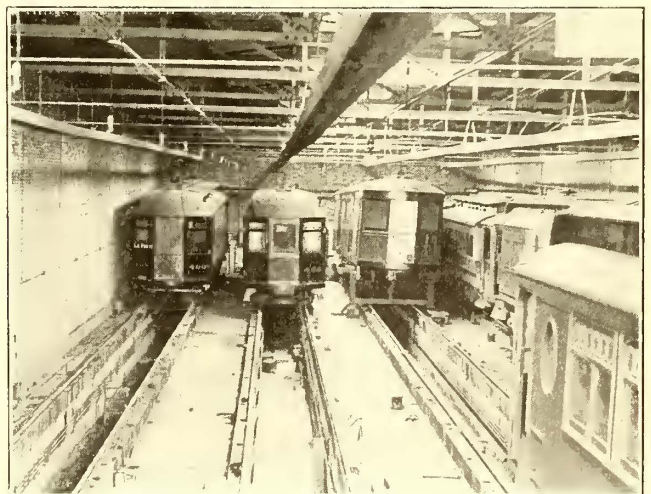
The armature shop provides facilities for doing all work necessary to repair and rebuild armatures. Its equipment includes a heavy lathe, a portable crane and a brake oven. This oven is 10 ft. x 6 ft. x 8 ft. in size, is built of brick and provision is made for heating it with steam in winter and with electric coils in summer. The armature coils used in this shop are manufactured by the substation employees of the road.



South Bend Shops—Storeroom Showing Adjustable Bins

did not weigh more than six tons. For these reasons the upper part of the table was designed as a bridge structure and provided with the locking bars shown in the illustration.

The elevating and lowering of the table with and without load is done by two pneumatic jacks placed near the ends of the table. In order that these jacks might work in unison four double racks were placed one at each corner of the table, these racks being connected by gears and common shafts. The table is propelled along the tracks in the cross pit by a



South Bend Shops—Car House and Light Repair Bay

Each substation has an equipment of the appropriate tools so that the substation attendants may wind coils during the time when they otherwise would have nothing to do.

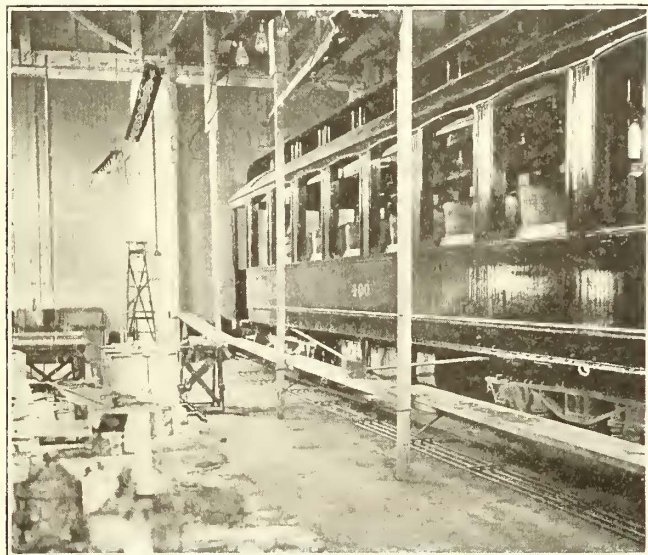
The main entrance to the shop building is through a vestibule located between the master mechanic's office and the lavatory.

STORE DEPARTMENT

The stockroom at the rear of the master mechanic's office is set off from the other portion of the shops by fireproof walls and double, metal-covered gravity fire doors. In the stock-

rooms, which are located on two floors, are 2000 storage bins. An air-operated elevator serves to handle materials between the two floors. Shipments of material from the steam roads are received on an industrial siding passing directly in front of the main entrance to the stockroom.

A view showing the storeroom side of the delivery window is presented. For facilitating delivery of car cable, wire, trolley rope and lamp-cord, supplies of these materials are kept on reels directly above the delivery window. Thus when needed the desired lengths can be pulled down in front of the window and cut off for quick delivery. The store department is run on the card system. The employee desiring the material from the storeroom pushes a button which rings bells inside the storeroom both upstairs and downstairs. By the time that the person wishing the material has his requisition made out the stock clerk has the material ready for delivery. Requisitions on the storeroom are made as follows: Each article which is in stock has a bin number. This number corresponds with a card in the office and the bin number is placed upon each requisition. Therefore, it is an easy matter to check out properly the storeroom material. The cards are on the lower ends of the bins. On one side of the card is the bin number and on the other is the full description of the article in that particular bin, just as shown by the catalog number and description. R. E. Cornwell, storekeeper, states that by having the catalog number and descriptions on these bins material is re-



South Bend Shops—Paint Shops Showing Adjustable Scaffolds

ordered more easily because it is not necessary to refer to catalogs.

The division boards for bins are cut on a 45-deg angle. All bins are made adjustable in this way so as to take care of any increased orders.

CAR HOUSE

The car house bay of the shop group has four tracks on 12-ft. centers and will house 12 large cars. The tracks have concrete pits under them 4 ft. 6 in. deep and the floors between the pits are depressed 12 in. below the base of the rails. As earlier stated, this section of the building has been so designed that it quickly may be adapted for shop use.

PAINT SHOP

Adjoining the car house on the opposite side from the repair shop are the paint shop and washroom, each with three tracks on 14-ft. 8-in. centers. The fittings in the paint shop include specially designed scaffolding. A unique feature of this painters' scaffold is that the posts supporting the scaffold planks may quickly be raised into the roof trusses so that all the floor space between the cars is clear of obstructions. Each of the scaffold posts is a piece of timber 4 in. square in section hung within a square hollow wooden box which, when the

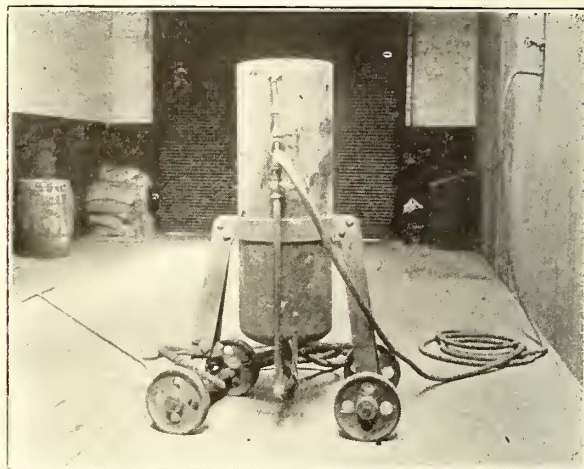
post is lowered to the floor, incloses only its upper end. When the post is raised it passes entirely inside the hollow box which is supported from the roof trusses and thus is out of the way. The scaffold posts are balanced with weights and cords passed over pulleys at the top of the hollow boxes. Holes are bored in the sides of the scaffold posts so that brackets made of round iron may be inserted for supporting planks at any desired height.

Special illumination for the sides of cars is provided in the paint shop. This is obtained by rows of incandescent lamps mounted within half-cylinders of sheet metal. These metal reflectors are 10 ft. long and four of them are hung on each side of a car. Each reflector with its row of lamps is supported by ropes and pulleys, so that it may conveniently be raised or lowered to obtain the best illumination on any part of the car. Similar banks of lights with reflectors are provided at each end of each car position on the three tracks.

These new shops are protected from fire by standpipes and hose in each corner of each subdivision of the building and by five city fire hydrants located on the outside of the shop group.

SAND BLAST FOR CLEANING STEEL CARS

The Chicago Railways Company has 650 large cars which have steel side panels and dashes. Before painting these first are cleaned by sand blast. A special equipment for doing this work has been made and is installed in a room set off from one corner of the erecting shop. In this room are two sand supply tanks and blast nozzles with hose of sufficient length to reach



Sand-Blast Outfit of Chicago Railways for Removing Paint from Steel Cars

all parts of a car. One of the sand blast equipments is illustrated. About four hours are required with the two nozzles to remove the paint from the steel exterior of a car below the window rail. After the paint has been removed the car is sent through the carpenter shop, where it is repaired, and then sent to washroom, where it is washed ready for painting.

SAFETY WASTE CANS

A special form of waste receptacle has been placed at those locations in the shops of the Chicago Railways where much wiping waste is used. The receptacles are large cylindrical waste cans into which a screen has been supported about 6 in. from the bottom. As the waste is thrown into the cans it rests on the screen and the oil and gasoline drain to the bottom space. Dirty waste collected from such cans can safely be thrown directly into the furnace without danger of flashing back into the fireman's eyes.

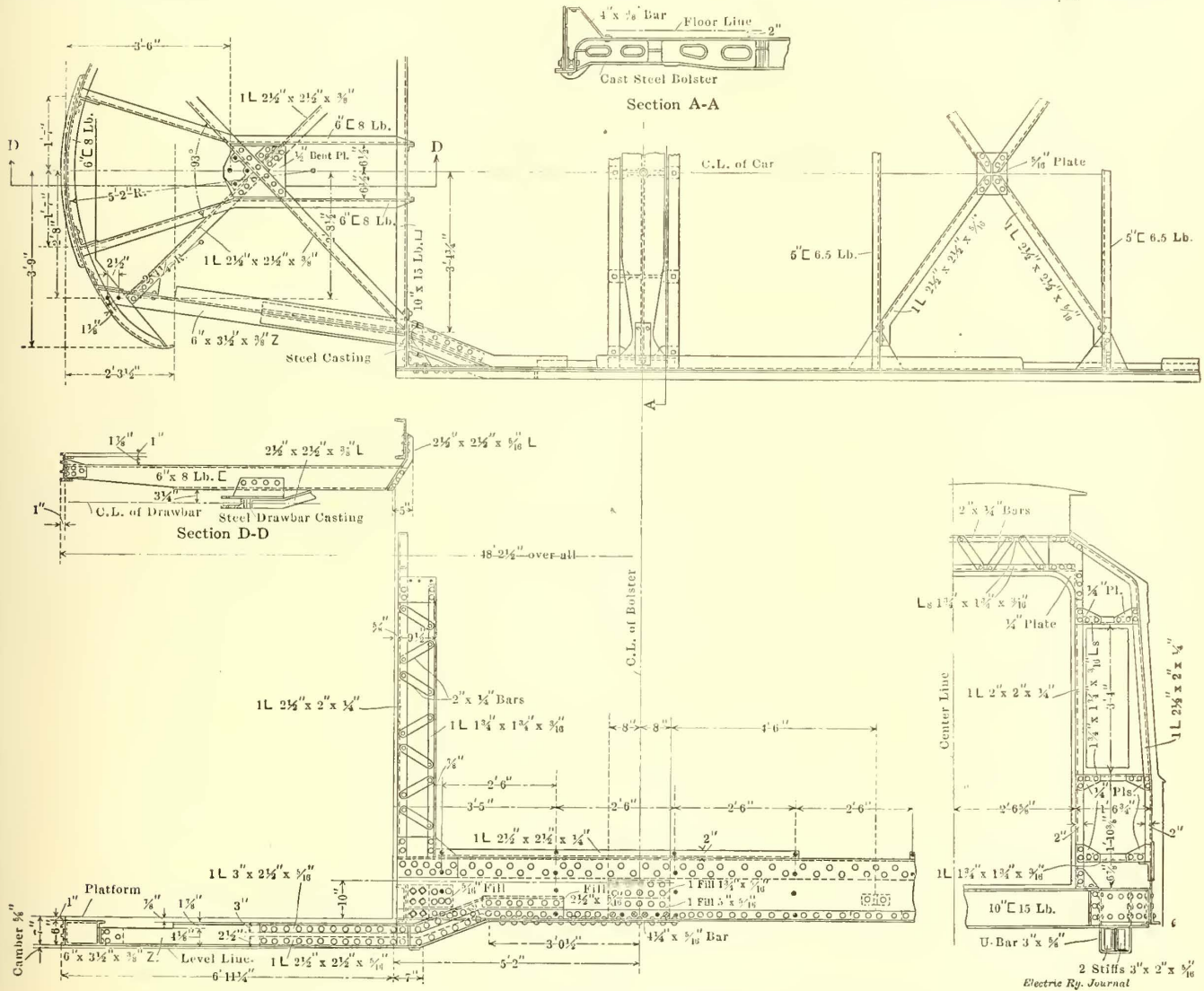
During January, 1911, 13 persons were killed on the street railways in Pennsylvania and 272 were injured. Of those killed five were trespassers.

New Pay-Within Cars at Boston

These Cars Are of the Semi-Steel Type with Manually Operated Doors and Steps, Capable of Being Controlled from Either Platform

THE Boston Elevated Railway Company recently placed a contract for the building of fifty new semi-convertible cars with the Laconia Car Works Company, of Laconia, N. H., the rolling stock being designed for surface operation with the prepayment system of fare collection licensed under the patents of the Pay-Within Car Com-

pany. In turn are riveted to the end and side sills. Steel corner castings are employed for the purpose of connecting the end and side sills in a rigid manner, and are riveted to the end sills and bolted to the side sills by means of turned bolts in ramed holes. A 3 in. x 5/8 in. "U" hanger is attached to each steel corner casting to serve as a support for the platform knees.



Boston Prepayment Car—Details of Structural Steel Framework

pany. The new cars illustrate a number of improvements upon the company's previous practice, including the use of an all-steel underframe of special design, steel bulkheads, steel roof trusses and folding steps and doors of the manually operated type. Each car is to be equipped with four Westinghouse "306" interpole, 60-hp motors with a gear ratio of 16 to 68; the seating capacity is to be fifty-two passengers, and the approximate total weight of the complete car, without passengers, is 26.5 tons.

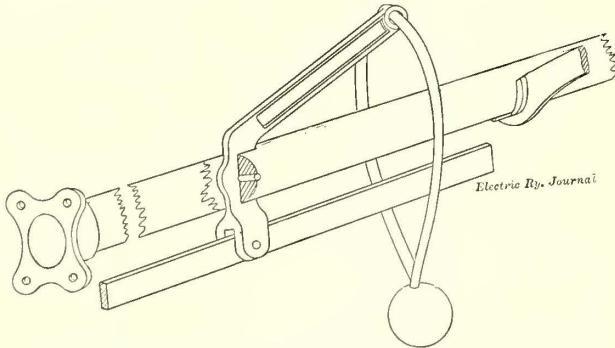
The principal dimensions of the cars are given in the table printed in the opposite column.

The entire underframe, cross-framing at the bulkhead and trusses supporting the roof are of steel construction, a special feature being the bulkhead design. This consists of latticed corner posts at each end of the car made up of 2-in. x 2 1/2-in. x 1/4-in. angles tied together with 2-in. x 1/4-in. bars and attached to the underframing by being riveted to gusset plates which

BOSTON ELEVATED RAILWAY COMPANY, NO. 4 SEMI-CONVERTIBLE CARS

	Feet. Inches.	
Length over bumpers.....	48	2 1/2
Length over corner posts.....	34	4
Distance center to center of bolsters.....	24	0
Width over eaves, lower deck.....	8	2
Width over eaves, upper deck.....	5	5 3/4
Width over window rails.....	8	8 3/4
Width inside at seats.....	8	3
Width of aisle.....	2	4
Width of arch in bulkhead.....	5	0
Height from rail to top of trolley board.....	12	0
Height from rail to car eaves.....	9	8 1/4
Height from rail to top of floor matting.....	3	4
Height of steps.....	17	
Height of platform.....	2	6
Height from rail to top of body center plate.....	2	6 1/2
Height from sill to trolley base.....	9	6
Height from top of rail to sills.....	2	6

The upper part of the bulkhead framing consists of an arch built up of 1 3/4-in. x 1 3/4-in. x 3/16-in. angles latticed together and forming a structure which takes practically all the thrust of the roof which is ordinarily transmitted through the wooden corner posts of a car and consequently requires in usual designs the use of heavy posts. The construction adopted tends to decrease the dead weight carried above the platform and to reduce the side sway. The wooden posts used in these new



Boston Prepayment Car—Double Signal Bell Pull

cars simply divide the window spaces and carry but little load, and practically the entire overhead weight is supported by the steel framework.

The underframe consists of steel side sills built up of plates and angles running the full length of the car between bulkheads and connected at either end with the channel end sill. The principal members of the side sills form on each side a 16-in. girder provided with reinforcing angles at the top. The floorbeams consist of 5-in. channels running between the side sills and riveted to the latter by framing connections and gusset plates. The platform supports consist of 6-in. x 3 1/2-in. x 3/8-in. Z-bars fastened to the side sills, bent down to take the platform and reinforced with angles. Two center sills are provided for each platform, each being made up of 6-in. channels which connect the end sill of the car framing and the bumper. Diagonal bracing is provided for each platform, of 2 1/2-in. x 2 1/2-in. x 3/8-in. angles. These diagonal braces are riveted to a 1/2 in. steel plate, flanged up on each side and riveted in turn to the 5-in. center channels. The drawbar steel casting is bolted to the diagonal braces and also to the 1/2-in. plate. The bumper of the car is a 6-in. channel connected to the ends of the platform sills. It is equipped with Hedley anti-climbing bumpers.

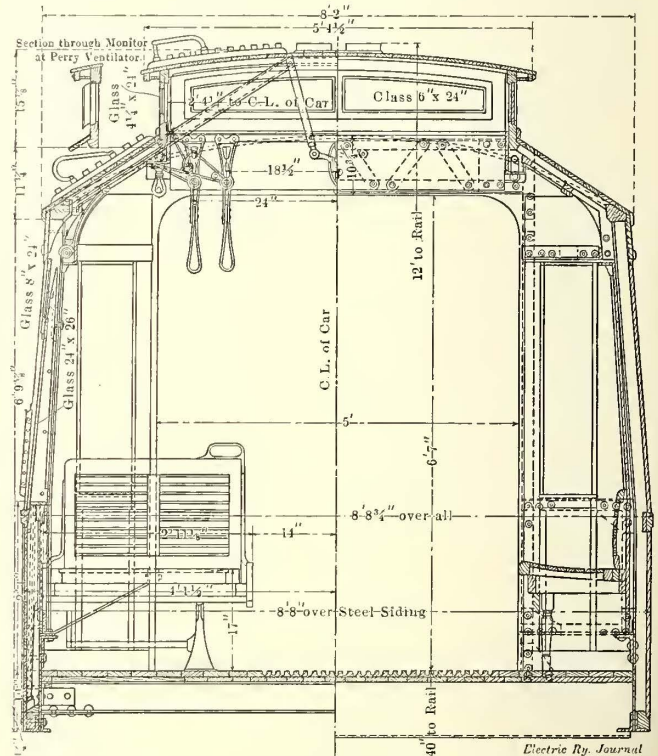
The platform sills are riveted to the end sills. The bolsters are solid steel castings and are provided with holes for center plates, pipes and conduits. They are attached to the side sills by bolts and are provided with steel braces to the top of the side sill and also with steel wear plates. Symington ball-bearing center plates are provided, and the side bearings are made of 3-in. x 1/4-in. steel plates. The under framing is provided with 2-in. x 2 1/2-in. x 5/16-in. angle cross-bracing between the side sills. The main roof supports consist of four steel trusses, each consisting of a 2-in. special channel extending across the car from post to post, reinforced by one 1 1/4-in. x 1/4-in. horizontal bar and two 1-in. x 1/8-in. diagonal braces. Between the channels the roof is carried by 7/8-in. x 1 1/4-in. ash rafters. The posts are of Indiana ash, bolted to the side sills and furred in at the top. Provision is made in each of the smaller posts to receive the wiring for the electric bell-signal system of the car, which is being supplied by the Consolidated Car Heating Company.

The roof boards are of 1/2-in. whitewood covered with cotton duck. Six Perry ventilators are to be provided in each side of the upper monitor deck. The upper deck is being built with no head lining, and the lower deck is straight from the lower deck sill to the body plate, giving the company the advantage of using wood in the direction of the grain and securing a stronger construction for a given weight of material as well as a slight reduction in the total cost of manufacture.

The vestibule frame is of ash, reinforced at the center posts by a 1 1/2-in. x 1/2-in. steel trap extending the full length of the post to which it is fastened by screws. It is also fastened to the platform crown piece at its lower end and to a 3-in. x 2 1/2-in. angle at its upper end. This angle extends around the vestibule at the plate from bulkhead to bulkhead in a continuous piece. It is hoped by this construction to increase the safety of the vestibule in case of collision, the idea being to have the whole vestibule buckle rather than have the corner posts break and splinter. Each side of the vestibule is fitted with two sets of double-leaf folding doors opening outward, one set toward the car body and the other toward the vestibule corner posts. These folding doors are operated manually by a device specially designed by the Pay-Within Car Company, with operating levers located under the platforms, and are so constructed as to enable the conductor to operate the doors and steps for either side of the platform from his fixed prepayment position. The motorman's control is similarly arranged so that he can operate both sets of doors and steps without moving from his position.

The cars are of the double-end type. Rubber strikers are provided on the edges of the vestibule doors. The steps on each side are operated by the same system of levers which swings the doors in and out. The steps are carried on wrought iron hangers which are fastened to the vestibule floor frame, and toe guards are installed to inclose the opening from the step tread to the platform.

The steps are of ash 1 1/4 in. thick, are provided at their



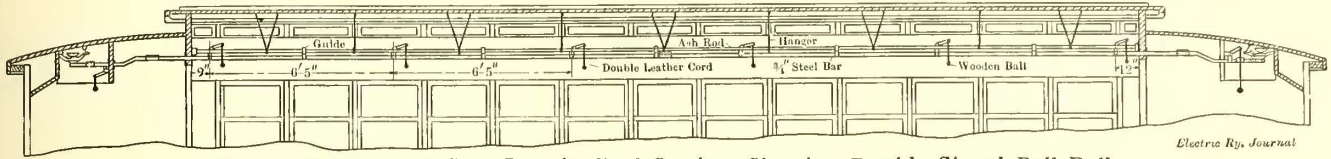
Boston Prepayment Car—Cross-Section

outer edges with Universal safety treads set flush with the top of the step and bent down over the edge to form a nosing. Each step is strengthened by four steel dowel pins, 3/8 in. x 6 in. in size. The floor is single beneath the seats and double beneath the center. The side flooring and under flooring in the center are of 7/8-in. Southern pine and the top flooring in the center of the car is of 7/8-in. matched maple extending the full width of the aisle. The car floor is extended out on the platform in a tapered form for a distance of 13 in. to provide a position for the conductor. This enables him to see the full width of the step at an elevation above the passengers during the boarding and alighting. This arrangement also provides wider entrance and exit passages between the conductor's control stand and the bulkhead panel. Although the cars are to be

of the prepayment type, with the door and step operating mechanism built under the patents of the Pay-Within Car Company, the railway company has not yet decided the exact details of the fare collection.

Each vestibule is to be provided with two three-leaf swinging doors, which, when extended, will form a motorman's compartment. These doors, when not forming the cab, are arranged to fold back against the slanting side of the vestibule. On the underside of the hood, extending from the top of the motorman's cab doors to the roof and following the outline of the cab, is an ash bulkhead, 1 1/4 in. thick, to which

The interior finish of the cars is to be of mahogany up to and including part of the monitor sill, the balance of the monitor being stained to match the finish below. The rafters and under side of the monitor roof are to be painted. The finish below the window rail in the car siding is to be of 3/16-in. agasote paneling, this material also being used on the under side of the lower deck. The exterior of the car body will be painted the Boston Elevated Railway Company's standard green color. All steel members are being given a priming coat of paint before assembly. The agasote paneling on the inside of the car siding is removable, and is held in place by small steel

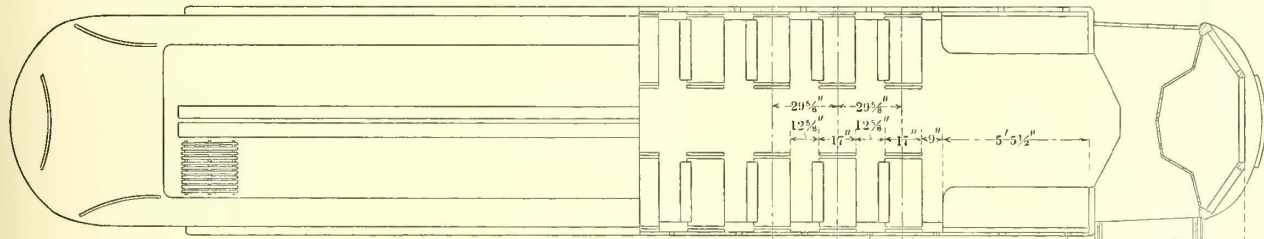


Boston Prepayment Car—Longitudinal Section, Showing Double Signal Bell Pull

are to be attached the switches, circuit-breaker, fuses, etc., included in the electrical equipment. This bulkhead is to be lined with "transite" on the motorman's side, and this material is also to be placed over all woodwork within a distance of 8 in. of switches, fuses, etc. Illuminated signs of the Hunter type are to be installed over the center vestibule windows.

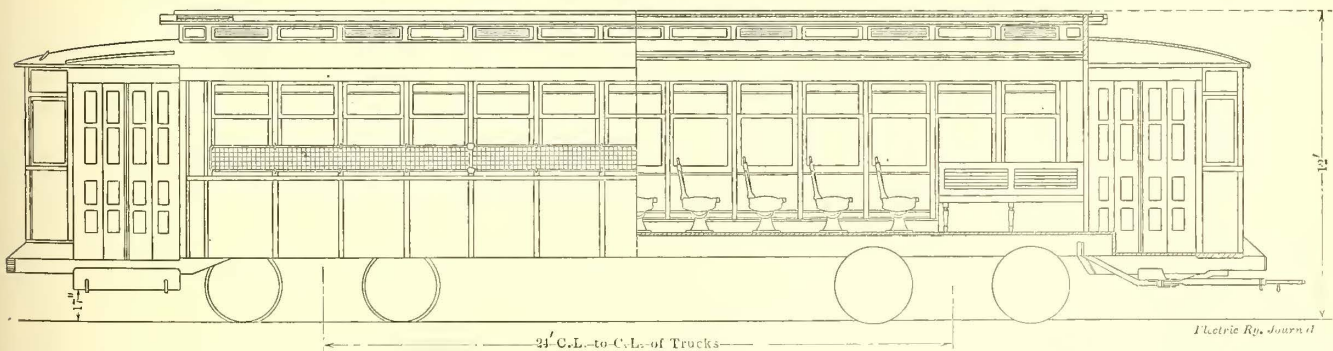
Thirteen windows are to be provided on each side of the car body. Each consists of two sash which are arranged to slide into a lower deck pocket in the roof and into a pocket in the side of the car. The outside of the window rail is to be covered with sheet steel in one continuous piece throughout full length of car. There will also be sheet steel plates ex-

angles. Advertising space is to be provided over windows extending the full length of the car, on the end bulkheads and on the outside of headers over the motorman's cab doors. The controller, brake valve and other fittings are attached to a 2 1/2-in. x 2-in. angle extending around the front of each vestibule. The outside of the vestibule is to be sheathed with 5/16-in. whitewood covered with sheet steel, the inside finish below the window stool also being of sheet steel. Hand-strap poles are run longitudinally on each side of the car and in the center of the car the hand-strap pole is brought out nearer the center of the aisle so as to be more convenient for passengers standing in the aisle between the cross-seats. Hand straps



Seating Capacity 52
 Unoccupied Floor Space ... 161 Sq. Ft.
 Standing Passengers 107
 Total Passengers 159

13 Window Openings 30" C'ters.
 34' 4" Over Corner Posts
 46' 10" Over Vestibules
 48' 2 1/2" Over Bumpers



Boston Prepayment Car—Plan, Part Side Elevation and Part Longitudinal Section of Car; Showing Also Part Seating Plan, Over-All Dimensions, Passenger Capacity, Etc.

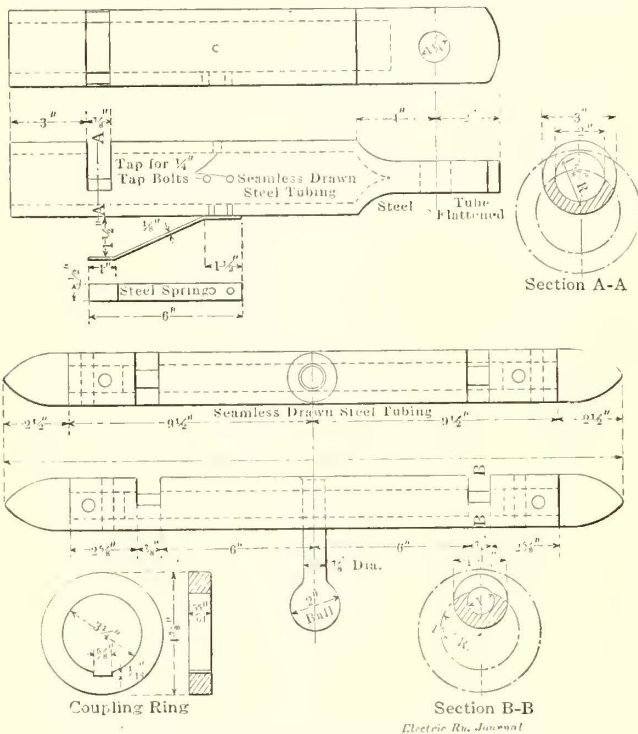
tending from post to post, which will form the lip on the inside of the window rail. Sash pockets are to be provided in the sides of the car below the window opening. Rubber cushions are set at the bottoms of the pockets. There are to be nine cross-seats on each side of the car and one longitudinal seat in each corner. The seats are of the Heywood Brothers & Wakefield type, the cross-seats having wooden slat backs of the reversible type with stationary cushions on the bottoms.

are to be 5 ft. 3 in. from the floor of the car. The buzzer system will be operated from the power circuit through appropriate resistance and fuse.

Sand boxes of the Kilbourn type are to be installed under the seat in the left-hand diagonally opposite corners of the car, and an air-pump governor will also be located below the seating space. The sand boxes are to be arranged for foot operation, with pedal in the cab. The heaters are to be of the truss plank type, supplied by the Consolidated Car Heat-

ing Company and mark a change in the location of this type of equipment for Boston Elevated Railway service. In the preceding type of semi-convertible cars built by the company the heaters have been located beneath the seats. The outside of the car is to be equipped with Clinton electrically welded wire screens at the window openings, the screen width being 12 in. The motors are to be controlled by the Westinghouse unit-switch control system, type "HL," with no jumper provision for train operation. Libby fenders are to be used, and the scrapers are to be arranged for pneumatic operation. The Westinghouse straight air-brake equipment, type "SME," is to be employed, and a hand wheel brake connection will be provided in the cab.

The trucks are to be supplied half by the Standard Motor Truck Company and half by The J. G. Brill Company. The trucks are to be designed for proper clearance under the car body, on curves of 35-ft. radius, allowing for a spring com-



Boston Prepayment Car—Details of the New Type of Drawbar Made of Seamless Steel Tubing

pression of 2 in. under load. The principal truck dimensions are as follows:

	Feet.	Inches.
Diameter of wheels.....	4	33/8
Wheel gage.....	4	8 1/4
Diameter of axle.....		5 1/2
Size of journals.....	1/4	in. x 8 in.
Wheel material.....		Roller steel

The cars are to be equipped with Neal headlights and double-faced pantasote curtains. A double signal bell pull is to be installed, operating a bell at each end of the car by hand lever attachment. The drawbars are of a type recently designed by Paul Winsor, chief engineer of motive power and rolling stock of the railway company, the essential feature being the use of a hollow tube of Shelby seamless steel into which fits a round slotted coupling bar of the same material. A slot in the outside tube is provided into which a coupling ring of steel is slipped, and in this manner the inner and outer tubes are locked together effectively, as indicated in the accompanying drawing.

All wiring is in conduit, and the lighting wires are run in two lines of loricated conduit down the sides of the car, one line on each side, with appropriate outlets for incandescent lamps. The car bodies are now being assembled at Laconia and will shortly be delivered to the railway company for equipment. The motor requirements were based on service on lines radiating northward from the Sullivan Square terminal.

EXTENSION OF THE LONDON, BRIGHTON & SOUTH COAST RAILWAY

According to a telegraphic dispatch from London, dated March 25, the success of the single-phase electric equipment of the London, Brighton & South Coast Railway has been so marked that the company has now decided to equip electrically the entire system of 479 miles. It is expected that the equipment will be completed in 1916.

This dispatch adds interest to some further particulars of the equipment of this line contained in the paper presented by Philip Dawson at the meeting on March 14 of the Institution of Civil Engineers in London. Mr. Dawson says that the company obtained parliamentary powers to equip its lines in 1903 and at that time he was appointed consulting electrical engineer. The system adopted was the single-phase at 25 cycles per second and a trolley voltage of 6700. The first electrical train was run Jan. 17, 1909, and the full public service was begun Dec. 1, 1909. Thirteen months of regular operation have entirely justified the adoption of the system. The distance first equipped was 8.7 miles, on which there were 10 intermediate stops of 20 seconds each, and the run is being made in 24 minutes. Subsequently the company decided to extend the system so that the amount electrified would be equivalent to 62 miles of single track.

The minimum drop in the earth return is limited by the Board of Trade to 20 volts. A system of distribution and feeding has been designed to meet these requirements and series booster transformers installed have given excellent results. There were originally 16 motor cars each equipped with four 125-hp Winter-Eichberg compensated repulsion motors. The new cars will have four 150-hp Winter-Eichberg motors, and 30 motor cars and 60 trailer coaches have been ordered. The new trains will be made up of units consisting of one motor car and one trail car instead of two motor cars and one trail car as formerly. The range in height of the trolley wire is from 20 ft. to 13 ft. 9 in. The contact surface of the bow collector is aluminum and it lasts from 5000 to 6000 miles. The pressure against the trolley wire varies from 8 lb. to 12 lb. Two bow collectors are used for each motor car, one for each direction of running. The operation of the reverser automatically reverses the bow collector and one collector does not come down until the other is in contact with the trolley wire.

In a recent trial run of a three-car train weighing 146 tons the train ran continuously for 12 hours with 20-second stops at each station and covered a distance of 173.58 miles. The average length of run was 0.79 mile. At the conclusion of this run the maximum rise of temperature of any part of the electrical equipment was 66 deg. C. (151 deg. Fahr.). During this test the following results were obtained: Power factor, 80.8 per cent; maximum current at starting, 126 amp; average acceleration, from 0 to 25 m.p.h., 1.75 ft. per second; and the power consumption on the train (which was a new one) 73 watt-hours per ton-mile. All the measures showed that the test results were within the guarantees. After the train had run for some time further tests were made which showed, in the case of a single trip from Victoria to London Bridge, an energy consumption of 65.7 watt-hours per ton mile for a schedule speed of 22 m.p.h., including 20-second stops at each station. The influence of a long run on the energy consumption is shown by the fact that for a through non-stop trip from Victoria to London Bridge at an average speed of 37 miles per hour the energy consumption was 34.4 watt-hours per ton mile, the maximum speed reached during the run being 50 m.p.h.

The weight of a complete motor car on the rails is 108,982 lb. The total weight of all electrical equipment, including collecting device, lighting, compressor, etc., is 40,484 lb.

The principal contractor was the Allgemeine Elektrizitäts Gesellschaft, of Berlin. All the overhead work was carried out by R. W. Blackwell & Company, and the rolling stock was constructed by the Metropolitan Amalgamated Carriage & Wagon Company.

ABBREVIATING CAR PAINTING METHODS

BY H. ARNOLD FRENCH, MASTER PAINTER, THE RHODE ISLAND COMPANY

The problem of reducing the cost of electric car painting is really a problem of methods. The many possible compounds of pigments and vehicles and the many different ways of applying them to surfaces offer a great number of working formulas for choice. The new order of things resulting from enforced economical requirements necessitates some radical changes in comparatively modern methods, which, if adopted, must necessarily sacrifice to a small extent the highly polished appearance of surfaces that are so expensive to obtain. If this can be accomplished without jeopardizing durability a very important part of the problem will be solved.

It is quite interesting to note the effect that any change in the painting of the electric cars of a city has upon the people who patronize them and see them daily. As long as the color and style of ornamentation to which they have been long accustomed remain the same the cars pass unnoticed as far as concerns any criticism of the condition of the paint. It is remarkable that this important point apparently is so little understood and exploited. Complaints are seldom heard from owners of fine estates concerning the large square span wire poles of the street railways in front of their residences, although the poles are covered with a rough but durable paint. On the other hand, it is a universal rule that the cars of the same railway, although seen only at intervals, must be painted by comparatively expensive methods.

Unless specifically brought to its notice the public, generally speaking, has little idea of car painting methods. Advantage should be taken of this fact for business reasons. To illustrate this point, take an old car body with the old paint removed and paint it with one coat of lead priming and two coats of rough stuff filling—a method recently considered as being extremely economical for a base on which to color. When finally varnished this car will look as though two coats of priming and four coats of filling had been applied for a foundation, provided due care was exercised in removing the old paint and in leaving the surface of the car free from scraper marks. Then take another old car body and, if there be no superficial disintegration, cover the old paint and varnish with one coat of some dark color of strong covering capacity. It is safe to say that when this second car is colored, ornamented and varnished exactly like the first not one person in a hundred unfamiliar with the painting business could detect any difference in the appearance of these cars in service on the street. In the past the writer has made some personal experiments along these lines with people of very good taste in most matters, yet he found only very few who could detect the difference between cars with a piano finish and cars painted like a tip-cart so long as both were brightly varnished. Where, then, is the wisdom of applying successive coats of rough stuff filling, composed mostly of costly varnish, to be followed by a greater expense in the scouring to obtain a mirror-like surface on street cars when the results are appreciated only by expert painters or a few sharp-eyed patrons?

The question of the value of strata of paint composed of three or more coats or rough stuff filling as a medium for the protection of wood and metal is, of course, a debatable one. Much has been written pro and con on this subject by noted master painters, whose opinion, based on experience, should be more or less convincing. Yet some new information is often obtained when the whole body of oxidized paint material that covers a street car is examined in detail from its adhesion to the surface through its different strata to the protecting varnish film on the outside. Contractions and expansions occasionally occur in well-seasoned whitewood car panels because they contain large volumes of interstitial air, together with their natural water which generally constitutes one-eighth of their total weight. This movement of the wood is very irregular, as the longitudinal action is much less than the

transverse action. The priming coat into which a sufficient amount of oil can be incorporated to keep it in an elastic state moves with every motion of the wood without breaking; but the filling, whose main office is to produce a level surface, must necessarily be of a hard, brittle nature in order that the stone may successfully cut off the surface. If the filling is compounded so that it may, when oxidized, remain in an elastic, protective state, the operation of rubbing it would be similar to that of filing off a piece of rubber to make it smooth. It is often the practice, especially among car manufacturers, purposely to let the filling dry in a soft, chalky condition in order to facilitate the leveling; as it is a soft stratum, it acts as an absorbent to the succeeding coats. The action of the filling on the varnish coats is noticeably effective, leaving them devoid of their natural luster after a time. Finally, when all of the coats of paint material are applied the filling, minus the tenacious qualities of the other coats that are capable of yielding to every movement of the active foundation, is always a menace to the durability of the whole paint body.

At the Oct. 21, 1910, meeting of the New York Railroad Club a paper on "The Protection of Metal Equipment" was read by a member and discussed by some of the most able master painters in the country. [An abstract of this paper by Wm. Marshall was printed in the *ELECTRIC RAILWAY JOURNAL* of Oct. 29, 1910.—Eds.] In view of the fact that all cars, irrespective of their motive power, are generally painted by similar methods it might be of some interest for the writer of this article humbly to comment on some of the deliberations of the club named and also to hazard a few suggestions.

In several painting formulas that were submitted rough stuff filling under different names was unanimously advocated as a necessary part of steel car painting; the object of its use, as was gathered from the proceedings, was mainly to effect a level surface. With all due regard for the opinion of these masters, I would like to inquire if it is absolutely necessary that cars that are seldom in a position to be critically examined, since they are isolated in train yards when not in use or are swiftly passing through sparsely populated sections when in service, should receive this expensive treatment? We might argue that freight cars are as much, if not more, in evidence than passenger coaches, yet no information is at hand of a freight car being treated with rough stuff filling in order that it might be beautified—certainly it is not the rule. Then, why waste time and money embellishing the exterior of a passenger coach when it can be protected and operated equally well by simpler painting methods that might save from 20 per cent to 50 per cent of the cost? If the surface of these cars, either at the time when it is necessary to remove the old paint or when they are being constructed, was prepared in the best manner to leave them as smooth as possible under the circumstances, then the application of lead, color and varnish judiciously mixed and properly applied would afford ample protection to either the wood or the metal of which they were constructed and still permit them to present a satisfactory appearance when in service. It might not be a very strong assertion to make that if a car was treated in the manner described and placed in a train composed of cars that were treated with the filling process the difference in appearance would not be detected by the public, provided that all of the cars of the train were newly varnished. Anyway, it is a simple matter to try the experiment on one car and watch the results.

My claim to the soundness of this reasoning against fillers is based somewhat on the failure of all of the painters in our shop to notice anything unusual about an electric car that had been painted the common way minus the filling during the time it remained in the shop to be varnished after more than a year's service. Yet this car was standing in a good light among 15 cars of the same type that had been treated with the filling process. Considering the high cost of all paint material at the present time, the significance of these remarks should offer some food for reflection. It cannot be disputed that a car finished with the elegance of a piano is a pleasing thing to gaze upon, but the question ever before us is: Is it practical or neces-

sary to place this finish, well as it may look, on a car of any kind?

So it seems reasonably clear that if a fairly level surface can be obtained by some other less expensive process than by the rough stuff filling that approximately represents 20 per cent of the cost of painting a car the filling might well be dropped from painting entirely as far as its value for anything else is concerned. It would be nonsense to assume that as level a surface could be produced by any other means as by the filling method, but, viewed from a practical standpoint, when difference in the cost is considered a small amount of the reduction of the finish would never be missed. However perfectly a surface is leveled and by whatever costly method this leveling is obtained, the effect remains in evidence only during the usually brief period between its application and the time it is subjected to modern car-washing practices, which invariably produce a "dead finish." This last thought suggests the unique proposition that the last coat of varnish on the exteriors of newly painted cars be rubbed to a "dead finish" in order that surface imperfections due to the absence of filling may be less noticeable. This operation could be done at a very small expense compared to the cost of rubbing filling, and the varnish would receive no harm from losing its superficial gloss. Nearly all of the interiors of new cars are finished without the gloss showing. It is a well-known fact that interiors are often purposely finished in this way so as to cover a multitude of small surface elevations and depressions that would be greatly magnified if the last coat of varnish was allowed to retain its brilliant gloss. Probably the only objection that would be raised to this novel departure from customary practices would be the time that would be required for the varnish to oxidize to sufficient hardness to allow the rubbing to be done, but car varnishes as a rule dry quickly, so it might make a difference of only two or three days, which would not be a matter of much consequence.

It is not so long ago that a proposal to paint cars in the present comparatively plain manner would have been commented upon only by a few far-seeing practical men and ignored by the majority as unworthy of notice. Yet the fact is established beyond controversy that this plainness represents a vast saving of money. A recent search of some old accounts emphasized this fact more fully by revealing some interesting comparisons regarding the cost of past and present painting methods. One item of touching up and varnishing a small, open-face, 16-ft. horse car placed the cost at \$32; another account on the same type of car showed the cost of gold leaf for ornamentation, outside of labor to apply it, to be \$27. All other work was charged in proportion. To-day we paint and varnish large 30-ft. vestibuled cars for less than it formerly cost to paint small horse cars. This radical change has been wrought by slow stages during many years, and still there remains the opportunity to reduce car painting expenses to a much greater degree, if we can be educated to relinquish our desire for ostentatious shine and glitter.

It may seem somewhat presumptuous to predict that some time in the future all passenger cars, both electric and steam, may be painted not only by methods that will not require rough stuff filling in the process, but that varnish also may be excluded. At first glance this proposition might seem somewhat startling just because it is not in accordance with customary practices; nevertheless, the probability of this change may develop into a fact at any time. A review of past and present economical requirements regarding the maintenance of cars foretells that further revision downward in the cost of painting methods may be expected in the future. However this may be, there is yet room for further reduction, if preservation alone is considered, as by the use of oil paint exclusively; for if gum and filling are eliminated—two ingredients that are not absolutely essential to the homogeneous body of paint in this case—the possibilities of further reduction in the cost can be easily estimated.

It seems rather illogical to argue that because a street car is such an ordinary object in the streets it attracts no

special interest outside of the service it renders. The chief point to be noted is the tendency of the public to regard the cars with the same indifference that they do the houses they pass, and the question arises, Why should they be painted by more expensive methods? No law is violated if a car should be painted as houses are painted. It would be only a change from established custom. Most of the houses that we dwell in are decorated and protected with oil paint alone. It would be considered absurd if rough stuff filling and varnish were included in the specifications for the painting of the exterior of a house. Doubtless there are a few fastidious people who would like to have the outside of their houses filled and varnished if the operation did not involve an enormous expense. If such expense is considered excessive on houses why should it not be so regarded on cars?

Viewed from any practical point, it must be acknowledged that an enormous amount of railway capital is invested in surface "mirrors" that reflect no financial return. Under the best circumstances these "mirrors" remain polished but a short time. The spending of money for paint material to be used for preserving railway equipment is manifestly a wise course to pursue, but dollars for decoration might better be used for purer pigments and vehicles that will prolong the life and usefulness of cars and still show a considerable balance on the right side.

SLIDING PORTABLE CROSSOVER OF THE DETROIT UNITED RAILWAY

A sliding portable crossover is in use by the Detroit United Railway. Details of the construction are shown in the accompanying illustrations on page 585.

The crossover is made of 7-in. guaranteed construction with run-offs at each end of 70-lb. rail. It is put together with iron spacing bars with a shoulder on each end and a drive key on the outside of the rail. By the use of the key the crossover can be put together and taken apart in a much shorter time than by any other method. Flanged shoes, attached to the bottom of the rails, hold the crossover at its proper place on the track and are also used for sliding the crossover on the track rails. As the crossover is of such weight that it cannot be pushed by a car it is not necessary to fasten it to the track in any manner.

The crossover while in use in Detroit has been moved from place to place on lines where cars are operated on a headway of one minute without delay to the regular cars. The crossover is pulled by the regular cars on lines where these cars have a four-motor equipment. On lines which have not this equipment construction cars are sent out to pull the crossovers when necessary. With the old type of surface crossover it was found that the expense of moving from one location to another was \$8 for labor and \$4 for material and repairs to the pavement. The sliding crossover is moved from one location to another for a total expense of \$2, making a saving in each movement of \$10. The total saving due to the introduction of this type of crossover on the Detroit city lines is estimated at about \$4,000 per year. The new crossover has been found to be more reliable than the old surface form and less of a disturbance to the operation of cars and derailments from its use are unknown. John Kerwin, superintendent of tracks of the Detroit United Railway, who has courteously furnished the information in relation to this improvement, states that this type has also been found to be a great deal more convenient and economical than the surface type of crossover formerly employed.

The first of the illustrations published on the opposite page shows the location of the anchor points and lengths of rails, the shoes and the tie rods.

Fig. 2 shows the details of cast-steel shoes, anchor points and tie rod "B." Fig. 3 gives the details of the tie rod and the tie-rod brace.

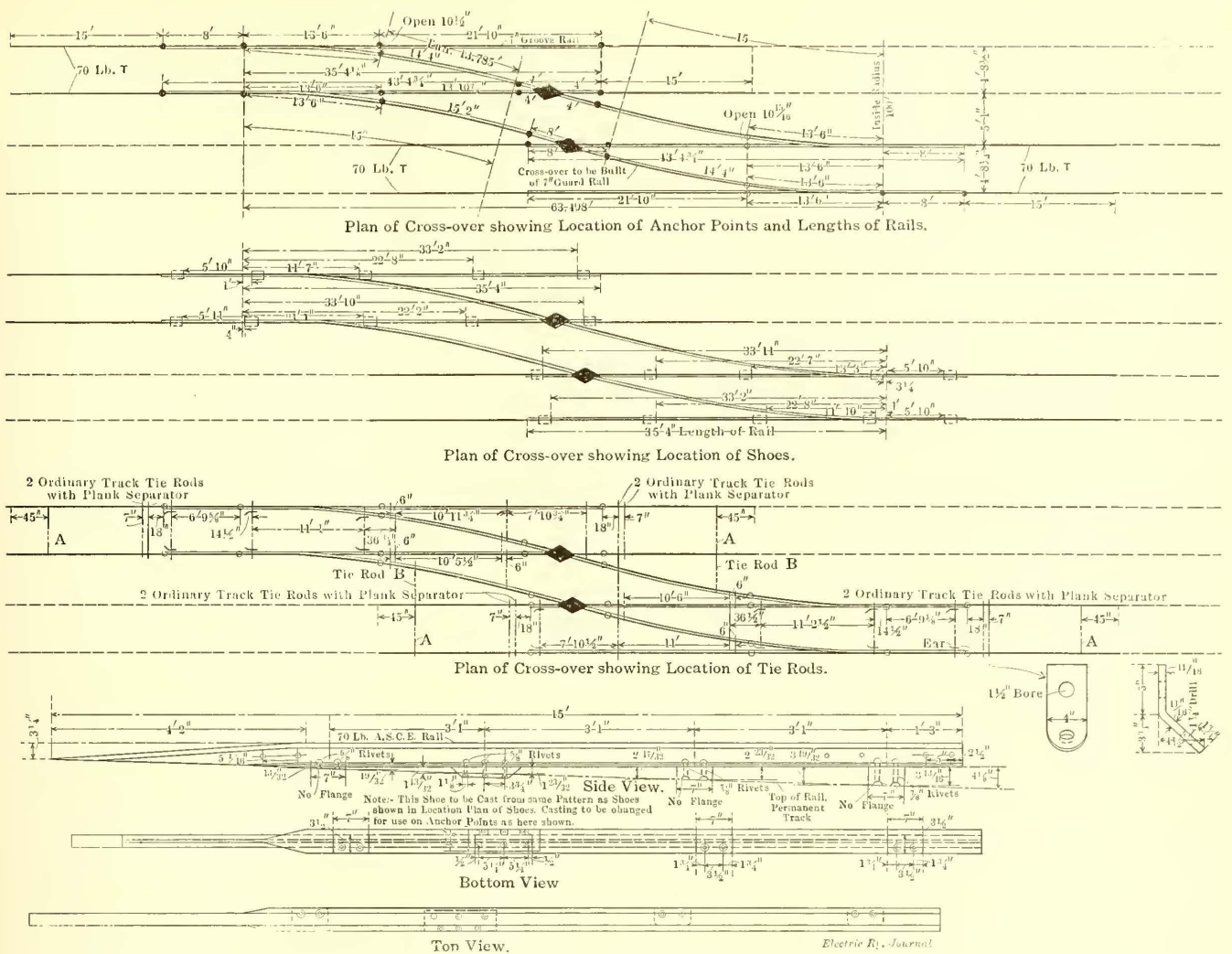


Fig. 1—Plan of Sliding Cross-over, Detroit

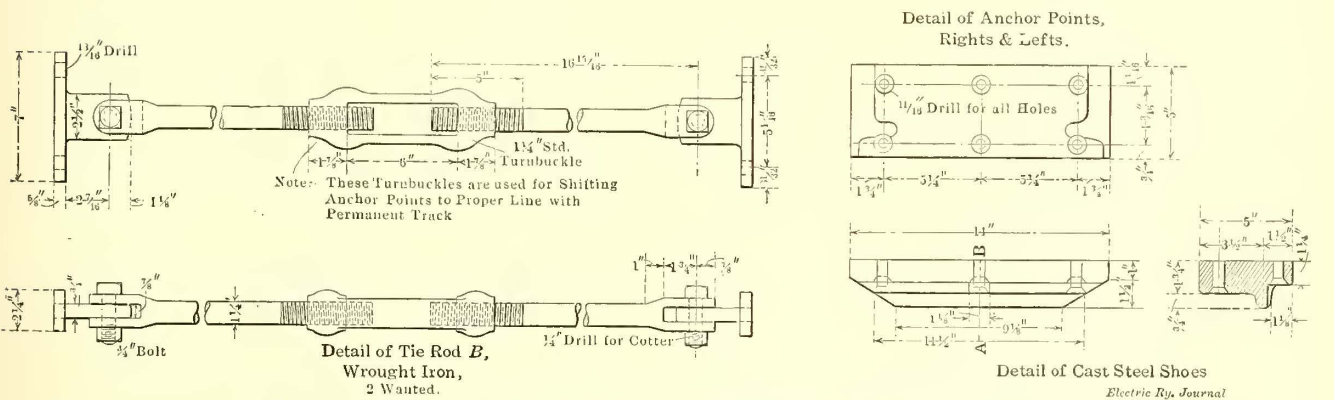


Fig. 2—Details of Tie Rod "B," Anchor Points and Cast Steel Shoes

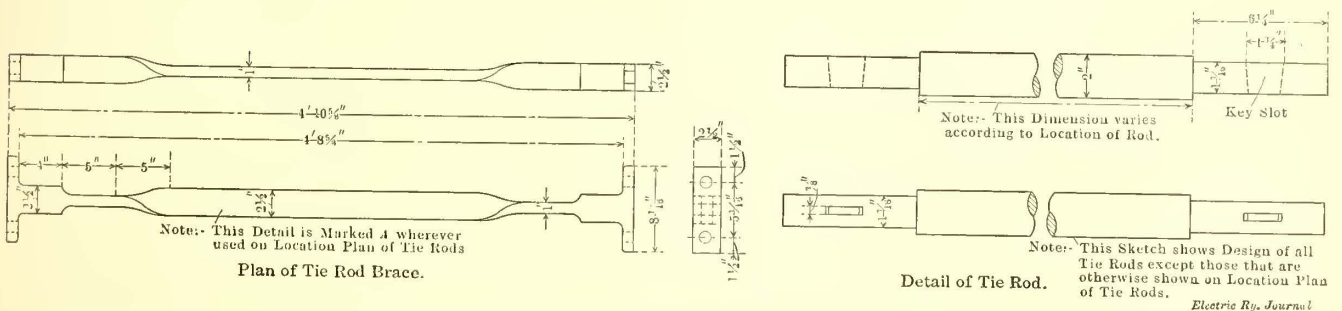
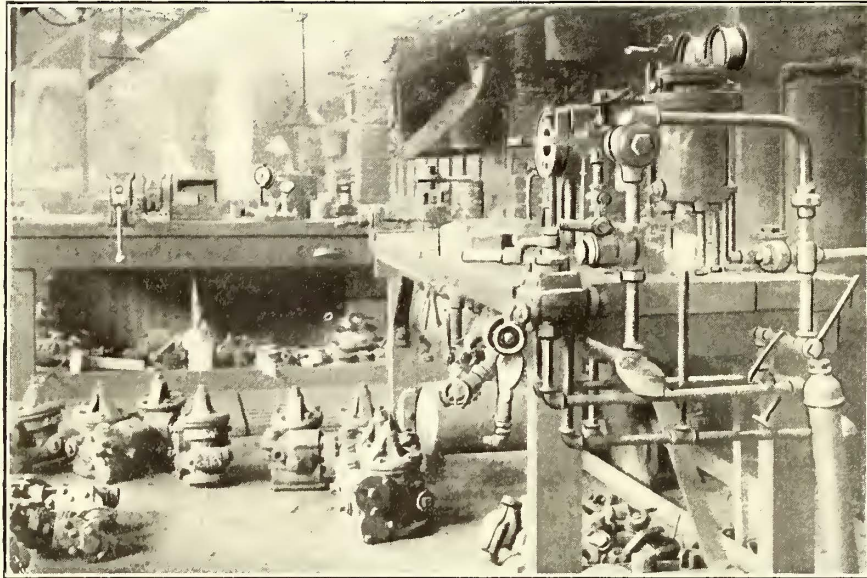


Fig. 3—Details of Tie Rod Brace "A" and of Tie Rods

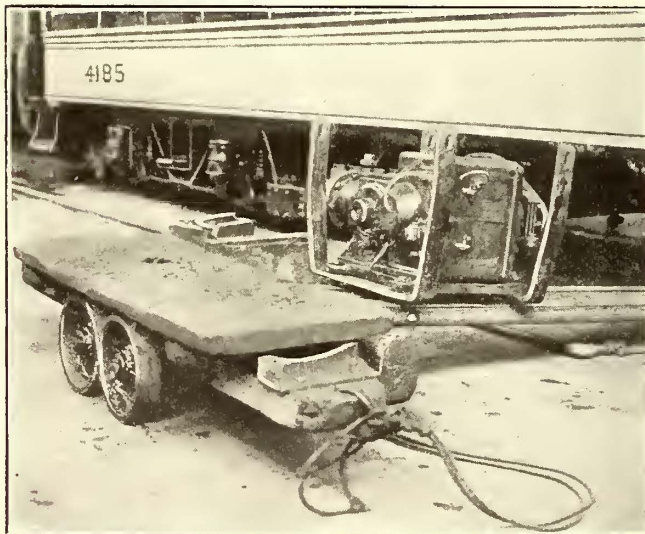
AIR BRAKE AND COMPRESSOR DEPARTMENT OF THE BROOKLYN RAPID TRANSIT SYSTEM

The beneficial results of the Brooklyn Rapid Transit System's policy to concentrate at one point all maintenance work of a certain character are well illustrated by the organization of the air brake and compressor departments. By placing all work of this kind at the Thirty-ninth Street shops it has



Brooklyn Air Brake Department—Triple Valve Testing Rack

been found feasible to secure the very best testing equipment and the highest grade of labor obtainable for this extremely important part of car maintenance. In order to reduce delays to a minimum every maintenance depot is supplied with enough spare compressors, valves and fittings to permit the cars to be available for service immediately without waiting for the return of the parts which require repair. Except for the simple replacement of compressor field coils and armatures, no important air-brake repairs of any character are now permitted



Brooklyn Air Brake Department—Slide and Truck for Compressor Removal

at other depots on the Brooklyn Rapid Transit System. It might be mentioned incidentally that the compressor field coils are made at the Fifty-second Street shops. They are impregnated by the vacuum process with very satisfactory results.

The work of this department is divided into two sections, one taking care of compressors only, while the other handles the rest of the air-braking equipment. The latter force is provided with a standard Westinghouse triple-valve test rack for trying

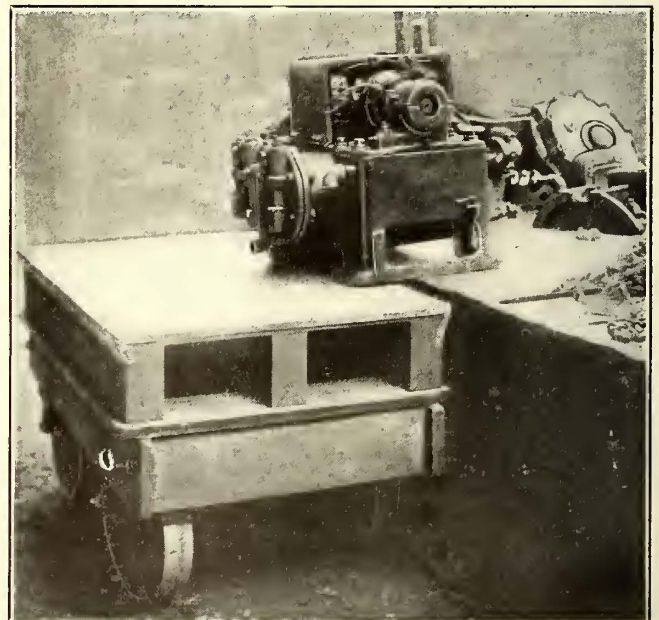
out the apparatus under more scientific conditions than would be possible with a home-made equipment in which the piping and pressure conditions under a standard car are directly imitated. Other equipment for this work includes a Hartford-Blanchard valve grinder and a Crosby gage calibrating machine.

As the equipments come into the shop for overhauling all of the parts, including the motorman's valves, triple valves, train-line feed valve, control-reducing valve and governors, are taken off and thoroughly inspected and repaired, after which the complete equipment is tested as installed under the car. Particular attention is given to the triple valves which are brought in every three months for cleansing and testing on the special test rack.

The different classes of work done by this force, which is composed of six men, are highly specialized. One man, for instance, takes care of the triple valve inspection, a second of the triple valve grinding, a third of the engineer's valves and governors, a fourth attends to all gage calibration, etc.

The compressor maintenance force is supplied with several interesting devices for saving labor in compressor handling and for decreasing maintenance expense. A compressor is removed from beneath a car by two men who draw it up a steel-lined wooden skid to a low truck, as shown in one of the accompanying illustrations. This work is usually done in about 15 minutes. The loaded truck is

then taken to the shop, where a chain hoist is attached to the compressor for delivery to the work tables. The compressor shop is also furnished with another type of truck. The top of this truck is flush with the work tables so that pump motors can be pushed onto the trucks and moved about readily to places where the hoist is not available. The compressors are



Brooklyn Air Brake Department—Truck for Compressor Transportation

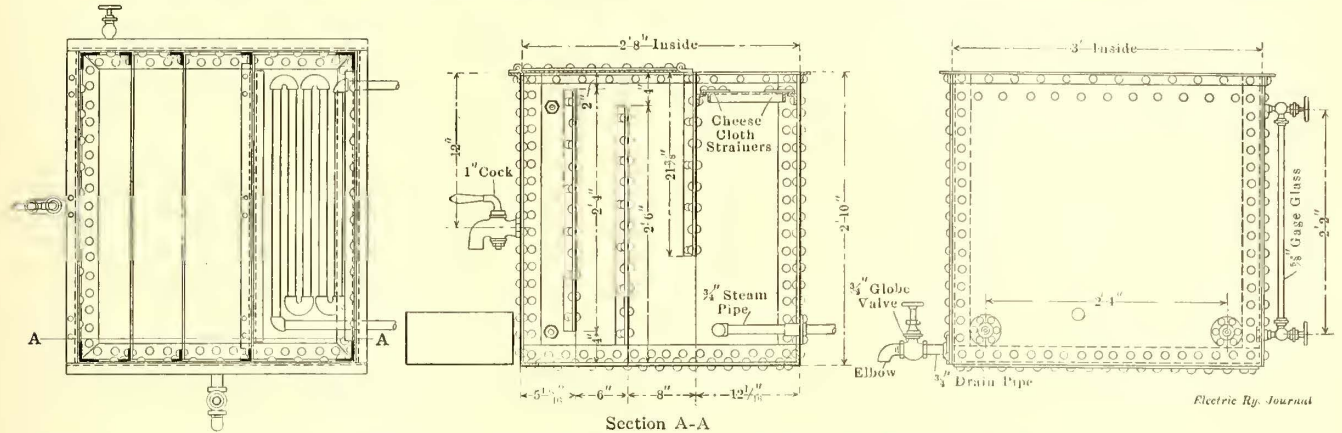
taken apart, thoroughly cleaned, their shaft bearings are renewed, their connecting rods examined, etc. The reassembled compressors are subjected to a five-hour test, during 80 per cent of which period the compressor is running.

The piston rings for Christensen B2 compressors are made at the East New York shops, but at Thirty-ninth Street the rings of the compressors are ground to a true surface by moving them over a lead plate covered with emery grains.

Much trouble has been experienced through the rusting of the entering ends of the air-hose nipples. Formerly these nipples were pushed into the pipe by hand, with the frequent consequence that the hose was injured even before it was placed in service. Furthermore, the oxidation of the hose caused the cutting of the rubber by flakes of rust and by the jagged edges

under piston, presses the pedal to clamp the hose in the aperture formed by the blocks and then admits air to the cylinder to operate the piston. This device enables a man to insert 150 non-rusting nipples a day, which is three times as fast as was possible by hand.

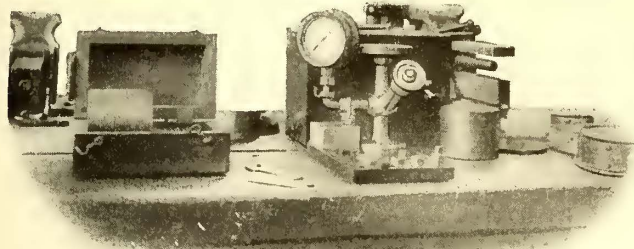
The accompanying drawing shows the type of four-chamber



Section A-A
Brooklyn Air Brake Department—150-Gallon Oil Settling Tank

of the nipple. Sometimes the nipple would drop out on account of the reduction in diameter due to rusting. The company is endeavoring to eliminate these undesirable conditions by inserting the nipples pneumatically and by providing the entering end of the nipple with a brass ferrule. The device

metal tank which was devised for the recovery of compressor oil. The first section is provided with cheese-cloth strainers. The oil is gradually cleansed as it percolates through these strainers. On reaching the bottom of the first chamber it flows into the second compartment, then into the third compartment and finally enters the fourth compartment through an opening at the bottom. By the time the oil has reached the fourth chamber it is thoroughly satisfactory for re-use. One faucet is provided to draw clear oil and another is installed for relieving the tank of sediment and water. Steam coils are used to maintain the temperature of the oil at 100 deg. Fahr. A gage is also attached to the tank to show the relative amount of oil and water contained therein. The dimensions show a 150-gal. tank, but the one at Thirty-ninth Street is of 250-gal. capacity, measuring 5 ft. instead of 3 ft. inside.

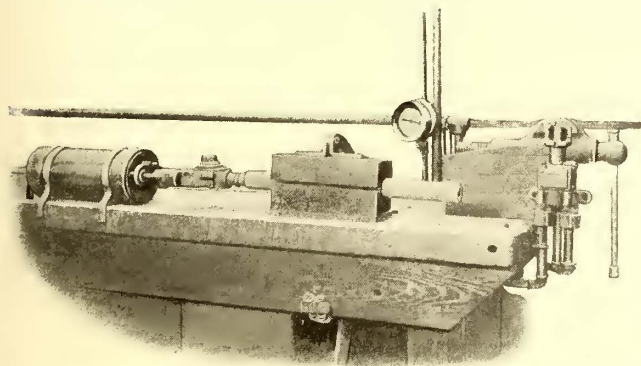


Brooklyn Air Brake Department—Gage Tester

for installing the nipples is shown in an accompanying illustration. The power is furnished by means of a home-made cylinder composed of a piece of 6-in. pipe, which was bored and packed like a regular brake cylinder. The piece of hose into which the nipple is to be inserted is placed in a grooved block

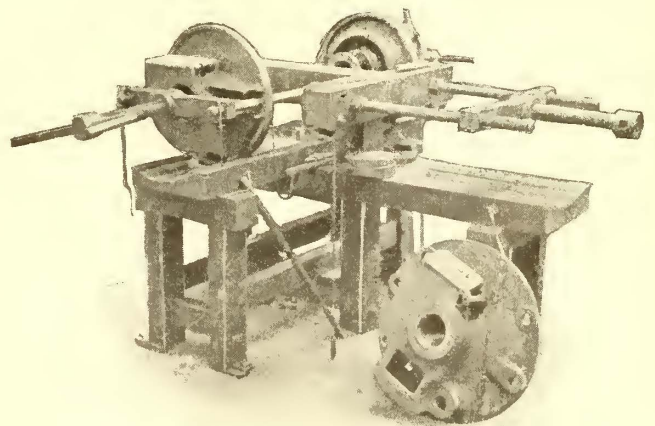
PRESS FOR ARMATURE BEARINGS

An accompanying illustration shows a press built in the shops of the Chicago Railways Company for placing or removing bearings in armature heads. The press is designed for use with both heads of a GE-70 motor and the pinion end head of a GE-216 motor. An armature head is slipped over two



Brooklyn Air Brake Department—Inserting Nipples into Air Hose Pneumatically

in line with the piston of the cylinder. The hose is clamped tightly by pressing upon it an upper grooved block which is hinged to the lower one and operated by means of a pedal. In addition to holding the hose in this manner, it is prevented from slipping by facing the grooves with rough pieces of old hose lining. When using this apparatus the operator lines up the hose with the ferruled nipple which is attached to the cyl-



Press for Armature Heads

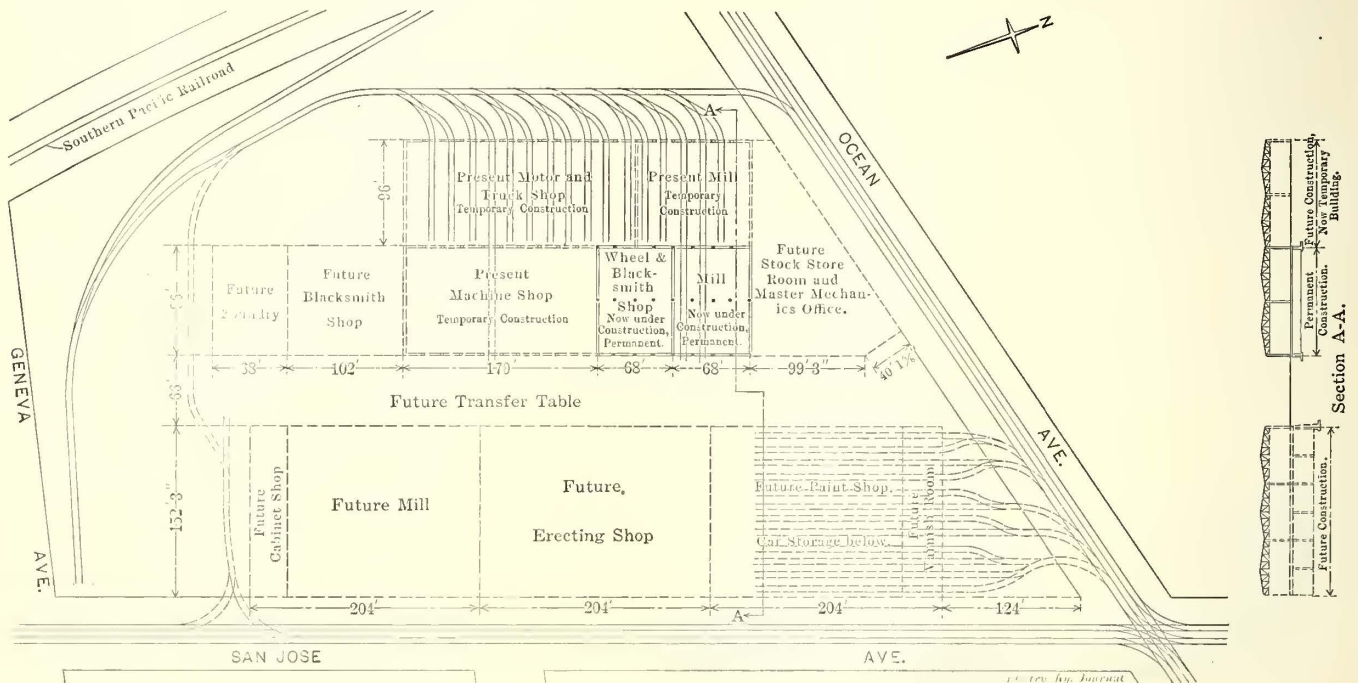
horizontal rods and a screw nut applied to force the bearing in or out of the head. In the application of new bearings the head is pushed over the bearing and a wrench is used to guide the dowel pin into its proper location. Bearings easily may be shimmed when being pressed in and more reliable work is obtained than when the bearings are driven in.

NEW SHOPS FOR THE UNITED RAILROADS OF SAN FRANCISCO

The United Railroads of San Francisco has just let the contract for the first section of its permanent shops to be erected on the tract bounded by San José, Geneva and Ocean Avenues. Elaborate plans for these shops were completed over four years ago and work was about to be commenced on their erection when the earthquake and fire of April 18, 1906, brought everything to a standstill. During the period of haste and confusion following the catastrophe temporary wooden shops with corrugated iron roof and sides were hurriedly erected to accommo-

used at present for a mill, blacksmith and wheel shop. A basement 96 ft. x 34 ft., with a clear height of 8 ft. 6 in., will be built under the north end of the shop for the special purpose of accommodating the motor and all shafting necessary for driving the mill machinery. In this way an absolutely clear space will be left for the operation of the monorail cranes. This idea will be carried out in all future extensions of the plant, as an elaborate system of monorail cranes will be used for intercommunication from one part of the shop to another. All cuttings from the mill machinery will be removed by suction machinery operated from a central plant.

The entire building will be absolutely fireproof, all walls,



Plan of New and Proposed Shops of the United Railroads of San Francisco

date the absolutely necessary repair work. These temporary shops followed the lines of the original plans. Later it was found that these buildings were not large enough to satisfy the demands upon them, so a temporary wooden paint shop was erected in one corner of the grounds entirely separate from the area allotted to the permanent buildings.

The enormous amount of repair and construction necessary on the entire system, due to the ravages of the earthquake and fire, delayed any further work on the shops until the present year. By that time the rapid growth of the system, as well as the expectation of the heavy traffic that the Panama Pacific Exposition of 1915 will bring to San Francisco, impressed the management with the necessity of providing adequate shop facilities. With this end in view there was designed the present steel frame building, which will be so placed that it can be used in conjunction with the wooden shops already in place and will at the same time be a nucleus for a permanent layout. As the wooden sheds deteriorate they will be replaced by steel shops similar to the present structure until the entire plant as originally planned will be in place. A certain amount of shifting from one plant to another will be necessary, but by careful planning this can be reduced to a minimum.

The new shop covers an area of 136 ft. x 96 ft. The roof is carried on trusses with a span of 48 ft., with a clear space from floor to truss of 19 ft. The trusses are spaced on 17-ft. center line. This layout requires only one line of columns through the center of building. In addition to the concrete roof the trusses are designed to carry three fully loaded 2-ton monorail cranes, figured as follows: Weight of crane, 2000 lb.; weight of load, 4000 lb.; allowance for impact, 2000 lb.; total load for one crane, 8000 lb.

At the apex of each 48-ft. bay there will be a 12-ft. x 102-ft. skylight of sheet metal and wired glass. The building will be

roof and floors being of concrete. All windows will be of rolled steel sections with ventilators.

Acknowledgments are due to W. B. Farlow, architect and engineer of buildings, and B. P. Legaré, engineer maintenance of way and construction, United Railroads of San Francisco, for the data in this article.

ALUMINUM CAR SIGNS IN NEW YORK

During January of this year the Metropolitan Street Railway of New York installed aluminum notice signs in about 40 cars. Usually there are carried in the cars of this company two transfer notices and one Board of Health notice. The ordinary type of sign, which is of cardboard, is placed in a glass-covered wooden frame. The aluminum sign is installed without any frame as it is screwed directly into the wood-

**CONDUCTORS ISSUE TRANSFERS ONLY
UPON REQUEST, WHEN RECEIVING FARE.**

Receivers, METROPOLITAN STREET RAILWAY CO.

Aluminum Car Sign

work of the car. When purchased in quantities these metal signs cost, fully lettered, only 40 per cent to 45 per cent as much as the other signs. The aluminum sign is not only light and very neat in appearance, but it is also likely that its maintenance will be inconsiderable. The only attention that the new signs will require is the keeping up of the original finish. These signs are bordered to give the desired framing effect.

PIT AND TRESTLE CONSTRUCTION FOR CAR MAINTENANCE

BY H. C. PRATHER, SUPERINTENDENT OF MOTIVE POWER AND MASTER MECHANIC BUFFALO, LOCKPORT & ROCHESTER RAILWAY

At the present time car inspection and maintenance is carried out over various types of pits, but occasionally a trestle track is employed as is the case in the shops of this railway. It may be of interest to discuss the conditions under which each class of construction is likely to give the best service.

The open pit construction undoubtedly has the advantage of superior light. Easy access from pit to pit also makes the foreman's work lighter, as he can look about without crawling down a hole and picking up a drop-light. Furthermore, the men working inside the pit are always under his immediate observation. By building a 30-in. man-way at both sides of every pit about 18 in. below the rail line a man can work more easily on brush holders, motor leads, lubrication, etc., when the cars used are without trap doors.

The trestle construction is undoubtedly superior where it is unnecessary to wash cars or wipe the outside of bodies on the same tracks where trucks, brake rigging and other apparatus are inspected or repaired under the car. The writer does not believe it practicable to change wheels on the trestle construction where the motors are of 75 hp or greater capacity, as most motors of such size have axle bearings split at 90 deg. so that quite a lot of rigging is required to hold the motor in place while the wheel is being removed. Our management is not in favor of changing wheels over a wheel pit, as it believes that the inspection benefits derived from removing the truck would outweigh any saving in time due to changing wheels over a drop pit.

The closed pit undoubtedly has the advantage of easy access to the car body by inspectors and car washers. It can also be made safer, as there is less danger from spreading rails where each track is connected by flooring or girders to the adjacent tracks.

The type of pit which appears the most advantageous to the writer for city carhouses (this does not include general shops) is a trestle pit construction floored between adjacent tracks 18 in. below the rail line. The men can travel from pit to pit easily, work on the lower part of the outside of the truck or brake rigging from the floor, which is depressed 18 in. below the rail line, and material can be moved between tracks and taken to the place of storage or application with much greater ease than if pulled along among a network of the piers and batterlegs which are absolutely essential to a safe open trestle. The only advantage that the open trestle pit construction would have over the floored type is superior light.

Any type of pit may be easily spoiled by an outside architect or building engineer who does not take into consideration the comfort of the man who has to do the work in the pits. The majority of pits built to-day have flat floors. This is entirely wrong. All pit floors should be crowned in the center and drained to shallow gutters running parallel with the tracks. These gutters should have a steep grade so that all snow, water and wheel wash which drops to the floor pits can be quickly carried away.

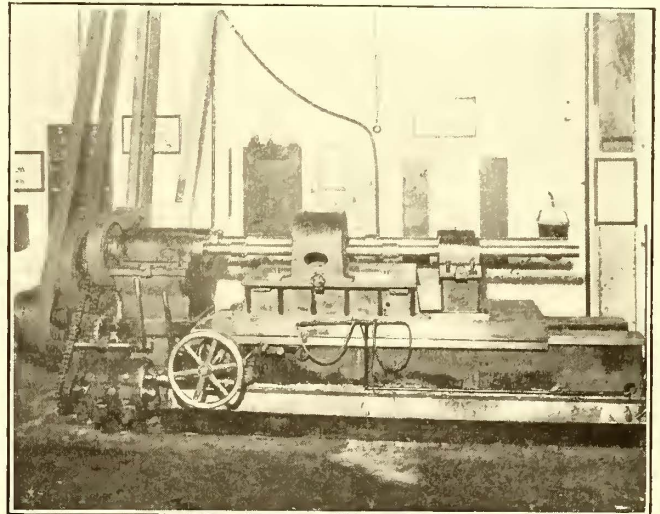
It has been the experience of the writer that four out of ten shops or carhouses have the pit floor below the seepage water line, so that the pits are constantly wet. It is hard to keep good men working in the pits when they find it necessary always to wear rubber boots or be at home sick with a bad cold three or four days out of the month. Work under a wet car at any time is very unpleasant, but if a man can keep his feet dry in winter weather he will be in much better condition to produce a good day's work than when he is constantly slopping and slushing around in the muck and mire of a poorly drained pit floor.

To sum up, the open type of pit construction is superior for inspection only, but for repairs it is more advantageous to use a closed pit with a depressed floor between adjacent tracks.

However, the type of pit selected for any carhouse should be entirely governed by such local conditions as the number and type of cars, the types of motors and trucks and whether car washing or cleaning is to be done over the same pit where inspection or repairs will be carried on. A combination of the trestle pit and the closed pit might be advisable in a carhouse handling several types of equipment.

REHABILITATING MOTORS OF THE METROPOLITAN STREET RAILWAY, NEW YORK

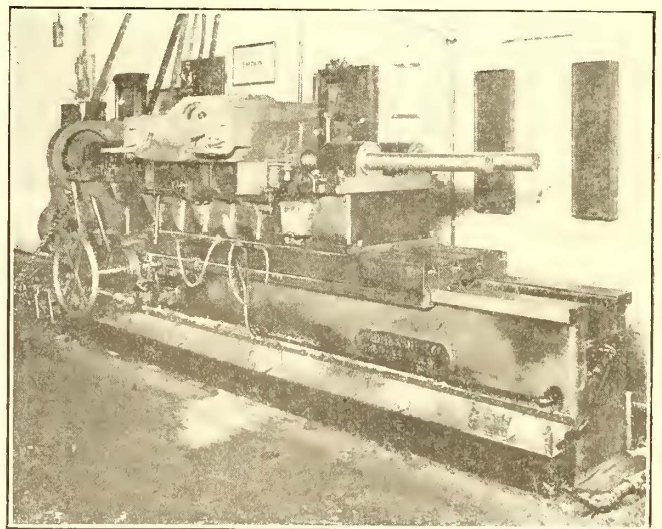
The Metropolitan Street Railway, New York, has in service under its cars a total of 1930 GE-57 motors. The frames of many of these motors have begun to wear in the axle and armature-bearing seats to such an extent that it is impossible to hold the bearing shells firmly in place and consequently considerable



Two-Spindle Boring Mill for Motor Frames

trouble has been experienced with the bearings. In order to prolong the life of the motors, which are still in good electrical condition, a method of reboring the frame bearings has been devised and all motors of this type are being rehabilitated as rapidly as the shop facilities permit.

A specially designed two-spindle horizontal boring machine made by the Beaman & Smith Company, Providence, R. I., has



Motor Frame in Place on Boring Mill

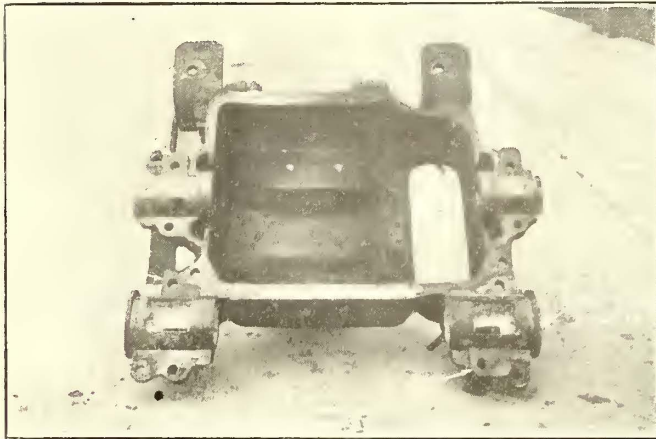
been purchased and installed in the Fiftieth Street shop. The two spindles of this machine are adjustable laterally and their outer ends turn in sleeve bearings mounted on the movable car-

riage. A saddle or jig is bolted to the carriage between the head stock and the outboard bearings of the spindles and the top half of the motor frame with the armature and axle caps bolted on is placed on this saddle. Shims are placed under each corner of the frame to raise it to a true alignment with the boring bars and the frame is then fastened down on the saddle with bolts put through the pole piece bolt holes. Each boring bar carries two cutter heads in which are inserted several small adjustable milling cutters, which are set to the proper radius. When the frame is accurately centered on the saddle the machine is started and all four bearings are bored at one operation. This saves time and insures absolute accuracy in the alignment of the bearings with respect to each other. A cut varying from 1/16 to 1/8 in. is taken by the machine. The cutters are flooded with a lubricant supplied from a barrel suspended above the machine, and as no lifting pump was supplied the lubricant is raised by

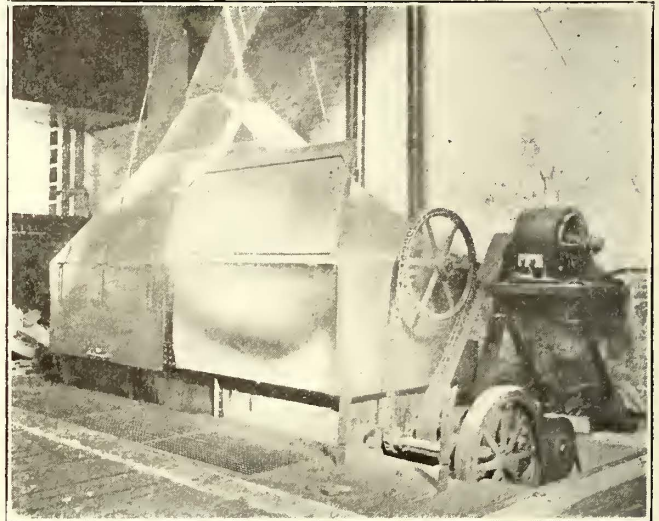
\$20 per motor, if the scrap value of the old shells is credited. It is believed that the life of each motor is increased about 20,000 miles by reboring and the complete overhauling which is given at the same time to the fields and armatures. This paper is indebted to H. H. Adams, superintendent of rolling stock and shops of the Metropolitan Street Railway, for the information from which this description was prepared.

GEAR-WASHING MACHINE

A machine for washing grease and dirt from motor and truck parts has just been built and installed in the Chicago Railways shops. This machine is located in a covered aisle between the truck shop and the machine shop. Briefly, it consists of a large tank into which may be lowered a steel cage



Motor Frame as Rebored, Showing Bearing Shells and Flat Keys

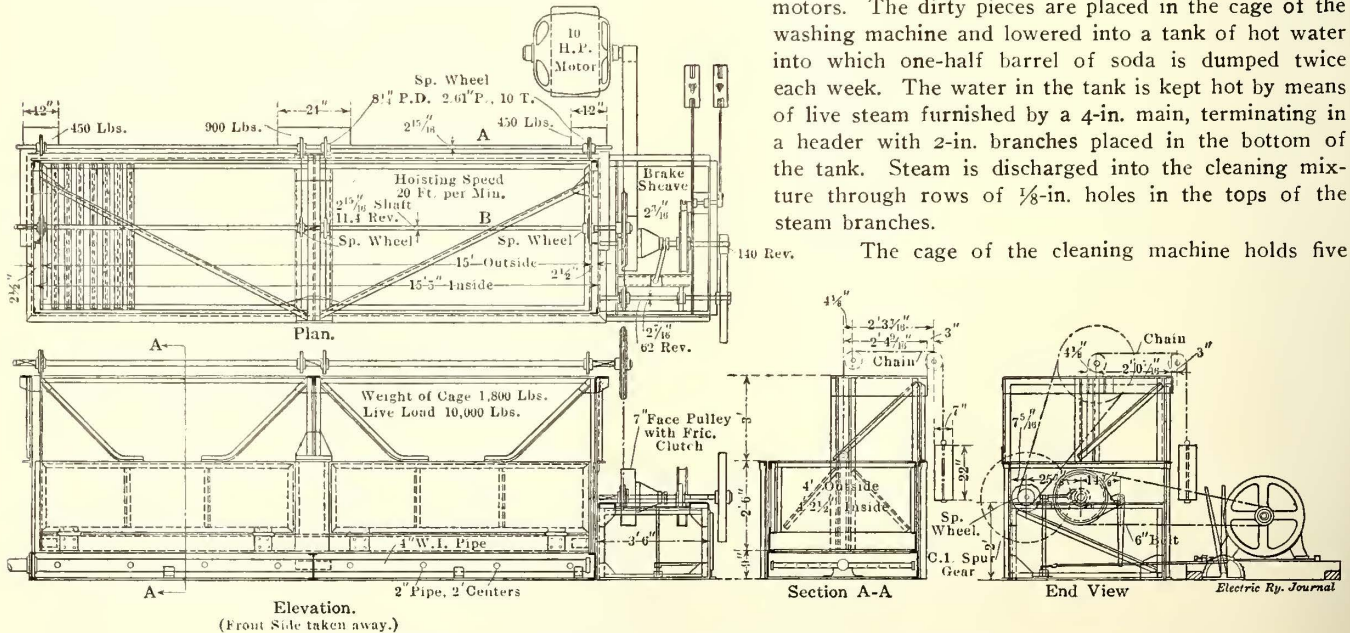


Gear-Washing Machine in Chicago

means of compressed air from a barrel under the floor into which it drains.

In reboring the frames the dowel pins in the bearing caps are cut off and flat keys fitting into slots in the bearing shells are substituted. The caps and the bearing lugs on the motor frame are slotted out on one side and the keys are inserted and held in place by one of the cap bolts. The keys cannot work loose and

carrying the parts to be cleaned. The accompanying illustrations show its appearance. This washing tank has brought about a substantial economy in cleaning gears, axle collars, armature heads, gear cases, journal boxes and similar parts of trucks and motors. The dirty pieces are placed in the cage of the washing machine and lowered into a tank of hot water into which one-half barrel of soda is dumped twice each week. The water in the tank is kept hot by means of live steam furnished by a 4-in. main, terminating in a header with 2-in. branches placed in the bottom of the tank. Steam is discharged into the cleaning mixture through rows of 1/8-in. holes in the tops of the steam branches.



Plan, Elevations and Section of Chicago Washing Machine for Gear Cases

the shells are held more securely than with a single small dowel pin. This scheme of keying in the shells was devised by H. P. Clarke, master mechanic in charge of shops. About five motors can be rebored in a day with the machine described and the total cost for machining and new bearing shells is less than

The cage of the cleaning machine holds five

tons and is charged once each hour. As the dirty castings are removed from the hot soda mixture they are swabbed off with a broom.

The steel tank which holds the cleaning mixture has inside dimensions of 15 ft. x 4 ft. 2 1/2 in. It is 3 ft. 3 in. deep and is

made from $\frac{3}{8}$ -in. plates riveted to channel irons and angles. The cage in which the parts to be cleaned are placed for lowering into the tank also is built of structural steel. It weighs 1800 lb. and is designed to carry a load of 10,000 lb. This cage is raised and lowered by means of a 10-hp motor and a link-belt transmission which includes a band brake to control the lowering, which is done by gravity. The cage has a lifting speed of 20 ft. per minute.

This washing machine and its operating mechanism are installed on a large concrete foundation so arranged that the washing tank extends but 16 in. above the floor. A concrete pit in front of the tank covered with iron grating receives the dripping from the castings as they are removed from the tank. This pit, which is $3\frac{1}{2}$ ft. wide and 4 ft. deep, also makes the lower part of the washing tank easily accessible. Sheet-iron covers for the top of the tank are provided to close it tightly when castings are being cleaned. A sheet-steel hood and stack have been placed above the tank to carry away the gases.

concrete in place, which was dumped to them from the top of the slopes. The reinforcement was laid on the ground first and then as the concrete pavement approached the top the workmen from time to time raised it to its proper position in the slab. The wearing surface was applied in the same manner as the slab, only it was allowed to lap the joints made in the concrete slab proper.

The slopes of the pits were made 1 to 1 to allow the coal to slide freely to the bottom. The bottom of the pit was reinforced under the frame bents to offer good foundations. A typical bent, as shown, was used throughout with anchor bolts



Coal Storage Pit and Trestle

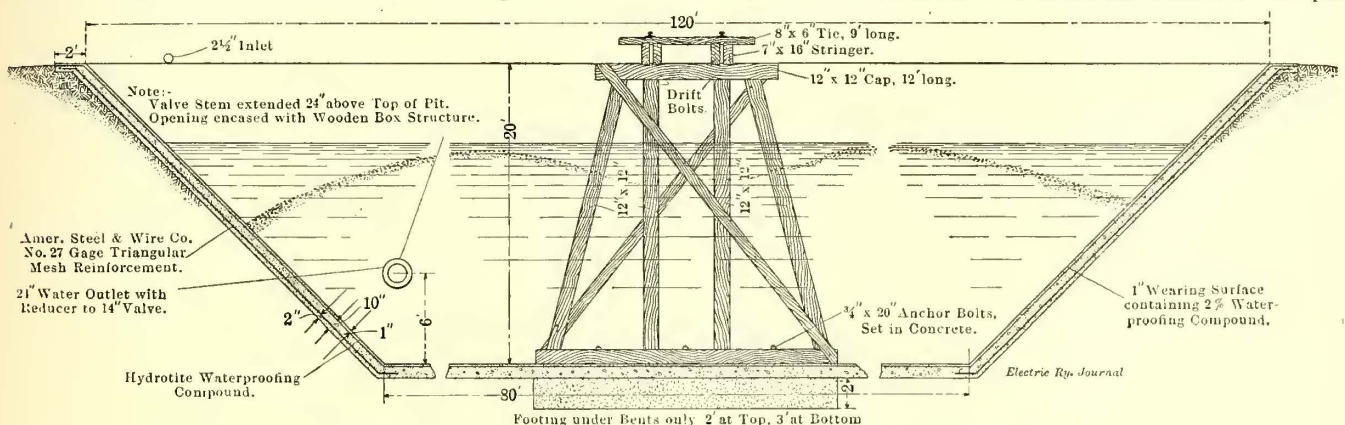
NEW COAL STORAGE PITS OF THE ILLINOIS TRACTION SYSTEM

The bridges and buildings department of the Illinois Traction System has just completed the first of two large coal storage pits for the power department. This company owns three coal mines and requires about 1500 tons of coal a day for its several plants. The two most important generating stations, so far as the interurban lines are concerned, are those at Peoria and at Riverton, a few miles east of Springfield. The two new coal storage pits are designed to provide under-water coal storage for these plants. The storage pit at Riverton is close to the plant, while the other pit is 16 miles east of Peoria, at Mackinaw Junction, and 20 miles west of Bloomington, where the local railway and light plant also is operated by the Illinois Traction Company. This location is easily accessible from Springfield and the pit probably will be filled with coal from the Springfield district.

The Riverton pit is 225 ft. long by 120 ft. wide and is an excavation below the general ground level. All four sides slope at an angle of 45 deg. to a depth of 20 ft. A framed trestle extending over the center of the pit will support the hopper-bottom cars in which coal will be received and also will carry the company's long-boom locomotive crane which will operate the grab bucket to be used in reloading fuel.

set in the floor to prevent any side motion which might be caused by vibration. A 16-ft. reach was used with double 7-in. x 16-in. stringers. Ties were spaced with 24-in. centers, the idea being to use only sufficient chords to carry the maximum load and thus leave ample space between the ties to allow drop-bottom dump cars to be handled. This trestle runs through the center of the pit and the width of the pit was governed by the length of the boom or extreme reach of a locomotive crane. The track over the pit is a stub siding with an Ellis bumper at the extreme end and the ties are extended over the 9-ft. length to allow for a 2-ft. walkway so that workmen may have free access to the sides of the cars.

The water supply is from a 3-in. main which discharges waste water from the condensers at the power house. The outlet was installed about 6 ft. above the bottom of the pit.



Section of Coal Storage Tank Used by Illinois Traction System

In constructing the pit the sides and bottom were paved with a 10-in. concrete slab, 9 in. being a 1:3:5 mixture of concrete with style 27 American Steel & Wire Company reinforcement placed about 2 in. from the bottom to prevent cracks and sliding from expansion, settling and contraction. The entire inside surface was coated with a 1-in. wearing surface of a 1:2 mixture of sand and cement, containing Hydratite waterproofing in the proportion of 1 part to 50 parts of the cement, mixed comparatively dry and laid in alternate sections, 6 ft. in width, running from the top to the bottom of the pit. The men worked from a temporary step scaffolding and tamped the

idea being that when the water was as low as this the crane man would have no trouble in picking up the rest of the coal in the bottom of the pit. Also it was necessary to retain a certain amount of water at all times owing to the pit's proximity to the river and the relative average water elevation in the river. The subgrade in the bottom of the pit is ordinary river sand and considerable pressure was anticipated during high water in the river, when the slab might heave and break. When 6 ft. of water is maintained in the pit the river pressure is counteracted.

The outlet was made 24 in. in diameter to reduce the scour-

ing effect of the overflow. The outlet valve was inclosed in a vertical 4-ft. square wood box made of 2-in. yellow pine, allowing about $\frac{1}{4}$ -in. space between the boards. This box will act as a screen to keep fine coal from being discharged from the pit when the water flows out. The valve stem is run to a point above the top of the pit where a hand wheel and walkway are provided from the edge of the pit to the valve box.

The coal storage pits were built under the supervision of E. M. Haas, of the Illinois Traction System.

A CONVENTION WITHOUT A COLLECTIVE EXHIBIT

A somewhat startling experiment is to be tried this year by the National Electric Light Association, whose convention in New York will be conducted without any formal exhibit of electrical apparatus. The convention begins on May 29 and continues until June 2; the technical meetings will be held in the Engineering Societies Building, in Thirty-ninth Street. The decision to dispense with the usual exhibition of electrical apparatus which has heretofore been an accompaniment of the conventions of this association was reached from a variety of

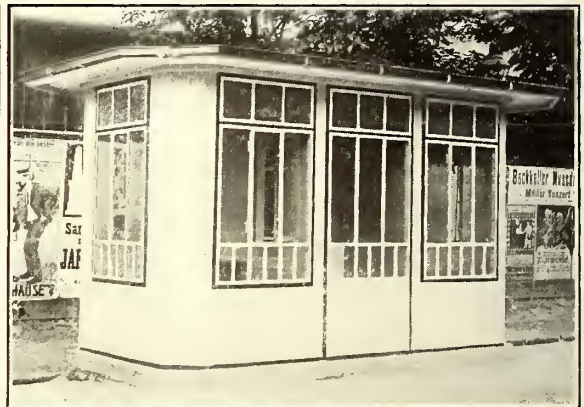
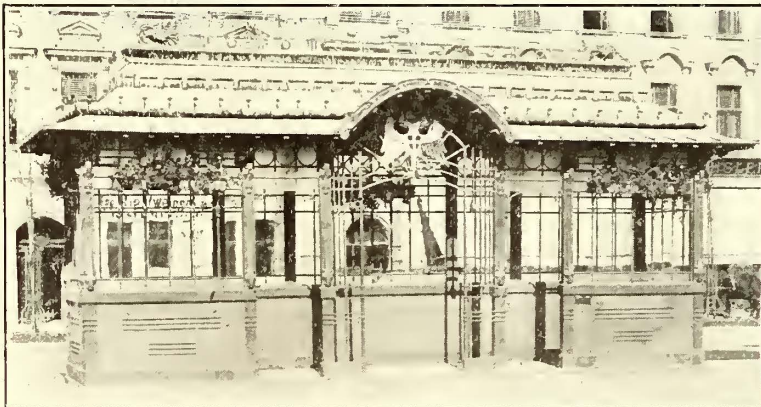
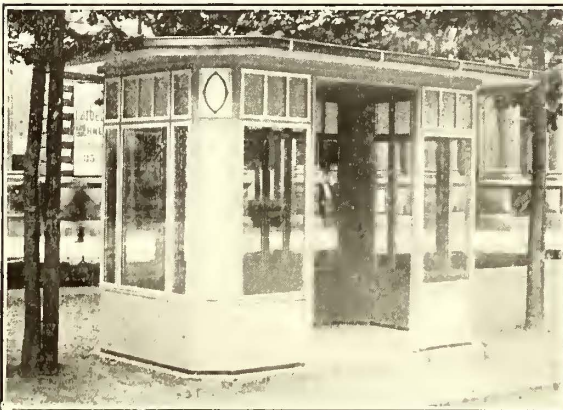
this kind, and it was found that about only 5 per cent cared to engage in such an exhibit.

Last year the convention of the National Electric Light Association was held in St. Louis, where the exhibit of apparatus made in connection with the convention was combined with a local electrical show. The exhibit continued for two weeks. During the first week admittance was obtained only by holders of special cards. The next week the public was admitted upon payment of a small fee, and the exhibitors shared the gate money.

Another somewhat novel feature of the National Electric Light convention this year is that there will be no official headquarters. The reason for this plan is obvious in a city like New York, where there are a large number of first-class hotels—perhaps 40—close to the place of meeting. The offices of the association itself will be the natural headquarters.

WAITING STATIONS IN VIENNA

A few months ago the Vienna municipal railway system decided to replace the old-style iron waiting stations used on the



Shelter Stations Recently Erected in Vienna for Surface Railway Passengers

reasons. One of these, and probably the principal one, was that for many years it has been customary to hold an electrical show in New York during October, at which the exhibits are very similar to those which would naturally be shown in connection with the National Electric Light convention, and it seemed to be unnecessary, as well as a considerable hardship on the manufacturers, to ask them to repeat next month the exhibit which they made in New York last October and which they will probably repeat in New York next October. Again, most of the types of apparatus which would be shown at a convention of this kind are in use in the large electric lighting and power stations in New York—or in showrooms—where they can be seen in operation. The decision to abandon the exhibits was not reached until after a consensus of opinion as to the desirability of such a move was obtained from all the manufacturers who would naturally exhibit at a meeting of

system with stations of a more modern type. Typical examples of the new stations are shown in the accompanying engravings. Three of these stations are designed in the "secession" style and vary in size according to the importance of the traffic at the points at which they are located. They have an iron frame with wooden sashes and fillings of marble and glass. The foundation is of concrete. The marble in some cases is ornamented. The roof is of iron and wood covered with metal, and has broad, projecting eaves to protect passengers standing on the platforms. The exteriors are painted gray and white, and in some cases are decorated inside with framed pictures. Care was taken that the style of the station should harmonize with the surrounding buildings.

One of the engravings shows an all-iron station of different design from the others. Stations of this type are painted a light green, and the roof is covered with copper.

ANNUAL MEETING OF THE NEW ENGLAND STREET RAILWAY CLUB

The annual meeting and banquet of the New England Street Railway Club were held at the Somerset Hotel, Boston, on the afternoon and evening of March 23. At the meeting in the afternoon the following were elected officers of the club for the ensuing year:

President, Franklin Woodman, Haverhill, Mass.; vice-presidents, Thomas Lees, Lowell, Mass., Thomas Hawken, Rockland, Maine, E. T. Millar, Concord, N. H., A. J. Crosby, Springfield, Vt., A. E. Potter, Providence, R. I., J. K. Punderford, New Haven, Conn.; secretary, John J. Lane, Boston, Mass.; treasurer, E. P. Shaw, Jr., South Framingham, Mass.

Executive committee, C. H. Hile, Boston, Mass.; Elton S. Wilde, New Bedford, Mass.; M. H. Bronsdon, Providence, R. I.; E. J. Dickson, Springfield, Mass.; Carl A. Sylvester, Newtonville, Mass.; John F. Stout, Boston, Mass.; F. M. Nellis, Boston, Mass. Finance committee, Franklin Woodman, Haverhill, Mass.; A. S. Michener, Boston, Mass.; Percy Hodges, Boston, Mass.

THE BANQUET

The annual banquet was served at the Somerset Hotel. The banquet hall was handsomely decorated. On the center of the wall over the head table was the flag of California, sent by Patrick Calhoun, president of the United Railroads of San Francisco, who was invited, but could not attend. There were music by an orchestra, singing by a quartet and chorons singing by all present. Nearly 600 guests were present and enjoyed the excellent repast provided.

C. H. Hile, the retiring president, opened the after-dinner exercises and introduced the newly elected president, who, after a few felicitous words of welcome to the guests, told of the flourishing condition of the club at the present time with 727 members and \$3,500 in the treasury. He then introduced Hon. Henry F. Hurlburt as toastmaster.

The first address of the evening was by Hon. Eugene N. Foss, Governor of Massachusetts. Governor Foss said in part:

"Whatever you may think of your companies as private properties, the fact is that they are private only in a very limited sense. In a large sense they are public. We call them quasi-public, because although they are financed by private capital still they are directly in the service of the people, and the public is the real source of their rights and powers. The time has now come when the people themselves are aroused to the necessity of having a hand in all public service corporations, and the company which fails to recognize this is bound to lose. Every head of a public-service corporation owes it not only to his own sense of justice, but owes it also to his stockholders, to act in full recognition of what is due to the public.

"It is not enough for a company to maintain the passive attitude of merely abstaining from all lobbying methods. In my judgment a company owes it to itself to come out openly with the greatest possible degree of frank publicity, not only regarding its assets, its expenses and its profits, but regarding its methods of doing business, its present efforts to please the people and its plans for further service. It should keep its ears open to every public criticism and should either answer these if they are wrong or comply with them if they are right.

"The people as a whole, even in the face of constant friction with the quasi-public corporations, rarely contemplate taking over such properties for themselves. They do not want them. All they want is to know that everything is open and above-board and that they are getting a square deal. The public ownership of these corporations is not generally a desirable thing—and the people have found that out."

General William A. Bancroft, president Boston Elevated Railway Company, made a convincing address. He said that he agreed with the statement of Governor Foss about publicity, as the time for concealment had long gone by—in fact, there was nothing to conceal. The question now was how long the street railway business is going to be a business at all. Most of the

troubles of the street railways to-day came from a lack of gross income, and this jeopardizes good service. Speaking then as a private individual, General Bancroft said that if private capital was to continue to furnish transportation it should be done upon the ordinary terms of business, that is, with the expectation of a reasonable profit. But the companies are met by the declaration which comes from many persons of reputed intelligence that capital in public utility enterprises is entitled to only "savings bank interest." Many men who say this expect in their own business profits of 25 per cent or 50 per cent or more. So there is legislation for reduced fares, for longer rides, for free transfers, for more paving, for bigger cars and for more frequent service. In short, burden upon burden is added until it is impossible for the company to earn even savings bank interest, and finally not even fixed charges. The natural sequel is municipal ownership; but if municipal ownership should be applied to transportation, there is no reason why it should not be applied to the other necessities of life, such as the telegraph, telephones, housing, clothing, furniture, fuel, etc.

Continuing, General Bancroft said that there were two conceptions of society in this country. One was that adopted by our forefathers and might be expressed by the phrase, "The laborer is worthy of his hire." This meant that industry, thrift, intelligence, prudence, foresight and sagacity were entitled to their reward. The other, raised to a considerable extent only within the last few years, was the cry, "Wealth is a crime," This meant that those who had riches must be deprived of them by taxes, income taxes, inheritance taxes, etc. This cry comes from the newspaper, from the chair of learning, the pulpit, the bench, the bar, the publicist, the office holder, the retired merchant and even the active merchant, not perhaps from all, but from some of them. It can be heard from every side. General Bancroft asked where the transportation man and the man of every other business should stand in this demand to abolish wealth. He asked particularly whether New England wished to keep its ideal of independence and its institutions of learning, of religion and of humanity. He believed that all who represented the hard-working men of the country would fail of their duty if they did not combat by every honest endeavor those measures which not only seek their destruction but the destruction of the government itself. In the final case the issue was whether the laborer was worthy of his hire or whether wealth was to be considered a crime.

The next speaker was Arthur W. Brady, president of the American Electric Railway Association. Mr. Brady paid a high compliment to Massachusetts and its railroad policy, which he said had a reputation elsewhere of being sane and being safe. The tendency of the times seems to be toward the regulation of public utilities companies by commissions, and this policy has been developed in Massachusetts to a degree unexampled elsewhere. A special feature which interested him in connection with this practice in Massachusetts was that the acceptance of the rulings of the railroad commission did not seem to depend upon its legal status, but that even the recommendations of the commission were accepted. Elsewhere the commissions seem constantly to be reaching out for broad plenary powers, which they claimed were necessary in their government of public-service companies. Another point of interest to Mr. Brady in Massachusetts railway practice was that the franchise question seemed to be settled. Elsewhere this question had still to be decided, as in Cleveland, Detroit and some other cities. Another point in Massachusetts practice that attracted wide attention in other States was the position taken in regard to higher fares. The 5-cent fare was no longer in Massachusetts considered a sacred thing, and companies, after showing all the facts in regard to their operation and proving that they needed a higher fare than 5 cents, had had such a higher fare granted to them with public approval.

In closing, Mr. Brady complimented the New England Street Railway Club on its growth and prosperity. He said that he believed in the association idea; that the activities of the Railway Club on its growth and prosperity. He said that he American Electric Railway Association were partly internal, that is, they are related to improving the art in its different de-

partments, and partly external, that is, they consider the relations of the companies to the public. He believed that if the public was taken into the confidence of the railway corporations to a greater extent the people would be altogether fair, and said that the duty of the railway companies throughout the country was to let the public know the facts in regard to the earnings and profits, as well as the losses, of the corporations.

Dr. Richard C. MacLaurin, president Massachusetts Institute of Technology, was then introduced by the toastmaster. Dr. MacLaurin told how science had made modern systems of transportation possible, and urged the railroad men to avail themselves of the potentialities of the young men trained in the scientific schools. He said that electric railways have a great influence not only on the material prosperity of the community in which they are located, but also upon the mental, spiritual and social development of the community. In conclusion he paid a tribute to the genius of Michael Faraday, whose early inventions and discoveries had laid the foundation for the modern science of electrical engineering, although Faraday did not at the time realize their industrial importance.

Hon. Walter Perley Hall, chairman Massachusetts Board of Railroad Commissioners, the next speaker, referred to the importance of railway companies looking out for the minor features of operation, which he said had a great deal to do with the attitude of the public toward the corporations. He gave as instances of points which he had in mind the desirability of neatness in appearance of the conductors and motormen, clean windows, freshly painted cars and absence of flat wheels. These may seem to some managers to be of minor importance, but they had a great influence in gaining public approval for the companies. Another matter which he urged upon the companies was to be perfectly frank with the public in regard to the declaration of their policies as carriers. He said that the average man did not care particularly about the financial management of the companies, but he did care about the service they were giving him.

Other speakers were Hon. James F. Swift, Attorney General of Massachusetts, and Joseph Smith, a representative of one of the daily papers in Lowell, Mass.

DECORATED CAR IN MANILA

On several occasions illustrations and descriptions have been published in these columns showing specially decorated railway cars for different large celebrations. One of the latest of these is a car of the Manila Electric Railroad & Light Com-



Decorated Car in Manila

pany, shown in the accompanying illustration. The car was decorated with American and Chinese flags, characters, etc., in honor of the great many Chinese located in Manila, and ran over the lines of the company on the Chinese New Year, at which time the Chinese hold large festivals. Inside the car was a band made up entirely of Chinese.

MARCH MEETING OF ILLINOIS ELECTRIC RAILWAY ASSOCIATION

An enthusiastic meeting of the Illinois Electric Railway Association was held at Bloomington on March 24. About 30 representative railway officials attended. The principal subjects discussed were interchangeable mileage, promotion of traffic, joint ticket and information bureau at Chicago and the establishment of the association on a firm working basis. H. E. Chubbuck, vice-president executive of the Illinois Traction System, presided over the single session which was held. After a luncheon at the Illinois Hotel Mr. Chubbuck entertained a party of 25 with a trip to St. Louis in his office car. This trip of 175 miles was made in six hours' running time, including short visits for the inspection of the extensive new facilities at the St. Louis terminal. On arrival at St. Louis Mr. Chubbuck entertained his guests with a dinner at the Jefferson Hotel.

At the beginning of the Bloomington meeting Secretary C. E. Flenner read the minutes of the previous meeting and W. L. Arnold, as chairman of the membership committee, announced the acquisition to membership of several new companies, including the Metropolitan West Side Elevated Railway and the Chicago & Oak Park Elevated Railroad. The Westinghouse Electric & Manufacturing Company and the Pennsylvania Steel Company were elected supply members.

H. J. Vance, general superintendent Chicago, Ottawa & Peoria Railway, reported the progress being made toward joint interchangeable mileage with the Central Electric Traffic Association. He had received a letter from A. L. Neereamer, chairman, stating that the proposed joint arrangements were being considered and no doubt a decisive answer could be given at the time of the next meeting. C. E. Morgan, general manager Indianapolis, Crawfordsville & Western Traction Company, who was a guest of the Illinois Association, described the considerable advancement made in joint traffic and transportation affairs in Indiana and the lines of the member companies of the Central Electric Railway Association.

John Leisenring, signal engineer Illinois Traction System, reported, as chairman of the block signal committee, that two members of his committee had attended the recent meeting of the block signal committee of the American Electric Railway Association. Plans were made for co-operation between the two committees.

Robert A. Barnett, chairman of the traffic auxiliary committee appointed at the last meeting to report on the accommodations available for a joint traffic and information bureau in Chicago, reported in part as follows:

"The committee appointed to investigate the feasibility of establishing an interurban city ticket office in Chicago has found a number of desirable locations, some of which are vacant at present and others will be available on May 1. A list of these offices together with data regarding their size and rental shows that very desirable quarters may be obtained on Clark Street in the loop district on the ground floor of buildings adjacent to those occupied by the steam trunk line city ticket offices for a rental of approximately \$5,000 a year. The committee gave no consideration to locations outside of Railroad Row. The committee made an approximate estimate of the operating cost of the joint office which showed that, including rental, the cost to the companies which had signified their willingness to operate this office jointly would total about \$10,000 a year. From the traffic standpoint the committee holds that the opening of this Chicago office will well be worth the expense to the interested lines."

The members of the association discussed ways and means for prorating the operating expense of the joint Chicago office and instructed the committee to determine definitely what companies would share in the expense. W. O. Woodward, traffic manager Chicago, Lake Shore & South Bend Railway Company, spoke of the value which a joint ticket office would be to his road and to the four other roads entering Chicago. Mr.

Chubbuck stated that the Illinois Traction System and the Chicago, Ottawa & Peoria Railway would willingly enter into an agreement for the maintenance of the joint office in Chicago. The traffic committee in charge of the joint ticket office subject will report in advance of the next meeting of the association, which will be held on May 26.

MARCH MEETING OF CENTRAL ELECTRIC RAILWAY ASSOCIATION

About 125 representatives of member companies of the Central Electric Railway Association held an enthusiastic meeting at the Hartman Hotel, Columbus, Ohio, on March 23. E. B. Peck, the new president, was in the chair and led the discussions on the various papers, so that considerable valuable information was elicited. Several parties traveled to Columbus by special interurban cars, one party being that chaperoned by Mr. Peck, who is vice-president of the Terre Haute, Indianapolis & Eastern Traction Company. F. E. Myers and E. F. Schneider took a party from the northern part of Ohio to Columbus in a parlor car of the Cleveland, Southwestern & Columbus Railway.

The next meeting of the association will be held at St. Joseph, Mich., on June 22, and the president suggested that all the members travel to the convention by special interurban cars so that there might be an opportunity for interchange of ideas and observation of other lines en route. After the reading of the minutes by Secretary Neereamer eight new supply members were admitted to the association.

STANDARDIZATION COMMITTEE REPORT

H. H. Buckman and W. H. Evans, in behalf of the standardization committee, described the work which the committee had done on the subject of brakes and brake riggings. No written report was ready for submission to the association, but the committee had prepared drawings which showed the proposed standards in regard to the size of cylinders, length of piston travel and maximum and minimum air pressures. Mr. Evans stated that prints showing these suggested recommendations of the committee would be sent to the different members of the association, so that the proposed standards could be discussed at the next meeting of the association.

INTERLINE TRAVEL

T. J. Gore, general agent Indianapolis Interurban Joint Ticket Agency Association, presented a paper on "The Development of Long Distance Travel." This paper was published on page 507 of the *ELECTRIC RAILWAY JOURNAL* for March 25.

F. D. Norveil, general freight and passenger agent Indiana Union Traction Company, spoke of the progress made in traffic affairs since the organization of the Central Electric Traffic Association, calling attention to the increase in interline ticket sales mentioned by Mr. Gore. Mr. Norveil held that any future increase in traffic in Indiana must largely be expected to come either from the natural growth of population or because of development of interline business. In competition with steam roads the electric railways of Indiana were now getting their share of local and through business, but an increase in the long-haul business was to be expected in proportion to the accommodations which the electric lines afforded. The duty of the traffic association as seen by its members was to bring about an increase in long distance business by keeping the ticket agents well informed regarding through routing and rates.

M. J. Insull, general manager Louisville & Southern Indiana Traction Company, complimented Mr. Gore when he stated that the substantial increase in interline business, as indicated by the ticket sales at the Indianapolis Terminal, might partly be attributed to the good work of the Indianapolis ticket-selling staff. At times as many as eight ticket sellers are on duty at the terminal station and they have a wonderful variety of questions to answer as a part of their regular duty. This

part of their work had been done so courteously and with such good judgment that it had been a factor in the increase of sales of long distance tickets.

Mr. Insull spoke of the field for development in interline travel. The possibilities of long trips and the convenience with which they could be made he thought should be placed more prominently before the public. He advised increased advertising of these facilities by all roads interested. This advertising should make it plain to a possible traveler how easily and how quickly the long trips could be made by interurban.

J. H. Crall, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company, called attention to several factors which had induced long distance travel. These included the through car service, high speeds, through checking of baggage and close connections at junction points. The latter factor was one which Mr. Crall thought should be given considerable attention with a view to improving connecting schedules.

Mr. Myers said that the possibilities of long distance travel depended so much on the design of the interurban car that he would appreciate expressions from other men regarding the best car for long distance interline service.

H. A. Nicholl, general manager Indiana Union Traction Company, told of the interline business of his company. Effort was made to run through cars over connecting lines wherever possible. He believed that interline operation had had a very great deal to do with increased revenue because passengers disliked so much to change cars at junction points even though close connections were regularly made. His company had practically adopted as standard for long distance runs a three-compartment car with a motorman and baggage section 10 ft. long, smoker 16 ft. and a general passenger compartment in the rear. So far single-car trains had been run, but traffic now required two-car trains and these would soon be put in service on the "Muncie Meteor" and the "Marion Flyer," fast trains of his road. Mr. Nicholl's preference for interurban cars was one with a center entrance and his company was planning to build such a car, arranging the interior for the general passengers in front with smoking and baggage compartments at the rear of the center entrance.

J. F. Starkey, district freight and passenger agent for the Indiana Union Traction Company, who soon will be traffic manager of the Lake Shore Electric Railway, argued for more traveling on the part of traffic officials. He cited several instances showing how desirable business had been obtained because the traffic officials were acquainted with operating conditions on foreign lines. He had just made a trip from Anderson to Louisville to make arrangements for a party which would charter a car for a trip from that city to Detroit, Mich.

Mr. Nicholl stated that while some through runs might be very desirable from the traffic standpoint they were often inadvisable because of operating reasons; also, interline cars sometimes were a burden to the connecting road having the least traffic, and to be successful a through run should be justified on both roads and be so scheduled that the through car could replace an existing train.

O. H. Murlin, general passenger agent Dayton & Troy Electric Railway, referring to the increase of interline business in 1910, thought much of it had been due to the increased familiarity of the station agents with the interline tariffs issued by the Traffic Association during the summer of 1909. He thought his road was one of the first to operate limited trains and at that time the maximum run was only 31 miles. The service had been so well received that it now included eight limited trains from Dayton to Lima and six between Dayton and Toledo, a distance of 164 miles. His Dayton office frequently had calls for through tickets to Detroit, Mich., and Louisville for long routes.

Mr. Tomlinson, Ohio Brass Company, suggested the use of time cards for through routes to assist in the promotion of long distance travel. He also described the fast four-car observation train service of the Puget Sound Electric Railway,

mentioning the normally crowded condition of the excess fare parlor cars operated.

W. E. Rolston, superintendent power and shops of the Cleveland, Southwestern & Columbus Railway, mentioned the factors tending to decrease the cost of limited service as compared with local service. Limited trains required from 30 per cent to 40 per cent less power, the maintenance charge was less, the labor cost was lower, and in addition a higher average fare per passenger was obtained with safer operating conditions.

John M. Keys, passenger agent Detroit United Railway, described the new joint service which will be inaugurated on April 4 over this line and those of the Michigan United Railway. Trains will be operated between Detroit and Lansing and Kalamazoo, the latter cities being 113 and 145 miles respectively from Detroit. Six through limited passenger trains will be operated daily each way between Kalamazoo and Detroit. In addition a fast through train will be operated each way daily between Lansing and Detroit. It will be called the "Capitol Flyer" and will require about four hours each way for the run.

W. S. Whitney, general passenger agent Ohio Electric Railway, spoke of an increase in traffic brought about by through cars. At one time the limited service between Dayton and Columbus and Zanesville and Columbus was operated as two runs of approximately 70 miles each. Last fall the two limited runs were consolidated, and as a result of the through service the earnings for four months show a considerable increase, which is thought to be brought about by no other reason than the through cars.

Mr. Insull asked whether from the earning standpoint parlor cars were desirable for long runs. He had in mind that the electric roads were not getting a certain class of travel because they were not giving fine enough equipment accommodations to encourage it. It was a question, however, whether it would pay to operate parlor cars.

H. C. Donecker, secretary American Electric Railway Association, was introduced by President Peck and addressed the meeting on the subject of co-operation, calling particular attention to the good feeling existing between the American Association and the sectional associations. He said in part that about 35 per cent of the operating companies in the United States were members of the American Electric Railway Association. This membership covered about 75 per cent of the total mileage in the country and on the basis of income represented about 80 per cent. The membership was as widely scattered as Montevideo, Uruguay, and Cape Breton, Canada. The American and affiliated associations had 44 committees with 303 members preparing reports for the next convention. Within the Central Electric territory were only five or six companies not members of the American Association. Mr. Donecker's compliments to the Central Electric Railway Association were received with much applause.

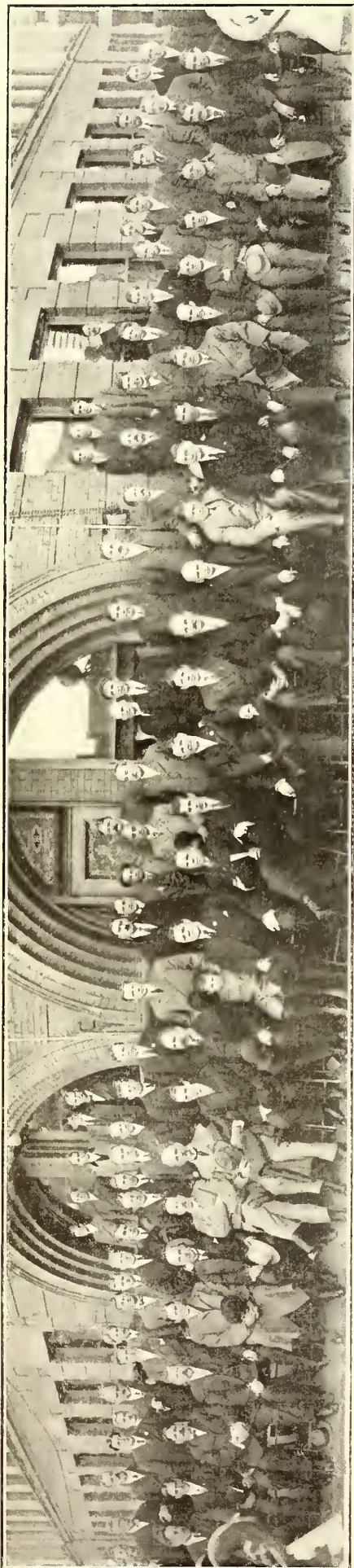
A paper on interline accounting next was read by L. T. Hixon, auditor Terre Haute, Indianapolis & Eastern Traction Company. This paper was published last week. Its discussion preceded a recess for lunch.

WHEEL TURNING

The first paper of the afternoon session was "Wheel Turning," by H. S. Williams, engineer Peter Smith Heater Company. This paper will be found on page 505 of last week's issue.

In discussing the wear on wheel flanges Mr. Ralston spoke of the severe wear brought about by operation over tracks built for city cars. An interurban car should have flanges 1 in. deep and $1\frac{1}{4}$ in. thick at the throat, but the track in few large cities would permit flanges of these dimensions and so the life of the wheel was reduced. He had found it best to establish a limit of wear which would be on the safe side and would not be so great that the worn flanges might permit the trucks and wheels to have a side motion that would increase their maintenance. His company thoroughly inspected all trucks after they had run 50,000 miles and put them in first-class condition. He had noticed even on this basis of inspection and repair that sometimes wheels operating under identical service showed from 5000 to 10,000 miles variation in mileage. The average results indicated that with $\frac{3}{8}$ in. taken off from the tread a full flange could be obtained after a service of 62,000 miles. He did not favor the leaving of a witness mark on the flange. While this witness mark might not impair the strength of the flange or its suitability for high-speed operation, nevertheless, should the car be derailed, Mr. Ralston feared that the presence of witness marks might bring about disfavor in court. Another reason for not favoring them was that of economy. If witness marks were left, usually they were about $\frac{5}{8}$ in. above the tread, and Mr. Ralston said that this made the effective flange only $\frac{5}{8}$ in. high. He next discussed the possibility of obtaining longer life from wheels. He had in mind that it might be possible by heat-treating the tread and flanges, as was done with gears, to obtain before the first turning a possible mileage of twice that now had. It would no doubt be difficult to handle hardened treads and flanges in the shop, but ways and means were now available for turning off hard spots in steel wheels. It might also be possible to anneal the wheels for re-turning. Mr. Ralston said that

Group of Attendants at Meeting at Columbus of the Central Electric Railway Association



the present cost in his shop for turning wheels was about 75 cents per pair and that the lathe machinist was paid \$2.25 per day.

Mr. Williams reviewed some of the discussion on this subject which was had at the New York State meeting, calling attention to the need for careful mating of wheels in order that uneven wear might be reduced. It was suggested that hardened wheels might be ground to shape, but he doubted whether grinding would serve to form a good flange.

Mr. Ralston thought grinding would be too expensive. In eight years there had come to his notice but two sets of steel wheels with flat spots of such size that the wheels required turning, and these two instances were brought about by skidding the wheels to avoid hitting vehicles.

Mr. Sawtelle, Tool Steel Gear & Pinion Company, said that his company was planning to harden wheel treads and flanges and he would be glad to hear discussion on whether such wheels might be lacking in adhesion.

C. Skinner, superintendent Scioto Valley Traction Company, thought that hardened wheels would have a tendency to slip. In his earlier service as a steam locomotive engineer he had had experience with chilled tires which had to be abandoned because of their slipping qualities.

W. H. Evans, superintendent of motive power Indiana Union Traction Company, also thought that hardened tires would be lacking in the adhesion so necessary for driving and braking in electric service. In connection with Mr. Williams' paper Mr. Evans called attention to the great need for extreme care in mounting wheels so that they should be properly placed on the axle in right relation to their journals. Careful mounting and accurate mating by the use of wheel tapes would reduce flange wear.

THE USE OF SAND

A paper on "The Use of Sand on Interurban Cars" was read by W. H. Evans, superintendent of motive power Indiana Union Traction Company, and will be found on page 506 of last week's issue. Mr. Ralston did not think it had yet been demonstrated that cars could be operated with maximum safety without sand. James Anderson, general manager of the Detroit United lines in Canada, said that no sand was used on his cars and no need for it was found. He believed better operation was obtained when the men were trained to operate the cars without the use of sand.

Mr. Skinner said that the Scioto Valley Railway, operating high-speed, heavy interurban cars and freight trains with three and four trailers and automatic air brakes, had found no need for the use of sand. Their cars were not equipped with sanders and he feared that at times damage might result if reliance were put on sanders and they got out of order. Mr. Anderson said that the Detroit city lines use sand and that the sanders were placed sufficiently high above the platform to assure that the sand would be kept dry.

Mr. Moore, superintendent Ohio Electric Railway, said that the State authorities were now under the impression that sand was necessary. He was pleased to learn that Mr. Skinner had been successful in operating 40-ton cars without sand. His personal view was that with two-motor equipments it was desirable to have sand to assist in getting the cars under headway and that sand was useful if properly handled. From his own experience Mr. Moore would dislike to operate 40-ton cars over city streets without having sand available. It was known, however, that an application of sand would not start wheels revolving after they had begun to skid, but if applied at the right time it would assist in making stops.

F. W. Coen, general manager Lake Shore Electric Railway, was operating his heavy, high-speed cars with sand, and the slower cars of less weight without sand, no matter whether equipped with air or hand brakes. The lighter cars had once been equipped with sanders, but the year after the use of sand was discontinued the accident troubles were reduced 50 per cent and this reduction might be due to the abandonment of sand. On his large cars he used lake sand carefully dried and kept in boxes above the floor level.

T. F. Grover, general manager Terre Haute, Indianapolis & Eastern, used sand in city service, but said that the sand boxes required filling only four times a year and then the old sand was removed and dried. When the tracks were slippery a sand car applied sand to the track at all the hazardous locations. Sand was rarely used on the interurban lines. Mr. Anderson said that it was the practice also in Windsor to operate a sand car, which tended to lessen flat wheels.

Mr. Evans said he was surprised to learn how little definite knowledge there was about the use of sand. He had found in preparing his paper that the subject was of far greater importance than he had imagined, and he suggested that the association could do much by further consideration of this and other apparently commonplace subjects. Mr. Evans was not willing to agree that any court might not change its preconceived ideas about the desirability of sanding equipment on cars if investigations made by a representative committee showed that it was not desirable to provide sand.

A paper on "Asphaltic Oils as Economical Wood Preservatives" by F. W. Cherrington, Indian Refining Company, was read by T. U. Franklin, of the same company. An abstract of this paper was published on page 504 of the ELECTRIC RAILWAY JOURNAL for March 25.

After a short discussion on wood preservation and the customary vote of thanks to the authors of the different papers, President Peck announced the adjournment until the St. Joseph (Mich.) meeting, which is scheduled for June 22.

CO-OPERATIVE EFFICIENCY WORK AT BOSTON

During the past few years the management of the Boston Elevated Railway Company has been confronted with many changes in the conditions under which service is rendered in metropolitan Boston. In common with all other transportation systems the company has had to sustain additional burdens comprised in the general term "increased cost of living," leading to advances in the unit cost of labor and material. The demand upon the company for service extensions and especially for additional transfer facilities, combined with a fare unit fixed by legislative enactment, has made it necessary for systematic studies of economy to be made with reference to the work of all departments. The problem of reducing expenses without sacrificing the quality of the service has been approached from many angles. Previous issues of this journal have reviewed the work which the company has done in the improvement of practice in carhouses and shops, leading to striking reductions in the number of defects of rolling stock on the road and to substantial gains in the mileage of wearing parts. Reference has also been made to the campaign of education adopted several years ago by the company in connection with the handling of cars on the street by motormen, and to the meetings of chief engineers of power stations, carhouse foremen and division superintendents at regular intervals throughout the year in the interest of increased efficiency of administration and service. Few companies have gone so far in the training of new men in the economical handling of rolling stock as the Boston organization, including elaborate provision of apparatus and graphic exhibits for the use of the company's school for transportation employees.

The possibility of still further improvements in the efficiency of the service and of larger economies in the transaction of business recently led the management to take two advanced steps toward insuring the most effective application of the specialized ability and insight possessed by employees. One step was the formation of an "Efficiency Club," composed of executive officers, bureau and department heads, and the other the organization of a so-called "Efficiency Committee," composed of certain responsible department heads and executive assistants in close touch with the larger details of administration through their personal contact with the work of the different branches of the company's service and their relations with the subordinate staff. Through the courtesy of General W. A. Bancroft, president of the company, the following out-

lines are given of the work of the Efficiency Club and the Efficiency Committee.

BOSTON ELEVATED EFFICIENCY CLUB

The first meeting of the club was held at the Parker House, Boston, on the evening of Feb. 28, 1911, and it was attended by about forty officers and employees of the company. A dinner was held, after which General Bancroft took the chair as the first chairman of the organization, stating that the object of the club was to be the interchange of ideas upon propositions directed toward increasing the efficiency of the company's service and business. Monthly meetings will be held, with the possible exception of during July and August, and at each meeting it is planned to have presented a paper bearing upon the economic side of the company's work, special effort being made to point out improved ways and means of handling the work of different departments. General Bancroft said that another purpose of the club is the closer acquaintance of department officers and responsible employees. The meetings will be planned to afford the fullest discussion of topics of interest, and the management hopes to secure in this way the benefit of many ideas. Speaking of the object of the club, he said: "What is wanted are ideas with sound reasons—a particular method of doing a piece of work; a particular treatment of material or machinery; a particular system of administration; a method of insuring the performance of given instructions; a particular arrangement of the hours of working on a given job; a given construction of a car, of a motor, of trucks; the arrangement of a carhouse; a system of moving supplies; the arrangement of timetables; an effective way of procuring sand, and its distribution; the disposal of snow; the cleansing of cars. These are some of the subjects which may be discussed. The directors have great expectations that you will be of assistance, both to the public and to the company, as a result of your studies and discussions. It does not matter where ideas may come from. A person who has only recently entered the service or a person whose duties and responsibility may not be of the greatest may give an idea which is not only worth considering, but which may prove worth adopting."

C. S. Sergeant, vice-president, succinctly set forth the purposes of the club by saying, "What we want of the members of this club is to pull weeds. Department heads must watch for leaks and practise economy in the interests of the company and the public that it serves."

The second meeting of the Efficiency Club was held on March 9, and in accordance with a rule adopted at the first meeting a new chairman occupied the chair, the incumbent being C. S. Sergeant, vice-president of the company. At this meeting the first regular paper to be read before the club was presented by H. M. Steward, roadmaster of the elevated division, his subject being "Handling of Supplies at the George Street Yard." This paper discussed the local transportation problems involved in the reception and transfer of materials and freight consigned to the company. It reviewed the various stages of development which the yard in question has undergone, illustrated by blueprints the successive track arrangements within the past ten years, pointed out the obstacles existing to the most efficient service and outlined a plan of improvement tending toward the realization of substantial gains in operating economy. Special attention was given to the problems of yard congestion as exhibited in the specific case in hand, and an estimate was given of the cost of various improvements, including the installation of an electric locomotive crane, with a statement of the probable yearly saving of the improved methods in different items of the yard operation. Although the treatment of topics at the club meetings will necessarily be based upon local interests within the company's organization, it is the intention of the management to seek the frankest discussion for the benefit of the company as a whole, and so far as possible the data and points brought out will be turned to account in the forming of conclusions and lines of policy.

WORK OF THE EFFICIENCY COMMITTEE

The Boston Elevated Efficiency Committee represents a new departure in executive administration. Its fundamental object

is to secure a more efficient conduct of detailed matters within the company through the presentation of advisory recommendations to the executive officers of the road. The committee is organized to give the management the benefit of its specialized and highly technical judgment upon a great variety of matters of detail which the executive committee of the board of directors has not the time to analyze in minute degree. The president and vice-president of the company are also constantly occupied with executive problems which leave little time for the protracted consideration of detailed matters. Through the Efficiency Committee, therefore, a great variety of subjects receive extended study and discussion, are passed upon by employees familiar with the general scope and purposes of the company's service, and are finally submitted to the executive officers with specific recommendations accompanied by condensed reports of their essential features. Final decision is then rendered by the executives on the basis of a broad knowledge of the company's policy and the expert presentation of evidence in connection with the committee's recommendations.

The committee is composed of the following gentlemen: Chairman, Matthew C. Brush, assistant to the vice-president; C. H. Hile, assistant to the vice-president; J. Henry Neal, general auditor; John Lindall, superintendent of rolling stock and shops; and James D. Andrew, superintendent of power stations. The work of the committee began on Feb. 6, 1911, when the first meeting and organization took place. Regular sessions were begun on Feb. 8, at the company's offices at 101 Milk Street, Boston, and 12 meetings were held in February. At present the committee devotes Tuesday and Thursday mornings and Friday afternoons weekly to its meetings. In general the matters that are brought before it have a close relation to the economy of operation within departments, but special consideration is given to the discussion of questions affecting the quality of service and the probable reception of changes and improvements by the public.

Special efforts are made by the committee to express in figures the various aspects of their investigations and recommendations. The meetings of the committee are made entirely private in order to facilitate the freest possible discussion, and not even a stenographic report is made of the deliberations. The meetings take a large share of the time of the committee members, but their direct connection with problems of a distinctly economic nature appears to justify this. All along the line the fact that such thorough consideration is being given to technical matters and questions bearing upon improved methods of doing business has done much to increase the interest of the rank and file of the company's employees in possible reductions of waste and better ways of performing old tasks.

The members of the executive committee of the board of directors are thoroughly in sympathy with the efficiency work of the company, and, as a member of the committee, James L. Richards recently stated to a representative of this journal that the results thus far obtained have been most gratifying, considering the short time in which these policies have been in effect. He felt that a long step had been taken in the right direction, and that the outlook for the future of such work is most attractive. The executive committee is now composed of the following gentlemen: General Bancroft, Robert Winsor, James L. Richards and James M. Prendergast. The working out of the scheme as a whole furnishes a striking example of the efforts of one of the largest street railway organizations in America to realize to the full the benefits of scientific management.

At the experiment station of the United States Bureau of Mines, Pittsburgh, Pa., several trial runs have been made with an experimental gas producer, using coke as fuel, with which limestone has been mixed in varying proportions. The purpose has been to flux the ash and form a liquid slag and thus avoid clinker and ash troubles and consequent shut-downs. Liquid slag has been readily made which runs freely from the producer. The high temperatures necessary are very efficient in the generation of gas.

CHICAGO MEETING OF JOINT COMMITTEE ON BLOCK SIGNALS

The joint committee on block signals of the Engineering and Transportation & Traffic Associations met at the Congress Hotel in Chicago on March 22. The following members of the committee were present: J. M. Waldron, signal engineer Interborough Rapid Transit Company; C. D. Emmons, general manager Ft. Wayne & Northern Indiana Traction Company; G. H. Kelsay, superintendent of power Indiana Union Traction Company; John Ross, assistant superintendent of track, Detroit United Railway. Morning and afternoon sessions were held. On invitation of the committee the following signal experts attended these sessions: E. B. Smith, signal supervisor New York Central & Hudson River Railroad; James H. Cormick, signal inspector Northern Pacific Railroad; John Leisenring, signal engineer Illinois Traction System; M. H. Hovey, consulting signal engineer Wisconsin Railroad Commission. Short addresses on signaling and signal apparatus were made by a number of engineers representing manufacturers of signal apparatus. These representatives included the following: W. K. Howe, General Railway Signal Company; Frank Rhea, signal department General Electric Company; L. F. Howard, Union Switch & Signal Company; M. D. Hanlon, Union Switch & Signal Company; M. R. Briney, General Railway Signal Company; W. A. Peddle, Hall Signal Company; C. B. Nachod and F. W. Kulicke, Nachod Signal Company; M. E. Launbranch, United States Electric Company; R. F. Gammons and J. J. Ruddick, United States Electric Signal Company. L. E. Gould, Western editor *ELECTRIC RAILWAY JOURNAL*, was appointed secretary of the meeting.

At the opening of the morning session Messrs. Waldron and Emmons described and discussed the replies to the data sheet on signals sent out by the committee which already had been received. A general discussion followed on the work which the signal committee should do preparatory to making its first report. Mr. Rhea recommended that the committee decide on uniform signal indications and aspects. Mr. Waldron mentioned the paper by W. K. Howe read before the New York State Association and his consideration of that subject. This would be of assistance to the committee, which already had started to obtain general data regarding systems of signaling and means for the protection of traffic.

Mr. Briney held that each electric road would be a subject for independent study and that eventually the electric roads would take advantage of the signaling experience of the steam roads. He recommended that an electric road begin its signal installation with apparatus and fundamental designs such that additional protection in later years could be afforded by additions to the first installation.

Mr. Howe said there were certain fundamental differences between steam and electric roads which would permit signaling electric roads at less cost.

Mr. Launbranch stated that his company manufactured selective dispatchers' signals which were not block signals in the strict sense of the word, but were installed with the idea of facilitating traffic by giving the dispatcher means for calling crews at any siding.

Mr. Rhea said he was firmly convinced that an installation of signals should be such that no special operating rules would be required. He advocated the policy of first protecting the curves and hazardous zones with signaling equipment that could later be made a part of a more complete installation. For most roads, two-position signals would suffice, but he recommended the installation of signal mechanisms designed for three-position indications which could be operated for the present as two-position signals and later used as three-position signals. He thought it would be well to consider the desirability of normal danger signaling on account of the short preliminary sections in the danger zones. The upper left-hand quadrant indication no doubt would be adopted universally by electric roads. Mr. Rhea favored installing four signals be-

tween adjacent passing points. The desirability of planning signals for the later addition of automatic train stops was recognized.

Following the general discussion on signaling the committee arranged a program for the day so that a representative of each signal company should have a private audience of one-half hour with the committee. At the conclusion of the meeting each signal company was requested to prepare a concisely worded and comprehensive description of its apparatus and its recommendations for installation, these descriptions to be accompanied by blueprints of circuits and other illustrations.

L. F. HOWARD, UNION SWITCH & SIGNAL COMPANY

Mr. Howard in his talk with the committee said that he agreed with Mr. Rhea as to the proposed scheme of locating four signals between sidings. The Union Switch & Signal Company was installing signals on the Illinois Traction System in accordance with this plan which it had followed also on several thousand miles of the Harriman System. He agreed with Mr. Briney that because of variations in operating conditions each electric road would warrant an individual signal study. He was a thorough believer in the continuous track circuit, but on some roads conditions were favorable to the use of the staff system and in other locations it might be possible to operate the signal mechanisms with short setting sections. This latter plan would reduce the degree of safety and no doubt would be abandoned in favor of the continuous track circuit as soon as financial conditions warranted installation of the latter. Mr. Howard said he understood that proposals had been made for the installation of short setting and resetting sections. His company was willing to sell apparatus suitable for such installations, but would not recommend the plan. Setting sections were safer than track instruments, but neither could be recommended.

Mr. Waldron said he would not recommend the use of setting sections of more than one or two rail lengths for surface track signaling. He asked if the committee thought it advisable to define and compare the value of continuous track circuits, short setting sections and track instruments.

When questioned Mr. Howard stated that his company was prepared to furnish signaling apparatus that would be operable on any kind of electric road. In reply to Mr. Kelsay he stated that alternating-current supply voltages ranged from 55 volts to 6600 volts, according to the economies of transmission. If a road had a 33,000-volt, 3-phase, 25-cycle transmission system, current for operating the signals could be obtained by reducing from 33,000 volts to 1100 volts or 2200 volts for distribution along the line. The signal mechanisms and lamps usually were operated at 110 volts. Track-circuit voltages rarely exceeded 8 volts at the track. Mr. Kelsay doubted whether on most electric roads the present poles would afford room for an additional single-phase, 2300-volt power line and from three to five signal control wires without placing the wires so that continuity of signal operation might be jeopardized.

Mr. Leisenring said that the Illinois Traction System was using three-pin arms to carry its signal control wires and was supporting the fourth and fifth wires underneath the arms. It was using a special scheme to save a transformer by feeding the local relay winding from the track transformer over an additional wire. Mr. Leisenring said that the signal work included full automatic distant signals, substation equipment and the lengthening of the sidings. The substation equipment included a panel with switches, circuit-breaker and fuses to control the output of a transformer which had its primary connected with the secondary side of a rotary converter transformer and which fed alternating current to the signal system along the road. Mr. Howard said that the Illinois Traction System was putting in an ideal signal installation and spending more money than most roads could afford.

Mr. Gould mentioned a possible economy in the use of light signals for daylight indications. A series of tests with signals having 8-in. and 10-in. lenses had recently been made by him on a high-speed, third-rail electric road and it was found

under the most trying daylight conditions with a bright sun reflected from fresh snow that the red indications could be seen plainly at distances from 1000 ft. to 1500 ft., which was approximately twice the braking distance.

Mr. Kelsay suggested that the committee request circuit diagrams of signaling apparatus, stating that while these were hard to follow the education obtained by studying them was worth while. Mr. Howard explained how the signal circuits were arranged so that any interference with or failure of the parts brought about a stop indication.

Mr. Hanlon said the Union Switch & Signal Company was developing several types of automatic stop arms using glass tubes and stop valves. The stop arm could be held in the clear position by an electric lock when necessary. Another scheme was to use a two-arm signal mechanism to operate the signal and the automatic stop arm. He noted that if light signals were used additional mechanism would be necessary for operating automatic stop apparatus.

FRANK RHEA, GENERAL ELECTRIC COMPANY

Mr. Rhea outlined the policy of the General Electric Company regarding the furnishing of signal equipment for electric railways. The question of electric railway signaling demanded careful consideration. No system of signaling should be installed that would require special rules unless as a last resort, although the installation of signal apparatus would no doubt require some additional rules. It was the best policy for a road to start out with the idea of getting the best possible signal equipment and then reduce the size of first installation according to the money available, bearing in mind a complete installation as the ultimate object. Single-track signaling was a subject of much importance and required much thought. The electric roads could do no better than follow steam-road practice for double-track signaling. After a general plan of signaling had been adopted the first step would be to protect the hazardous points and later finish the installation. Few electric lines would be warranted now in installing distant or three-position signals because of the expense, but two-position signaling had been thoroughly tried in steam railroad practice and electric railway service justified its use. He suggested installing three-position mechanisms which could be had at no additional cost and using the zero to 45-deg. indication at present, thus leaving the 90-deg. indication available for three-position work. There were no patent complications involved in the use of upper-quadrant signals. On account of the short time intervals between cars in electric railway operation it would be well to investigate the normal danger method of control, because with this form of control the motorman knows when he sees a signal clear that the signal at the other end of the block is set at stop. In this connection Mr. Rhea outlined some principles in connection with single-track signaling. Electric roads should first decide on the protection for opposing trains and then consider following movements. He suggested five typical arrangements of signals for single-track roads. If automatic stops were to be used later he would recommend instead of through sidings the use of two spur sidings, one for each direction, with sufficient space between them for braking and require trains to head in and back out.

Regarding the use of short track sections for setting signals Mr. Rhea said that they required stick relays and their operation violated the closed circuit principles, which were greatly to be desired.

A second development after signals had been located at the sidings was the use of intermediate signals, placing the siding signals at a coincident location. Another question to be decided was whether or not an electric road could afford to install single or double-end preliminary sections.

Regarding the so-called "trolley contact" signals Mr. Rhea recommended their use, providing a road could not afford track-circuit signals. Such signals had a useful and legitimate field on certain roads.

W. K. HOWE, GENERAL RAILWAY SIGNAL COMPANY

Mr. Howe stated that his company manufactured a full line

of automatic signaling apparatus, interlockings, etc., but did not build trolley contacts. His company was prepared to furnish selective dispatchers' signals, either power-operated for both setting and restoring, or manually restored. Mr. Howe did not agree with Mr. Rhea fully regarding the location of signals at and between sidings. He said that a permissive signal would be applicable to many situations on electric roads. A question to be answered regarding automatic stops was whether the railroad desired them as a check on the observance of signals or as a means for bringing a train to a standstill when a signal had been disobeyed. Mr. Howe said that experience with automatic stops installed by his company on one interurban road had shown that they assisted discipline greatly. One of the best motormen on this road endeavored to see how close to a stop arm he could run his car and drifted into the arm, thus breaking the glass tube. That man wrote a three-page letter to the superintendent showing his regard for discipline. If automatic stops were to be provided then all signals must be staggered to provide sufficient braking distance. This added to the cost of installation. When a company was considering automatic stops a careful analysis of the methods of operation and a study of the past records should be made to determine for which of the two results the automatic stops should be designed. Mr. Howe agreed with Mr. Rhea that future signals probably would be of the three-position type but he thought that two-position signals in most instances would suffice now. He made a plea for standardization of signal aspects and materials. He felt that only one kind of indication should be used for one set of conditions. This requirement would not affect the details of the apparatus and would greatly reduce the cost of manufacture.

Mr. Howe said that nine-tenths of the problem of signaling any road was to know what was required, and the committee by establishing requirements could greatly assist the signal companies. Mr. Howe called attention to the data sheet accompanying the paper which he recently presented before the Street Railway Association of the State of New York.

In connection with the light signals which his company was prepared to install Mr. Howe said means were available for checking a motorman when a signal was passed but that this would not stop the train. Mr. Waldron said that his experience had shown it to be cheaper to use light signals than semaphore signals in connection with automatic stops.

Mr. Howe said that the cost of a signal installation was largely dependent upon the service, the distance between sidings, whether they were stub-end or through sidings and the amount of return current necessary to be handled through the track rails. He did not recommend economy when it affected safety. The order of consideration was first safety, second reliability and third economy. Short setting sections did not give 100 per cent safety and signal engineers called them "trap" circuits. When questioned by Mr. Smith as to whether the railroads should adopt some odd frequency for signaling, Mr. Howe said that this would require the installation of frequency-changers in place of static transformers and since the double-wound relays largely provided against false indications in a.c. signaling work he did not recommend an odd frequency.

Regarding light signals Mr. Howe said that preliminary tests had shown them to be distinguishable under severe sunlight conditions at twice the braking distance. Light signals would bring about a reduction in the cost of signaling for electric roads of approximately 15 per cent. They were more reliable than semaphores and their maintenance was practically nothing. He did not, however, wish to minimize the value of a semaphore indication to those roads which could afford it.

C. B. NACHOD, NACHOD SIGNAL COMPANY

Mr. Nachod first described the principles of obtaining signal indications with continuous track circuits and with local contacts. He thought that so far as safety was concerned they were equivalent, provided that with the contact system the trains were indivisible within the block. He said that most electric roads preferred to operate permissively and that non-

permissive operation would change conditions greatly. He next described the various contact-making devices. (1) A track contactor consisting of a short piece of extra rail used in connection with a contact shoe carried on a car. This was not approved by him because of the additional apparatus required. (2) Track instruments which cannot be used for permissive operation because it is impossible to build an instrument which will count fast enough and accurately enough to register the wheels of a train. (3) Insulated track sections. To have a sense of direction two track sections are needed, each of sufficient length so that a train will count as a unit. This would require sections of at least two rail lengths. The setting sections might be energized by a battery or through a high-resistance connection between the trolley and the ground with a current tap at an intermediate point. This was objectionable because of the power wasted and the high voltage existing when the ground connection was broken. Regarding the insulated setting sections of track, Mr. Nachod said there was danger of failure if two trains left a block section as one train. A failure might also occur if a train touched a track section without passing clear through. This, however, would be a danger failure and not a clear failure. A foreign body might short-circuit the setting section and give a clear failure.

Mr. Nachod next described trolley contacts. These were either mechanical or electrical. The mechanical contacts were not so satisfactory because of the requirements for maintenance of moving parts. The electrical contactor had no moving parts and the type furnished by the Nachod Signal Company was now operating satisfactorily at 55 m.p.h. on the Chicago & Milwaukee Electric Railroad. He believed that it would work satisfactorily at higher speeds. The signal mechanism manufactured by his company was actuated by the power from the trolley line. This meant that the trolley wheel must be on a live wire or the signal would not be set. For these reasons the signals had been located in advance of the contactors so that a motorman could see the signal that had been set to protect his train. This arrangement aided discipline.

The advantages of trolley contactors as outlined by Mr. Nachod were their short length as compared with track setting sections, thus providing against the probability of simultaneous setting from opposite ends of the block. With these contactors short-circuiting was extremely improbable and no additions to the car equipment were required because they were operated directly by the trolley wheel. These contactors were suitable for operating any signal with any desired aspect. He would not, however, advocate the use of trolley-contacts for controlling signals in complicated yards. Other advantages claimed for the Nachod contactor were ease of installation, low maintenance cost and non-interference with the track.

The relay furnished with the Nachod signals operated from the trolley-current supply and because of this the parts could be massive and ample power used to eliminate possibility of sticking. These relays required little attention. In the *ELECTRIC RAILWAY JOURNAL* for March 11 a description of the Nachod signals showing their flexibility with regard to an installation on single-end sidings was presented. Mr. Nachod said that his relay could operate over a range of from 180 volts to 650 volts. It was suitable for controlling semaphore signals of any design. He had in mind the manufacture of solenoid-operated signals for interurban use. The light signals were visible on a hazy afternoon at a distance of 800 ft. Regarding light signals for high-speed operation Mr. Nachod said that if the railway company would install an a.c. power line to furnish good voltage to the signal lamps he thought that excellent indications could be given by lamps in the daytime.

R. F. GAMMONS, UNITED STATES ELECTRIC SIGNAL COMPANY

Mr. Gammons told the committee that his company was the pioneer in building automatic signals for electric railways and for 12 years it had devoted its attention very largely to protecting single-track roads. The first signals had given light indications, but now inclosed semaphores had been added. The signals were operated by overhead contactors and worked very satisfactorily up to 30 m.p.h. His company was bringing out

as an improvement on its old design a new contact maker that would be satisfactory for any speed. One of the principal advantages of the United States signals was the low cost and they were perfectly satisfactory except for purely high-speed roads, on which the former types of contactor had not been satisfactory. These mechanisms could be used with signal blades if preferred, but with the present type of signals the indication is in the form of a white disk at the entrance end and a red disk at the leaving end of a block. The latest signals manufactured, he said, had the appearance of steam railroad semaphores. They were installed on concrete foundations and could be operated from trolley contact-makers or by track-section setting.

Mr. Ruddick said the signals operated from the 500-volt supply and where track-setting sections were used a difference of potential of only 1.75 volts existed across the insulated joints. The relays operated well with that voltage. The signal system wasted only $\frac{1}{2}$ amp at each end of a block and worked effectively on 250 volts drop. The relay was normally closed. The cost per block was about \$350 for counting signals.

W. A. PEDDLE, HALL SIGNAL COMPANY

At the beginning of the afternoon session Mr. Peddle described the signal apparatus supplied by the Hall Signal Company for electric roads. The most novel piece of apparatus was the track transformer which replaced the insulated rail joints and inductance bonds used by other signal companies at the ends of track sections. This track transformer used the track rails as the primary and a coil of cable laid against the webs of the track rails for a length of about 15 ft. as the secondary. The current induced in the secondary was sufficient to energize the track coil of the signal relay. Signals operated with these track transformers had been installed on the Long Island Railroad and on the Interborough Rapid Transit lines. The principal advantage was the absence of insulated joints. Relays of the galvanometer type were used.

The Hall Signal Company was designing a new bond that would operate at 4 volts with 25 amp flowing through the track circuit. The consumption of current at the coil location was now about 30 watts and the operation of a 2000-ft. track section required about 100 watts. Mr. Peddle said that the Hall Signal Company's track instruments were used to operate signals on the Paris underground railway.

M. E. LAUNBRANCH, UNITED STATES ELECTRIC COMPANY

Mr. Launbranch described the system of selective signals manufactured by his company. Their operation was based on the use of the Gill telephone selector, several thousand of which were in service on 70 steam roads. Some railroad circuits on which 30 of these selectors were in use had shown no failures in two years. The Gill selector was operated directly over any existing telephone line and served either to ring a call bell in a station or release a semaphore. The dispatcher's signal which the United States Electric Company made was a combination of the Gill selector and a standard Hall electric slot semaphore arm. It was designed for control over the telephone circuit. A key in the dispatcher's office sent out a combination of irregular impulses to which but one of the receiving stations would respond. This principle of selecting by means of a combination of irregular impulses rather than a series of regularly spaced impulses, it was claimed, increased the safety of selection.

The selector at the signal on receiving the correct combination of impulses closed a contact which in turn opened a local circuit, releasing the electric slots and permitting the signal arm to drop to the stop position. This arm was locked automatically in that position and could be restored only when released by the dispatcher. This provided against unauthorized manipulation of the arm. The falling of the arm made certain electrical contacts, giving back an answer which could be read audibly by the dispatcher or registered on a tape. After the dispatcher had given his orders he released the arm by again calling that station and an indication that the arm was ready for restoring was given to the motorman by the tapping of a bell.

The object of the dispatcher's signal was to facilitate traffic

by enabling the dispatcher to call crews to the telephone. A feature of the United States Electric Company's dispatcher's signal was the automatic locking of the arm in the stop position. These arms might be set by track relays if desired, and the relays would operate in conjunction with the Gill selector. The Gill selectors in connection with semaphore arms and slots manufactured by the Union Switch & Signal Company had been installed by the Twin City Rapid Transit Company on its Still-water interurban line.

Regarding the flexibility of application of the Gill selector, Mr. Launbranch said that the Union Pacific Railroad had some circuits including 30 of these selectors, part of which controlled semaphore arms located at sidings at which there were no operators. By the use of these semaphore equipments the dispatcher could call train crews to the telephone and facilitate traffic. It was the practice on the steam roads to use an audible answer-back.

ORGANIZATION OF COMMITTEE WORK

At the conclusion of the audiences with the representatives of the signal companies the committee arranged for subdividing the preparatory work on its annual report into the following sections:

1. Instructions from associations.
 2. Personnel of committee.
 3. Minutes of meetings.
 4. Introductory paragraph on signals.
 5. Historical.
 6. Résumé of data sheets.
 7. Necessities of electric railway signals.
 8. Digest of state and interstate commission rulings and laws.
 9. Present signal installations and cost.
 10. Work under way during 1911.
 11. Conclusions and recommendations for 1912 committee.
- Appendix. Abstracts of descriptions of apparatus furnished by signal manufacturers.

EXHIBIT NOTES RELATIVE TO M. M. AND M. C. B. CONVENTIONS

J. D. Conway, secretary Railway Supply Manufacturers' Association, 2135 Oliver Building, Pittsburgh, Pa., has issued a list of the companies which up to March 24 had announced the intention to be represented at the June, 1911, Atlantic City convention of the Master Mechanics' and Master Car Builders' Associations. It is announced that the total exhibit space occupied will be something over 76,000 sq. ft., which is an increase of over 5000 sq. ft. compared with 1910.

The Eldredge Express & Storage Warehouse Company, Atlantic City, N. J., has the contract for both the hauling of exhibits to and from the railroads and also their placing in the exhibit spaces. The association will issue Circular No. 2 about May 1, with particulars as to the official firms selected by the association to provide furniture, floral decorations, special electric work, shipping instructions, etc.

PROPOSED AFFILIATION OF CENTRAL ELECTRIC RAILWAY AND ACCOUNTING ASSOCIATIONS

As announced on page 503 of last week's issue, committees are at work on the plans for the affiliation of the Central Electric Accounting Conference with the Central Electric Railway Association. At a meeting held March 22 the subject was discussed by the executive committee of the larger association. This association has appointed a sub-committee on consolidation as follows: H. A. Nicholl, M. J. Insull and R. A. Crume. The sub-committee of the Accounting Conference which has been instructed to report on this subject to the Accountants' conference at its meeting in June at Springfield, Ill., is comprised of J. D. Maynes, E. L. Kasemeier and L. T. Hixon.

THE "NINE-HOUR IN ELEVEN" BILL IN MASSACHUSETTS

The Massachusetts Street Railway Association has recently compiled and published in pamphlet form statistics and other information relative to the bill now before the Street Railway and Labor Committee of Massachusetts known as the "Nine-Hour in Eleven" bill. Briefly this bill provides that, except on legal holidays and Sundays and in case of accident or unavoidable delay, a day's work for trainmen on electric railways shall not exceed nine hours, and that it shall be performed within 11 consecutive hours. The pamphlet contains the substance of laws relating to the regulation of hours of street railway employees in other States where any statutes of this kind have been passed. Only nine States outside of Massachusetts, namely, Rhode Island, New York, New Jersey, Maryland, Illinois, Louisiana, Florida, Washington and California, according to the pamphlet, have statutes regulating such hours, and no State has any law approaching the arbitrariness of restrictions proposed in the Massachusetts law. The testimony of employees on many roads is given to show that there is not only no demand for such a law, but that the employees consider it unwarranted and detrimental to their own interests.

Statistics are added obtained from 24 roads in the State operating 2225 miles of track, or 94.6 per cent of the total mileage of the State, and employing 8518 regular men, and a total of 10,225 men including extras. These show that under the proposed law, if no additional extra men were employed, the companies must abandon 3294 trips, or 11 per cent of the present service. If the present schedules were operated it would be necessary to employ 4014 additional men, or 47 per cent of the present total number. The following combined statistics of the roads reporting are added:

Hours of Operation:	
No. of cars operated more than 18 hours daily.....	27.7%
" " " " between 16 and 18 hours daily.....	13.4%
" " " " " 14 and 16 " " " ".....	1.2%
" " " " " 5 and 14 " " " ".....	8.6%
" " " " " 2 and 5 " " " ".....	18.4%
" " " " less than 2 hours daily.....	30.2%
Present Working Hours:	
No. of men working 9 hours and over daily.....	5834 or 68.3%
" " " " 8 to 9 hours daily.....	794 or 9.3%
" " " " 7 to 8 " ".....	434 or 5.1%
" " " " 6 to 7 " ".....	296 or 3.5%
" " " " 5 to 6 " ".....	357 or 4.3%
" " " " less than 5 hours.....	809 or 9.5%
Average Length of Service of Employees:	
No. of men who have left service in past 5 years.....	8792
No. of these men who left service on account of death, ill-health or disability.....	346 or 3.94%
Average length of service of all present men, excepting first-year men.....	7.65 years
No. of men in service less than one year.....	2772 or 27%
" " " " " from 1 to 5 years.....	3219 or 31.5%
" " " " " 5 to 10 " ".....	1726 or 17%
" " " " " 10 to 15 " ".....	1282 or 12.5%
" " " " " 15 to 20 " ".....	665 or 6.5%
" " " " " more than 20 " ".....	561 or 5.5%
Comparative Size of Cars:	
Average seating capacity of open cars, 1893.....	35
" " " " " 1911.....	51.7
Increase.....	47.8%
Average seating capacity of closed cars, 1893.....	25.7
" " " " " 1911.....	35.7
Increase.....	39%
Comparative Speed:	
Average speed, 1893.....	8.52 miles per hour
" " " " " 1911.....	9.80
Increase.....	15%
Comparative Wages:	
Minimum wage paid in 1893.....	15c per hour
Maximum " " " 1893.....	22½c " " "
Minimum " " " 1893 (except Boston Elevated).....	20c " " "
Maximum " " " 1911.....	17½c " " "
Maximum " " " 1911.....	27c " " "
Average wage paid in 1893.....	about 19c " " "
" " " " " 1911.....	25c " " "
Increase in average wages.....	31.5% " " "
Number of Cars Equipped with Air Brakes:	
In 1893.....	0
In 1911.....	2448 or 23.3% of total number
Number of Double Truck Cars in Service without Air Brakes in 1911:	
Boston Elevated.....	1164
Boston & Northern and Old Colony.....	182
All other roads.....	9
Number of Cars Equipped with Arc Headlights:	
In 1893.....	0
In 1911.....	2005 or 28.6% of total number
Number of suburban or interurban cars without arc headlights in 1911. 31	
Mileage Protected by Block Signal or Telephone Dispatching:	
In 1893.....	0
In 1911.....	1737 or 78.1% of total.
Average Weight of Rail:	
In 1893.....	47.4 lb. per yard
In 1911.....	73.1 " " "
Increase in average weight.....	54%

TRACK AND ROLLING STOCK CHANGES IN SCRANTON, PA.

During the past year the Scranton Railway Company, which is a subsidiary of the American Railways, Philadelphia, has done some interesting track work and has made various changes in rolling stock and shop practice under Frank Caum, general manager, as described in the following paragraphs:

Beginning in April, 1910, the company electrified 9 miles of track embracing a line to Moosic Lake which had been operated by steam under the name of the Scranton, Dunmore

track. This unit cost was made up of \$2.59 for the 80-lb. rails and fixtures, \$1.93 for all concreting and paving 17 ft. wide and 33 cents for the line and bonding. There was considerable rock excavation and grading on this job. Other special conditions were the inclusion of a cross-over in the middle of the section and a turn-out at the end. It was also necessary to rebuild 300 ft. of one track owing to the settlement caused by an abandoned sewer.

On all tangent jobs with similar construction, but using 90-lb. rail, the cost was \$4.25 per foot of single track. A third

GEAR LUBRICATOR'S REPORT.

Car Number	Gears			Pinions			Air Motor				
	Gears O.K.	Gears Fair	Gears Bad	Lubricated	Pinions O.K.	Pinions Fair	Pinions Bad	Greased	Type	Cleaned	Oiled

MOTOR LUBRICATOR'S REPORT.

Car Number	Style of Motor	Greased		Oiled	

AIR MOTOR REPORT.

Car Number	Brakes do not release	Compressor fuse blown	Compressor out of order	Motorman's valve O.K.	Motorman's valve stiff	Motorman's valve leaks	Reservoir O.K.	Reservoir leaks	Reservoir drained

MOTOR REPORT.

Car Number	Carbons put in Motor No.				Brushholder removed from Motor No.				Cause of removal	Commutator O.K.	Commutator Cleaned	Commutator Dirty	Commutator Worn	Commutator Flat
	1	2	3	4	1	2	3	4						

CAR WIRING REPORT.

Car Number	Controller			Motors			Resistance		Overhead Circuit & Heaters			Headlights	Auto. Gov.	
	Controller O.K.	Flange put on	Segment put on	Spring broken	Grounded	Repaired	Motors O.K.	Arm Wire	Field Wire	Field Wire burned off	Grounded			Spring broken

Electric Ry. Journal

Electric Ry. Journal

Scranton Railway—Headings on Five Inspection Forms

& Moosic Lake Railroad. This lake is 12 miles from Scranton and consequently the first 3 miles are a part of the Scranton city system. The electrification of the line necessitated the erection of poles, overhead wires and considerable changes in track and power equipment. Many curves were eliminated, grades were reduced and additional switches installed to handle with greater dispatch the large summer business to the lake. The rails were bonded with the electric-weld system of the Electric Railway Improvement Company, Cleveland. The company also installed two 400-kw portable substations.

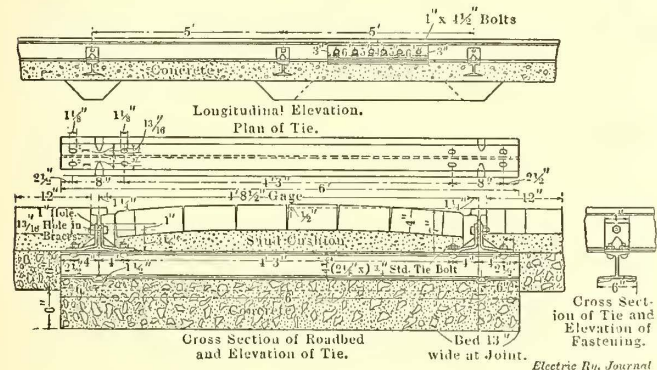
During the last four years the Scranton company has reconstructed about 15 miles of track on account of changes in paving. The principal feature of this track is the use of a concrete foundation, Carnegie steel ties spaced 5 ft. centers and Lorain 80-lb. 7-in. rail section No. 235. No tie rods were used, as the rail clips were made to serve as braces. About 3 miles of this construction were laid during the summer of 1910, except that the rail was an A. S. C. E. section weighing 90 lb. per yard. It included filler brick alongside the web and beveled block to form a groove. This track is furnished with

job covering 7300 ft. of single track with 80-lb. rail, including some special work, cost \$4.67 per foot of single track.

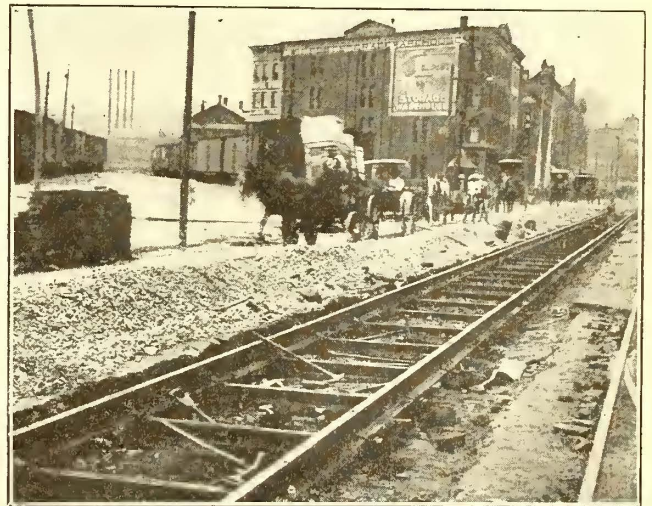
The unit costs for the steel tie and concrete construction were usually as follows:

- Steel ties.....\$1.40 each
- Rail braces......85 per set
- Stone, \$1 per cubic yard at the quarry, which was 4 miles from the work.
- Sand, 70 cents per ton, f.o.b. Scranton, but hauled 2 miles to the work.
- Cement, \$1.25 per barrel, delivered to the concrete mixer.
- Paving brick, 3 in. x 4 in. x 8½ in., \$24.50 per 1000 delivered at the job.
- Stretcher brick and filler brick, 4¾ cents per running foot.
- Ordinary labor, \$1.25 to \$1.50 a day.

During 1910 the company remodeled nine double-truck cars at an expense of \$1,100 each. Among the changes made was the installation of longer platforms and longitudinal seats, which are preferable to the original cross seats on account



Scranton Railway—Steel Tie and Concrete Construction



Scranton Railway—Steel Tie and Concrete Construction

Continuous rail joints and 9-in. concealed flexible bonds. The company is also doing work on the main highway between Luzerne and Susquehanna Counties. Twenty-one miles of this highway are to be paved, and the railway is therefore reconstructing the 17 miles over which it operates. The construction used for this road will consist of 70-lb. A. S. C. E. rails, wooden ties, Duquesne joints, Churchill splice bars and concealed bonds.

It may be of interest to give some costs of the steel tie and concrete foundation track previously mentioned. In one case 2850 ft. of track was constructed for \$4.85 per foot of single

of the narrow cars. The new cars for Scranton will probably be of some prepayment type and have flat arched roofs. The flat arch roof should prove very desirable because of the many low railroad bridges in Scranton. It can be designed to give a desirable increase in the inside height of the car and yet have a lower roof clearance than the present monitors.

The Scranton company prefers the use of steel-tired wheels. These wheels are of the National type, and average 96,000 miles despite considerable scoring from the gritty soil. The original depth of the flange is 1 1/8 in., the wheels being sent to the shop when the flange is worn down to 3/4 in. The wheel

press is used to insert steel bushings for loose wheels. The company is now replacing its 4-in. axles by 4½-in. axles and its 4½-in. axles by 5-in. axles.

The Scranton company uses split gears only. These are lubricated with Dixon graphite grease with satisfactory results. All of the gear cases are of malleable iron, either of the General Electric or Columbia Machine Works manufacture. The experiment is now being tried of lubricating the remaining Westinghouse Nos. 3, 12 and 68 and G. E. Nos. 57 and 67 motors with oil-soaked woolen waste which is packed in the grease box. The other motors, which are of the G. E. Nos. 70 and 80 types, are fitted with oil cups. It is the practice to lubricate all motors twice a week. The brushes are of the Laclede type and are maintained at a tension of 8 lb. Cars are overhauled about every 50,000 miles.

John Duffy, master mechanic of the company, has recently devised some inspection forms which are drawn up to convey much more information than the usual shop report. Each report is individually signed by the man who does the work, and countersigned by the night foreman, so that in case of court proceedings the form is admissible as legal evidence. The extended inspection data called for by these forms will be noted by reading the headings in the accompanying cuts. Thus

TROLLEY REPORT.

Car Number	Base		Pole		Wheel		Harp		T. Wire		Catcher		Rope	
	Base O.K.	Base broken	Pole O.K.	Pole bent	Wheel O.K.	Wheel worn out	Harp O.K.	Harp broken	Trolley wire O.K.	Trolley wire off	Catcher O.K.	Catcher repaired	Rope O.K.	Rope broken

Electric Ry. Journal

REPORT OF CAR INSPECTOR.

Car Number	Axle Caps		Arm Caps		Axle Brasses		Axle Collars		Motors		Gear Cases		Wheels										
	Cap O.K.	Cap loose	Cap tightened	Cap loose	Brasses O.K.	Brasses fair	Brasses worn out	Brasses not feeding	Collars O.K.	Collars loose	Too much play	Collar adjusted	End play taken out	Arm adjustment O.K.	Arm loose to pole piece	Arm needs changing	Case O.K.	Hole in cases	Cases worn out	Cases off	Wheels O.K.	Wheels flanged	Wheels worn out

Electric Ry. Journal

REPORT OF CAR INSPECTOR.

Car Number	Brakes										Trucks			
	Brakes O.K.	Brake Hanger Broken	Brake Rods Stripped	Brake Shoes Broken	Brake Shoes Worn Out	Brake Handles Out of Order	Ratchet Wheel and Dog Out of Order	Brake Pins Broken	Release Spring Broken	Trucks O.K.	Journal Box Broken	Truck Springs Broken	Pilot Board Broken	Trucks Noisy

Electric Ry. Journal

Scranton Railway—Headings of Truck, Brake, General Motor and Trolley Forms

the report of the inspector of brakes and trucks is not confined to a simple statement that the brake rigging is "O. K.," but it also must show separately whether the brake hangers, rods, shoes, handles, pins, ratchet wheels and release springs were found in order. The truck inspector must report specifically on the journal boxes, truck springs, etc., while the electrical inspector must testify to at least 26 possible conditions relating to axle and armature caps, axle brasses and collars, motor gear cases and car wheels. The car wiring inspector must report on a minimum of 31 items. The motor report gives the brush-holder and brush data for the individual railway and compressor motors, and also includes six columns for various commutator troubles. The report for the air brake equipment includes information on brake release compressor fuse, reservoir and motorman's valve. Two report forms are used for lubrication, one of which covers the greasing of gears and other work on the same, and the other of which relates to the oiling or greasing of the motors. A rather unusual form is that for the overhead current-collecting equipment. This report is designed to give all pertinent facts concerning the condition of the trolley base, the pole, the wheel, the harp, the wiring, the trolley catcher and the catcher rope.

Doubtless some railway superintendents will consider these forms rather elaborate, but there is no gainsaying the fact that the average shop inspector is not a man who will or can make out a detailed report unless most of the possible troubles are before him in print for simple confirmation or denial.

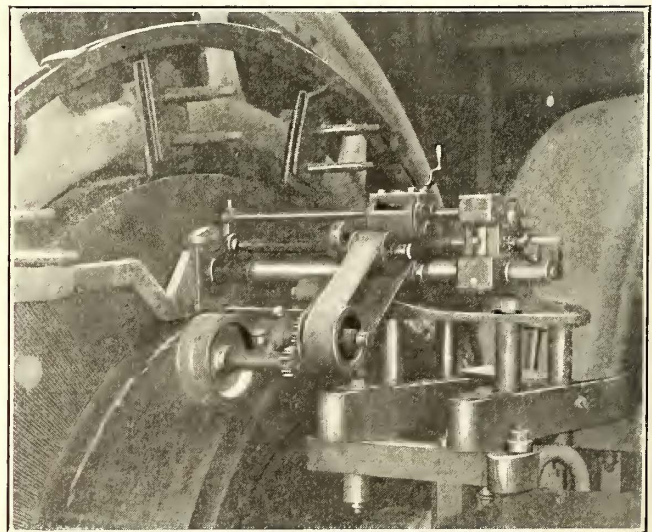
MEETING OF THE COMMITTEE ON CONVENTION LOCATION

A meeting of the committee on convention location was held in Chicago, March 24. The American Electric Railway Association was represented by John I. Beggs, John H. Pardee, E. C. Foster and H. C. Donecker. Mr. Foster attended the meeting in place of James F. Shaw, who was unable to be present. The Manufacturers' Association was represented by C. C. Castle, Walter L. Conwell, K. G. Hequembourg, and George Keegan. The technical press was represented by Hugh M. Wilson and H. J. Kenfield. The committee had an excellent opportunity of inspecting the facilities afforded at Chicago, because the convention of the American Railway Engineering & Maintenance of Way Association was being held in Chicago at the time of the meeting. The meeting rooms at Congress Hotel and the exhibits at the Coliseum were inspected. It was the general sentiment of the committee that the convention should be held in the Central West if any city in that territory possessed the hotel and exhibit facilities necessary to accommodate those who would be in attendance at the convention.

After considering the facilities in Chicago the committee visited Minneapolis, St. Louis and Rochester, N. Y. It will prepare a report upon the facilities of these cities for submission to the American Electric Railway Association at an early date.

AN AUTOMATIC COMMUTATOR GRINDER

The Phillips Manufacturing Company, New York, is placing upon the American market an automatic commutator grinder which is widely used abroad for truing commutators in position on generators, motor-generator sets, rotary converters, etc. The accompanying cut shows the device applied to a 1500-kw rotary converter in New York City. An important feature of this machine is its speed, because the grinding wheel can be geared to run as high as 2500 r.p.m. The grinding spindle is direct-driven by means of a rubber-friction wheel which is run from the revolving commutator to obviate the necessity for a



Commutator Truing Device Applied to a 1500-kw Rotary Converter

separate motor. This spindle is carried by a strong slide and is absolutely rigid. The bearings are very long and the spindle and drum are balanced to permit high-speed running without vibration. In operating, the grinding spindle moves to and fro across the face of the commutator without breaking and tearing the mica or dragging the copper. The grinding mechanism is automatically reversed at each end. It can also be constructed so that stops can be set for grinding the surface right

up to the connecting wires and back to the edge. Means are provided for the refined adjustment of the friction and grinding wheels. It is asserted that this machine will restore the commutator to a perfect curve and, furthermore, that it can be set to remove a given flat spot without wearing off metal elsewhere. The device is particularly adapted for vertical machines of all types which have commutators of 7 in. diameter and upward. A light hand-feed machine also is built by this company to true up commutators from 4 in. to 12 in. diameter and 9 in. deep. The grinding wheels of both types are of a composition which will not pick up particles of copper or mica. A hood is provided to take care of the copper dust in order to avoid short circuits.

INCORPORATION OF J. M. JONES' SONS COMPANY

J. M. Jones' Sons Company, the well-known car builder of Watervliet, N. Y., was duly incorporated under the laws of the State of New York on Feb. 2, 1911. The following directors are named in the certificate of incorporation: John H. Jones, James B. McLeese, Floyd R. Jones and Paul R. Jones. The directors subsequently elected John H. Jones president and treasurer and James B. McLeese vice-president and secretary. The corporation is authorized to buy and sell and also to manufacture all kinds of railroad cars and motor vehicles and all parts thereof and appliances therefor. The location of the principal business office of the company is in Watervliet, N. Y. The firm known as J. M. Jones' Sons has been in the car business for over 25 years, previously being known as J. M. Jones & Company. It is one of the oldest street car building concerns in the United States, if not the oldest. Originally the business was that of manufacturing carriages, but when horse or tram cars were introduced in this country the firm engaged in their manufacture and afterward continued to follow the development of the electric railway car business. The new company is a close corporation, which is controlled by men long connected with the business, who will maintain the high standards of the past. John H. Jones is well known to the street railway fraternity and Mr. McLeese, the office manager, has been with the company since boyhood. Floyd R. Jones and Paul R. Jones are sons of John H. Jones.

REGULATING POLE ROTARY CONVERTERS

Rotary converters are often installed where the service requires variable ratio between the a.c. and d.c. voltage. The Potomac Power Company, of Washington, D. C., has solved the problem by using the General Electric Company's new regulating pole rotary converters. These accomplish the voltage regulation in a very simple manner without the use of complicated apparatus or wiring. They are provided with auxiliary regulating poles, which are so set that one regulating pole adds its flux to that of a main pole, either increasing or decreasing it, and so increasing or decreasing the d.c. voltage. The current in the regulating pole circuit is varied by means of a rheostat inserted in this circuit.

Five of these rotaries, each having a capacity of 1000 kw, have been installed by the Potomac Power Company, three of which are used in railway work for supplying current to the Washington Railway & Electric Company. They give a variation of from 515 volts to 600 volts. By means of these any desired subdivision of load between the various substations of the railway company can be obtained, as by increasing the potential at which the power is supplied by a substation, other conditions remaining the same, its load may be increased, and by reducing the potential its load may be diminished. These machines have the usual shunt and series winding on the main pole and a shunt winding on the regulating pole. The field winding on the main pole gives the usual compounding at any voltage to which the machine is adjusted by the rheostat in the regulating pole circuit. The other two converters are used for lighting at 240 volts to 300 volts.

AUTOMATIC TROLLEY SWITCH FOR HIGH-SPEED INTERURBAN SERVICE

The Railway Materials Company, Chicago and New York, is making the "Rymco" high-speed automatic trolley switch, which is intended to provide a continuous overhead circuit at passing points, regardless of whether the siding or main track is used. The throwing of the track switch lever gives the proper adjustment of a 6-ft. trolley tongue blade. Communication between the track switch and the blade tongue of the trolley switch is accomplished through a bolt riveted to the tongue blade, whose rear end is fastened to the siding wire and which lies almost parallel to this wire when it is not in use, a connecting pull rod and pipe and bell cranks. A metal hood bolted to the double hanger directly over the track switch protects the wearing parts from the weather.

The end of the tongue blade which is brought into contact with the main wire when the siding is to be taken is hollowed on the side to insure good contact. This contact is maintained permanently by adjusting the bolt which is run up through the hood. The bottom of the blade tongue is rounded to conform to the section of the adjoining trolley wire. The ease of installing the tongue is one of the strongest features of this device. The top of the casting is made exactly like a standard trolley ear and is fastened in the same manner. No hinge is required because the necessary lateral movement of the switch blade is obtained through the flexibility of the metal. The rest of the equipment includes rods, clevises, bell cranks, wood strain insulators, turnbuckles and bolts.

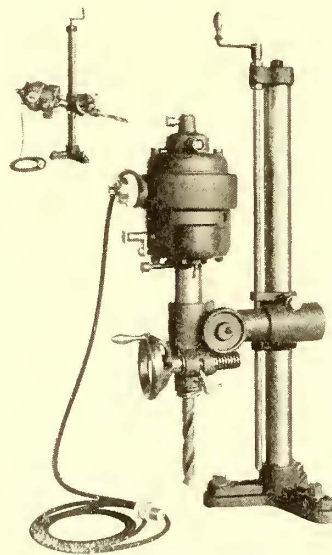
A device of this kind eliminates the necessity of transferring the trolley wheel at sidings. Furthermore when the siding is not to be taken the main line is left absolutely unobstructed so that the wheel may go by without hindrance.

PORTABLE ELECTRICALLY DRIVEN RADIAL DRILL FOR A. C. OR D. C. CIRCUITS

The Lamb Electric Company, Grand Rapids, Mich., is making an electrically driven radial drill either for mounting on the work which is to be drilled or for setting up on a bench as may be most convenient. The capacity in steel is 1 in. and smaller.

According to the type of motor, the weight of the complete equipment varies from 125 lb. to 150 lb.

This machine can be operated in any position; its extreme height is 40 in. The greatest distance from the spindle to the base is 28 in., but this can be made longer or shorter as may be desired. The distance from the column to the center of the spindle is 8¼ in. or longer. The column is 2½ in. in diameter and is made of steel tubing. The hole in the spindle is No. 3 Morse taper. The travel of the spindle is 5 in. It is operated by a rack and pinion, which in turn is operated by a worm and gear. The spindle has quick return when desired. Two speeds (165 r.p.m. and 230 r.p.m.) can be furnished, the change from one speed to the other being instantly obtained by shifting a knob. The one-speed motors are run at 110 volts and the two-speed motors at 220 volts. Any of these drills can be operated either by a ¼-hp d.c. motor or a ½-hp a.c. motor, whichever happens to be most convenient.



Portable Drill in Two Working Positions

LONDON LETTER

(From Our Regular Correspondent)

Sir Edward Henry, the commissioner of police for London, was a guest at the annual dinner of the Tramways & Light Railways Association and predicted that eventually a great system will result, with the railways as the arteries of general traffic, the tramways as the veins and the motor buses as the capillaries.

At the same meeting Lord Robert Cecil pointed out that the machinery for obtaining statutory powers for smaller enterprises should be simpler than exists at present. H. J. Rodgers, councillor of Newcastle-on-Tyne, a new vice-president of the association, said: "I am connected with municipal tramways, but I do not see why the companies and the municipalities should not pull together. Whether worked for shareholders or by the municipality for the ratepayers, we are a huge business concern. It is only by the two interests pulling together that tramways can be carried on as business concerns, and the effort should be to prevent, as far as possible, municipal tramways from sliding into philanthropic movements."

It is unfortunate that these sentiments are not adopted more extensively by the local authorities who work tramways. As a matter of fact, the pressure put upon the local authorities by the voters who do not pay any direct rates, but who nevertheless form a majority of their constituents, is greater than they can bear. In London, for instance, workmen are carried an ever-increasing distance for a return fare of 2d, and the hours during which these tickets are issued are being lengthened, with the result that last year there was a loss of £50,000 on workmen's cars alone. This loss will be increased to £123,000 a year by the proposal to add another hour to the running of workmen's cars in the morning. The halfpenny fares are another cause of loss all over the country.

Town planning is being widely discussed. The advantages are fully recognized of thoroughfares wide enough for a double line of trams, with sufficient room for vehicles on either side. The principal obstacle in the way of these projects is the cost. Even when this has been overcome the result is not always approved. For instance, the new approach to St. Paul's Cathedral from the south, with its new bridge over the Thames, has a bend in it which will shut out the view of the church if carried out according to the present ideas of the City Corporation. The Institute of Architects has not been consulted, and the president of that body has asked for delay in order to consider the subject more thoroughly. The reconstructed Southwark Bridge, not far distant, if properly designed would answer for some time to come, and might be made a means of connecting the tramways north and south of the river.

The cross-town links between the northern and southern lines are few and far between. The proposal to bring the trams over the new St. Paul's Bridge and carry them underground past the Cathedral to Aldersgate Street seems unnecessarily expensive and risky. The foundations of the edifice depend upon a bed of gravel which is connected with the river and in which the water rises and falls with the tide. A tube below the level of this water-bearing stratum would act as a drain, for the water would percolate along the outside of the tunnels. During the floods in Paris parts of the Metropolitan tube acted as main drains to some of the low-lying parts of the city. Such abstraction of water under St. Paul's would probably endanger the building.

The north to south communications will probably be improved soon in many places. The widening at Hammer-smith Roadway will enable trams to run direct from Putney and places south of it right away to Willesden and beyond. The lines over Vauxhall Bridge to Victoria Station should be taken down Victoria Street and joined with those at the west end of Victoria Embankment. Westminster Bridge Road should be joined to the Blackfriars Bridge approach by trams passing the new County Hall in Belvedere Road. The embankment lines at their east end should be connected with those running up to Pentonville by putting down rails in Farringdon Street, and the network would be complete, especially when the Southwark Bridge trams were

also laid. The London County Council seems rather unfortunate in regard to its subways. Neither Rotherhithe nor Blackwall is used for trams, and the small, single-deck cars which alone can use the narrow, crooked tunnel between Waterloo Bridge and Holborn can hardly be regarded as successful considering the outlay.

The trackless trolley cars at Bradford and Leeds will be watched with interest by other municipalities which are being urged to extend their tramways. The state of the municipal exchequers, the heavy renewals and the unreasonable demands on the municipal corporations make it impossible for them to satisfy the requirements by tram extensions, and the advent of the railless cars is welcomed on account of their comparatively low first cost. Although the trackless vehicles have been running in Austria and Germany for some time, Leeds will be the first to introduce them into the United Kingdom.

The main steam railways with suburban lines in and around the metropolis feel the competition of the trams keenly. The tramways, being for the most part in the hands of local authorities, have to a certain extent been built at the cost of the railways, which are, as a rule, the largest ratepayers in the district served. Moreover, the tramways are worked so as to enter into direct competition with older steam railways and not as feeders to them.

The paper read by Philip Dawson recently before the Institution of Civil Engineers, London, gave a good account of the successful venture of the London, Brighton & South Coast Railway in competition with road cars. Robert Blackwell has been the contractor for a great deal of the work. When the trams first began running the number of passengers on the South London line was cut in two, but in less than 18 months this loss has been made good and the electrification will soon be extended to the branches which run from the Crystal Palace to London Bridge and Victoria Stations respectively. These branches will be ready for the pageant at the Crystal Palace.

The Metropolitan Railway has adopted automatic electric signaling on its Baker Street-Neasden line, as well as on its portion of the Inner Circle. The track circuit arrangements are similar to those on the District Railway and they allow of 50 seconds headway between through trains. At St. John's Wood, Finchley Road and West Hampstead signal cabins have been retained for working crossings and sidings, but for normal working these boxes are closed and full automatic working is used. At Willesden Green a new cabin has been built with an illuminated track diagram. The 23 block sections over the 5-mile stretch average 1200 ft. in length, and automatic train stops are employed throughout. Lamp signals, dwarf signals and semaphore signals are employed. In the two latter forms the line-clear position of the arm inclines upward instead of downward, so that it tends to fall naturally into the horizontal stop position and balance weights can be dispensed with. The gear, comprising electric motor, cut-out, transmission gear, clutch and pneumatic buffer, is fully inclosed. The arm is held in the clear position by an electro-magnet and thus drops to danger if the actuating current fails. All the signals are electrically lighted by two lamps in parallel, but oil lamps can readily be substituted. Automatic train describers have been installed at some of the stations.

The purchase of German rails for a newly acquired route of the Birmingham Corporation Tramways, which is to be converted from the cable to the overhead system, has caused considerable comment. The chairman of the tramway committee said that the saving of £900, or 8 per cent, justified the action of the committee. Only two English tenders were received, and it was suspected that some understanding existed between the English firms. The chairman said that the committee would see that the standard rate of wages was paid which existed in the district where the rails were manufactured. It was not stated what the cost of such supervision would be or whether the hours of work insisted upon in England would be imposed on the German makers. The close inspection necessary during the manufacture of the rails would also add to the expense, so that the £900 difference in contract price between the German manufacturer who secured the order and the English firms will probably be reduced considerably by the time the rails are delivered.

A. C. S.

News of Electric Railways

Progress of the Conferences in Cleveland

At the meeting of the special committee of the Cleveland Chamber of Commerce on March 21, 1911, G. M. Dahl, street railway commissioner, stated that he was unwilling that any changes should be made in the Tayler grant unless the company agreed to expend at least \$2,500,000 for improvements and betterments. Attorney Andrew Squire, acting for the company, said that the company could not guarantee an expenditure of this kind until investors agreed to purchase the stock at par, as the company was unwilling to sell bonds and further depreciate the stock. Arrangements were made for private conferences later in the week.

Both Mr. Dahl and City Solicitor Baker are opposed to an increase in the maximum rate of fare to 5 cents and 1 cent for a transfer. F. H. Goff, chairman, assured them that this would be an opportune time to increase the maximum, if it was shown that the financing could be done more cheaply by such a change. He presented figures prepared by W. S. Hayden, of Hayden, Miller & Company, to show that the company, by selling \$5,000,000 of bonds at a discount of \$150,000, had already lost the price of 5,000,000 car rides. The sale of bonds necessary to take care of the needs of the company during the life of the grant would mean a loss of about \$8,000,000, or 240,000,000 car rides. Mr. Goff said that the value of the franchise was the only thing that a lender recognized as security, and the value of the franchise in Cleveland under a maximum fare of 5 cents and 1 cent for transfers might be \$30,000,000 or \$40,000,000. Mr. Goff suggested that the stock be placed in the hands of trustees under option for city or licensee purchase at any time at 110. Mr. Dahl doubted the possibility of such an arrangement, since the Tayler grant provided for the maximum rate of fare for the last 15 years of the grant in case the franchise was not renewed. He argued that an increase of one cent in the fare would mean \$430,000 a year to the patrons of the company.

Attorney Squire agreed that the city should have the initiative in suggesting improvements and extensions during the first 10 years of the grant, but not during the last 15 years. The city was safeguarded from poor service by the right to renew the grant or name a purchaser for the property.

City Solicitor Baker contended that the city should have the right to compel extensions during the entire life of the grant, subject only to arbitration during the last 15 years of the grant. The company should make extensions at the annual rate of one-fifth of the earnings for the previous year. The city should have the right to seek a market for the stock if the company cannot find one. It should also have the right to name a purchaser at any time. The company agreed to the suggestion that premiums on bonds should be used for betterments, conceded the city's right to take part in labor arbitrations and agreed that the interest fund should be invested in high-grade securities. Mr. Squire objected, however, to the idea of extending the fare charged in the city to the suburbs when they are annexed to the city.

Montreal Street Railway and City to Agree Upon New Franchise

The negotiations between the representatives of the Montreal Street Railway and the City of Montreal have resulted in a compromise whereby the original bill applied for at the present session of the Quebec Legislature to incorporate the Montreal Tramways Company has been passed in amended form. The bill as originally applied for provided that authority should be given to the company to effect a new agreement with the city within the shortest time possible. If, however, the city authorities could not arrive at an understanding with the company the terms of the agreement were to be determined by the Public Utilities Commission for Quebec. The company was also to be given the right to operate in Montreal and suburbs, carry both passengers and freight under the regulations of the Utilities Commission and construct an underground railway.

The grant was opposed because it was felt that the regulation of the railway would be taken out of the hands of the city. The bill as finally passed contains the following provisions: In the event of the property of the Montreal Street Railway, Montreal, Park & Island Railway, Montreal Terminal Railway and Public Service Corporation being acquired, the Montreal Tramways shall have during a period not exceeding 42 years from the sanction of the act the right and power, with the approval of the Quebec Public Utilities Commission, to acquire, construct, equip, maintain and operate, by any power other than steam, tramways in Montreal as they now exist and as extended. This provision is to be subject, however, to a contract being entered into between the city and the company to determine the duration of the franchise, the conditions which the company shall be held to comply with as to the operation, maintenance, equipment, establishment and extension of routes in the different streets and thoroughfares of the city, the rates of fares, the percentage to be paid to the city on the gross earnings of the said company, the share of the cost of paving and maintaining the streets and of removing the snow to be paid by the company, and such other terms and conditions as the city may deem advisable to impose. All differences between the city and the company in regard to the interpretation of the contract shall be submitted to the Quebec Public Utilities Commission for final settlement. The company shall have the right to transport freight and mails at terms to be settled by common accord with the municipalities.

By the terms of the act, therefore, the Montreal Tramways Company secures a 42-year franchise for both freight and passenger traffic in Montreal, the Island of Montreal, Isle Jesus and Isle Bizard, subject to terms and conditions to be agreed upon between the company and the City of Montreal, all differences to be finally adjusted by the Public Utilities Commission.

Negotiations Resumed in Toledo

March 28, 1911, was set to resume negotiations between the City of Toledo, Ohio, and the Toledo Railways & Light Company. The committee of the whole will first decide whether the draft of an ordinance demanding 3-cent fares and making other stringent requirements which was prepared by City Solicitor Schreiber shall be taken as a basis or whether another draft shall be made. Under the suggestions of the Mayor the question of fare was to be left until last for discussion. The valuation of the property will probably form one of the first subjects for discussion.

Carl H. Nau, of Nau, Tanner & Rusk, Cleveland, Ohio, who reported to the city recently in regard to the earnings of the company, has submitted to Mayor Whitlock a series of charts which show how the earnings of the company are dispensed. In this connection the Mayor said:

"Some time ago, in studying the franchise problem, it occurred to me that it might be made a little more clear and simple if it could be shown just how the nickel a passenger gives the conductor for his fare is divided and where each part of it goes. And so I asked Carl H. Nau, the expert accountant who examined the books of the company for the city and made the splendid report, if it would not be possible to show this by diagram. Mr. Nau made a study of the figures and had three diagrams drawn which seem to me to illustrate the whole subject quite clearly. Of course he cannot do it now with absolute mathematical accuracy, because we have not got the valuations. The city at this time has only the data which Mr. Nau gleaned from the books of the company; it has, too, of course, the inventory of the property, but the valuations have not been made and without these valuations it is impossible to speak with that accuracy which should be required when the problem is ultimately resolved. The unknown factors, therefore, must be assumed. Mr. Nau, however, has explained the whole matter and I am sure that most people will share with me the interest I found in his diagrams and explanations.

"It might also be interesting to know that the last time I saw Tom Johnson he said to me that if in the beginning of the street car controversy in Cleveland he had such a report as Mr. Nau made for the city it would have been of an advantage he could not estimate. And men from other cities who have been interested in the street car problem and are students of it have often congratulated the city on the possession of such an illuminating document."

The City Council of Toledo has authorized Cornell Schreiber, City Solicitor, to sue to collect \$29,946, which the city claims is due from the Toledo Railways & Light Company as its portion of the cost of the pavement on Broadway.

The Toledo & Western Railway, which is controlled by the Toledo Railways & Light Company, is making improvements to the track, overhead work, equipment and power system which will cost about \$100,000.

Reasons for Sale of Des Moines Properties

G. B. Hippee, president and treasurer of the Des Moines (Ia.) City Railway, and treasurer of the Interurban Railway, Des Moines, Ia., has issued a formal statement in which the reasons are given for the recent sale to Harris, Forbes & Company, New York, N. Y., of the interest in the railroads held by himself. H. H. Polk, N. T. Guernsey and others of Des Moines. Mr. Hippee said in part:

"In 1889 the present company took hold of the various street railways then in existence in Des Moines. About all they purchased was a franchise and a streak of rust. They expended large sums of money, reorganized, rebuilt and placed the company in the front rank, and up to 1905 Des Moines had a street railway which was several years ahead of the growth of the city.

"In 1905 certain patriots concluded that for political and personal reasons it would be policy to attack the street railway. They attacked its franchise and stopped its expansion and retarded its growth, because no money could be raised on a doubtful franchise. After some very expensive litigation and several years in court I suggested to this committee two years ago that one of the great acts for it to accomplish would be to interest itself and aid in the settlement of the street railway controversy; that the controversy was retarding the growth and development of the city, and that no one thing could do so much to promote the growth of Des Moines as good rapid transit.

"Des Moines, however, is made up of a class of people who believe one thing to-day and another to-morrow, so that getting together with them has seemed to be impossible on any basis that would enable the company to live and give good service. It seemed to be the idea of some that they would be better off by getting new men and new ideas interested in the property. To this we acquiesced and made a deal with W. B. McKinley, of the Illinois Traction System, and his associates, but that was no go, and Des Moines lost one of the great opportunities that knocked at its door. Then came the Myers syndicate, but we may let that go with the simple statement that Mr. Myers came and went, but still the street railway controversy went on, not as near an end now as when the negotiations began.

"Lately we offered the city this property and agreed to finance it for municipal operation. Again Des Moines refused to take the property, which it was assured by the experts would pay and pay well. The reason advanced was that the price was too high, but it seemed that private corporations did offer and now would give more for the stock of the company than it was offered for to the city if the company had a living franchise or if the Turner franchise litigation were at an end. Nobody wants to buy a lawsuit and much less pay a premium for the same.

"The interests I represent have been anxious for some time to dispose of their holdings. Life is too short for the slow wheels of the courts to grind out justice. We have made up our minds that it is not well for local people to have financial interests and be connected with the management of a local corporation. So we have sold all our interests to N. W. Harris. I ask your kindest indulgence and consideration for J. R. Harrigan, the new manager. I know that if Des Moines gives him a chance he will more than make good and give first-class service, and I hope that you will not try to discourage the investment of outside capital.

I was elected a member of the Greater Des Moines committee as the representative of the Des Moines City Railway. As I soon will retire from that company I have tendered my resignation as a member of the committee."

Speech of B. S. Josselyn at Annual Reunion in Portland

The yearly reunion of the employees of the Portland Railway, Light & Power Company, Portland, Ore., and their families was held at the Oaks skating rink in Portland on the evening of March 13, 1911. The Oaks rink is a building 400 ft. long and 200 ft. wide, and at least 3000 employees and their families assembled. Lunch was served. B. S. Josselyn, president of the company, made a speech in which he said in part:

"With the daily cares of an institution so large as ours it is impossible to give the individual thought to each of my co-workers that I should like, and it is in gatherings of this sort that I am brought face to face more forcefully than at any other time with the responsibilities of my position in trying to make so many people prosperous and happy. I think it has been proved that my judgment was correct in doing away with the old plan of suspending employees from work for carelessness or infraction of rules and in adopting the merit and demerit system. The Portland Railway, Light & Power Company is probably the largest employer of labor in Oregon and its army of employees is increasing rapidly—due to the phenomenal growth of the community and our necessity of keeping up with the procession.

"The greatest enemy of man is self or selfishness. Had it not been for selfishness there would have been no need of the ten commandments, for not one of them can be violated except through selfishness of some sort. In order to achieve success and happiness we must work as a unit, subjugating self, and have faith in our work.

"Beware of finding fault with others, realizing that we cannot justly judge another, for we do not know the other person's problems as we do our own and without that knowledge our judgment is unfair.

"I am so filled with the conviction of what is necessary to produce harmonious results that I could not pass the opportunity by of telling you what my experience has proved in the hope that it may help many of you who are present to-night.

"I am more impressed than ever with the responsibilities of my position in striving to conduct a corporation which employs so much labor in a manner that will serve the best interests of our community and at the same time make the employees happy and prosperous. I ask that you continue to help me make good not only to the public but yourselves, for without your assistance my efforts will be useless. I hope that these events may occur more frequently in future than in the past and I wish you peace, health and prosperity."

Col. T. S. Williams on the Control of Public Utilities

Col. T. S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, was quoted as follows by the Brooklyn *Daily Eagle* on the subject of the control of public utility corporations in a report of an interview with him which appeared in that paper recently:

"Whether public utilities be owned and operated by the city or continue to be owned and operated by the created instrumentalities of the State, the underlying principle of their control and regulation should always be the best and broadest interests of the people. To project them all upon the government is an experiment which only the most thoughtless would try, at least until government has shown itself more capable of handling the responsibilities it now carries. If public utilities are to continue largely, as at present, in the possession of corporations, they require, both from the corporations and from the government, the most intelligent co-operation and the broadest conception of the welfare of both city and corporation. Such a conception involves large profits for the corporation and abundant conveniences for the people. You cannot expect the investment of the hundreds of millions required to transport the inhabitants of Greater New York properly without the assurance of more than ordinary interest. No more

valuable privilege has been granted in a generation than that to construct and operate the New York subway, and the most liberal concessions of a generation were made to achieve it. But what are all the millions its promoters have made or may make compared with the benefits to the people and the enrichment of their government? It is a fact not known, or, if known, not appreciated, that in the Borough of the Bronx alone during the six years following the letting of the subway contract the assessed value of real estate showed a greater increase than in the 25 years preceding that contract.

"I am not one of those who believe much in the efficacy of laws for the accomplishment of the most substantial reforms. Men will not be good merely because to be bad is illegal and may subject the evildoer to punishment. The most thorough and wholesome reform springs from within and accompanies the evolution of conscience. And the development of conscience as exemplified in the finer distinctions of right and wrong has been in no activity of society so marked in recent years as in the conduct of corporate affairs. Never was the sense of responsibility so keenly felt among those who handle other people's money as it is to-day, and never was there a higher standard of business honor. A wholesome public sentiment will eventually cure, in a natural way, most of the evils from which we may now suffer."

Advertising Campaign in Chattanooga

The Chattanooga Railway & Light Company, Chattanooga, Tenn., has begun a campaign of publicity to show that its efforts have been to aid in the development of the city. It has inserted half-page advertisements in the daily papers. In the initial advertisement, under the head "What We Do for Chattanooga," the company said:

"The company had on its payrolls during 1910 an average of more than 600 employees.

"It employed in its shops an average of 84 men.

"For 1910 these employees received in wages from this company the sum of \$327,223.98, which they used in buying food, clothing, fuel and other goods from the merchants in Chattanooga.

"This company is the largest taxpayer in the city and county. This company believes in building up Chattanooga industries, therefore buys everything possible in Chattanooga. It believes in giving the people of Chattanooga the best transportation and lighting service possible.

"It has done more to build up Chattanooga than any other industry—in its progress, building and expansion. The people follow the car line.

"It carries the people 14 miles for 4 cents, and gives a universal transfer, something no other city in the South does.

"It hands every person who rides on a 4-cent ticket a 20-per cent dividend. This is a greater percentage than paid by any other road in the South.

"It runs larger and better cars and 25 cars of the latest type were purchased during 1910. It increased the maximum number of cars in operation during the rush hours from 60 to 82 during 1910.

"It increased the headway on all lines, giving quicker and more frequent service, and contemplates still more frequent service in the near future.

"It is building the best piece of electric railway in the South—the Rossville short line—between Chattanooga and Rossville, Ga.

"It believes in a bigger, busier and brighter Chattanooga, and will help to make it so."

Inquiry into Physical Property in Maryland

The Public Service Commission of Maryland has adopted the following order, which provides for an inquiry into the physical condition of the properties which are under the jurisdiction of the commission:

"Resolved, that the chief engineer be, and is hereby, directed to take immediate steps for—

"1. The inspection of the physical property of the steam railroads operated in Maryland with reference to the condition of track and roadbed, bridges, tunnels and rolling stock, steamboats where operated under railroad charters,

having reference to the comfort, convenience and safety of passengers and the public, safety appliances, crossings and practices in relation thereto.

"2. The inspection of the properties of all steamboat lines operating between points in Maryland, including vessels, wharves, terminal facilities, safety appliances, life-preserving equipment and other matters and things as they affect safe and adequate service.

"3. The inspection of all electric and street railroads operated in the State, including power supply, tracks and overhead construction, cars, safety appliances, crossings and all other matters and things which affect safe and adequate service by the corporations.

"4. The inspection of the properties of all gas and electrical corporations doing business in Maryland, their instrumentalities and facilities, and the purity and efficiency of their respective products.

"5. The inspection of the plants and property of all water companies doing business in the State with reference to the adequacy of the supply of water and the purity thereof and the general efficiency of the service."

ASSOCIATION MEETINGS

Massachusetts Street Railway Association—Boston, Mass., April 12.

Central Electric Traffic Association—Lima, Ohio, April 12.
Missouri Electric, Gas, Street Railway & Water Works Association—St. Louis, Mo., April 13, 14 and 15.

Iowa Street & Interurban Railway Association—Davenport, Ia., April 20 and 21.

New England Street Railway Club—Boston, Mass., April 27.

Southwestern Electrical & Gas Association—Houston, Tex., April 27, 28 and 29.

Arkansas Association of Public Utility Operators—Little Rock, Ark., May 3, 4 and 5.

Illinois Electric Railways Association—May 26.

Central Electric Accounting Conference, Springfield, Ill., June 10.

Central Electric Railway Association, St. Joseph, Mich.—June 22.

Street Railway Association of the State of New York—Cooperstown, N. Y., June 27 and 28.

New Indiana Line Opened.—Service has been established by the Beach Grove Traction Company over its line between the Traction Terminal Building, Indianapolis, Ind., and Beach Grove.

Traction Situation at Detroit.—A resolution was adopted on March 23, 1911, by the Common Council of Detroit, Mich., which provides for submitting the question of a general revision of the city charter by a charter commission to the people at the April election. The resolution was so worded, however, that the question will not be submitted to a vote in case a bill now pending before the Legislature is made a law. By the terms of this bill the city would be enabled to amend its charter piecemeal. The amendment desired will allow the city to own and operate its own street railway, and the object of the resolution is to prevent delay in case the Legislature does not act.

Spokane Transportation Club.—The Spokane Transportation Club, Spokane, Wash., held its annual banquet in Spokane on Feb. 24, 1911. Waldo G. Paine, traffic manager of the Spokane & Inland Railroad, who is president of the club, was toastmaster. Mr. Paine, in a short address, reviewed the history of the club. Addresses were also made by J. B. Campbell, secretary of the Spokane Merchants' Association, and Robert E. Strahorn, vice-president of the Oregon-Washington Railway & Navigation Company. The officers of the club for the ensuing year follow: Waldo G. Paine, president; A. W. Doland, first vice-president; H. S. Collins, second vice-president; J. W. MacIntosh, secretary, and R. L. Ford, treasurer.

San Francisco's Municipal Railway.—The Board of Supervisors of San Francisco has sold \$93,000 of the bonds of the Geary Street, Park & Ocean Railroad to seven bidders. The total amount offered for sale was \$600,000. The remaining securities to the value of \$507,000 will be sold by the City Treasurer. In regard to the present status of the court pro-

ceedings growing out of the injunction secured by the United Railroad of San Francisco to prevent the city from carrying the new railway down Market Street to the ferries and over Point Lobos Avenue from Thirty-third Avenue to Forty-second Avenue, a letter has been received by the Supervisors from City Attorney Long stating that the city's appeal from the order by United States Circuit Judge Van Fleet granting the injunction would be heard by the Circuit Court of Appeals during the May term. There is nothing to interfere with the reconstruction of the Geary Street, Park & Ocean Railroad as it exists at present. The injunction merely restrains the city from proceeding with work on the municipal line on Market Street, on which the United Railroads operates.

Decision in Regard to Railway Jurisdiction in Washington, D. C.—The District Court of Appeals of the District of Columbia has sustained the Police Court of the District, which recently quashed a case brought by the District Commissioners against a street car motorman who operated a car equipped with an arc headlight. The decision of the District Court of Appeals was handed down by Chief Justice Shepard, who said: "Whatever power the District Commissioners may have had over the operation of street cars in the District, the effect of Section 16 of the act of May 23, 1908, was to transfer the same to the Interstate Commerce Commission in all particulars enumerated therein, which expressly include proper and safe power, equipment, appliance and service. There can be no doubt that a headlight is a part of the safe equipment of a car and a necessary appliance. Complete power of regulation of the same having been conferred by the said section upon the Interstate Commerce Commission, any power which the District Commissioners may have in respect thereof under acts of Congress terminated at once. Former laws by the authority of which the regulation was promulgated were necessarily repealed by Section 16 of the present law, which is utterly inconsistent with and repugnant to them. With the repeal of this authority all regulations dependent thereon ceased to have any further force or operation."

Employers' Liability Law Declared Invalid in New York.—In a decision concurred in by all the judges and handed down by the Court of Appeals on March 24, 1911, the so-called workmen's compulsory compensation act, passed at the last session of the Legislature, has been declared unconstitutional on the ground that the act involved a violation of the constitutional provision against the taking away of property without due process of law. Under the act of 1910 an employer of labor in what have become known as extra-hazardous occupations was liable for all injuries to his employees even though it should be shown that these were not in any way due to negligence or lack of precaution on the part of the employer. The law provided that if the injury was caused wholly or in part through "a necessary risk of the employment or one inherent in the nature thereof," or through the employer's failure to exercise due care or to comply with any law affecting such employment, the employer should be liable to compensate the injured workmen according to a scale fixed in the law. The only exception was where a workman was disabled for less than two weeks or where the injury occurred through the "serious and wilful misconduct of the workman." It is stated that, in order to provide a basis for future progressive legislation along these lines, it would be desirable to have a test case brought which could be carried to the United States Supreme Court, the case in which the present decision was handed down not being of a character which would permit such procedure.

Report to Be Submitted on Dallas Properties.—In announcing that Stone & Webster, Boston, Mass., propose to build an interurban electric railway from Waxahachie to connect with the lines of the Northern Texas Traction Company, Fort Worth, Tex., at Oak Cliff, E. T. Moore, general manager of the Dallas (Tex.) Electric Corporation, said: "Stone & Webster desired to build and operate this new line in connection with the Dallas properties. This would have been an advantage to Dallas and would have enabled the local lines to do more for Dallas than they otherwise can. As repeatedly stated, the investment required cannot safely be made in connection with the local companies under the present franchise conditions. The adjournment of the Legislature without action permitting

the people of Dallas to vote on any franchise readjustment leaves the possibility of co-operation between the local companies and the new line too indefinite for consideration now. It is the purpose of the Stone & Webster management to present to the people of Dallas, within a short time, the full facts concerning the cost, value, present condition and earning power of the Dallas companies under their management, in order that the exact situation may be fully understood by all. It is confidently believed that when the facts are thus disclosed and understood the citizens of Dallas will agree that Stone & Webster are justified in acting without further delay, independently of the Dallas companies, although this does not bring Dallas all that it might wish from the new line, or all which could have been secured had necessary franchise rights been granted."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

CALIFORNIA

The California Legislature has decided to submit to the people a constitutional amendment for the creation of a new appointive railroad commission to consist of the three commissioners now in office and two others. According to the new plan the commission will consist of five members who shall be appointed by the Governor, to hold office for six years and to be subject to removal by a two-thirds vote of the Legislature for dereliction of duty, corruption or incompetency. The third measure, Senate constitutional amendment 47, introduced by Burnett, of San Francisco, was adopted by the Senate and similar action will be taken in the Assembly. It gives the Railroad Commission control over all public utilities, including interurban and street railways, canals, pipe lines, plants, etc. The commission will have the right to fix rates to be charged for commodities furnished or services rendered by public utilities. The powers respecting public utilities now vested in the boards of supervisors or the governing bodies of cities and towns shall be retained by them unless a majority of the electors of a county, city or town vote to surrender such powers to the railroad commission. The California Assembly has passed a transfer bill which makes transfers on city and interurban railways good for 90 minutes. Senator Bennett's bill to permit San Francisco to operate its Geary Street, Park & Ocean Railroad down Market Street to the ferry has passed the Assembly. It will now go to Governor Johnson for his signature. A bill for the same purpose has already been signed by the Governor, but its effect was nullified by the omission of two words.

MASSACHUSETTS

The Senate has killed the bill to provide for the equipment of all street-railway cars with lifting jacks. The Senate has accepted the adverse report of the committees on railroads and street railways on the bill to provide for an examination as to the mental capacity of employees of railroads and street railways. A resolve has been introduced into the House to provide for an estimate of the cost of removing the elevated structure of the Boston Elevated Railway between the North Station and Sullivan Square, Charlestown, and to substitute a double-track subway. The committee on street railways has voted leave to withdraw on the bill to substitute limited franchises to street railways carrying freight and express matter for unlimited permits. The bill represented an effort on the part of the Worcester city government to override the jurisdiction of the Massachusetts Railroad Commission. The policy of the commission has been to grant franchises for this service without time limits. The Senate has accepted the adverse report of the committee on street railways on the bill to enlarge the authority of street railways in regard to the issue of preferred stock.

Hearings were held during the week ended March 25, 1911, on the bills to provide for the electrification of steam railroads in the Boston metropolitan district. Various improvement associations appeared on behalf of the bills, and the adverse report of the majority of the joint commission on metropolitan improvements was criticised. The railroads will be heard later. Hearings were also concluded upon the Boston & Eastern bill, which seeks to require the Railroad Commission to issue a certificate of exigency to the incorporators of this company. The petitioners con-

tended that the necessity of the proposed high-speed line from Boston to the North Shore has been demonstrated, and that the Railroad Commission, although admitting the need of the line, has refused to issue a certificate to enable construction to be begun. W. H. Coolidge for the New York, New Haven & Hartford Railroad opposed the Boston & Eastern bill on the ground that the financial standing of the promoters was unknown, and that the plans of the New York, New Haven & Hartford Railroad for a tunnel under Boston Harbor amply meet the transportation needs of the North Shore.

OHIO

The Winters public utility commission bill as reported to the House by the committee on codes will apply mainly to telephone matters. In the cities local city councils will have the right to fix rates of service, but these rates may be reviewed by the commission. The Calvey bill, which would require both ends of street cars to be inclosed, has been placed on the Senate calendar in regular order and will come up near the end of the session. The Senate bill to require steam and electric railways to keep their rights of way free from weeds has been passed by the House and awaits the signature of the Governor. In case the roads fail to observe the requirements of the law township officers may have the work done and collect from the roads the expense and 100 per cent additional as penalty. Under the terms of a bill presented by Senator Dean electric railways would have the same right as steam roads to condemn property.

PENNSYLVANIA

In all likelihood April 4, 1911, will be the time limit placed by the Legislature for the introduction of new bills. The leaders are figuring on adjournment about May 15. Among the important measures affecting electric railways introduced during the week ended March 25, 1911, was one by Senator Fox which provides that any street railway incorporated under the act of 1889 may construct and maintain in streets in boroughs tracks not exceeding 500 ft. in length without the consent of the municipal authorities. However, no section of street thus appropriated shall be occupied by any other street railway and the company must first obtain the written consent of the owners of at least 51 per cent of the number of feet of the land fronting on the portion of the street affected. The act, of course, affects only boroughs in which street railways are now lawfully operated or may be lawfully operated in the future. The bill will permit the electric railways to make short connecting links between existing lines without the delay of getting an ordinance through a borough council.

One of the revenue measures introduced provides for taxing real estate of corporations heretofore exempt from taxation by counties, cities, boroughs, townships and school districts. The real estate of the following corporations is subject to taxation under the measure: Railroads, street railways, canal companies, bridges, gas, pipe line companies, electric light, heat and power companies, water, telegraph, telephone and express companies.

Senator Adams has introduced a bill designed to release street railroads from municipal regulation of the amount of license fees to be paid by these corporations. The Legislature of 1905 enacted the law "providing for the determination by the Court of Common Pleas of the proper county of all disputes as to the reasonableness of the amount of license fees between municipal corporations and telegraph, telephone or light or power companies." Senator Adams seeks to supplement this by extending the provisions of the 1905 act so as to apply to street railways.

The House has passed the bill requiring the semi-monthly payment of wages. The House has also passed the bill empowering viewers to assess against railroads and street railways shares of damages caused by change of grade or highways. Among the bills reported out of committee affirmatively were those making railroads liable for injuries received by employees when there has been negligence on the part of the company and to make train wrecking a felony and prescribing the death penalty where fatalities result.

WASHINGTON

The House has passed the public utilities bill with a few amendments.

Financial and Corporate

New York Stock and Money Market

March 28, 1911.

There was a trifle more activity in the stock market to-day than on any previous day during the week and prices were somewhat stronger. Interborough-Metropolitan continues to sell in small volume, prices being little changed.

The money market continues to be remarkably easy and the banks are having difficulty finding profitable use for their surplus funds. Rates are still low. Quotations to-day were: Call, 2¼@2½ per cent; 90 days, 2¾ per cent.

Other Markets

The Philadelphia market was firmer to-day, in sympathy with Wall Street, and transactions were somewhat increased. Price changes for traction shares were insignificant, although the tone was fairly strong.

There has been little trading in traction shares in the Chicago market during the week. Prices of elevated stock are practically stationary, the terms having been fixed for the merger.

In the Boston market there has been, during the week, moderate trading in Boston Elevated and Massachusetts Electric preferred at former prices. Other tractions have been dormant.

During the past week there has been considerable activity in the Baltimore market in the shares of the United Railways. Prices have advanced slightly and the closing quotation to-day was 18¾. The bonds of the same company continue to be in demand at former prices.

Quotations of traction and manufacturing securities as compared with last week follow:

	March 21.	March 28.
American Light & Traction Company (common).....	a293	a293
American Light & Traction Company (preferred).....	a106	a106
American Railways Company.....	43¾	44¼
Aurora, Elgin & Chicago Railroad (common).....	444	44
Aurora, Elgin & Chicago Railroad (preferred).....	a88	88
Boston Elevated Railway.....	a129	a129
Boston Suburban Electric Companies (common).....	15½	*15½
Boston Suburban Electric Companies (preferred).....	a75	73
Boston & Worcester Electric Companies (common).....	8½	8½
Boston & Worcester Electric Companies (preferred).....	41	41
Brooklyn Rapid Transit Company.....	77¾	78¾
Brooklyn Rapid Transit Company, 1st ref. conv. 4s.....	84	84¼
Capital Traction Company, Washington.....	a126¼	a126½
Chicago City Railway.....	a185	a190
Chicago & Oak Park Elevated Railroad (common).....	3½	3
Chicago & Oak Park Elevated Railroad (preferred).....	6	7
Chicago Railways, ptcptg., ctf. 1.....	a92½	a91
Chicago Railways, ptcptg., ctf. 2.....	a25	a24½
Chicago Railways, ptcptg., ctf. 3.....	a9	a10
Chicago Railways, ptcptg., ctf. 4.....	a5	a5½
Cincinnati Street Railway.....	*132	a132
Cleveland Railway.....	92½	*9
Columbus Railway (common).....	*96	a96
Columbus Railway (preferred).....	*100½	a101½
Consolidated Traction of New Jersey.....	a76	a76½
Consolidated Traction of N. J., 5 per cent bonds.....	a105	a105
Dayton Street Railway (common).....	a30	a30
Dayton Street Railway (preferred).....	a105	a105
Detroit United Railway.....	a70	a69¼
General Electric Company.....	149½	148½
Georgia Railway & Electric Company (common).....	a134	a133
Georgia Railway & Electric Company (preferred).....	a91	90
Interborough Metropolitan Company (common).....	19¼	18¾
Interborough Metropolitan Company (preferred).....	53¼	53¼
Interborough Metropolitan Company (4½s).....	78¾	78¾
Kansas City Railway & Light Company (common).....	a24¾	a24¾
Kansas City Railway & Light Company (preferred).....	a70	a70
Manhattan Railway.....	a140	a136½
Massachusetts Electric Companies (common).....	17¾	17½
Massachusetts Electric Companies (preferred).....	a87	a87
Metropolitan West Side, Chicago (common).....	a23¾	a23¾
Metropolitan West Side, Chicago (preferred).....	a69¼	a69¼
Metropolitan Street Railway, New York.....	*15	*15
Milwaukee Electric Railway & Light (preferred).....	110	110
North American Company.....	72½	*47½
Northern Ohio Light & Traction Company.....	*43¼	*43¼
Northwestern Elevated Railroad (common).....	a23	a23
Northwestern Elevated Railroad (preferred).....	a65	a64¾
Philadelphia Company, Pittsburgh (common).....	a54¾	a54¼
Philadelphia Company, Pittsburgh (preferred).....	a43	a43
Philadelphia Rapid Transit Company.....	a20	a19¾
Philadelphia Traction Company.....	a84¼	84¼
Public-Service Corporation, 5 per cent col. notes (1913).....	*100¼	a101½
Public Service Corporation, cfs.....	a106	a106
Seattle Electric Company (common).....	a109½	a108
Seattle Electric Company (preferred).....	a100	a98
South Side Elevated Railroad (Chicago).....	a70	a71
Third Avenue Railroad, New York.....	103¼	103¾
Toledo Railways & Light Company.....	a8½	a8½
Twin City Rapid Transit, Minneapolis (common).....	a109	a108¾
Union Traction Company, Philadelphia.....	a47½	a47½
United Rys. & Electric Company, Baltimore.....	17¾	19
United Rys. Inv. Co. (common).....	47½	*47½
United Rys. Inv. Co. (preferred).....	74¾	75½
United Rys. Inv. Co. (preferred).....	74¾	75½
Washington Ry. & Electric Company (common).....	a36¼	a36½
Washington Ry. & Electric Company (preferred).....	a89	a89¼
West End Street Railway, Boston (common).....	92½	a91
West End Street Railway, Boston (preferred).....	103	a103½
Westinghouse Elec. & Mfg. Co.....	67	67
Westinghouse Elec. & Mfg. Co. (1st pref.).....	a120½	120½

aAsked. *Last sale.

Annual Report of Chicago City Railway

The annual report of the Chicago City Railway for the year ended Jan. 31, 1911, shows the following:

GROSS EARNINGS.

Passenger receipts, including Southern Street Railway.....	\$9,762,274
Receipts from other sources.....	343,168
	<u>\$10,105,443</u>

TOTAL EXPENSES.

Operating expenses, taxes and renewals of combined systems, interest on capital investment of Chicago City Railway and net earnings of Southern Street Railway.....	\$8,596,508
Net earnings of Chicago City Railway.....	\$1,508,935
City's proportion, 55 per cent, as per ordinance.....	829,914
Company's proportion, 45 per cent, as per ordinance.....	\$679,021
Interest on capital, as certified by Board of Supervising Engineers.....	1,994,939
Income from operation.....	\$2,673,960
Other income.....	439,180
	<u>\$3,113,140</u>
Interest on bonds outstanding.....	1,127,708
Net income.....	\$1,985,432
Dividends.....	1,800,000
Surplus for twelve months ended Jan. 31, 1911.....	<u>\$185,432</u>
Percentage of net income to capital stock at par.....	11.03

T. E. Mitten, the president, says in his report:

"The completion of work required during the rehabilitation period ended April 15, 1910, has been accomplished.

"Your property has produced a net income of \$1,985,432, from which four quarterly dividends of 2½ per cent have been paid, aggregating a total of 10 per cent upon the \$18,000,000 capital stock, and leaving an amount of \$185,432 surplus earnings for the year.

"Adequate provision being contained in the settlement ordinance, under which we are now operating, insuring the establishment of reserves sufficient to maintain effectually the present physical excellence of the property, there remained, in the opinion of your directors, no reason for longer conserving the large treasury surplus, which as of Jan. 31, 1910, exceeded the par value of the capital stock to the amount of \$1,319,891. Distribution of a portion of this surplus has therefore been made during the year by the payment of extra dividends, aggregating 6 per cent upon the capital stock."

Annual Report of the Lake Shore Electric Railway.

The following statement shows the results of operation for the last two years of the Lake Shore Electric Railway system, comprising the Lake Shore Electric Railway, the Lorain Street Railroad, and the Sandusky, Fremont & Southern Railway:

	1910	1909
Gross income.....	\$1,206,112	\$1,109,083
Operating and taxes.....	632,533	586,184
Net.....	573,578	522,899
Interest.....	417,049	414,950
Surplus.....	156,528	107,949

E. W. Moore, the president, says in his report in part: "A new 300,000 cir. mil. feeder was strung from the Fremont power house westward for a distance of approximately 2,500 ft., thereby removing the feeder cables from possible danger of high water, the old feeder line having followed the river. The high and low tension systems were completely rebuilt at the Sandusky yards. A large amount of track bonding was done during the year, brazed bonds being used for this work.

"A large corrugated iron culvert was placed under the track near Berlinville. Seven new single end sidings were built during the year. Approximately nine miles of track was lifted and reballasted with crushed stone.

"The company having ample power for handling its business, no additions were made to the power plant excepting the purchase of one 400-kw rotary which was installed in the Sandusky substation.

"The buildings in Sandusky were altered on account of the re-location of the substation machinery and that portion of the building released was turned over to the shop department, giving us additional needed shop facilities.

"A storage building for the use of the overhead and track departments was built in the rear of the substation at Vermilion.

"All passenger cars used on limited schedules were

equipped for train operation. One new work car body was built at the Sandusky shop. Three straight air equipments were changed to automatic air equipments. Twenty 60,000 lb. capacity 34-ft. flat cars were purchased for use in the crushed stone trade.

"This company was granted a franchise for double-track rights for a period of 25 years over the new concrete bridge across Rocky River, recently built by the Commissioners of Cuyahoga County. This bridge is said to be the largest concrete single arch ever built in this country. A franchise for a period of 25 years was granted this company by the Commissioners of Erie County over the new bridge in course of construction across the river at Huron, Ohio. It is anticipated that we shall be able to use both of these bridges in the early summer, which will materially improve our service.

"During the year the plan adopted at the last annual meeting for converting the \$3,000,000 of preferred stock and accumulations into \$1,000,000 first preferred cumulative 6 per cent stock and \$2,000,000 second preferred non-cumulative 5 per cent stock was carried into effect and the new securities issued therefor. Under the plan the first preferred stock was cumulative from July 1 last with dividends payable quarterly, and dividends have been paid. The plan could not have been carried through except for the hearty co-operation of the stockholders. It is anticipated that both the company and its stockholders will be largely benefited in the future through this rearrangement.

"On the Sandusky, Fremont & Southern Railway Company a siding approximately one mile in length was built from the main line near Castalia to the Wagner Stone Company's quarry. This connection was built on private right-of-way purchased by the company for the purpose of handling crushed stone for commercial purposes."

Detailed earnings and expenses of the Lake Shore Electric Railway for two years compare as follows:

Earnings.	1910	1909
Passenger revenue.....	\$894,215	\$818,263
Baggage revenue.....	2,625	2,512
Parlor, chair and special car revenue.....	5,725	6,621
Mail revenue.....	1,963	1,968
Milk revenue.....	2,489	2,238
Freight revenue.....	66,034	58,596
Switching revenue.....	345	117
Miscellaneous transportation revenue.....	11	43
Station and car privileges.....	2,704	2,683
Parcel room receipts.....	428	363
Storage.....	72	112
Rent of tracks and terminals.....	1,637	2,209
Rent of equipment.....	5,152	4,897
Rent of buildings and other property.....	758	600
Power.....	11,267	12,054
Miscellaneous.....	10,454	6,336
Total.....	\$1,005,879	\$919,612
Expenses.	1910	1909
Maintenance way and structure.....	\$78,777	\$77,306
Maintenance equipment.....	70,728	65,089
Operation power plants.....	83,357	70,641
Conducting transportation.....	187,025	175,491
General and taxes.....	116,209	108,804
Total.....	\$536,096	\$497,331

Earnings per car mile on the Cleveland division were 34.54 cents, on the Toledo division 30.32 cents, and on the Sandusky-Norwalk division 31.69 cents. Earnings per mile of road for the entire company were \$5,912 last year, as compared with \$5,408 the preceding year.

Traffic statistics compare as follows:

	1910.	1909.
Per cent of operation.....	53.30	54.08
Car miles.....	3,462,678	3,325,869
Income per mile—cents.....	29.05	27.65
Operation and taxes per car mile—cents.....	15.48	14.95
Net earnings per car mile—cents.....	13.52	12.70
Passengers carried.....	5,429,748	4,951,002
Earnings per passenger—cents.....	18.52	18.57

Gross income of the Lorain Street Railroad was \$175,232, an increase of \$10,761 over the preceding year. Operating expenses and taxes were \$96,437, an increase of \$7,584.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Eli West, receiver of the Columbus, Delaware & Marion Railway, has announced that the interest on the first mortgage bonds of the company, due on Nov. 1, 1910, will be paid on or before May 1, 1911, at the office of the Cleveland Trust Company, Cleveland, Ohio.

Evansville (Ind.) Electric Railway—E. R. Barnard, Philadelphia, Pa., offers for subscription at a price to yield 6 per cent first mortgage 4 per cent gold bonds of the Evansville Electric Railway, dated May, 1901, and due May, 1921; principal and interest payable at the office of the Farmers'

Loan & Trust Company, New York, N. Y., trustees. The total authorized issue is \$1,200,000, of which the entire amount is outstanding. The bonds are secured by a mortgage on the entire street railway system in Evansville, Ind. except 1 1-3 miles of an interurban line which has been merged with this property.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—The Fort Wayne & Northern Indiana Traction Company, which was organized recently to succeed the Fort Wayne & Wabash Valley Traction Company, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 25, 1911, page 350, has organized by electing directors as follows: Hugh J. Pritchard and William A. Tucker, New York; Randall Morgan and John J. Collier, Philadelphia; Hugh J. McGowan, Indianapolis; Henry C. Paul and James M. Barrett, Fort Wayne; Harry E. Vordemark, Arthur H. Mohr and Frederick H. Schmidt. Mr. Pritchard and Mr. Tucker are new members of the board. The officers of the Fort Wayne & Wabash Valley Traction Company were elected in the same capacities as with the Fort Wayne & Northern Indiana Traction Company.

Hudson & Manhattan Railroad, New York, N. Y.—The Hudson Companies has notified the holders of its 6 per cent gold bonds, due Oct. 15, 1911, that the offer of the extension of the notes until Oct. 15, 1913, by their exchange into the new 6 per cent notes of the company, maturing on Oct. 15, 1913, with a cash payment of \$15 with respect to each \$1,000 note, will be withdrawn on April 1, 1911.

Illinois Traction Company, Peoria, Ill.—Mackay & Company, New York, N. Y., offer for subscription a limited amount of Illinois Traction Company's 6 per cent cumulative preferred stock at 93 and accrued dividend to net the investor 6.45 per cent.

Indianapolis, New Castle & Toledo Electric Railway, Indianapolis, Ind.—The property of the Indianapolis, Newcastle & Toledo Electric Railway has been ordered sold by Judge Vinson Carter, of the Superior Court, to satisfy mechanics' liens amounting to about \$25,000 and to pay bonds amounting to \$2,998,437.50 held by the Knickerbocker Trust Company, New York, N. Y. The date of the sale has not been set.

Kokomo, Marion & Western Traction Company, Kokomo, Ind.—Gross income in 1910 was \$261,485 as compared with \$233,863 in 1909. Of the 1910 earnings \$99,420 was received from the interurban railway department, \$62,146 from the city railway department and \$99,919 from light and power. Operating expenses in 1910 were as follows: Interurban, \$44,490; city railway, \$30,531; light and power, \$38,364; total, \$113,385. Gross income, less operating expenses, was \$148,100. Fixed charges last year aggregate \$66,810. A special reserve fund for depreciation was established on Jan. 1, 1909, and during the year beginning on that date \$20,253 was set aside for that purpose. A similar amount was set aside in 1910. The surplus for 1910 after provision for charges and depreciation was \$61,037 as compared with \$49,678. Dividends of 3 per cent were paid on the common stock during 1910, and after provision for miscellaneous charges the net surplus for the year was \$28,878 as compared with \$39,432 in the previous year. Passenger earnings per car mile in the interurban department were 23.4 cents in 1910 and 22.1 cents in 1909.

New Orleans Railway & Light Company, New Orleans, La.—The New Orleans Railway & Light Company has declared a quarterly dividend of 1 1/4 per cent on its preferred stock, payable on April 10, 1911. This places the stock on a 5 per cent basis. The last previous declaration by the company was 2 1/2 per cent on Jan. 1, 1911.

Seattle (Wash.) Electric Company.—The Seattle Electric Company has declared in connection with the usual quarterly dividend of 1 1/4 per cent on its common stock an extra dividend of 2 per cent, payable on April 15, 1911. The semi-annual dividend of 3 per cent on the preferred stock is payable on April 1, 1911. The company has paid 6 per cent per year on its preferred stock since October, 1901, and 7 per cent on the common stock since 1909.

Southwestern Street Railway, Philadelphia, Pa.—Judge Holland in the United States Circuit Court at Philadelphia has filed a decree authorizing a resale of the Southwestern Street Railway, which has been in the hands of receivers for several years.

York (Pa.) Railways—The stockholders of the York Railways have authorized an issue of \$700,000 of one and two-year 6 per cent collateral trust gold notes secured by a pledge of the 5 per cent gold bonds of the company.

Dividends Declared

American Cities Railway & Light Company, New York, N. Y., quarterly, 1 1/2 per cent, preferred.

Aurora, Elgin & Chicago Railroad, Chicago, Ill., quarterly, 1 1/2 per cent, preferred; quarterly, 3/4 of 1 per cent, common.

Central Pennsylvania Traction Company, Harrisburg, Pa., 3 per cent.

Cincinnati (Ohio) Street Railway, quarterly, 1 1/2 per cent.

Citizens' Railway & Light Company, Muscatine, Ia., 1 1/2 per cent, preferred.

Columbus, Newark & Zanesville Electric Railway, Columbus, Ohio, quarterly, 1 1/2 per cent, preferred.

Denver & Northwestern Railway, Denver, Col., quarterly, 2 per cent.

Kokomo, Marion & Western Traction Company, Kokomo, Ind., 3 per cent, preferred.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1 1/4 per cent, preferred; quarterly, 3/4 of 1 per cent, common.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1 1/4 per cent, preferred.

Northwestern Elevated Railroad, Chicago, Ill., quarterly, 1 per cent, preferred.

Ottawa (Ont.) Electric Railway, 2 1/2 per cent.

Philadelphia Company, Pittsburgh, Pa., quarterly, 1 1/2 per cent, common.

Porto Rico Railways, Ltd., Ponce, Porto Rico, quarterly, 1 3/4 per cent, preferred.

Quebec Railway, Light & Power Company, Quebec, Que., 1 per cent.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, \$3.00.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1 1/4 per cent, first preferred and preferred.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., quarterly, \$1.25, preferred.

Western Ohio Railway, Lima, Ohio, quarterly, 1 1/2 per cent, second preferred.

MONTHLY ELECTRIC RAILWAY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD.						
Period.		Gross Revenue.	Operating Expenses.	Net Revenue.	Fixed Charges.	Net Income.
1m.,	Feb.	'11 \$112,296	\$75,912	\$36,385	\$35,834	\$551
1 "	"	'10 103,399	63,267	40,133	32,154	7,979
8 "	"	'11 1,167,950	669,238	498,712	272,745	225,966
8 "	"	'10 1,063,190	586,167	477,023	241,692	235,331
CENTRAL PARK, NORTH & EAST RIVER RAILROAD.						
1m.,	Nov.	'10 \$53,201	\$49,847	\$3,354	\$2,663	\$690
CONEY ISLAND & BROOKLYN RAILROAD.						
1m.,	Nov.	'10 \$108,994	\$74,575	\$34,419	\$32,275	\$2,145
HOUGHTON COUNTY TRACTION COMPANY.						
1m.,	Jan.	'11 \$23,256	\$16,020	\$7,227	\$6,540	\$686
1 "	"	'10 25,340	15,156	10,183	6,341	3,842
12 "	"	'11 309,391	166,466	142,925	77,897	65,026
12 "	"	'10 321,745	171,971	149,775	74,369	75,405
METROPOLITAN STREET RAILWAY.						
1m.,	Nov.	'10 \$1,159,952	\$658,538	\$501,414	\$322,806	\$178,609
NORFOLK & PORTSMOUTH TRACTION COMPANY.						
1m.,	Feb.	'11 \$1,400,080	\$788,008	\$612,071	\$500,919	\$111,153
1 "	"	'10 1,284,257	725,121	559,135	513,141	45,995
NEW YORK & QUEENS COUNTY RAILWAY.						
1m.,	Nov.	'10 \$88,427	\$85,293	\$3,134	\$26,499	\$23,365
PENSACOLA ELECTRIC COMPANY.						
1m.,	Jan.	'11 \$22,369	\$13,243	\$9,126	\$6,166	\$2,960
1 "	"	'10 20,608	12,158	8,450	4,785	3,665
12 "	"	'11 274,864	160,690	114,174	61,913	52,260
12 "	"	'10 247,188	141,995	105,583	53,009	52,574
SEATTLE ELECTRIC COMPANY.						
1m.,	Jan.	'11 \$478,729	\$276,670	\$202,059	\$110,404	\$91,665
1 "	"	'10 467,700	310,390	157,310	105,649	51,661
12 "	"	'11 5,599,218	3,179,069	2,420,149	1,312,085	1,108,064
12 "	"	'10 5,919,065	3,454,635	2,464,430	1,250,074	1,214,356
THIRD AVENUE RAILROAD.						
1m.,	Nov.	'10 \$283,418	\$142,310	\$141,109	\$56,639	\$84,469
TWIN CITY RAPID TRANSIT COMPANY.						
1m.,	Feb.	'11 \$576,935	\$395,485	\$271,450	\$140,079	\$131,371
1 "	"	'10 536,955	281,618	255,337	140,229	115,107
2 "	"	'11 1,195,874	642,279	553,595	280,158	273,437
2 "	"	'10 1,120,917	584,250	536,668	280,485	256,209

Traffic and Transportation

Interstate Commerce Commission Orders Reduction in Fare

In the case of the complaint filed with the Interstate Commerce Commission to require the Washington, Alexandria & Mount Vernon Railway, Washington, D. C., to substitute a 10-cent fare for the 15-cent single fare which it charges between Washington and Four Mile Run, St. Elmo, St. Asaph, Mount Ida and Del Ray, the commission has filed an opinion in which it says in part:

"This petition puts in issue the reasonableness of defendant's single-trip fare from Washington, D. C., to Four Mile Run, St. Elmo, St. Asaph, Mount Ida and Del Ray, in Virginia. The gravamen of the complaint is that the fares mentioned are equal to those applying from Washington to Alexandria, Va., although the distance to Alexandria is about two miles more than the average distance between Washington and the group of towns above mentioned, which are intermediate to Alexandria.

"The defendant's tracks extend from Twelfth Street and Pennsylvania Avenue, Washington, through a portion of Virginia to Alexandria and Mount Vernon. The distance from the terminus in Washington to the terminus in Alexandria is 7.5 miles. From the Washington terminus to Four Mile Run the distance is 4.1 miles. The distance to Del Ray, the farthest point named, is 5.5 miles. The average distance to the several points involved is said to be 5 miles.

"The passenger fares are based upon a group or zone system. The first zone extends from the Washington terminus to the south end of the highway bridge, a distance of about 1.5 miles, and within this zone the single-trip fare is 5 cents. The second zone extends from the south end of the highway bridge to Addison, a further distance of 2 miles. The single-trip fare between this zone and Washington is 10 cents. The remainder of the line to and including Alexandria constitutes a third zone of about 4 miles. The single-trip fare between this zone and Washington is 15 cents. There is no station between Addison and Four Mile Run. Although passenger fares are established to and from Four Mile Run, there is little demand for such fares; and the next station beyond, which is St. Elmo, is the first station within the Alexandria zone to and from which there is travel.

"In addition to the single fare of 15 cents defendant has established the following round-trip and commutation fares between Washington and points in the Alexandria zone: Round trip, 25 cents; 8 single trips, 90 cents; 25 single trips, \$2.50, and 52 single trips, \$4.05, good within a calendar month and not transferable. Applied to the average distance of 5 miles between Washington and the stations mentioned in the complaint the fares above specified produce approximately the following revenue per passenger mile: Single trip, 3 cents; round trip, 2.5 cents; 8 trip, 2.25 cents; 25 trip, 2 cents; 52 trip, 1.5 cents.

"Apparently the road has been economically and efficiently managed, and the service rendered by it to the communities along its line seems to be adequate and convenient. At present it operates 73 northbound and 72 southbound trains per day.

"As has been noted, the average distance from Washington to Four Mile Run, St. Elmo, St. Asaph, Mount Ida and Del Ray is about 5 miles. An examination of the fares of other suburban lines entering Washington shows that generally for similar or even greater distances the single fare is 10 cents. That fare would give defendant substantially the same revenue per passenger mile as it receives under the 15-cent fare to Alexandria. The defense presented by the company may, in a general way, be divided into three heads. First, it is asserted that the passenger travel from the complaining towns is light and therefore a somewhat higher fare is justified than would be maintained if the traffic were of greater density. Second, that any reduction in fares is unwarranted because 'it is only within the last few years that the stock of this railroad has ever paid any dividends, and those paid have been very meager, and have recently been reduced, if not abandoned altogether.' Third, it denies in its answer that it is subject to the act to regulate commerce.

"Defendant estimates that during 1909 there were 55 passengers per day, or 20,075 trips for the year, between Washington and the group of stations in question, as compared with about 575 passengers per day, or 200,000 trips per year, between Alexandria and Washington. Defendant argues that the passenger revenue derived from these small communities does not pay for the service rendered and that they are the beneficiaries of the facilities provided to accommodate the heavy passenger travel between Washington and Alexandria. This may well be true and yet have no bearing upon the reasonableness of the present charge. Certainly it ought not to be expected that these communities should bear an undue portion of the cost of a transportation service designed and for the most part used to meet the requirements of other and larger communities; nor does the fact that defendant, in order to furnish adequate service to the large cities at its termini, operates through these towns many more trains than are necessary to their needs warrant the exaction of a charge in proportion to the frequency of the service incidentally furnished. It might well be assumed that inasmuch as the present service must be maintained to accommodate the travel between Washington and Alexandria any additional traffic secured from the intermediate points is in the nature of a net gain to the carrier.

"An examination of the defendant's annual reports to the commission for the years in which such reports have been made (1908, 1909 and 1910) fails to indicate that its financial condition is so distressing as is suggested in its brief. The total capital issued against its 19 miles of line up to June 30, 1910, is \$3,950,000, or \$207,894.74 per mile of line, composed of \$2,450,000 of 5 per cent bonds secured by a mortgage on the entire property, of which \$115,000 is held in the treasury, and \$1,500,000 of capital stock. Neither the amount of money invested in the property devoted to the service of the public nor the consideration received from the sale of stocks and bonds is disclosed, and, in the absence of explanation, this seems plainly a case of gross over-capitalization. Assuming that the actual investment in the property is \$50,000 per mile of line, or \$1,000,000 in all, the earnings in 1910 were sufficient, after laying aside a surplus, to return about 16 per cent upon the investment. Again, assuming that all of the 20,000 trips between Washington and the communities involved had been under a 10-cent fare, and none of such trips under round-trip or commutation fares, the net loss to defendant would have been \$1,000; and it would still have been able to meet interest charges on its large capital, pay all operating expenses, declare a dividend of 2 per cent on its stock and lay aside a surplus of more than \$52,000.

"Although defendant asserts in its answer that it is not subject to the act to regulate commerce, the point is not mentioned in its brief, and we do not understand that it seriously presses the matter. It files tariffs and statistical reports in accordance with the act and seems heretofore to have considered itself subject to the jurisdiction of the commission.

"It is our opinion, and we so find, that defendant's single-trip fare of 15 cents for the transportation of passengers from Washington to Four Mile Run, St. Elmo, St. Asaph, Mount Ida and Del Ray is unjust and unreasonable, and that for the future it ought not to exceed 10 cents. An order will be entered accordingly. From complainant's testimony and brief we infer that he intended to attack the fares from the Virginia points to Washington, although the language of the petition does not specifically mention those fares, but we assume that defendant will reduce them in accordance with our conclusion herein."

In its order to the company the commission says:

"It is ordered that the above-named defendant be, and it is hereby, notified and required on or before May 1, 1911, to cease and desist, and for a period of two years thereafter to abstain, from charging, demanding, collecting or receiving its present single-trip fare of 15 cents for the transportation of passengers from Washington, D. C., to Four Mile Run, St. Elmo, St. Asaph, Mount Ida and Del Ray, Va., or from Washington to any of said points, which said fare is found by the commission in its report to be unreasonable.

"It is further ordered that said defendant be, and it is hereby, notified and required on or before May 1, 1911, to establish and for a period of two years thereafter to main-

tain and apply to the transportation of passengers from Washington, D. C., to Four Mile Run, St. Elmo, St. Asaph, Mount Ida and Del Ray, in Virginia, or from Washington to any of said points, a single-trip fare not in excess of 10 cents, which said fare is found by the commission in its report to be reasonable."

Accidents in New York City in January

The Public Service Commission of the First District of New York has made public a summary of accident reports for January, 1911, as compared with January, 1910, and January, 1909. The report also shows the total number of revenue passengers carried by the street railways for the same periods and the total number of revenue car miles operated. While the total number of accidents on street railways has increased 64.5 per cent, the car miles operated have increased 9 per cent and the number of revenue passengers carried has increased 6 per cent. On all railroads, including both steam railroads and street railways, the total number of accidents for January, 1911, was 4799, as against 4413 in January, 1910. On street railways the total number in January, 1911, was 4428, as against 4143 in January, 1910. The total number killed on all roads was 20, as against 33 in January, 1910. Of the 20 killed in January, 1911, 12 were on street railways and 8 on other railroads, as against 19 on street railways and 14 on other roads in January, 1910. The total number of revenue passengers carried on the street railways in January, 1911, was 131,200,000, as against 123,860,742 in January, 1910, an increase of 7,339,258, or about 6 per cent. The total number of revenue car miles operated by the street railways in January, 1911, was 25,250,000, as against 23,066,576, an increase of 2,183,424, or about 9 per cent. A summary of the accidents on street railways follows:

	January, 1911.	January, 1910.	January, 1909.
Car collisions.....	85	113	105
Persons and vehicles struck by cars.....	1,323	1,195	821
Boarding.....	653	509	467
Alighting.....	513	410	431
Contact electricity.....	20	26	23
Other accidents.....	1,834	1,890	1,556
Totals	4,428	4,143	3,403
INJURIES.			
Passengers.....	1,742	1,426	1,279
Not passengers.....	470	421	393
Employees.....	293	367	258
Totals	2,505	2,214	1,930
SERIOUS (INCLUDED IN ABOVE.)			
Killed.....	12	19	10
Fractured skulls.....	1	3	4
Amputated limbs.....	1	3	4
Broken limbs.....	25	21	27
Other serious.....	104	106	85
Totals	143	152	130

REVENUE PASSENGERS CARRIED AND REVENUE CAR MILES OPERATED IN JANUARY, 1911, 1910 AND 1909.

January.	Revenue Passengers.	Revenue Car Miles.
1909	113,354,174	22,204,921
1910	123,860,742	23,066,576
*1911	131,200,000	25,250,000

*The figures for January, 1911, are approximate, as they involve an estimate of a very small portion of the traffic.

Conference in Regard to Traffic to New York State Fair

Representatives of the New York State Fair Commission and the railroad and electric railways which carry visitors to the State Fair at Syracuse, N. Y., were before the Public Service Commission of the Second District recently in an endeavor to make more satisfactory arrangements in relation to fares to and from Syracuse and in regard to the terminal facilities at the fair grounds. Among those who participated in the conference were Raymond A. Pearson, Commissioner of Agriculture, and all of the members of the State Fair Commission; L. F. Vosburgh, general passenger agent, and Harry Parry, Buffalo, and W. S. Randolph, Albany, general agents of the New York Central & Hudson River Railroad; George A. Cullen, general passenger agent of the Delaware, Lackawanna & Western Railroad, and W. C. Gray, operating manager, and T. H. Mather, chief engineer of the Syracuse, Lake Shore & Northern Railroad.

The proposition of the State Fair Commission that the round-trip tickets now sold at 15 cents should be inter-

changeable on steam and electric railways was opposed by Mr. Vosburgh and Mr. Cullen. Mr. Cullen stated that the New York Central & Hudson River Railroad would be very glad to put in effect an 8-cent fare for a single trip to or from the ground instead of the 15-cent round trip and 10-cent single-way fares. Mr. Vosburgh agreed with him that this would be satisfactory to his company and that such a rate would be adopted if the electric railways adopted the rate. He pointed out that interchangeable tickets would complicate accounting and congest incoming evening trains, whereas at the present time the New York Central & Hudson River Railroad's service was operated without cause for complaint and received its share of the business.

The members of the State Fair Commission all stated that they believed the 8-cent fare proposition an improvement over the present arrangement and approved the adoption of this plan. The representatives of the Syracuse, Lake Shore & Northern Railroad present said that they were not empowered to pass upon the fare proposition. The commission recommended the adoption of the 8-cent fare proposal by the Syracuse, Lake Shore & Northern Railroad and asked Mr. Gray to urge upon the representatives of his company the adoption of the plan. If the Syracuse, Lake Shore & Northern Railroad accedes to this request the arrangement will go into effect at the next fair.

Through Interurban Service from Detroit to Kalamazoo

As a result of traffic arrangements between the Detroit United Railway and the Michigan United Railway a through limited service will be placed in operation between Detroit and Kalamazoo on April 4, 1911. The lines of the Michigan United Railway are chiefly operated on the third-rail system, and among the details worked out was the equipment of the interurban cars of the Detroit United Railway so that they would operate over the tracks of the Michigan United Railway. The schedule has been approved by the operating departments of both companies. Under the new arrangements limited cars for Kalamazoo will leave Detroit at 6:10 a. m. and every two hours to 4:10 p. m., and limited cars for Detroit will leave Kalamazoo at 6:45 a. m. and every two hours to 4:45 p. m. All the cars will stop at such important centers as Ypsilanti, Ann Arbor, Jackson and Battle Creek. The new service will also include a through limited car between Detroit and Lansing via Jackson that will leave Lansing at 6 a. m. for Detroit and leave Detroit at 6:10 p. m. for Lansing. The running time between Detroit and Kalamazoo will be five hours and five minutes and between Detroit and Lansing three hours and 55 minutes. All the limited runs will be made without change of cars and the schedule is so arranged as to conform with the limited schedules of the other lines of the Detroit United Railway. Under the new schedule passengers from Toledo, Saginaw, Flint and Port Huron will travel all the way by electric railway with only a short wait at Detroit.

Transfer Ordinance in Louisville.—An ordinance to increase the transfer privileges on street railways in Louisville introduced in the Council has been referred to the committee on railroads.

Atlantic Shore Railway Removes Office.—The general offices of the Atlantic Shore Railway will after April 3, 1911, be located at the Town House, Kennebunkport, Maine. The post office address of the company will be Kennebunk, Maine.

Car Capacity Ordinance in Minneapolis.—The ordinance passed by the Council of Minneapolis to limit the capacity of street cars to one and one-half times the seating capacity of the cars will become effective on April 15, 1911. The Twin City Rapid Transit Company has begun to post notices in its cars which state their seating capacity.

Inquiry into Service of New York & Long Island Traction Company.—The Public Service Commission of the First District of New York has ordered an inquiry into the service on the Mineola division, the Jamaica-Hempstead division and the Jericho Turnpike division of the New York & Long Island Traction Company. The hearings will begin on March 31, 1911.

Increase in Wages in Winnipeg.—The Winnipeg (Man.) Electric Railway has advanced the wages of its employees 2 cents an hour, effective on April 1, 1911. The following is the new scale of wages: 23 cents an hour for first six months; 25 cents an hour for second six months; 26 cents an hour for second year; 28½ cents an hour for third year; 29 cents an hour after three years.

Request for Station on Rochester & Eastern Rapid Railway.—The Public Service Commission of the Second District of New York has received a petition from residents near the "Marsh Road" stop on the Rochester & Eastern Rapid Railway, Rochester, N. Y., requesting that a station or shelter be erected at this stop. The complaint has been served on the company and an answer required within 20 days.

Front Platform Rule in Brooklyn.—The Brooklyn (N. Y.) Rapid Transit Company has posted in the cars of certain of its surface lines a large placard which reads: "No passengers allowed to ride on front platform of closed cars except policemen in uniform, firemen in uniform, employees with platform passes or in uniform. Motormen are held responsible for the enforcement of this rule and passengers are requested to observe this rule."

Accidents on Interstate Electric Railways.—The Interstate Commerce Commission has issued Bulletin No. 37, which contains a summary of railroad accidents during July, August and September, 1910. The total number of collisions and derailments was 78, and 46 persons were killed and 458 injured. The total number of train accidents was 85, the total number of persons killed was 148, and the total number injured was 1,150.

Wreck on Indiana Line.—Eastbound passenger car No. 606 on the Connersville division of the Indianapolis & Cincinnati Traction Company's line collided head-on with a regular freight car near Fountaintown on the afternoon of March 18, 1911. The 30 persons in the passenger car were thrown out of their seats. According to the report of the freight crew the two cars had orders to meet at Fountaintown. The freight car became disabled and stopped for repairs. It had run only a short distance toward Fountaintown when the collision with the passenger car occurred. The Railroad Commission is investigating the cause of the collision.

Additional Elevated Stations in New York.—The Public Service Commission of the First District of New York has directed that an inquiry be held as to the advisability of ordering the Interborough Rapid Transit Company to build an additional station on the Ninth Avenue elevated line at Eighty-seventh Street and Columbus Avenue, and on the Second Avenue elevated line at 105th Street, and also of rebuilding and possibly relocating the station on the Second Avenue line at Allen and Rivington Streets. The inquiry will also cover the questions of requiring additional stairways at eight stations on the Second, Third and Ninth Avenue lines. The hearings will be held before Commissioner Eustis beginning on April 6, 1911.

Hearing on Commutation Rates in Maryland.—At the hearing before the Public Service Commission of Maryland on the petition of the citizens of Catonsville and Govans for an order to require the United Railways & Electric Company, Baltimore, Md., to restore commutation-rate privileges which were withdrawn recently on the plea that their continuance was a violation of the Maryland Public Service Law, the attorney for the complainants pointed out that the Constitution provided that State laws could not be passed which would impair the validity of a contract already established. The commutation privileges were withdrawn following a complaint from a number of suburbs not enjoying the privilege, which declared that they were being discriminated against. Ordered by the Public Service Commission to answer the complaints, the company withdrew all the commutation rates on the ground that they violated the law. At the hearing before the commission the willingness of the company to comply with the complainants' demands was maintained, but counsel for the company declared that the company saw no legal way in which it could restore the rates on the line in question without making the commutation privilege applicable to all its lines.

Personal Mention

Mr. Richard Yates, formerly Governor of Illinois, has been appointed attorney for the Illinois Traction System at Springfield, Ill., to succeed Mr. George Gilespie, resigned.

Mr. John O'Connell, purchasing agent of the Central Pennsylvania Traction Company, Harrisburg, Pa., has been elected treasurer of the company to succeed William J. Calder, deceased.

Mr. F. Van Vranken, superintendent of the southern division of the Pacific Electric Railway, Los Angeles, Cal., has been appointed assistant superintendent of the Los Angeles Railway Corporation under Mr. John J. Akin, superintendent.

Mr. O. B. Coldwell, electrical engineer of the Portland Railway, Light & Power Company, Portland, Ore., has been elected first vice-president of the Oregon Society of Engineers, which has just been organized in Portland with a charter membership of 160.

Mr. J. F. Starkey has been appointed traffic manager of the Lake Shore Electric Railway with headquarters at Sandusky, Ohio, effective April 1, 1911. Mr. Starkey was formerly district passenger and freight agent of the Indiana Union Traction Company at Anderson, Ind.

Mr. G. W. Harlan, who has been appointed general manager of the Colorado Railway, Light & Power Company, Trinidad, Col., to succeed Mr. Franklin P. Wood, was manager of the company from 1903 to 1906 and has been connected with various lighting plants in Illinois and Arkansas.

Mr. Martin Plunkett has been appointed master mechanic of the Choctaw Railway & Lighting Company, McAlester, Okla. Mr. Plunkett has had 10 years' experience in the mechanical department of the Illinois Traction System and its subsidiary properties, part of that time as master mechanic.

Mr. W. C. White, formerly superintendent of the Los Angeles-Pacific Company, Los Angeles, Cal., will remain in control of the lines formerly operated by this company under the plan of organization of the consolidated company in Los Angeles by which the lines are grouped in three divisions.

Mr. William H. Tucker, for several years superintendent of motive power of the Northern Ohio Traction & Light Company, Akron, Ohio, has resigned to become superintendent of the electric light plant of the City of Jacksonville, Fla., effective May 1, 1911. Mr. Tucker was formerly manager of the Jacksonville (Fla.) Electric Company.

Mr. J. V. H. Torner has resigned as division shop foreman of the Beloit shops of the Rockford & Interurban Railway, Rockford, Ill., and has been appointed shop foreman of the Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., in charge of the company's shops and car-houses, reporting direct to the general superintendent.

Mr. A. S. MacAndrew has been appointed master mechanic of the Joliet & Southern Traction Company, Plainfield, Ill., to succeed Mr. W. H. Crabbe, resigned. Mr. MacAndrew was formerly master mechanic of the Bloomington car shops of the Illinois Traction System in charge of maintenance and light repairs to cars that lay over there, some of which were operated on the a.c.-d.c. line and some of which were operated on the d.c. line between Decatur and Bloomington.

Mr. J. B. Bowray, formerly superintendent of the Northern division of the Pacific Electric Railway, Los Angeles, Cal., has had his jurisdiction with the consolidated electric railways at Los Angeles, Cal., extended through the addition of the Glendale line and the Pasadena city line to his division. Besides these lines Mr. Bowray will be in charge of the Mountain division, Glendora, Covina, Sierra Madre, El Molino, Pasadena Short Line, South Pasadena, Annandale, Oak Knoll and San Gabriel lines.

Mr. William Hutchinson, engineer-in-chief railway and tramway construction New South Wales Government Railways, is on a visit to this country inspecting electric railway systems. He arrived in New York via Vancouver about three weeks ago and visited several cities on his way East.

He plans to sail for London about the middle of this month and will return by way of southern Europe to Australia. The New South Wales Government Railways owns and operates the local tramway system in Sydney.

Mr. A. F. Elkins, who was elected president of the Central Electric Accounting Conference at the regular meeting of the conference held on March 11, 1911, in Springfield,

Ohio, was born in Butler County, Ohio, in 1875. Mr. Elkins' entire business career has had to do with accounting. He has been auditor of the Columbus, Delaware & Marion Railway since June, 1904. Mr. Elkins has always been active in the affairs of the Central Electric Accounting Conference and his election as president of the conference was in recognition of the service which he performed in the interest of the conference in his former office of secretary and treasurer of the conference.



A. F. Elkins

As president of the conference Mr. Elkins succeeds Mr. S. C. Rogers, whose resignation from the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, to become secretary and treasurer of the Youngstown Dry Goods Company was noted in the *ELECTRIC RAILWAY JOURNAL* some time ago.

Mr. Thomas McCaffery, formerly general superintendent of the Pacific Electric Railway, Los Angeles, Cal., has been appointed superintendent of the southern half of the consolidated electric railways at Los Angeles, including the Whittier, Santa Ana, Long Beach, Newport, Huntington Beach, San Pedro, Wilmington and the Point Firmin lines. Mr. McCaffery will have charge of the operation of the lines of the Pacific Electric Railway around the harbor and the operation of the city lines in Long Beach and the Watts local line.

Mr. John McCarthy, who has been division supervisor of the Harrison division of the Public Service Railway, Newark, N. J., for the last five years, was presented with a silver service on March 6, 1911, by the employees of the division with which he is connected as a token of their esteem. Mr. McCarthy was also presented with a gold locket by the supervisors of the other divisions of the company. Mr. Newton W. Bolen, superintendent of transportation of the Public Service Railway, made the presentation speeches.

Mr. Edward E. Strout has been elected vice-president of the Nahant & Lynn Street Railway, Lynn, Mass., to succeed Mr. Thomas A. Kelly, who has been elected president of the company. Mr. Strout's railroad experience commenced in 1890, when he constructed the power plants for the Boston & Northern Street Railway in Lynn and Chelsea, the power plant for the New York, New Haven & Hartford Railroad at Nantasket, Mass., and the power plant at Woburn, Mass. In 1905 he constructed the Nahant & Lynn Railroad. Mr. Strout is a member of the firm of Strout Brothers, Lynn, Mass., masons, builders and general contractors.

Mr. Thomas A. Kelley has been elected president of the Nahant & Lynn Street Railway, Lynn, Mass., to succeed William Lacroix, deceased. Mr. Kelley was formerly vice-president of the company. Mr. Kelley was born in Lynn on Nov. 30, 1865, and after attending the public schools entered the employ of a small store. A short time later he went to work for the Patrick Lennox Company, Lynn, and then entered the firm of Thomas Green & Company as junior partner. After the death of Thomas Green the firm continued under the name of Kelley & Green. Later Mr. William A. Green sold his interest to Mr. Kelley and since that time the business has been conducted under the firm name of Thomas A. Kelley & Company, with offices in Boston, Rochester, Chicago, Cincinnati and St. Louis, and plants in Lynn and Yardsley.

Mr. C. R. Moore has been appointed superintendent of transportation of the Springfield (Ill.) Consolidated Railway and has entered upon his duties with that company. With the exception of two years during which he served as superintendent of construction of the American Light & Water Company, Kansas City, Mo., Mr. Moore has been connected with street and interurban railways for 17 years, serving in the capacities of motorman, inspector, superintendent of construction, dispatcher, etc. He has been connected with the Cincinnati Street Railway, Cincinnati, Lawrenceburg & Aurora Electric Street Railway, Cincinnati, Georgetown & Portsmouth Railway, Indianapolis & Northwestern Traction Company, Illinois Traction System and the Terre Haute, Indianapolis & Eastern Traction Company. Mr. Moore resigned from the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., to become connected with the Springfield Consolidated Railway.

Mr. E. C. Deal has resigned as manager of the North Carolina Public Service Company, Greensboro, N. C., to become general manager of the Augusta Railway & Electric Company and the Augusta-Aiken Railway & Electric Company, Augusta, Ga., on April 1, 1911, to succeed Mr. James R. League, resigned. Mr. Deal is a native of Atlanta, Ga. He is 34 years old and gained his early experience with the Georgia Electric Light Company, now the Georgia Railway & Electric Company, Atlanta, Ga., which he served in various capacities from 1894 to 1898. Mr. Deal then entered the employ of Stone & Webster, Boston, Mass., and was connected with the properties operated by them in Baltimore, Seattle, Brockton and Terre Haute. He left Stone & Webster in 1904 to enter the employ of the Gas & Electric Company of Bergen County in New Jersey as chief engineer in charge of the company's properties in more than 40 municipalities in northern New Jersey. After this company was absorbed by the Public Service Corporation of New Jersey, Mr. Deal was made superintendent of the electric properties of the Public Service Corporation in central New Jersey. He resigned from this company in 1908 to become connected with the banking house of W. N. Coler & Company, New York, N. Y., as general manager of the North Carolina Public Service Company and engineer of other public service properties owned by W. N. Coler & Company. The property of the Augusta Railway & Electric Company and the Augusta-Aiken Railway & Electric Company has recently been acquired by a syndicate in which Redmond & Company and J. G. White & Company, Inc., New York, N. Y., are interested.

Mr. Franklin Woodman, the newly elected president of the New England Street Railway Club, began his street railway service with the Metropolitan Street Railway, Boston, as a starter in 1877.



F. Woodman

He next became clerk to the division superintendent. Four years after he entered the service of the Metropolitan Street Railway Mr. Woodman was appointed superintendent of the Roxbury division of the West End Street Railway. This position he held for eight years, when he was chosen superintendent of the Union Street Railway, New Bedford. After two and one-half years with the Union Street Railway Mr. Woodman was made superintendent of the Lowell, Lawrence & Haverhill Street Railway, Haverhill, Mass., and remained with that company until it became a part of the Boston & Northern Street Railway system in 1899, when he was made general manager of the Merrimack Valley division of the Boston & Northern Street Railway. He remained in this position until the fall of 1901. Early in 1902 Mr. Woodman was appointed general manager of the New Hampshire Electric Railways, Haverhill, Mass., and has continued in that capacity since that time.

OBITUARY

Charles Wallace Hunt, president of the C. W. Hunt Manufacturing Company, West New Brighton, N. Y., died March 27, 1911, at his home. Mr. Hunt was born at Candor, N. Y., 70 years ago. He was a noted inventor of conveying machinery, one of his principal inventions being the automatic or counter-weighted railway. Mr. Hunt always took an active interest in engineering association affairs. He was a past-president of the American Society of Mechanical Engineers and a member of many other engineering and civic bodies.

Stanley Robison, who with his brother, Frank DeHaas Robison, was interested in the Cleveland (Ohio) City Railway before the Cleveland City Railway and Cleveland Electric Railway were consolidated, died in Cleveland on March 24, 1911. Mr. Robison was born in Dubuque, Ia., and was graduated from Northwestern University, Evanston, Ill., in 1879, as a civil engineer. Besides being interested in the Cleveland City Railway, Mr. Robison was for two years receiver of the Ft. Wayne (Ind.) Consolidated Electric Railway. Both Mr. Robison and his brother later became identified with professional baseball and Stanley Robison at the time of his death owned the franchise of the St. Louis National League team.

F. L. Hart died on March 23, 1911, at Jamaica, N. Y. Mr. Hart was born in Brooklyn, N. Y., in 1861. He was graduated from the Brooklyn Polytechnic Institute and after a short business connection with the Wright Engine Works, Newburg, N. Y., and with the United States Electric Lighting Company, Newark, N. J., he was appointed engineer in charge of installing and operating the electric plant of the New York & Brooklyn Bridge. Then for seven years he was superintendent of operation of the 125th Street line of the Third Avenue Railroad. He then resigned to join the engineering force of the Metropolitan Street Railway, New York. He remained with that company two years and then accepted the position of manager of the Baltimore City Passenger Railway, where he remained six years. He then became general manager of the Washington Railway & Electric Company, Washington, D. C., but two years later he entered the employ of the firm of Thomas Basshor, Baltimore, contracting engineers. About two years later his health began to fail and he returned to New York and made his home with his father and brother in Brooklyn. Mr. Hart was a member of the American Society of Mechanical Engineers.

Meeting of Executive Committee Arkansas Operators.—The executive committee of the Arkansas Association of Public Utility Operators met in Little Rock, Ark., on March 15, 1911. The following members were present: D. A. Hergarty, vice-president and general manager of the Little Rock Railway & Electric Company, Little Rock, Ark.; Byron C. Fowles, general manager of the Pine Bluff (Ark.) Corporation; W. L. Wood, vice-president and general manager of the Texarkana Gas & Electric Company, Texarkana, Ark.; Edw. T. Hardin, general superintendent of the Hot Springs Water, Gas & Electric Company, Hot Springs, Ark.; W. C. McGuire, general manager of the Wilson Water & Electric Company, Arkadelphia, Ark.; W. R. Herstein, of the Electric Supply Company, Memphis, Tenn.; Frank Grayson, of the St. Louis Car Wheel Company, St. Louis, Mo. The date and place of the annual convention was set for May 3, 4 and 5, at Little Rock, Ark. Papers were assigned to different members of the association covering the operation of railways, gas, electric light, natural gas and water companies. The committee for the entertainment of delegates and guests follows: D. A. Hergarty, chairman; S. A. Stearns, manager of the Arkansas Home Water Company, Little Rock, Ark.; E. C. Beach, manager of the Pulaski Gas Light Company, Little Rock, Ark.; F. C. Bragg, of the Electric Construction Company, Little Rock, Ark.

The Chicago Railways Company has put into trial service two of its large double-end pay-as-you-enter cars that have been equipped with mechanically operated doors at the entrance sides. On one car a door mechanism furnished by the Pay-Within Car Company has been applied, and on the other is a mechanical door-operating mechanism designed and built in the railroad company shops.

Construction News

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

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

RECENT INCORPORATIONS

Alberta (Alta.) Electric Railway, Calgary, Alta.—Incorporated in Canada to build an electric railway from Calgary to Banff, Medicine Hat, Long Coulee, Lethbridge, Macleod and Wood Mountain. Capital stock, \$10,000,000. Headquarters, Calgary. [E. R. J., Jan. 14, '11.]

***Turlock Traction Company, Modesto, Cal.**—Incorporated in California to build a 4-mile electric railway between Turlock and Denair. Capital stock, \$500,000. Incorporators: S. N. Griffiths, Fresno; A. M. Morton, Lloyd Griffiths, A. C. Chatom and D. R. Shafer, of Turlock.

***Maysville Public Service Company, Maysville, Ky.**—Application for a charter has been made in Kentucky by this company to build an electric railway in Maysville. Capital stock, \$150,000. Among the incorporators are: A. M. J. Cochran, R. A. Cochran, W. H. Cox, H. Ficklin and Samuel Hall, all of Maysville.

Peaks Island Railroad, Portland, Maine.—Application for a charter has been made in Maine by this company to build an electric railway on Peaks Island. Capital stock, \$100,000. Directors: Arthur H. Moulton, Edgar E. Rounds, Geo. F. Kavanaugh, Geo. C. Ricker, W. C. Wheldon and H. H. Sturgis, all of Portland. [E. R. J., March 25, '11.]

***Virginia, Eveleth & Gilbert Traction Company, Duluth, Minn.**—Chartered in Minnesota to build an electric railway to connect Virginia, Eveleth and Gilbert. Capital stock, \$25,000. Incorporators: W. M. Prindle, E. B. Merrill and G. T. Eagling.

***Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.**—Chartered in Missouri to build an electric or steam railway in Missouri. Capital stock, \$720,000. Directors: Ward S. Arnold, Chicago, Ill.; H. Grant Peabody, William A. Medill, George Townsend and George S. Beardsley, of Kansas City.

***Durham & Danville Railway, Durham, N. C.**—Application for a charter has been made by this company in North Carolina to build a 51-mile electric or steam railway between Durham, N. C., and Danville, Va., via Durham, Orange, Person and Caswell Counties. It is expected to obtain power from the Southern Power Company. Capital stock, \$250,000. Incorporators: C. C. Wake, C. M. Carr, H. E. Satterfield, J. F. Wily, W. F. Carr, W. B. Guthrie and J. L. Moorehead. Headquarters, Durham, N. C.

***People's Electric Railway, Muskogee, Okla.**—Incorporated in Oklahoma to build an electric railway in Muskogee. Incorporators: W. M. Patterson, Samuel Spaulding, J. B. McDonald, W. R. Robison, T. H. Martin and J. H. Huckleberry, all of Muskogee; G. W. Risser, Oklahoma City.

***Independent Developing Company, Pittsburgh, Pa.**—Chartered in Pennsylvania to build urban and interurban electric railways between Duquesne and Glassport and to take over the Duquesne & Dravosburg Street Railway and the Duquesne Annex Land Company. The plans include the immediate construction of about 3 miles of track to connect Duquesne Annex and Dravosburg and the probable continuation to Glassport.

***Greenville & Nolachucky Railway, Chattanooga, Tenn.**—Chartered in Tennessee to build a steam or electric railway from a point on the Southern Pacific Railway, 2 miles east of Greenville, to Walton. Capital stock, \$100,000.

FRANCHISES

Montgomery, Ala.—The Alabama Traction Company has received a franchise from the City Council to build its lines in Montgomery. This company will build 25 miles of track in Montgomery and extend it eventually to other towns. Charles G. Abercrombie, general manager. [E. R. J., Feb. 25, '11.]

Vallejo, Cal.—The Vallejo & Northern Railways has received a franchise from the supervisors to build its tracks along Front Street to the Main Street wharf in Vallejo. T. T. C. Gregory, Suisun, president. [E. R. J., Feb. 25, '11.]

Whitehall, Ill.—The Alton, Jacksonville & Peoria Railway, Jerseyville, has received an 18-month extension of time on its franchise to build its tracks through Whitehall.

Hobart, Ind.—W. P. Hood and associates have received a 50-year franchise from the Town Board to build an interurban railway between Hobart and Cary. A company is being organized with a capital stock of \$100,000 to build the line. [E. R. J., June 6, '08.]

Vincennes, Ind.—The Vincennes-Interstate Traction Company have asked the County Commissioners for a 50-year electric railway franchise in Vincennes. W. Funkhouser and C. W. Battin, Evansville, are interested. [E. R. J., March 25, '11.]

Rockville, Md.—The Washington, Westminster & Gettysburg Railway has received a franchise from the Montgomery County Commissioners to build through Montgomery County, from below Four Corners to Burnt Mills, Cloesville and Sandy Springs. The company has also received a franchise to build through Westminster.

Hastings, Minn.—The St. Paul Southern Electric Railway, St. Paul, has received a franchise from the City Council to build its tracks through Hastings. The line will connect St. Paul, Hastings, Red Wing and Lake City. W. L. Sonntag, general manager. [E. R. J., March 18, '11.]

Bogota, N. J.—The Public Service Railway, Newark, has asked the Borough Council for a 50-year franchise to build its tracks over the Queen Anne Road in Bogota.

New Rochelle, N. Y.—The Westchester Electric Railroad, Mount Vernon, has received a franchise from the Common Council to double-track its line on North Avenue, between Huguenot Street and Mayflower Avenue, in New Rochelle.

Richfield Springs, N. Y.—The Oneonta & Mohawk Valley Railroad, Oneonta, has received a franchise from the Council to connect its tracks with the Delaware, Lackawanna & Western Railroad tracks in Richfield Springs. Work will begin as soon as the weather permits.

Lock Haven, Pa.—The Lock Haven & Jersey Shore Railroad has received franchises from the City Council to build its tracks through Lock Haven. It will connect Lockport, Dunnstable, Pine Creek, Charlton, Woolrich and Avis. L. M. Patterson, Lock Haven, president. [E. R. J., March 25, '11.]

New Castle, Pa.—The New Castle, New Wilmington & Sharon Electric Railway has received a 6 months' extension of time on its franchise from the City Council in which to begin work on its proposed 15-mile electric railway to connect New Castle, Bethel, Sharon, New Wilmington, Middlesex and Meadville. James Campbell is interested. [E. R. J., Sept. 24, '10.]

Greenwood, S. C.—The Greenville, Spartanburg & Anderson Railway has received a 60-year franchise from the City Council to build its tracks through Greenwood.

Seattle, Wash.—George W. White and associates have asked the County Board for a franchise to build an electric railway from Seattle to Lake Burien, a distance of 4 miles. [E. R. J., Jan. 14, '11.]

Altoona, Wis.—The Chippewa Valley Railway, Light & Power Company has asked the City Council for a franchise to build its tracks through Altoona.

TRACK AND ROADWAY

Arkansas Valley Interurban Railway, Little Rock, Ark.—This company has let contract for 40,000 ties to be used on the extension from Sedgwick to Newton and from Newton to Halstead. O. A. Boyle, Wichita, Kan., general manager.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company will build a 22-mile extension from Victoria to Deep Cove.

Vernon, B. C.—The Couteau Power Company has completed arrangements for building an electric railway from Vernon to Lumby. A. E. Ashcroft, Vernon, B. C., is interested.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—This company has awarded the contract to S. F. Hobler, Sanger, for grading its line. The contract for construction and equipment has been awarded to the Hudson Counties Company, New York, which has sublet the

entire contract to the Pinkerton Construction Company, Philadelphia. John B. Rogers, 52 Eleventh Street, San Francisco, chief engineer. [E. R. J., Sept. 10, '10.]

Tidewater & Southern Railroad, Stockton, Cal.—This company advises that construction has begun on its 44-mile electric railway to connect Stockton, Atlanta, French Camp, Escalon, Modesto, Cens and Turlock. The company will furnish power for lighting, and will operate 9 cars. Capital stock, authorized, \$1,000,000. Officers: K. C. Brueck, Stockton, president; J. A. Coley, vice-president; Byron A. Bearce, Stockton, secretary, treasurer and general manager, and J. H. Wallace, chief engineer. Headquarters, Stockton. [E. R. J., Dec. 17, '10.]

Shore Line Electric Railway, New Haven, Conn.—The contract has been awarded by this company to the Pierson Engineering & Construction Company, New Haven, for the construction of 2 miles of track between Branford and Bristol.

Tampa, Fla.—C. W. Alton, Anderson, Ind., is considering plans to build an electric railway from St. Petersburg to Tampa, Fla.

Augusta (Ga.) Railway & Electric Company.—This company has contracted with J. G. White & Company, Inc., New York, N. Y., to build an extension of one mile and to reconstruct considerable track.

Chicago, Ottawa & Peoria Railway, La Salle, Ill.—Andrew Ward & Son, Oak Glen, has been awarded the contract by this company for excavation and grading work for the 23-mile extension from Joliet to Morris. Driscoll & McCalman, Decatur, has been awarded the contract for the concrete work.

Rockford (Ill.) City Traction Company.—This company, which was incorporated recently, was organized to operate the electric railways in Rockford controlled by the Union Railway, Gas & Electric Company. In this way the city lines in Rockford will be segregated from the Rockford & Interurban Railway. [E. R. J., March 25, '11.]

Cincinnati, Madison & Western Traction Company, Indianapolis, Ind.—This company will soon award contracts for the construction of 41 miles of track. A subsidy tax of \$100,000 has been voted the railway. It will connect Hanover, Madison, Scottsburg and Lexington. J. E. Greeley, Louisville, president. [E. R. J., Aug. 20, '10.]

Eastern Indiana Traction Company, Richmond, Ind.—This company is being organized to build a line from Richmond, Ind., to Cincinnati, Ohio, via Liberty, Brookville and Harrison, Ohio. The proposed capitalization is \$1,000,000. Those composing the committee in charge of organization are: A. M. Gardner and Paul Comstock, Richmond; E. R. Beard, Liberty; R. L. Head, Brookville, and F. J. Brinkman, Harrison, Ohio. [E. R. J., Dec. 31, '10.]

Fort Dodge, Des Moines & Southern Railroad, Fort Dodge, Ia.—This company is planning the expenditure of \$500,000 in the improvement of its line.

Henderson (Ky.) Interurban Railway.—H. U. Wallace & Company, Chicago, are making surveys for the proposed electric railway to connect Henderson, Owensboro, Uniontown, Morgan Field, Sebree, Dickson and Providence. The following officers have been elected: Malcolm Yeaman, Henderson, president; E. F. Wheaton, Nashville, Tenn, vice-president and general manager; T. W. Argue, Henderson, secretary and treasurer; H. C. Wallace, engineer. [E. R. J., July 2, '10.]

Brandon, Man.—The city engineer has been instructed to prepare plans for a municipal street railway.

Fristoe, Mo.—E. E. Trippe, Fristoe, and B. O. Taylor, Bosworth, are said to be interested in a plan to build an electric railway from Warsaw to Springfield, via Cross Timbers. Surveys will soon be made.

Kansas City, Ozarks & Southern Railway, Kansas City, Mo.—This company is considering plans for building an extension from Kansas City to Forsyth and Hollister, via Brown Branch, Bradleyville, Kisee's Mills, Kirbyville and Mansfield. It would follow Beaver Creek and cover about 35 miles.

Keansburg, N. J.—Judge W. W. Ramsay, William Gehlhaus and Richard Carr plan to build an electric railway in Keansburg. It will be built by private capital.

Millville, Tuckahoe & Ocean City Electric Transportation Company, Millville, N. J.—Surveys are being made by this company for its proposed line between Millville and Ocean City. E. W. Bush is interested. [E. R. J., Sept. 3, '10.]

Ocean City (N. J.) Electric Railway.—Plans have been completed by this company to build a branch from Thirty-fourth Street to Beesley's Point, in Ocean City. The work is to be completed before summer.

Long Island Railroad, New York, N. Y.—This company has begun double-tracking and electrification, which it is expected will be completed from Woodside to Port Washington within 18 months.

New York, N. Y.—The contract has been awarded to Snare & Triest Company, New York, for the installation of the electrical equipment of the conduit tracks, and the construction of the track extension on the plaza of the Queensboro Bridge, over the East River, between the boroughs of Manhattan and Queens.

Cleveland, Alliance & Mahoning Valley Railway, Alliance, Ohio.—This company announces that 30 miles of the proposed line has been financed and that work will be begun at once. Of this 25 miles between Ravenna and Alliance and 5 miles between the terminus of the Corlett local line in Cleveland and the Randall race tracks will be built first. It will connect Cleveland, Alliance and Mahoning. [E. R. J., Jan. 14, '11.]

East Liverpool Light & Traction Company, East Liverpool, Ohio.—It is said here that this company and the Ohio Scenic Railway have made plans for double-tracking the lines of the Tri-State Traction Company between Follansbee, W. Va., and Steubenville, Ohio, this spring. The Tri-State Traction Company will be taken over by the above-named companies in April.

Lake Erie & Northern Railway, Brantford, Ont.—The Railway Committee of the Canadian House of Commons has passed a bill authorizing this company to build its railway from Port Dover, Ont., on Lake Erie, via Simcoe, Waterford, Brantford and Paris, thence to Galt, with a branch to Paris, Glenmorris and Ayr. W. P. Kellett, Brantford, general manager. [E. R. J., Jan. 14, '11.]

Guelph (Ont.) Radial Railway.—This company will receive bids for the construction of the St. Patrick's Ward extension. J. J. Hackney, general manager.

*Albany, Ore.—G. E. Fosbroke, St. Paul, is considering plans for building an electric railway from a point about 18 miles east of Sutherlin down the valley to Albany.

Central Pennsylvania Traction Company, Harrisburg, Pa.—This company has begun the relaying of rails on the important lines in the business section of Harrisburg. The cost is about \$25,000.

Lock Haven & Jersey Shore Railroad, Lock Haven, Pa.—This company advises that surveys are being made and that construction will begin within two months on its proposed electric railway to connect Lock Haven, Clinton, Courtney and Jersey Shore. Contracts have not yet been awarded. The company will also furnish power for lighting purposes. Capital stock, authorized, \$150,000. L. M. Patterson, Lock Haven, president. [E. R. J., March 25, '11.]

West Penn Railways, Pittsburgh, Pa.—This company has awarded to O'Connor & Madigan, Connellsville, Pa., the contract for grading and concrete work of a 3-mile extension from Bettmer to Vance Mills. The laying of tracks from Juniata to Bitner has begun. The company is also considering plans for building an 8-mile extension from Leisenring to Uniontown, a 7-mile extension from Greensburg to Jamison and a 3-mile line from Masontown to Martin Station.

Sunbury & Northumberland Electric Railway, Sunbury, Pa.—Work has been begun to connect the lines of this company and those of the Sunbury & Selinsgrove Street Railway in Sunbury.

Moose Jaw Electric Railway, Moose Jaw, Sask.—This company advises that it has begun construction and that all contracts have been awarded except those for buildings and small operating supplies, which are being advertised for now, for building this 6-mile railway within the limits of Moose Jaw. Its power station and repair shops will be located in Moose Jaw, and it will operate 6 cars. Capital stock, author-

ized, \$500,000; capital stock, issued, \$127,000. Officers: A. A. Dion, 35 Sparks Street, Ottawa, president; Newton J. Kerr, vice-president; D. R. Street, Ottawa, secretary and treasurer; A. H. Dion, Moose Jaw, superintendent, and J. B. McRae, Citizen Building, Ottawa, chief engineer.

Regina Municipal Railway, Regina, Sask.—Bids will be received by the City Commissioners until April 5, 1911, for the construction of the initial 7 miles of this municipal street railway. L. A. Thornton, city engineer.

*Murfreesboro, Tenn.—J. E. Manson, D. M. Peebles, R. T. Batey and associates are considering plans to construct an electric railway between Nashville, Murfreesboro and Nolensville.

Nashville Railway & Light Company, Nashville, Tenn.—This company has filed an amendment to its charter, authorizing the extension and construction of several new lines.

*Union City, Tenn.—Citizens of Union City are considering plans for building an electric railway from Union City to Gibbs, to connect with the Illinois Central Railroad.

*Dallas, Tex.—Stone & Webster will build an interurban electric railway from Waxahachie to connect with the lines of the Northern Texas Traction Company at Oak Cliff. Engineers have been put in the field to check the surveys made in 1906.

*Houston, Tex.—W. S. Kirkham, Houston, is said to be making plans for constructing a 5-mile electric railway from the terminus of the Liberty Avenue line, Houston, to Port Houston. McCarthy & Son are the engineers.

SHOPS AND BUILDINGS

Northern Electric Railway, Chico, Cal.—Plans are being made by this company for remodeling its building at Eighth Street and J Street, in Sacramento.

Illinois Traction System, Champaign, Ill.—This company has completed and opened for service a new depot on Salisbury Street, North St. Louis.

Southern Traction Company, St. Louis, Ill.—This company will soon decide on a location for building several interurban stations along its Rock Island South line. The structures will be 1-story and of brick construction.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company will begin in April the construction of its new car house on Nicollet Avenue, between Thirty-first and Thirty-second Streets, in Minneapolis. The new building will cover the entire block eventually. Club rooms will be provided for the men.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has awarded the contract to B. J. Jobst for building a pavilion at Lake Manawa. The structure will be 60 ft. x 145 ft. The dancing floor will be of hard maple and will measure 50 ft. x 90 ft.

Exeter, Hampton & Amesbury Street Railway, Exeter, N. H.—This company has moved into its new quarters in the Wood Block, in Exeter. The building will contain the main office, the display room and the manager's private office. On the ground floor are the work room and store rooms.

Piedmont Traction Company, Gastonia, N. C.—This company will spend \$500,000, it is said, building freight and passenger depots and warehouses in Charlotte. W. C. Lee, Charlotte, vice-president. [E. R. J., Sept. 10, '10.]

Northern Ohio Traction & Light Company, Akron, Ohio.—Work on the new car house of this company, just south of Akron, will be begun about May 1, according to present plans. It will entail a cost of about \$200,000.

Ohio Electric Railway, Cincinnati, Ohio.—This company has awarded contracts for the construction of a 2-story passenger station at Columbus. The building will be 190 ft. x 90 ft., and will cost between \$150,000 and \$160,000. The waiting rooms, express and baggage departments will all be on the ground floor.

Scioto Valley Traction Company, Columbus, Ohio.—Plans for this company's new passenger and freight station to be erected at Chillicothe call for a 1-story building to be located on Main Street. The structure will be in two sections, the waiting room, 20 ft. x 30 ft., and the storeroom, 27 ft. x 50 ft. The freight department composes the rear portion of the station and is 25 ft. x 70 ft. [E. R. J., March 18, '11.]

Portland Railway, Light & Power Company, Portland, Ore.—Contracts have been awarded and construction will begin soon on a storehouse to be constructed by this company on East Water Street, between Hawthorne Avenue and East Clay Street, in Portland. The structure will be 100 ft. x 200 ft., of reinforced concrete construction. It will have a basement and 2 stories at the beginning, with the initial work made to receive 2 more stories as soon as the need for the additional space shall develop. The building will be used as the general emergency headquarters of the company, and will contain complete club rooms for the linemen.

Moose Jaw Electric Railway, Moose Jaw, Sask.—Bids will be received until April 1 by this company at the office of R. G. Bunyard, Bank of Commerce Building, Moose Jaw, for building a carhouse in Moose Jaw.

Richmond & Henrico Railway, Richmond, Va.—This company has awarded the contract to P. J. White & Son for building its car houses in Fulton. Work will begin at once. The cost is estimated to be about \$35,000.

Twin City Electric Company, South Bend, Wash.—This company will build a carhouse in South Bend during April. [E. R. J., March 18, '11.]

POWER HOUSES AND SUBSTATIONS

Holley Electric Railway, Porterville, Cal.—This company has purchased a site in Strathmore for a power house which is to be the main distributing station of the Holley power lines which run from Porterville. H. H. Holley, Porterville, manager. [E. R. J., July 23, '10.]

Augusta Railway & Electric Company, Augusta, Ga.—The Augusta Railway & Electric Company and the Augusta-Aiken Railway Company have contracted with J. G. White & Company, Inc., New York, N. Y., for the extensions and improvements to their power houses and power systems, which will cost approximately \$500,000. The power house extension is planned for two 2500-kw steam turbines, one of which, with the necessary boilers and auxiliaries, will be installed this year. A 7½-mile transmission line will be built from the power house in Augusta to the power house of the Augusta-Aiken Railway, near Clearwater, S. C., and a 500-kw motor generator set will be installed at this point and a 300-kw set in the present substation near Aiken. The wires in Augusta will be placed underground on three of the principal streets. This will involve laying about three miles of conduits.

Indianapolis, Columbus & Southern Traction Company, Seymour, Ind.—A contract will soon be awarded by this company for building a dam in Driftwood River, constructing a canal 6 miles in length and equipping a power house in Columbus.

Michigan United Railways, Detroit, Mich.—This company is considering plans for building a power plant with a capacity of 6000 kw and a substation in Jackson.

Cape Breton Electric Company, Ltd., Sydney, N. S.—This company will build extensions to its power house in Sydney. Through Stone & Webster it has awarded the contract to the Allis-Chalmers Company for one 500-kw turbo-generator, 2300-volt A. C. H. C. Foss, general manager.

Lehigh Valley Transit Company, Allentown, Pa.—This company has ordered, through Ford, Bacon & Davis, one new switchboard and equipment from the General Electric Company.

Moose Jaw Electric Railway, Moose Jaw, Sask.—This company will receive bids until April 1 for the building of a power house at Moose Jaw. A. A. Dion, 35 Sparks Street, Ottawa, president.

Northern Texas Traction Company, Fort Worth, Tex.—A new power house to be located on Calhoun Street, Fort Worth, is being planned by this company.

Twin City Electric Company, South Bend, Wash.—This company will begin construction in April of a power plant to be located in South Bend.

Pan-Handle Electric Railway & Power Company, Spokane, Wash.—This company is considering plans to build a 30,000-hp. power plant on the Priest River, in Northern Idaho. Victor M. Smith, New York, is interested.

Manufactures & Supplies

ROLLING STOCK

Jacksonville (Fla.) Electric Company expects to purchase 10 passenger cars.

Tri-City Railway, Davenport, Ia., has ordered 14 Brill 39-E trucks from the American Car Company.

Georgia Railway & Electric Company, Atlanta, Ga., is building six additional passenger cars in its own shops.

Sioux Falls (S. D.) Traction System expects to purchase either several storage battery cars or several gasoline motor cars.

Easton (Pa.) Transit Company has ordered three 20-ft. 8-in. semi-convertible car bodies from The J. G. Brill Company.

Holyoke (Mass.) Street Railway has ordered three 14-bench open car bodies from the Wason Manufacturing Company.

Metropolitan Street Railway, Kansas City, Mo., it is reported, expects to build 50 new passenger cars in its own shops during 1911.

New York State Railways, Rochester, N. Y., has ordered from the General Electric Company 15 G.E.-219, four-motor equipments.

Central California Traction Company, San Francisco, Cal., has ordered two Brill 27-MCB-3 trucks, through Pierson, Roeding & Company.

British Columbia Electric Railway, Victoria, B. C., has ordered three Simplex dump cars from the Simplex Self-Cleaning Car Company.

Cape Breton Electric Company, Sydney, N. S., has purchased from the Canadian General Electric Company two two-motor car equipments.

Lancaster & York Furnace Street Railway, Lancaster, Pa., has purchased three trailer flat-car bodies, 33 ft. long, mounted on Brill 55-D trail trucks, from The J. G. Brill Company.

Wilmington & Philadelphia Traction Company, Wilmington, Del., has ordered through J. G. White & Company from the General Electric Company six G.E.-88, four-motor equipments and 16 G.E.-88 two-motor equipments.

San Juan Light & Transit Company, San Juan, P. R., has purchased four Simplex dump cars, equipped with Westinghouse air brakes, M.C.B. draft rigging and automatic couplers from the Simplex Self-Cleaning Car Company.

Boise (Idaho) Railroad, noted in the ELECTRIC RAILWAY JOURNAL of March 25, 1911, as having ordered two closed cars through Pierson, Roeding & Company, ordered these cars through Henry Levis & Company.

New York State Railways, Rochester, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of March 25, 1911, as being in the market for 15 30-ft. 11-in. semi-convertible, pay-as-you-enter cars, has ordered these cars from the G. C. Kuhlman Car Company.

Scranton (Pa.) Railway, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 4, 1911, as having ordered 10 cars of the pay-within type from the Cincinnati Car Company, has specified the following details for these cars:

Type of car....double truck	Couplers	Tomlinson
Bolster centers.....18 ft.	Curtain fixtures....	Forsyth
Length of body.....30 ft.	Curtain material...Pantasote	
Over vestibules	41 ft.	Gongs
Width over sills.....8 ft. 2 in.	Hand brakes	Peacock
Sill to trolley base.8 ft. 5¼ in.	Heating system	Consol.
Height, top rail to sills,	Headlights	arc
2 ft. 7¾ in.	Motors	4 G.E.-88B
Body	Push button signal.Cons. buz.	
Interior trim	cherry	Roofs
Underframe	composite	Sanders
Air brakes	West.	Sash fix....Nat. Lock W. Co.
Bolsters	steel plate	Seats
Bumpers,		H. & K.
	Hedley anti-climber	Seating material....rattan
	Car trimmings	bronze
	Control system	K-28
	Trucks	Taylor

TRADE NOTES

Q M S Company, Plainfield, N. J., has received an order to furnish Stanwood steps for the 100 new cars of the Los Angeles Railway.

Theodore L. Condron, Chicago, Ill., civil engineer, states that he will carry on under his own name the engineering business lately carried on by Condron & Sinks.

Link-Belt Company, Chicago, Ill., has moved its Boston sales office from 84 State Street to 131 State Street. Lawrence Spillan will be in charge of the new office.

Ackley Brake Company, New York, N. Y., reports receipt of an order for a large number of Ackley adjustable brakes from the Yokohama Electric Railways, on which system this brake is standard.

Electric Storage Battery Company, Philadelphia, Pa., has declared a regular quarterly dividend of 1 per cent on both its preferred and common stock, payable April 1, 1911, to stockholders of record March 25, 1911.

W. B. Dickson, first vice-president of the United States Steel Corporation, has resigned and will retire from office on May 1, 1911. Mr. Dickson has been connected with the steel corporation since its organization in 1901.

Heywood Brothers & Wakefield Company, Wakefield, Mass., has received an order through J. G. White & Company to furnish pressed steel seats for the 22 new cars of the Wilmington & Philadelphia Traction Company.

A. Eugene Michel, New York, N. Y., advertising engineer, announces that W. F. Schaphorst, of the mechanical engineering department of the New Mexico College of Mechanic Arts, has resigned to become a technical writer on his advertising staff.

Dossert & Company, New York, N. Y., announce a large increase in their business for February, 1911. Among some of the large orders recently received for connectors is one from the Sao Paulo (Brazil) Tramway & Light Company and another from the Rio de Janeiro (Brazil) Tramway, Light & Power Company.

Republic Iron & Steel Company, Pittsburgh, Pa., has elected Thomas J. Bray, formerly vice-president, president of the company, to succeed Tracy W. Guthrie, resigned. Henry S. Round, formerly secretary and treasurer, has been elected vice-president and treasurer, and Richard Jones, Jr., general manager, will also act as secretary.

Toronto (Ont.) Railway is asking inventors and others interested in life-saving devices to submit to the company plans, rough drawings or models of any device to be used upon cars for the prevention of accidents. All communications on this subject should be addressed and plans and models submitted to the master mechanic of the company.

Sanitary Rag Company, Kalamazoo, Mich., has just completed its new five-story steel factory containing approximately 75,000 sq. ft. of floor space. The company employs 150 people in producing its washed wiping cloths and has a daily capacity of 100,000 lb. Several large orders for this product have recently been received, among which is one from the United States Government for all government departments. The cloths are very carefully made and are thoroughly washed and sterilized to prevent any possible impurities.

National Car Advertising Company, New York, N. Y., reports that it has recently secured the lease of the advertising privileges of the cars of the Lehigh Valley Transit Company, Allentown, Pa., and of the Binghamton (N. Y.) Street Railway. Both are to use the company's "Auto-scope," by which the advertising cards are kept in motion, a plan by which the advertising company claims that their advertising value is increased. This device has been in use for some time past on the following railways: Fairmont Park Transportation Company, Northampton Traction Company, Easton & Washington Traction Company, Montgomery Traction Company and the Atlantic & Suburban Traction Company.

Prepayment Car Sales Company, New York, N. Y., which was noted in the *ELECTRIC RAILWAY JOURNAL* of March 4, 1911, as having been formed by the merging of the Pay-As-You-Enter Car Corporation and the Pay-Within Car Company, at a recent meeting elected the following officers and directors: Duncan McDonald, of the Pay-As-You-Enter

Car Corporation, president; A. H. Englund, of the Electric Service Supplies Company, vice-president; Harold Rowntree, vice-president of the National Pneumatic Company, treasurer; J. B. Burdette, president of the Pay-Within Car Company, secretary; Thomas W. Casey, of the Pay-As-You-Enter Car Corporation, general manager, and the following directors: W. D. Baldwin, president of the Otis Elevator Company, and R. L. MacDuffie, vice-president of the Railway Improvement Company.

ADVERTISING LITERATURE

Nelson Valve Company, Philadelphia, Pa., has issued a number of circulars describing different styles and types of valves manufactured by the company.

Duplex Metals Company, Chester, Pa., has issued a circular calling attention to the reduction in price of copper-clad steel wire, which took effect on March 22, 1911.

General Electric Company, Schenectady, N. Y., has issued Bulletins Nos. 4815 and 4817 on "Motor Drive for Metal Working Machinery" and the "G.E.-214 Railway Motor."

Graphite Lubricating Company, Bound Brook, N. J., has issued a circular letter calling attention to the merits of the "Bound Brook" graphite and bronze bushings and bearings.

Railway Improvement Company, New York, N. Y., has issued a circular letter calling attention to the large saving in power brought about by the use of the Coasting Time Recorder.

Fletcher Manufacturing Company, Dayton, Ohio, has issued Catalog No. 565, containing illustrations and price lists of electrical construction supplies which the company manufactures.

Edward E. Early Company, Canton, Ohio, has issued a circular pertaining to "Early's Commutator Cement." In connection with this circular the company has also issued a partial list of users of the cement.

Burton W. Mudge & Company, Chicago, Ill., has issued a folder on the Adams motor car for track work. The car, which has a seating capacity for three persons, contains a 4½-hp motor and is capable of making a speed of from 3 to 45 m.p.h.

Sherwin-Williams Company, Cleveland, Ohio, is distributing in pamphlet form a reprint of the address delivered before the Cleveland Advertising Club on the "Use and Abuse of Trade Journal Advertising," by Richard W. Western, who is connected with the advertising department of the company.

Waterbury Company, New York, N. Y., has issued in pamphlet form a reprint of the article that appeared in the *ELECTRIC RAILWAY JOURNAL* of Feb. 25, 1911, on "The Simultaneous Installation of Seven High-Tension Submarine Cables," which were installed for the Union Railway across the Harlem River.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued sections Nos. 317, 319 and 578 of its perpetual Catalog No. 3001, on "Type D Indicating Meters for Direct Current," "Types H. HA and HB Edgewise Switchboard Meters for Direct Current" and "Type A Over-Voltage Relays for Direct-Current Circuits."

American Steel & Wire Company, Chicago, Ill., has published the "American Wire Rope News" for February, 1911. The issue contains articles on "Wire and Wire Rope on Aeroplanes," "Reclamation of Mississippi Valley Alluvial Lands," "Misuse of Wire Rope and Thimble Protection," "Use of Non-Spinning Hoisting Rope on Bucket Machinery" and "Heavy Duty for Wire Rope in Quarries."

United States Electric Company, New York, N. Y., has issued Bulletin No. 701, with the title "Some Preventable Accidents," in which three of the collisions reported in the latest train accident bulletin of the Interstate Commerce Commission are analyzed and shown to have been preventable had this company's system of dispatcher's control of semaphore or train-order boards been in use. The Gill selector is the essential piece of apparatus in this system. It causes a signal when set to report itself audibly to the dispatcher and it cannot be restored to the proceed position until electrical permission so to do has been given by the dispatcher, although the dispatcher may clear the signal without the intervention of the train crew or agent.