

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Vol. XLIII

NEW YORK, SATURDAY, APRIL 25, 1914

No. 17

STEADY EMPLOYMENT A FACTOR IN WAGES

In view of the sweeping lay-offs of employees in the steam railroad field during the past three or four months, the value of continuous work as afforded by substantially all electric railways may well be pondered by officials and subordinates alike. Certainly steadiness of employment is a very real factor in the welfare of employees and should be considered in fixing wages paid for routine work and in setting salaries as well. Compared with the hourly compensation paid metal workers, masons and other industrial wage earners, the pay of a motorman or a conductor often seems small; but it should never be forgotten that the latter are on the whole remarkably free from interrupted income due to weather conditions, the failure of materials to arrive on a job and other business conditions which often lead to days and weeks of enforced idleness on the part of the highly-rated craftsman. It is safe to say that the support of a family can be financed more satisfactorily in most cases where the wage earner's wife knows what she can "count upon" in the weekly pay envelope than where spasmodic high daily earnings are spread over "off" days in which the money flows outward only, assuming the same or approximately an equal total yearly reward for the labor of the breadwinner. We believe that more comparisons of yearly earnings between craftsmen of various kinds and street railway employees will go a long way toward demonstrating that the wages of the latter are relatively much more favorable than has often been realized in arbitration proceedings, apart from the natural differences in skill required which may properly account for a good share of the difference in hourly rates remaining after the factor steadiness is suitably weighed.

COIN HANDLING AND COUNTING

Any advance in industrial work is certain to bring its new problems, and the prepayment car is not an exception to this rule. One of the new questions raised by its increasing use, although of comparatively minor importance, is that of the best method of handling the larger number of coins received. Where a railway passenger knows that he must pay his fare while entering a car he is more likely to have a small coin ready than when he could wait for change while in his seat. The result is that a very much larger proportion of the receipts on most roads is coming in coins of all denominations, but particularly the smaller denominations, than in the past. It is consequently more than ever the duty of the cash receiving department to seek economy in the handling of coins. As a rule, the

banks require that the coins should be put in wrappers, and one company estimates that the cost of wrapping pennies, nickels and dimes, exclusive of the payment for wrappers, is \$6 per \$10,000 wrapped. In some cities the local retail merchants are willing to pay par for change in bags and sometimes they are even willing to pay a slight premium if it is wrapped in rolls. The most economical practice for handling coins for a railway of good size is to do the work of sorting and accounting by machinery and then put the coins into bags or other receptacles. All that remains is to tie up the bags and, if desired, to check the contents by weight. The receivers may continue to count by hand the receipts of the individual conductors, but it will be found that they will do so with greater accuracy because they are relieved of the distraction of wrapping the coins.

TOO MANY SEATS IN CARS?

An interesting feature of modern car design is the almost frenzied effect which some builders are making to get seats into every nook and cranny. Once upon a time the designer of city cars believed that a longitudinal seat on each side was about the right thing. Then the increasing length of rides and higher acceleration gradually led to various combinations of cross seats and corner seats. Now we find seats on the front platform as a matter of course, while several companies have also placed benches on the devil-strip side of the rear platform. It has even been proposed to install a platform seat in front of the conductor's collection stand. Some center-entrance cars show a still more intensive use of seats. Thus in one case a seat actually is placed at the head of each cross-seat aisle directly in front of the circular seat at the end of the car. This evident desire to seat as many riders as possible is certainly praiseworthy but, after all, cars will have to be designed for easy passenger movement during rush hours until the millennial "seats for everybody" era. Operators do not always appreciate the fact that the real clearances in a car are not the aisle widths shown on the plans or by measurements when the car is empty but the width between the hips and shoulders of seated passengers. For example, when cross seats are only 34 in. wide, the 24-in. aisle of theory is only 18 in. or less in reality. The same fact, of course, applies to other kinds of seating. When the car passages are constricted it is natural that passengers should complain of discomfort and require more time to get off the car. Under the circumstances it would seem well to stick to a seating lay-out which allows for more flexible operation during hours of excessively heavy travel. It may

even be found feasible to work out a scheme in which part of the seats could be folded to afford greater clearances when needed.

DEVELOPMENTS IN THE SKIP-STOP IDEA

One of the admirable features of American street railway service as compared with that in European cities is the higher schedule speed despite the fact that the American car has to make more stops per mile on account of the shorter spacing between stops and because of the greater passenger capacity per car. For this superiority, the willingness of American operators to adopt the best in motors, control and brakes is largely responsible. Still, the stop problem on our city lines is one that is growing more serious as the routes are extended and are becoming more densely peopled.

This situation has been brought about largely because of the theory that a car must stop for passengers at every street corner entirely independent of the distance between the cross streets, whether it is 200 ft. or 600 ft. This custom has been followed so long that not only the public but many railway managers themselves believe that it is not only logical but necessary. The absurdity of this contention is shown by the fact that in cities where the blocks are oblong in shape, as in New York, some cars may have to make twenty stops for passengers per mile whereas others are required to stop for passengers only eight or nine times per mile. In other words people do not complain in some cases where the stops are 600 or 700 ft. apart, whereas when there are short blocks they demand stops as often as 200 ft. apart. We might add that in Berlin, which also has a highly congested population, the stopping points for the surface cars average about 800 ft. apart, and the same situation prevails in other European cities.

So far the only practicable solution for this problem is the skip-stop plan in one of its various forms. We do not mean in any way to minimize the difficulties of educating the public so that such a plan may be installed but do wish to call attention again to the fact that railways in several cities have been successful in introducing this method, and one company, the Metropolitan Street Railway of Kansas City, has followed the plan for three years. In this case every other car stops at every other cross street so that while each car has to make only one-half the stops which it formerly did, a prospective passenger knows that every other car will stop at his station. The plan is followed only during the rush-hours so that the question of longer headways is of no importance because at that time the car spacing is short.

The saving in running time, a saving in which both public and company share, has been considerable. The economy in energy, brakeshoes and general maintenance due to the fewer accelerations and brakings is less tangible but must exist nevertheless. These results, which are based on three years' operation over two important lines, prove that it is worth while to try to educate the public to the value and real need of the skip-stop.

HANDLING SCRAP

A prominent consulting engineer recently said that when he inspected a railway system the first thing that he went to see was the scrap heap. It was a place where he could best judge the efficiency of the mechanical department, and even that of the accounting department and purchasing agent. The truth is that the term "scrap" is too often considered synonymous with "trash" or "refuse," but the electric railway manager who is seeking economy in all departments will find that it means a great deal more than that. Scrap really means anything from sound but obsolete and uneconomical equipment to broken odds and ends which find no place even in the best-regulated welding department. In view of the large quantities of scrap that may accumulate on a railway, it is astonishing that more managers do not recall their boyhood trips to the junkman. At any rate, the actual scrap should be sorted into the various grades of iron, steel, brass, etc., because the buyer will not give the best market prices when he is buying a "cat in a bag." Companies which have never tried the plan of scrap segregation do not realize the great difference which it makes in the returns for material sold.

But a careful examination of a good many scrap piles will often reveal some discarded apparatus that ought not to be there, because, with proper effort, it could be worked up for use again. For this reason it is desirable to follow a practice like that at Montreal where all returns come to one shop and where the master mechanic himself decides the fate of all material left by his assistants after the removal of renewable material. Companies that operate a brass foundry are, of course, untroubled by the question of worn-out wheels and the like because they find their way back to the home melting pot. It is always possible to find use for all sizes of round and rectangular bar iron or steel, and motors which have outlived their usefulness under cars can often be rewound and used for intermittent work in the shop.

The assembling of salable scrap is also an important one. Thus, the linemen should be urged to save all copper wire clippings with the idea of boxing and shipping them to a central point when enough have been accumulated. Section crews should also be instructed to collect all kinds of scrap metal at the different section tool houses, and, following a previous notice, a car should be run over the road several times a year to transport these small quantities of scrap to headquarters. It does not look like good business to see discarded wheels, bolts, tubing and other parts rusting along the right-of-way. Some roads go so far as to require the return of the scrapped part for every new part sent out of the storeroom, especially with brass castings. It follows that with such a rule in force slightly defective parts will not be renewed if it is possible to adjust them for further service, because the request for exchange will show that the workman is using poor judgment.

Very few electric roads have occasion to dispose of scrap rail except in very small quantities. The rails

taken out of a trunk line are usually transferred to branches or sold as relay rails to other companies at a fair market price. If scrap rail in short lengths, or in condition not satisfactory for further service in the track, is assembled at a central point, the bridge and building department will find innumerable places where it can be used economically, as lintels in brick work, reinforcement or grillage in concrete work, etc. Careful assembling and sorting of scrap offer a double value in that it not only brings a saving in operation but also instils the idea of economy in the minds of those who need it most.

PROPOSED ADOPTION OF THE NEAR-SIDE STOP IN NEW YORK

The revival of the near-side stop agitation in New York City has been opposed during the past week by several of the daily papers, notwithstanding the referendum vote on the Brooklyn Rapid Transit System in which 181,000 passengers were in favor and only 17,000 against the plan. Just why there should be opposition on the part of the press or of anybody to this perfectly rational method of operation is not altogether clear. The principal arguments so far brought against it are that it was once tried and given up on Manhattan Island, and that during a few days in the winter it would be more difficult for passengers under the new plan to reach the rear platform. The latter argument to be valid would require the admission that the streets of New York are kept less clean than those of the many smaller cities where the near-side stop has been successfully introduced.

It would be interesting to know whether any of those who are opposing the near-side stop have considered its advantages in the way of safety and of saving time. As regards the latter, it is certain that even under the best conditions, the retardation of braking plus the acceleration after a stop is made require nine seconds in time and that every stop itself takes about six seconds more. If so, it is easy to see that every time a car made two stops at a cross street, one on the near side on account of traffic and one on the far side to let passengers on and off, there is a loss of fifteen seconds. It is hardly likely that such double stops occur at intervals less frequent than eight per mile under average circumstances, and if that assumption is accepted the minimum loss of time amounts to two minutes per mile. This may not be worthy of consideration by the passengers, although their time ought to be of some value. But to the railway companies such an addition to the running time of their cars, amounting to an average of possibly 15 per cent, is of serious concern, and the fact that it is entirely unnecessary does not decrease its importance to any appreciable extent.

With center-entrance cars the point made in regard to greater ease of access to the car with the far-side stop disappears. With this type of car the distance from the cross-walk to the entrance is the same with either kind of stop, provided the car just clears the cross streets in both cases.

EFFICIENCY IN THE MECHANICAL DEPARTMENT

In this issue we devote a considerable amount of space to the maintenance records of the New York Railways and to a description of the way in which these records are used in the mechanical department to increase the general efficiency. The method of use is of more general interest than the actual figures because the latter will necessarily vary with the equipment used, the facilities for repair, the wages paid and other local conditions. With a modern equipment throughout of motors, trucks, etc., Mr. Doyle could undoubtedly greatly reduce the cost of maintenance on the New York Railways, but it is difficult to imagine any better way of "keeping up the punch" among those responsible for the actual maintenance of equipment than that employed by him.

As on other city roads, but perhaps to a more marked degree than on any other, the reliability of the service and of the equipment is a very essential matter on the New York Railways. The profit lies in the short haul business. If a car ride of four or five blocks will save a few minutes to the busy man of business, he will be perfectly willing to pay a nickel to save this time. But if the car is not there when he wants it, or if the cars on a busy avenue are stopped because of a breakdown on one of the cars, the company's treasury suffers. Under conditions like these there is undoubtedly a very close relation between the number of run-ins and the net receipts, and the latter will increase as the number of run-ins is reduced.

This problem is solved in the mechanical department of the New York Railways by definitely locating the responsibility in the case of failure so promptly that the cause is analyzed and the remedy applied before there can be many, or any, repetitions of the trouble. The keynote of the system is publicity of the records. The foreman of each department not only knows about the defects in the cars and equipment for which he is responsible, but he knows that every other foreman knows about them. This makes him diagnose each trouble as it arises and be prepared at the weekly meetings to explain the remedy which he has applied in his effort to keep the defects down to a minimum. Inevitably the result is a "snap" and a "go" which is reflected clearly in the performance, as the published records show.

The system is one which is not applicable only to large properties. Smaller companies can follow the same plan in perhaps a less elaborate way. If an unusual trouble develops they are not compelled to search for a solution on their own properties. The files of the technical press contain accounts of all kinds of troubles and of the ways in which other companies have solved them. For this reason the weekly meetings or the monthly meetings of the heads of departments need not be confined to a discussion of the troubles directly connected with the property and the remedies found for them, but the experience of other companies, so far as it has been published, can be utilized even on the smallest roads.

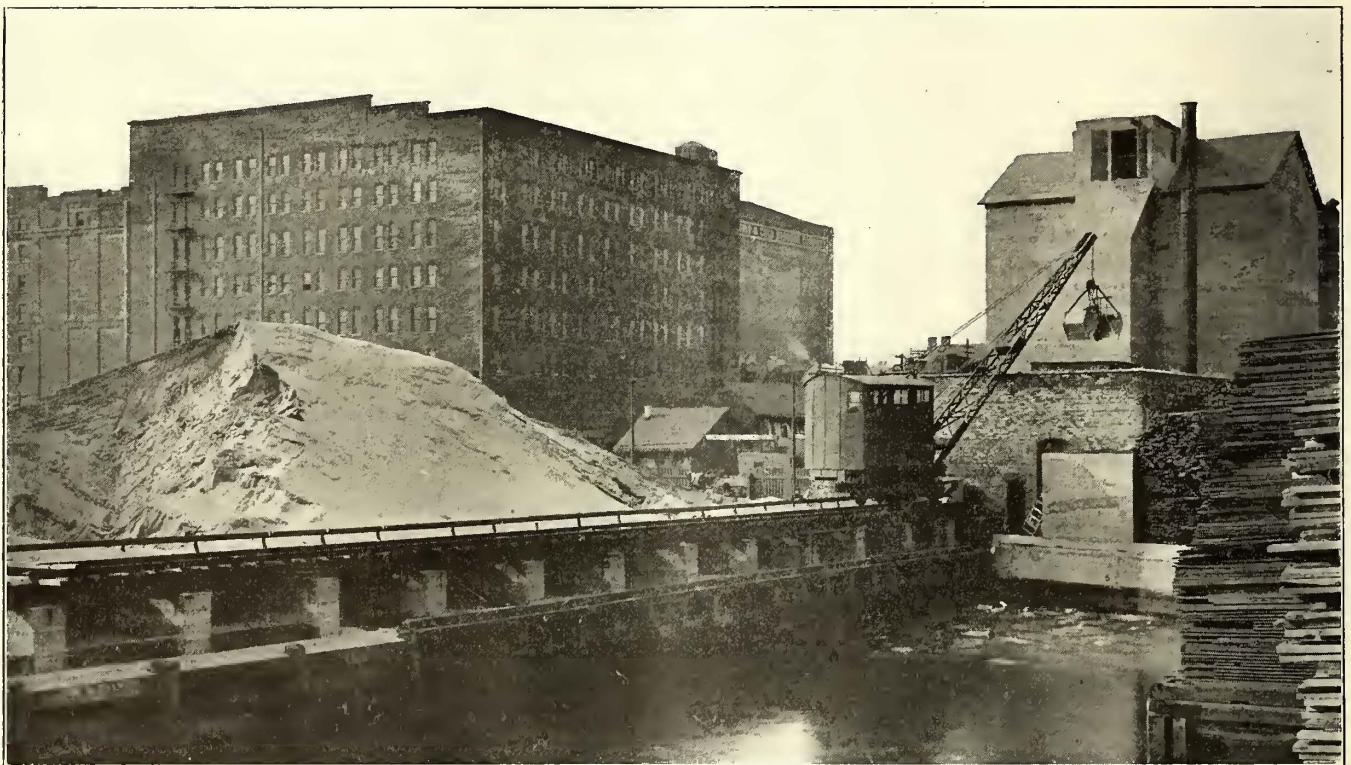
Sand-Handling by the Philadelphia Rapid Transit Company

Details of the Very Elaborate Plant for Receiving, Drying, Storing and Distributing Sand Recently Completed by This Company Are Given—Of Special Interest Is the 15-Yd. Tank Car Which Discharges Sand by Means of Compressed Air

The term "sand-handling," in the above caption, is really a misnomer, as the whole purpose of the equipment of the Philadelphia Rapid Transit for receiving, drying, storing and distributing sand is to obviate handling, machinery being utilized to the maximum extent. This company has treated the sand problem as one worthy of the same kind of study given to power houses, rolling stock, track and electrical distribution, and, as a result, dry sand is delivered to

it is raised by a bucket elevator to the top of a tower and falls, through rotary screens, into an elevated concrete bin, from which it is delivered by gravity to the cars below.

The sand cars, two in number, carry steel tanks and air compressors for putting the sand in the tanks under pressure. The tanks may be emptied, through spouts below, into receiving hoppers such as are provided in the floors of some carhouses, or the sand may



Philadelphia Rapid Transit Company—General View of Sand-Drying and Storage Equipment

the cars at a very low cost in spite of the considerable investment in machinery.

GENERAL LAY-OUT OF THE PLANT

The plant consists of a pier on the Delaware River at Beach and Green Streets, near the Beach Street power house, with large space for sand and other storage; a reinforced concrete drying, storing and loading house adjacent to the pier; two large-capacity sand cars of special design, and receiving, storing, distributing and delivering apparatus in the carhouses.

In brief, the route of the sand from barge to rails is this. It is picked up from the barges by a clamshell bucket operated from a derrick car which travels on a track on one side of the pier. The bucket delivers it in a large, shallow concrete storage which parallels the track. From the storage pile the same crane car delivers it to a hopper in the drier-room roof, from which it falls into cylindrical drier. From the drier

be discharged through hose connections to elevated storage bins.

In the most recently constructed carhouses the sand is received in these floor hoppers, hoisted by means of bucket elevators, distributed by belt conveyors to bins located over the carhouse bays, and finally discharged at convenient points in the bays through spouts and valves to the sand pails.

THE PIER AND RECEIVING PLANT

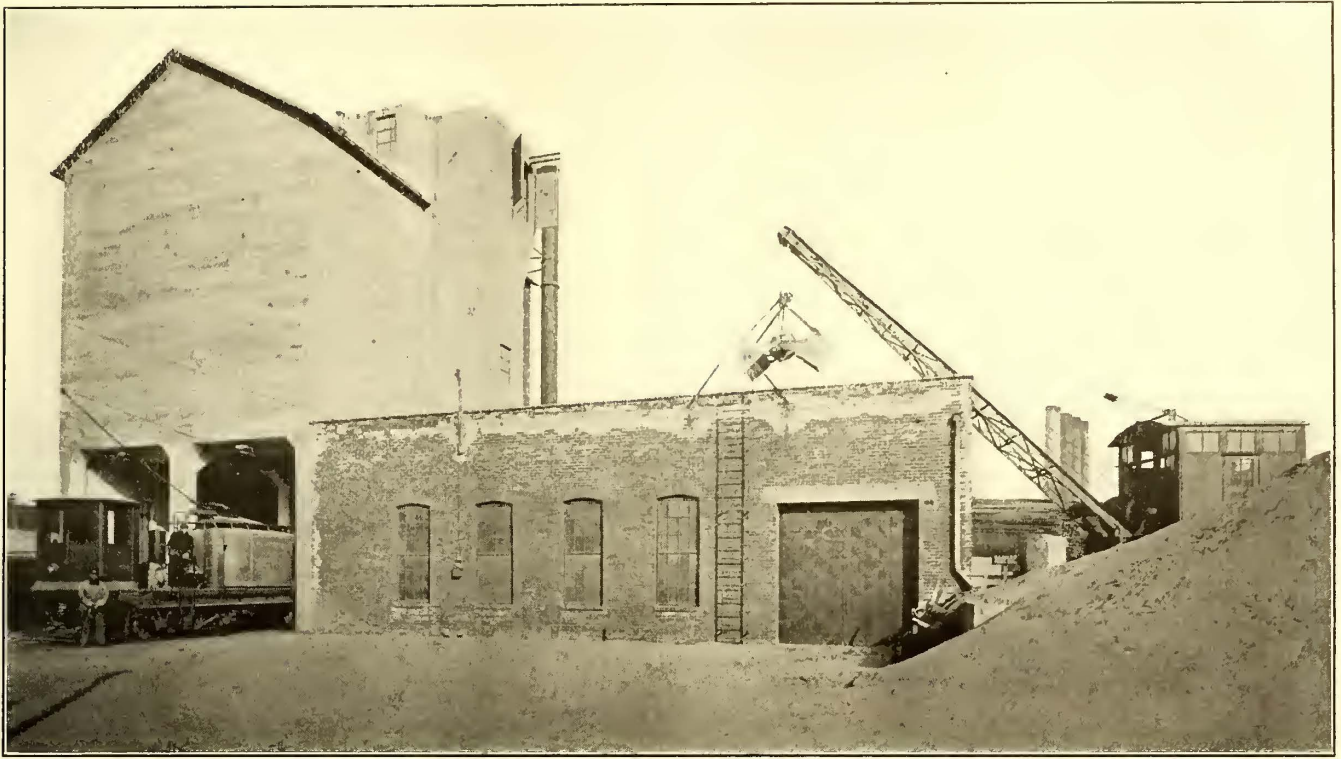
Pier No. 34, at the land end of which the sand-drying plant is situated, is about 600 ft. by 120 ft. in size. It contains, besides the sand-storage bin, spaces for storage of gravel, paving blocks, ties, lumber, stone and conduit. There is a crane runway on the three water sides of the pier, and railway trackage is provided to all parts. The 2000-yd. sand bin is roughly a thick, concrete, reinforced floor, covered with 6-in. planking. The floor is divided into three sections each of which slopes toward a drain in its own center. A

reinforced concrete wall, or curb, rises 4½ ft. above the floor and surrounds it on all sides.

The crane runway is carried upon yellow pine stringers which rest upon the outer wall of the bin and upon concrete piers spaced about 10 ft. apart. The runway is a substantial track of the local standard-gage,

THE DRIER, STORAGE AND LOADING HOUSE

The sand is dried and stored in a large building consisting of two sections, a one-story brick structure to house one present and one prospective drier and a high reinforced concrete structure for the storage bin and auxiliaries.



Philadelphia Rapid Transit Company—Sand Drier House and Storage and Loading House

5-ft. 2¼-in., with oak ties. A protected third-rail supplies current to the car, which is of a standard type manufactured by the Link Belt Engineering Company. The car is operated by the same man who attends to

The drier now in use is of the direct-fire type, constructed by the Coatesville Boiler Works, and is standard except that it discharges at the rear instead of at the front as the manufacturer prefers to have it. It



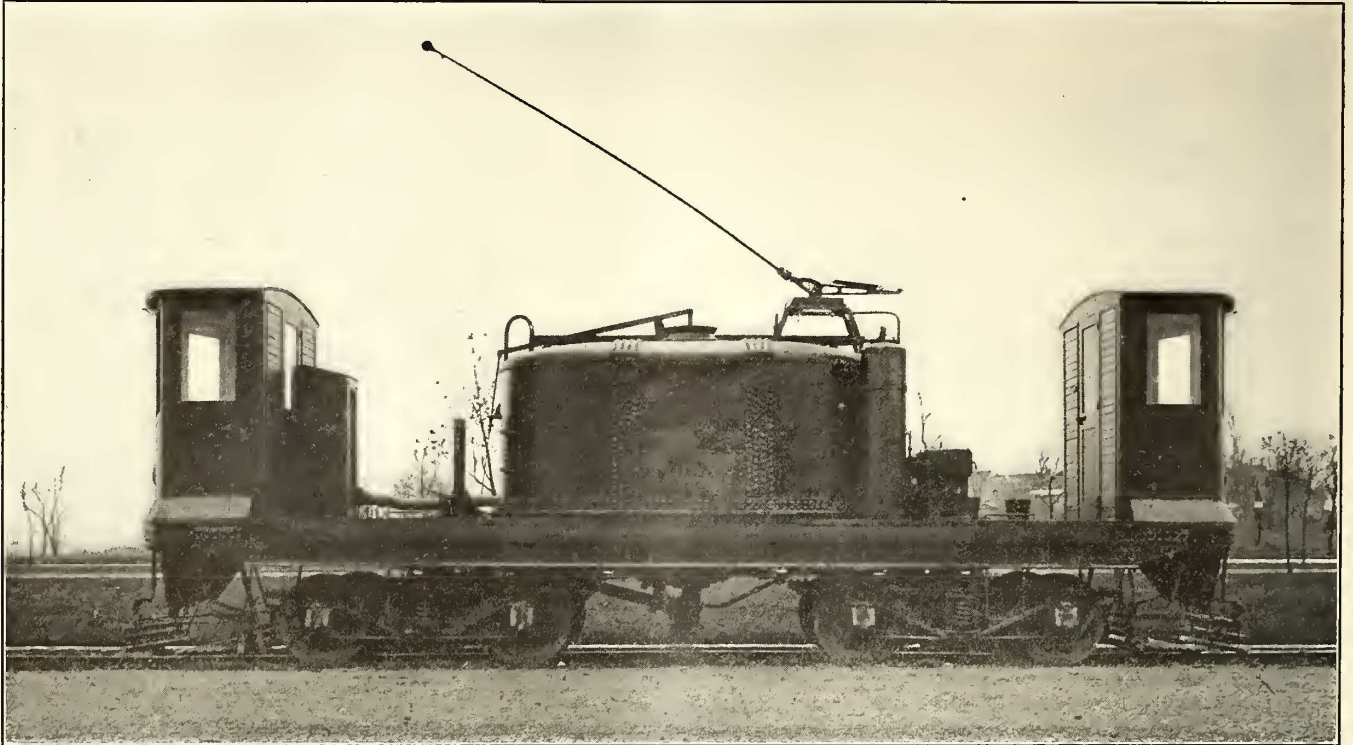
Philadelphia Rapid Transit Company—Sand Valve in Action—View in Sand Drier House

the drier house. Owing to the location of the house with respect to the sand pile very little time is required to transfer a large quantity of sand from pile to drier.

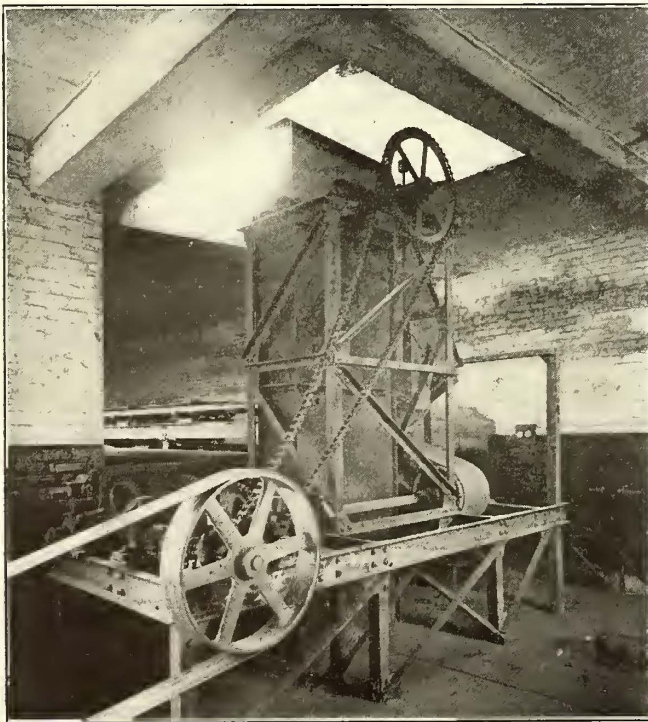
consists of a slightly inclined steel shell approximately 5 ft. x 25 ft. in dimensions, having a number of longitudinal ribs projecting inward. The shell is supported and rotated on two steel tires connected to it

by spring steel pieces which allow for expansion and contraction. The tires rotate on rollers and the whole shell is electrically driven. The drive comprises a back-gear 15-hp, 575-volt, 525-r.p.m. Electro-Dynamic motor belted to a countershaft carrying a gear mesh-

driven Sturtevant blower, with a No. 35 planing-mill exhaustor, which has sufficient capacity for two driers. This blower supplies air to the ash pit through a blast gate and to the space above the fire also, where it mixes with the products of combustion, reducing their tem-



Philadelphia Rapid Transit Company—Sand Car with Capacity of 15 Cu. Yd.



Philadelphia Rapid Transit Company—Sand Elevator in Carhouse



Philadelphia Rapid Transit Company—Belt Conveyor Distributing Sand in Carhouse

ing with a large gear surrounding the drier shell. The speed reduction in the drive is about 90 to 1.

The drier shell conducts the hot gases from a furnace to a receiving chamber at the rear, bringing the sand into intimate contact with them. The furnace is furnished with forced draft from a 5-hp motor-

perature and increasing the volume of gas. Sand is fed into the end of the shell, above the furnace, from a spout leading from the hopper in the roof. The feed is automatically controlled by an endless apron driven by a More & White cone speed change. This apron speed is changed to conform to the amount of

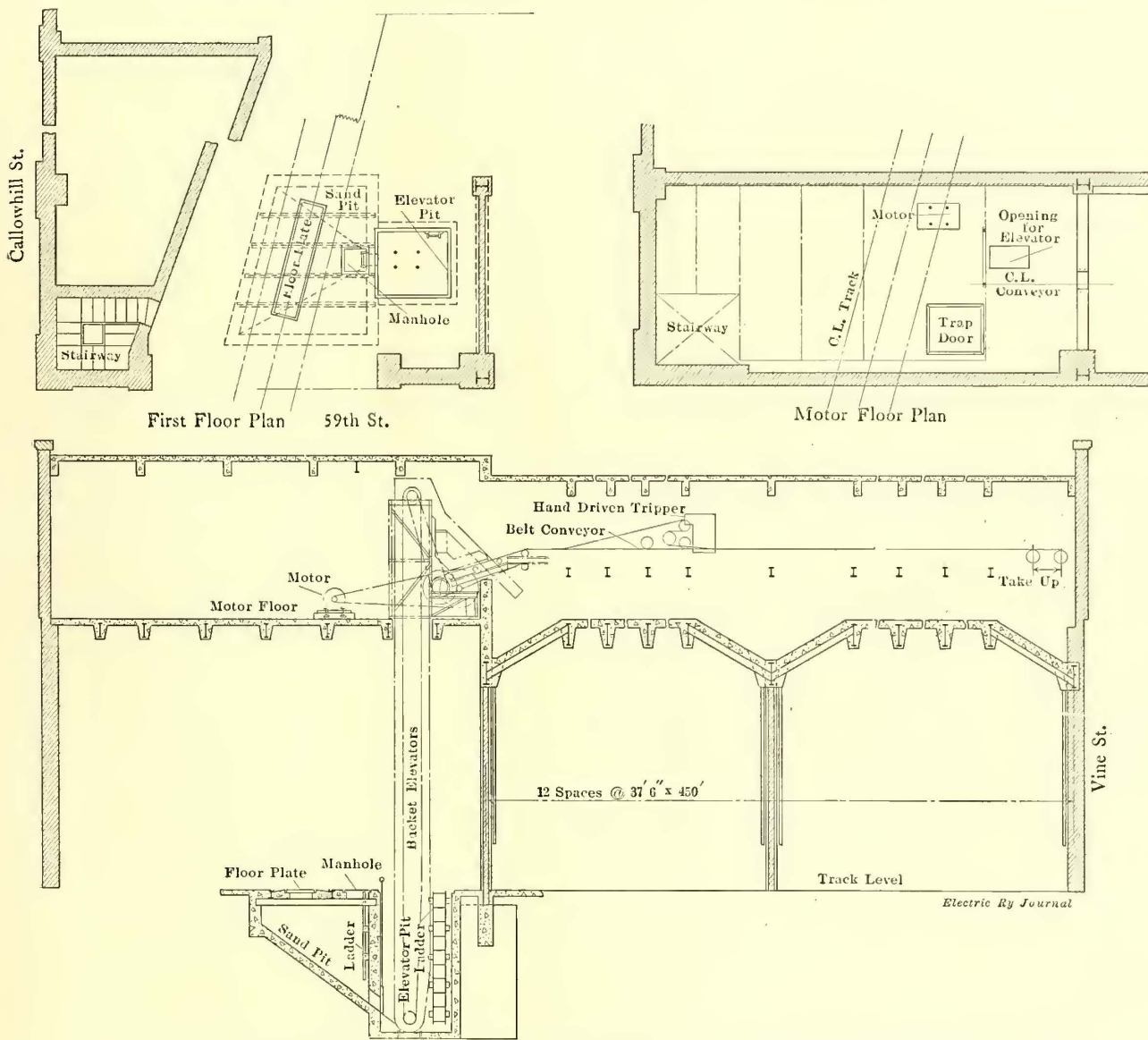
moisture in the sand to be dried. At the rear of the drier is a brick chamber from the top of which a stack leads above the roof and which furnishes a small storage space. A spout from the bottom of this leads to the hopper of a bucket elevator mounted in an offset from the concrete bin structure. The future drier will also discharge into this elevator.

The bucket elevator raises the sand to a height of about 50 ft., discharging into an inclined screen which separates the fine sand and the gravel. This screen makes about 20 r.p.m. The screen is placed just under the roof of a substantial reinforced concrete bin of about 900 cu. yd. capacity, the storage space being

spouts in the floor through which the sand flows into cars below. The space under the bins forms a neat room for filling and storing the two sand cars which form the present equipment.

THE SAND CARS

The most novel feature of the whole installation is the type of car which has been developed for transporting the sand to the carhouses and filling the bins or hoppers. It was necessary to provide for a variety of carhouses. In some floor hoppers are placed between the tracks, in others the storage bins are elevated. The device finally decided upon is a steel tank car as



Philadelphia Rapid Transit Company—Sand-Handling Apparatus in the Callowhill Street Carhouse

approximately 30 ft. x 40 ft. x 20 ft. A small gravel bin is placed at one side of the main bin. To prevent the heaping of sand in the center of the bin two continuously rotating screw conveyors are placed just under the screen and are driven at about 100 r.p.m. A single motor of 10-hp capacity supplies power for elevator, screen and conveyors.

The sides of the large bin are braced by vertical reinforced concrete beams, this being necessary because the dry sand exerts practically the same horizontal pressure as it would if it were a fluid. The method of placing the reinforcing rods is similar to that used in horizontal beams. The bin contains two

illustrated in the accompanying engraving. It consists of a steel underframe supporting an air-tight steel tank with a capacity of 15 yd. Cabs on the ends house the control apparatus. The body is mounted on Brill 50-E2 trucks with 16 ft. between bolster centers, and its length over all is 34 ft. The motors are of the GE-210 type.

The tank is furnished with a spout in the bottom, from which sand is delivered to floor hoppers by gravity, and with a bottom connection for a 4-in. hose, through which the sand is forced by air pressure. To provide the latter a motor-driven compressor and storage tank are used.

It is interesting to note that the full load of the sand car can be discharged by gravity through the bottom spout in seven minutes, including the time required to get the car into the carhouse and out again. Recent tests show that it can be emptied in twelve minutes through a 4-in. hose, 40 ft. long, when the hose is vertical and the air pressure about 40 lb. per square inch. The sand will not flow in a horizontal hose unless it is started by means of a blast, as if the flow is stopped in a horizontal, filled hose, the sand binds and refuses to start again.

The two cars now in use have ample capacity for the entire system and provide some reserve for emergency, the storage capacity of the carhouse bins being sufficient in most cases for some weeks' supply.

THE RECEIVING AND DISTRIBUTING APPARATUS

In the older carhouses only the usual slightly elevated bins are provided for storage, and these, as explained, are filled through the hose connection by the sand car. In the most recent two houses, Luzerne and Callowhill Streets, elaborate elevators, conveyors and bins are used, that at the Callowhill Street house being shown diagrammatically in the drawing reproduced herewith. Briefly, the equipment is as follows: Projecting above the roof of the main building on the Fifty-ninth Street side is a long narrow story which is divided into a number of bins corresponding to the bays below. In this story runs a Robins belt conveyor with a hand-operated tripper. At one end of the conveyor is a bucket elevator fed from a track hopper. All of the machinery is driven by a 5½-hp motor installed as shown.

The photographs show the relations of the several parts of the equipment, one being a view across the row of bins and another one of the upper part of the elevator casing and the gearing for driving the conveyor and elevator.

At the bottom of each bin is a pair of hoppers, one on each side of each partition wall separating the bays. A 2-in. pipe leads from the bottom of each hopper to a weighted sand valve at a height above the floor convenient for filling the sand pails. It will be noted that these outlets are near the entrance to the carhouse so that pails can be filled with minimum effort on the part of the motormen.

MR. INSULL DISCUSSES THE CENTRALIZATION OF POWER SUPPLY

At the weekly meeting of the finance forum of the West Side Y. M. C. A., New York, held Monday evening, April 20, Samuel Insull, president Commonwealth Edison Company, Chicago, Ill., discussed the "Centralization of Power Supply." C. A. Coffin, chairman Board of Directors, General Electric Company, presided at the meeting.

In his address Mr. Insull said that the centralization of power supply was essentially a monopoly on purely economic grounds for it conserved capital, labor and the prime sources of power with the best possible results to the user and producer. He stated that the day would come when the great public utility commissions of the nation would question the waste of capital, labor and effort which went with the separate production of energy for separate classes of users. Mr. Insull believed firmly that power generation and distribution should be a monopoly, but also that it should be regulated by the State. If the companies would not run their business with the public on a square basis, the commissions were there to protect the people. On the other hand, the same commissions should protect the investors against unreasonable demands from consum-

ers or communities. In his experience the commissions had proved of great benefit to the industry as a whole.

Mr. Insull discussed at length and in a very interesting way the different classes of customers supplied by the Commonwealth Edison Company and the effect of a diversity factor on the cost of energy production. He explained that in order to obtain a scientific basis for rate making his company had taken watt-meter tape readings at half-hour intervals to find the diversity factor on the circuits of eighty-two industrial customers. Individually each customer showed great variations in demand, but these fluctuations were far less when integrated at the station busbars.

In the Chicago district, centralization has been brought to such an efficient standard that the charges for service compare very favorably with the much-vaunted cheapness of hydroelectric rates. From other curves showing the relative growth of investment and output, it appeared that the Commonwealth Edison Company had increased its business from a sale of 60,000,000 kw-hr. in 1903 to 840,000,000 kw-hr. in 1913. Another proof of the efficiency of centralized supply and of the technical improvements made in recent years was the reduction in the amount of coal required per kw-hr. from 6.93 lb. in 1902 to 2.87 lb. in 1913, with the possibility of another 30 to 35 per cent reduction. The income per dollar invested had increased despite lower rates to the consumer, for while the operating costs had increased, the depreciation and interest charges had decreased in still larger measure on account of better load factors, etc. Mr. Insull referred only incidentally to his company's contracts for railway power supply in Chicago but observed that this business amounted now to 500,000,000 kw-hr. a year.

Mr. Insull also showed a load map for the State of Illinois exclusive of Cook County (Chicago and vicinity). On this map he indicated the large number of towns which still had isolated plants without twenty-four-hour service and also of territory which had no electric service at all. His company is building large power stations and transmission systems in various parts of the State with the idea of giving a twenty-four-hour service everywhere. A beginning is being made in the northeastern part of the State. One of the first consequences of more reliable and continuous power supply has been the settling of manufacturers in small towns and the wider adoption of electrical machinery by the farmer. The charge for energy to these country consumers compares very favorably to that charged in cities of the second and third class. On the whole, group utility management had proved a great success, and the enormous field which still remained for development in one state alone was clear from the fact that less than 45 per cent of the population of Illinois gets electric service to-day.

Steps have been taken by the Metropolitan Street Railway, of Kansas City, to prevent newsboys and others from hanging on the back of cars with or without paying fares by the simple expedient of removing all equipment formerly used as a foothold by such violators of the company's rules, or, in some cases, by merely altering it. The drawbar which has extended underneath the car at the back has always been a friend of the impetuous or miserly passenger. The mechanical department of the Metropolitan has placed the drawbar on a pivot, and it is now swung far around and underneath the car, where it is hung on a hook when not in use. The rear bumper, the only other support available for rear-platform passengers, has been covered with a concave, cast-iron plate, effectively preventing anyone from riding without paying a fare, and incidentally reducing the number of accidents on the road.

Statistics on the New York Railways

The Operation of the Rolling Stock of This System Is Followed Up by Comprehensive Records and Charts, by Which Those Responsible for the Condition of the Equipment Are Kept Informed as to the Results of Their Work

The New York Railways have developed an effective system of compiling and utilizing statistics of car defects which has proved most helpful in reducing road delays and run-ins. These statistics are generally prepared in the form of curves which are sent each month to all heads of departments and serve as a basis for discussion at all staff meetings. At the staff meetings, which are held at frequent intervals in the office of the superintendent of equipment, J. S. Doyle, the various foremen come prepared to analyze the curves, and if any foreman is unable to explain the causes for results

ance with the uniform system of accounts of the Public Service Commission of New York, First District. This includes the cost of all repairs made in shops and carhouses but does not include inspection, car cleaning, lubrication or replacements of carbon brushes, lamps, etc. The average car to which the costs apply is a 40-ft. city car, weighing 30,000 lb. This curve is based on the monthly figures for the past two years, but another is shown in Fig. 2 which gives the annual cost per car mile and extends over a considerable period of years. In the latter curve, the high cost shown in 1908

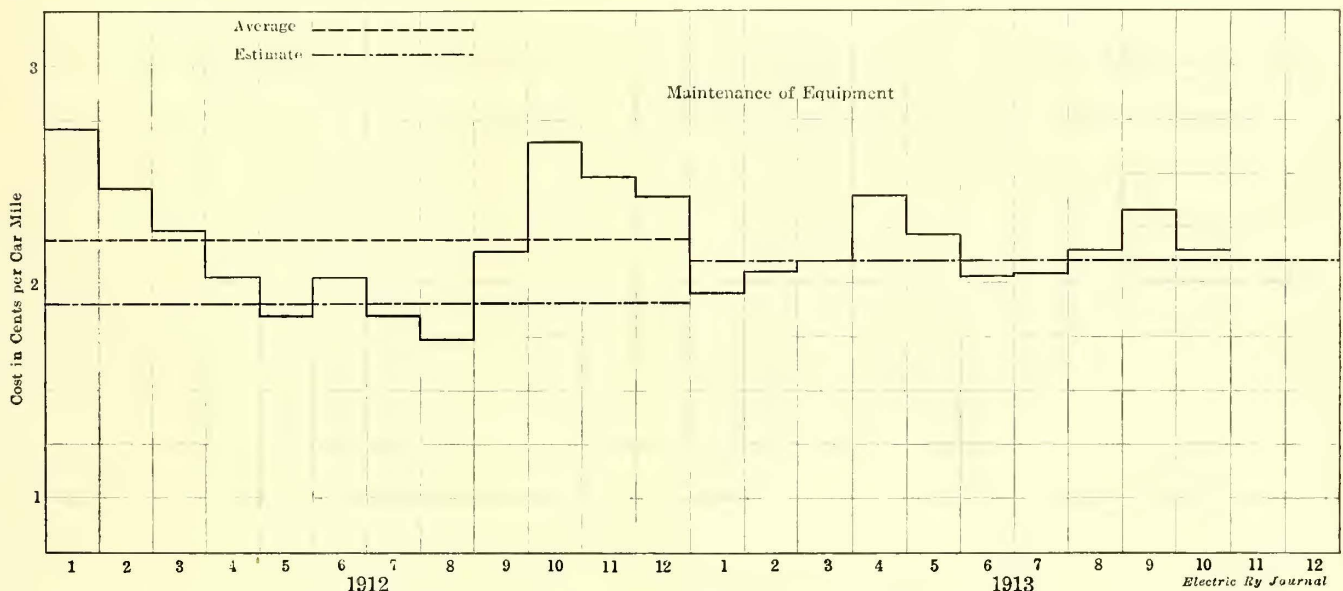


Fig. 1—Cost of Maintenance of Car Equipment Exclusive of Car Cleaning, Inspection, Lubricant and Minor Replacements, New York Railways

for which he is responsible some other foreman is usually able to do so. In fact, by this system of watching apparatus and diagnosing causes for failures it has become possible to operate the old equipment on the system in a most satisfactory manner.

The most important result that has been effected by this plan is found in a reduction of 75 per cent in the number of "run-ins." Much of the traffic in New York is of the "short-ride" variety, and obviously, where delays occur from failures of equipment the direct loss in fares is heavy because short-riders will not wait for cars. With approximately 1300 cars on the system, each averaging 2000 miles per month, the "run-ins" have been reduced in two years from 1300 per month to about 300 per month.

To attain this result, even such an apparently small item as broken bell cords has been subjected to close analysis with the result that they have been almost eliminated. In the same way controller fingers have been given special attention, and in order to avoid the flash-overs and controller troubles which were found to be characteristic of a lot of old No. 1000 motors on open cars, the line voltage is reduced during the summer from 585 to 550.

GENERAL MAINTENANCE COSTS

The curve shown in Fig. 1 gives the total cost per car mile for the maintenance of equipment in accord-

ance with the uniform system of accounts of the Public Service Commission of New York, First District. This includes the cost of all repairs made in shops and carhouses but does not include inspection, car cleaning, lubrication or replacements of carbon brushes, lamps, etc. The average car to which the costs apply is a 40-ft. city car, weighing 30,000 lb. This curve is based on the monthly figures for the past two years, but another is shown in Fig. 2 which gives the annual cost per car mile and extends over a considerable period of years. In the latter curve, the high cost shown in 1908

was due to the fact that every car on the system received an overhauling within the twelve months, this being the first year of the receivership of the old Metropolitan Street Railway. The average car in 1908 was, of course, considerably smaller than that of the past year, 128 large pay-as-you-enter cars having been purchased since 1908, and 273 long closed cars have been converted to the pay-as-you-enter type. The curve reproduced in Fig. 3 shows the labor costs in the carhouse on a basis of 1000 ton-mile units. Another curve, which is not reproduced, shows that the material costs for the carhouse work run close to an average of 15 cents per 1000 ton miles. The carhouse labor and material costs do not cover the cost of overhauling in the shops but do include all work done at carhouses, such as running repairs, car cleaning, inspection and small replacements, so that they overlap to some extent on the maintenance-of-equipment costs already given. Fig. 4, covering carhouse labor, shows a comparison of the costs obtained at different carhouses on the lines of the New York Railways. These comparisons of costs at different carhouses are made in a number of cases, although only this curve and one other are reproduced in this article, serving merely as examples. By this means, the different carhouse foremen are shown clearly where they stand, and they are stimulated by the competition to keep their costs at proper figures.

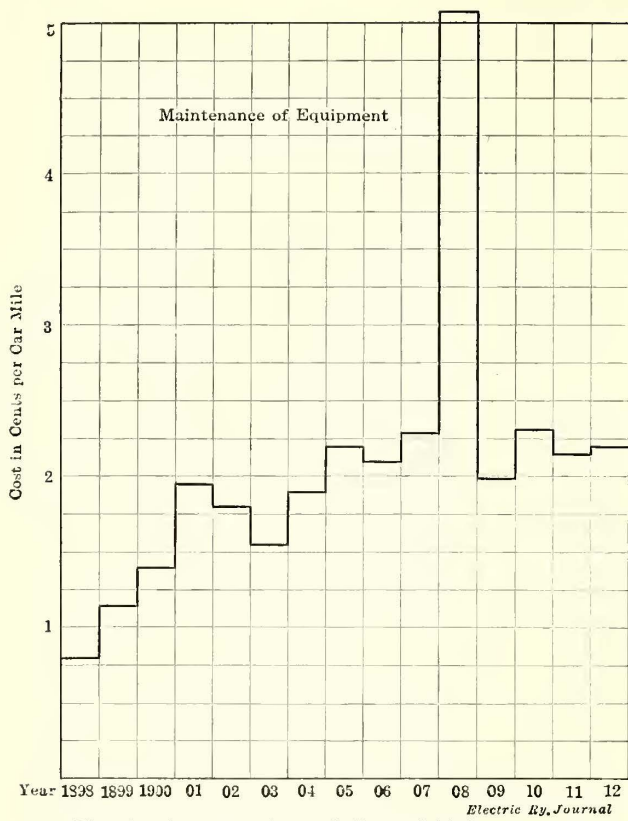


Fig. 2—Average Annual Cost of Maintenance

The shop organization, it should be said, is divided into electrical, mechanical, carpenter and paint departments. There are three shops, respectively called the Sixth Avenue Shop, the Lexington Avenue Shop and the Lenox Avenue Shop. The major portion of the machine, electrical and carpenter work is done at the Sixth Avenue Shop, the painting and some carpenter work at the Lexington Avenue Shop and the armature work and some machine shop work at the Lenox Avenue Shop. There are eleven carhouses, divided into six inspection districts, all of which comprise a department entirely separate from the shops where general overhauling is done.

MISCELLANEOUS COSTS

Fig. 5, covering the cost of material for lubrication, is self-explanatory, and another similar curve, not reproduced, is kept up by the statistical department to show the cost of brakeshoe material. The latter averages about 4.5 cents per 1000 ton miles. Wheel and axle cost was \$1.50 per 1000 car miles in 1912 and about 90 cents in 1913. The principal cause of this large difference is due to the fact that a large number of the original installation of rolled steel wheels required their first renewal in 1912.

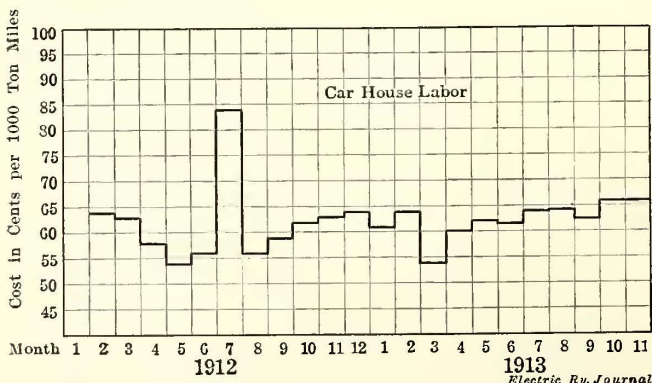


Fig. 3—Labor Costs in Carhouses for All Purposes

Other curves not reproduced here owing to lack of space, cover sand-drying cost at carhouses, which ranges between 50 cents per 1000 car miles in winter and 20 cents per 1000 car miles in summer owing to the greater use of sand in cold weather; also the cost of labor and material for replacing glass. The summer cost of glass replacement, exclusive of that installed at the repair shops, amounts to about 15 cents per 1000 car miles, but in March this rises to about 60 cents per 1000 car miles and in December to about 45

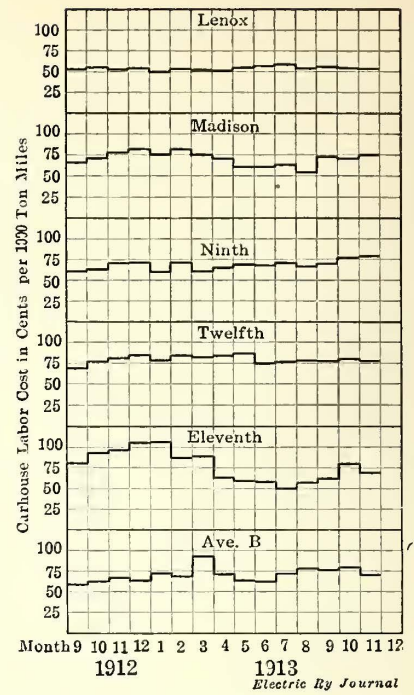


Fig. 4—Comparative Cost of Carhouse Labor

cents per 1000 car miles on account of the changeable weather, which requires the windows to be opened and closed more frequently, thus causing more glass to be broken. Still another curve shows the cost of labor and material for replacing incandescent lamps for lighting, this cost amounting to about 15 cents per 1000 car miles.

In the curve, reproduced in Fig. 6, showing cost of car cleaning labor, the increase indicated in the early part of 1913 is due to the fact that the management decided that the cars should be kept at the highest possible degree of cleanliness.

Still other curves, which are not reproduced, show that the wheel-guard cost averaged 40 cents per 1000 car miles in 1912 and rose to about 55 cents per 1000 car miles in 1913. This is one of the few items which has shown an increase and is due to the large amount of subway construction and street repair work now going on in New York. Other curves, not reproduced, show the labor and material costs of general repairs, subdivided between the electrical, mechanical, carpenter and paint departments. There have also been prepared a number of curves which compare the efficiency of different types of apparatus on both a cost and a failure basis.

DEFECTS CHARGEABLE TO EQUIPMENT

Grouped under the general heading of delays and defects are a number of curves among which the one reproduced in Fig. 7 shows the number of cars removed from service on account of defects chargeable to the

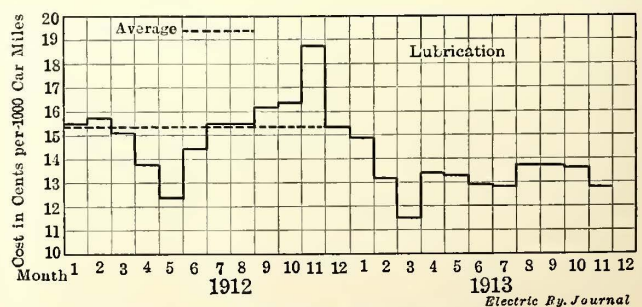


Fig. 5—Cost of Lubrication—Material Only

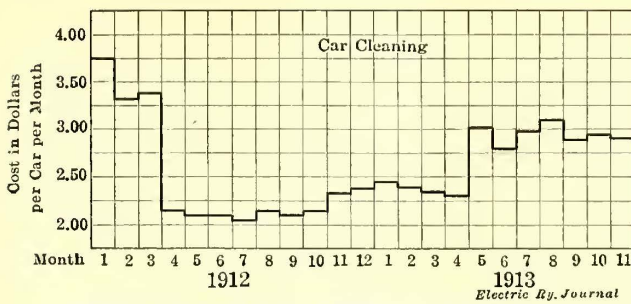


Fig. 6—Cost of Car Cleaning—Labor Only

car equipment department and indicates the effect of the attention which has been devoted to the reduction of car failures. Fig. 8 shows the cars removed from service as chargeable to each one of the different carhouses and is another example of the competitive system. It also shows the various carhouse foremen the results of their work in comparison with those of other carhouses. These curves, it should be said, include only cars which are taken off the road on account of actual defects chargeable to the car equipment department and do not include cars on which defective equipment is reported but not found, and cars which have been removed from service for examination after accidents, collisions, etc.

The curves showing the records of defects as reported by the transportation department and found to be properly charged to the car equipment department are made up from what are called "door-sheets," each motorman reporting the condition of his car at the end of his run on a sheet at the door of the carhouse for this purpose. These are supplemented by a "defective car report" made by the carhouse foreman each day. Motormen are not allowed to turn in cars on their own initiative, but have to obtain what are called "run-in slips" from a transportation department inspector on the road, who examines the defect as reported by the motorman.

DEFECTS REPORTED IN SERVICE

The curve of Fig. 9, showing the number of car-body defects reported, includes the figures for defective bodies, register, signal circuits, signs, gongs and sand boxes, defects in any of these items being listed under this head and showing in the curve. Reports of wet sand by the transportation department are shown by Fig. 10, the remarkable decrease which appeared during the fall of 1913 being due to the fact that through the experience of the previous year the sand boxes were inspected and tested nightly in order to insure operation. The curve of Fig. 11, covering broken door chains reported by the transportation department, is another case where

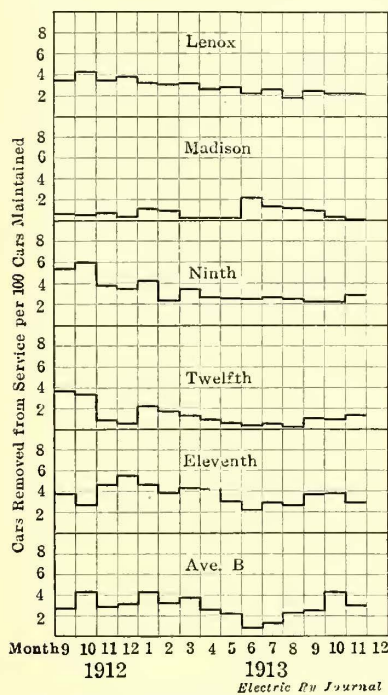


Fig. 8—Comparison of Pull-Ins Charged to Various Carhouses

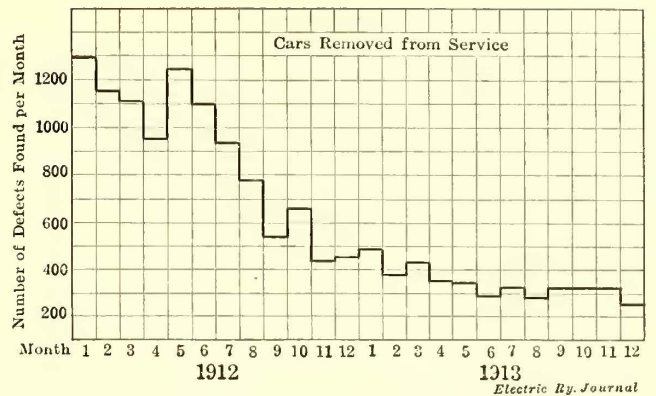


Fig. 7—Cars Removed from Service on Account of Defects Chargeable to Car Equipment Department

trouble was practically eliminated by special attention to the cause. In this case the design of the door and operating mechanism was improved, and the inspection of the door and its slide was made very much more thorough.

On the curve of Fig. 12, showing register clocks reported defective by the transportation department, the figures do not apply to the operating levers but to the works behind the face of the register. By means of a redesigned spring a reduction in the number of defective mechanisms was effected as shown. With reference to the curve of Fig. 13, showing breakage of signal bell cords, it should be said that the old method of

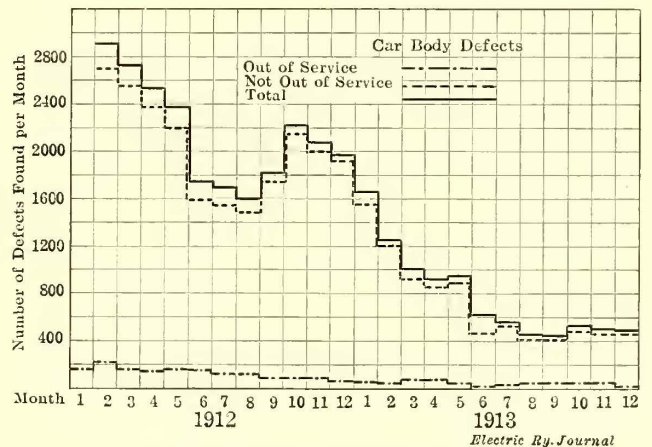


Fig. 9—Defective Car Bodies Reported

handling bell cords was to wait until the cord broke before applying a new one, but owing to the large number of cars reported on this account the equipment department began to give the matter special attention. The cords were examined very closely when the cars were brought in for inspection at the regular 700-mile

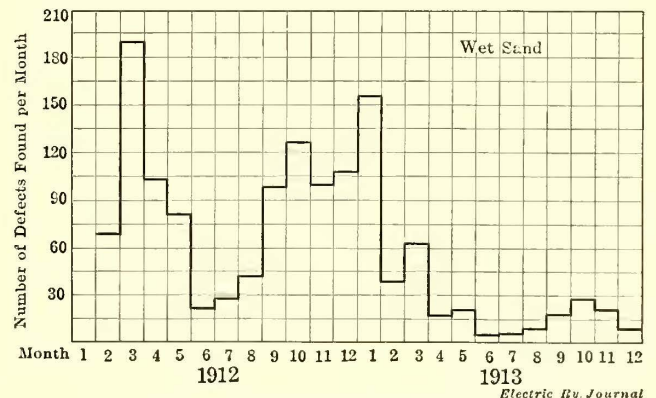


Fig. 10—Cars with Wet Sand Reported

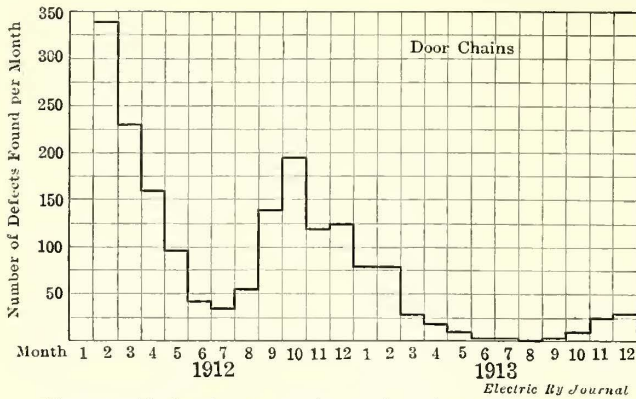


Fig. 11—Defective Door Operating Chains Reported

intervals, and they were removed before the failure took place. In addition, a change was made in the design and location of the bushing in the hole in the bulkhead where the cord passed through. This eliminated much of the fraying and eventual breakage of cords. With regard to Fig. 14, showing the number of broken gong hammers reported by the transportation department, it should be said that steel hammers were installed in place of cast-iron ones, and as these came into use the number of failures from this cause rapidly decreased.

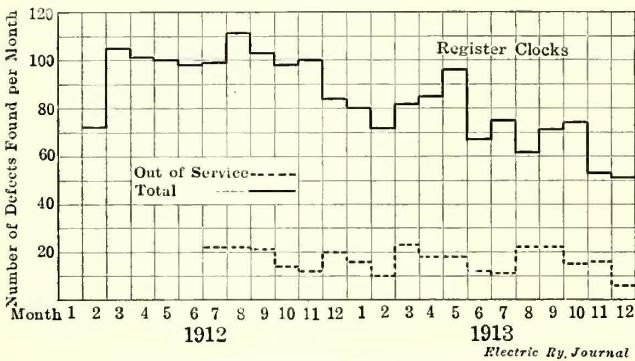


Fig. 12—Defective Registers Reported

In the curve of Fig. 15, showing the total number of truck defects reported chargeable to the car equipment department, the figures include defects of trucks, journals, wheels, axles and wheel guards. The reduction shown by this curve was effected by more thorough overhauling when the cars were in the shop and by more thorough inspection in the carhouses. The same

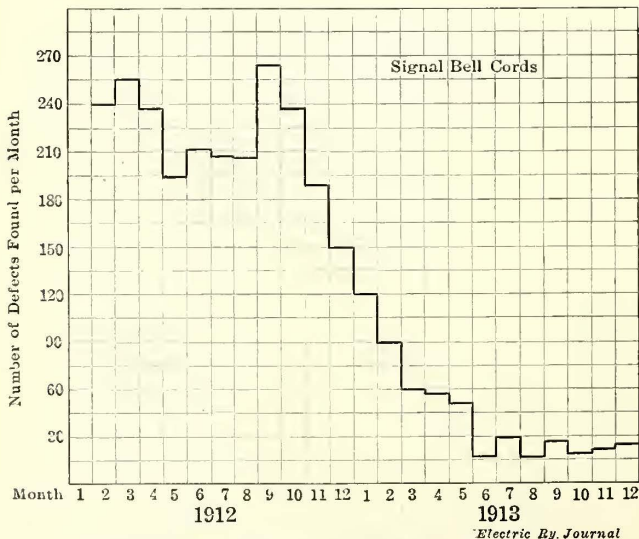


Fig. 13—Defective Signal Bell Cords Reported

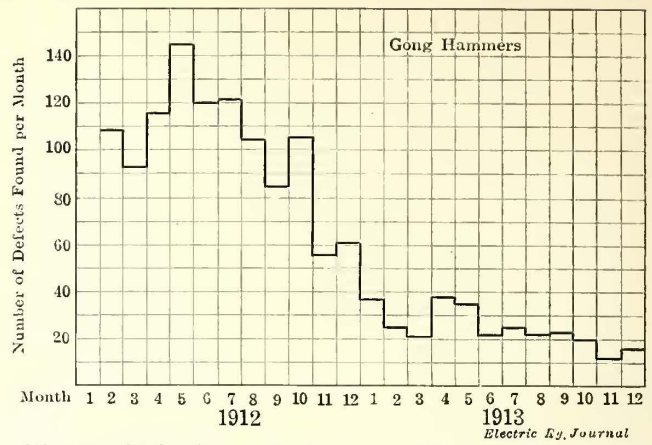


Fig. 14—Defective or Broken Gong Hammers Reported

decrease was secured in brake defects, as the inspection was made more complete, brake guides were installed, and, in addition, 640 cars were equipped with air brakes.

In the curve of Fig. 16, showing the record of elec-

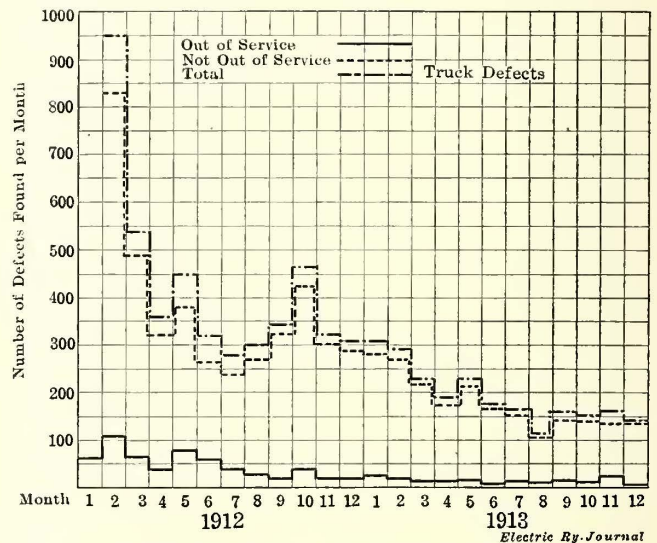


Fig. 15—Defects in Trucks Reported

trical defects, the figures include the control, the motor, the underground trolley plow, heat, light and miscellaneous electrical apparatus. Other curves, which are not reproduced, show that the controller drum defects were steadily reduced from a figure of approximately 120 per month early in 1912 to about 30 per month in the late part of 1913. This also was accomplished through more thorough overhauling, through the installation of an insulator block to prevent short circuiting in the controller drum, and through more careful inspection. In the same way the controller fingers defective went down from about 200 per month early in 1912

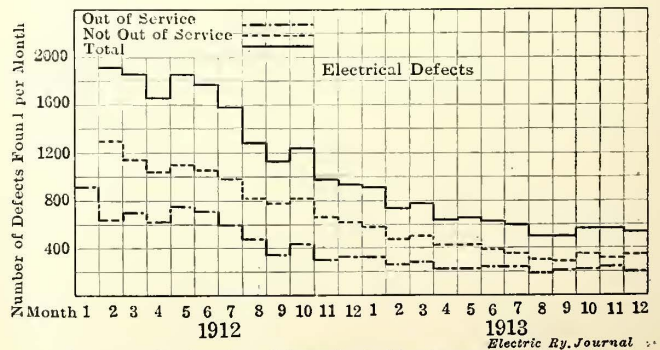


Fig. 16—Defective Electrical Equipment Reported

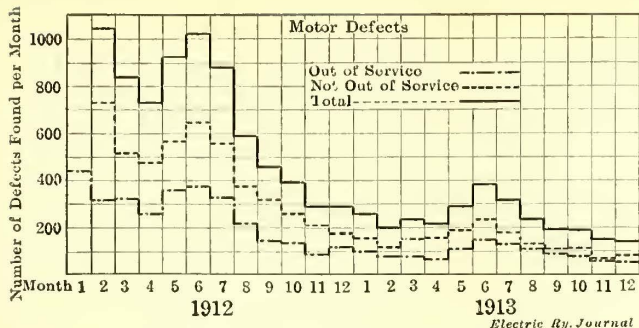


Fig. 17—Defective Motors Reported

to a fairly steady average of about 15 defects per month for the last six months of 1913. A large part of this reduction was effected through a new design controller finger.

The reduction in the number of motor defects, as shown by Fig. 17, was effected by a redesigned field on the GE-57 motors. The GE-1000 motors had the fields impregnated throughout and also had the commutators slotted. Improved methods for insulating field and armature coils and for banding armatures were also introduced into the shops with the result shown by the graphical record.

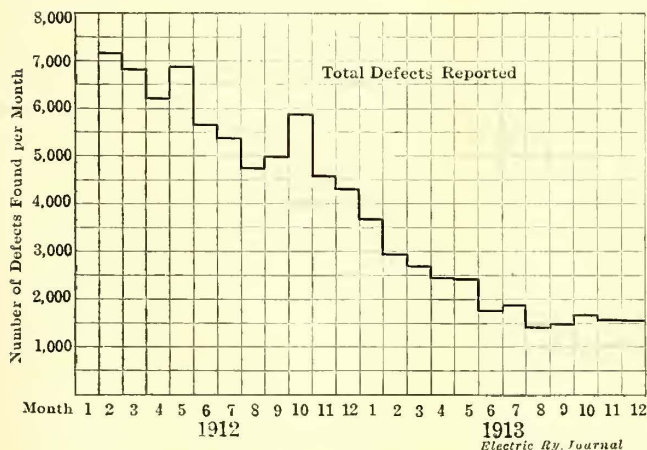


Fig. 18—Defects of All Kinds Reported as Chargeable to Car Equipment Department

On other curves, not reproduced, covering electrical defects, the brush holder spring failures are shown to have been reduced from about 700 per month early in 1912 to a steady average of twenty per month late in 1913, this being the result of an improved brush holder spring and more careful inspection. The underground trolley plow failures were reduced from 300 per month to seventy per month during the same period on account of a new type of plow.

The record of the total number of defects reported by the transportation department is shown in Fig. 18. This includes all of the foregoing records as well as those for which no curves have been reproduced.

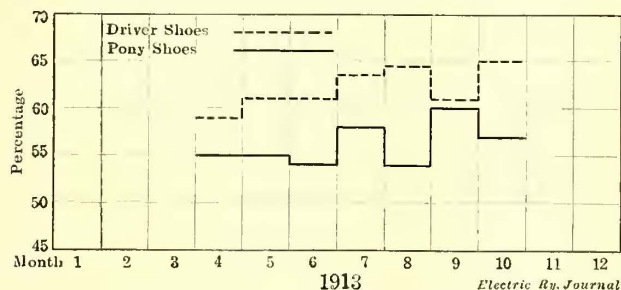


Fig. 19—Percentage of Brake Shoe Weight Worn Away in Service

Another group of curves covers such records as the number of wheels turned out of the wheel shop and the number of armatures put through the shop, the average of the latter for 1912 being 570 and for 1913, 510. In 1912, 830 wheels per month were put through the shop on an average, and during 1913, 750 per month were put through. The percentage of brake-shoe material actually worn away in service is also shown by a curve which is reproduced in Fig. 19.

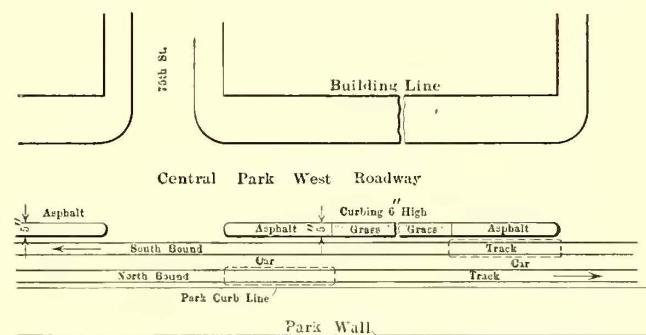
In addition to the graphic charts, each foreman also receives detailed statements of labor and material distribution, cars removed from service and total defects reported.

SAFETY ISLANDS ON WIDE AVENUES

BY S. STRIEZHEFF

At this time much agitation is going on in New York relative to the relocation of the street railway tracks of Central Park West, which now run close to the eastern curb. It has been proposed that these tracks should be shifted to the center of the street so that passengers who alight from southbound cars will not be exposed to danger from automobiles when crossing the wide distance to the western curb. This plan, which is favored by the city authorities, would cost nearly \$100,000.

The writer believes that a much simpler, less costly



Plan of Proposed Safety Island for Wide Streets

and really more efficient way is available by providing safety islands for the full length of each block. As shown in the accompanying sketch, a strip 5 ft. wide and furnished with a 6-in. curb would be ample. As the cars on this street are stopped at the far side, one car length (about 45 ft.) at each end of the island could be asphalted while the intervening area could be covered with turf or flowers. Such a scheme is perfectly feasible on a 100-ft. street like Central Park West. Under the present conditions a passenger is discharged in the street; his danger, while decreased, would not be eliminated if he should be discharged from tracks located in the middle of the roadway, as proposed by the city. If islands are used, however, a northbound passenger would be discharged at the eastern curb line along the park while a southbound passenger would be discharged on an island. In either case the passenger would have plenty of time to get his bearings and could wait until it was safe to cross the street. As the island would be 6 in. above the regular pavement level, it would also reduce the step height on end-platform cars from, say, 15 in. to the more comfortable figure of 9 in. This plan would cost much less than any other suggested, would provide the greatest possible safety and would have the further merit of adding to the beauty of the avenue. As previously indicated, such islands are applicable to any wide streets. The city and traction officials can hardly afford to disregard this means of obtaining the ideal trinity of safety, economy and beauty.

Electrolysis Prevention in Edmonton, Alta.

The Author Discusses the General Theory of Electrolysis Mitigation as Covered by the British Board of Trade and Their Application to Conditions in Alberta—He Also Describes Several Plans from the Economic Standpoint

BY W. T. WOODROOFE, FORMER SUPERINTENDENT EDMONTON RADIAL RAILWAY

In view of the article printed in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 3, 1914, dealing with methods of eradicating electrolysis on street railway systems, it may be of interest to describe the scheme drawn up by the Edmonton Street Railway Department to overcome troubles from electrolysis which have occurred in connection with the water mains in the city.

RULES FOR THE PREVENTION OF ELECTROLYSIS

In approaching this subject, it was considered that the British government had drawn up a very adequate set of rules controlling street railway systems in the United Kingdom. It was thought expedient to remodel the system of negative feeders in Edmonton so that they would conform to British Board of Trade rules. The principal features contained in the British regulations consist in limiting the emf drop in any section of the track to 7 volts and, further, in providing that in no instance shall the water mains approach within 3 ft. of the track. Experiments with earth plates have shown that increasing the distance between plates to more than 3 ft. does not greatly increase the resistance between them. Where the above two conditions have been fulfilled experience has shown that there has been no trouble from electrolysis. Other important points contained in the British rule are:

(1) The system shall be earthed by means of two earth plates spaced not less than 20 ft. Four volts applied across the two earth plates shall produce a current of not less than 2 amp.

(2) The leakage current from the track to the earth, through the earth plates, shall not exceed 2 amp per mile of single track, or 5 per cent of the total current, suitable instruments being provided in the earth connection to record the leakage of current which actually occurs.

(3) Where the rails are positive to the water mains, it should be possible to reverse the current by connecting three Laclanché cells in series between rails and pipes. Where the water mains are positive to the rails, it should be possible to reverse the current by inserting one Laclanché cell in circuit. The insulation resistance of continuously insulated cables should not fall below 10 megohms.

METHODS OF PROCEDURE

In the design of the new system of negative feeders the following method was followed: The average distributed current for the various routes was worked out for a given schedule of cars running. The average current was calculated for average and peak loads as follows:

The unit energy consumption in kw-hr. per car mile, W , having been determined from consumption curves or from actual meter tests on the cars, the current was determined from this and the line voltage, $I = W \div E$.

The energy consumption in this case was calculated from the time-speed curves and checked by tests. On level track the current consumption was found to be about $1\frac{1}{2}$ amp per ton, the total for double-track cars ranging from 35 amp to 50 amp as a practical working range.

Having the average current per car the total average current was determined for the peak and regular loads, the duration of which were five and thirteen hours respectively.

Let I_1 = average current for the peak load.

L_1 = length of the section of track in miles,

s = speed of car in miles per hour,

n = number of cars passing over the section per hour,

I = average current per car,

$2I$ = average current, for the double track, per car on each track.

$$I_1 = \frac{L_1}{s} \times n \times 2I$$

The current, I_2 , for the regular load, is calculated in the same manner, substituting the corresponding number of cars per hour.

The combined average or "effective" value of the current is obtained from

$$I_3 = \sqrt{\frac{(I_1^2 \times 5) + (I_2^2 \times 13)}{18}}$$

the effective value being equal to the square root of the mean square current.

LAYING OUT THE FEEDING SECTIONS*

The average current for the several routes having been determined, it is now necessary to divide it among the negative feeding sections, each of such length that its own current, flowing to its selected feed point shall split it up into two subsections having equal rail drops. Assuming two sections of track L and l , Fig. 1, joining at X , the currents flowing toward X are as indicated.

Let e = permissible voltage drop in either section,
 R = specific resistance of track in ohms per mile,†

I_m = current per mile in section L ,

i_m = current per mile in section l .

Then

Total current in section $L = LI_m$

Total current in section $l = li_m$

Resistance of section $L = LR$

Resistance of section $l = lR$

The voltage drop in section l is then

$$e = \frac{li_m \times lR}{2} = \frac{i_m \times lR^2}{2}$$

Similarly in section L ,

$$e = \frac{LI_m RL^2}{2}$$

For the purpose of determining the voltage drop in a section of track it may be assumed that the current is concentrated at the center of the section and flows to

*This method of studying the distribution of current and voltage drop is due to J. G. and R. G. Cunliffe (See Proc. Institution of Electrical Engineers, of Great Britain, Vol. 50, pp. 692, 727.

†In the case of Edmonton we allowed the following values:

2 rails 80 lb. = .035 ohm per mile

4 rails 80 lb. = .0175 ohm per mile

2 rails 60 lb. = .0233 ohm per mile

2 rails 60 lb. = .0467 ohm per mile

The above values include the resistance of the bonds.

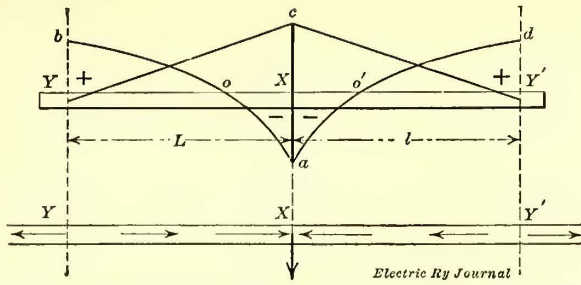


Fig. 1—Edmonton Radial Railway—Voltage Drop Diagram

the negative feeder tap point through half the resistance of the particular section of the track as shown in the above formulæ.

Transposing the above equations

$$l = \sqrt{\frac{2e}{i_m R}} \text{ and } L = \sqrt{\frac{2e}{I_m R}}$$

or

$$\frac{L}{l} = \sqrt{\frac{i_m}{I_m}}. \text{ That is, } L : l = \sqrt{i_m} : \sqrt{I_m}.$$

This distribution of current and of voltage drop is as shown in Figs. 1 and 2. In Fig. 1 are illustrated the conditions for equal sub-section lengths and equal intensity of loading, while Fig. 2 is for unequal loading. In the lower parts of the figures the directions of the currents are shown by the arrows. Point X is the tapping point for the negative feeder and Y and Y' are the artificial dividing points where the direction of current reverses. The following keys will be useful in interpreting the figures.

- Fig. 1 X = negative feeding point,
- Xa = potential at feeding point,
- Y, Y' = artificial dividing points,
- O, O' = neutral or zero potential points,
- Yc, Y'c = loading or current distribution,
- Yb = Y'd = potential at dividing points,
- L, l = lengths of subsections.

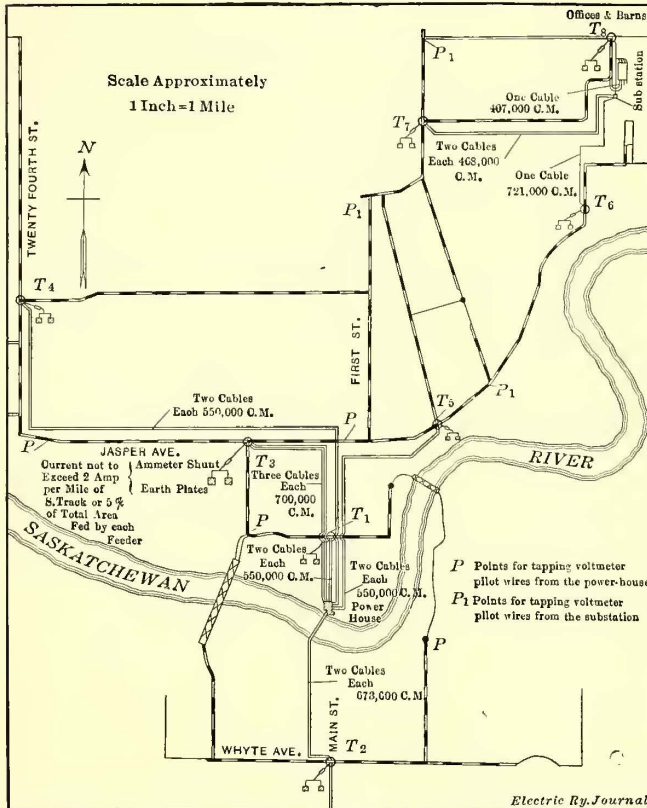


Fig. 3—Edmonton Radial Railway—Proposed Layout of Negative Feeders

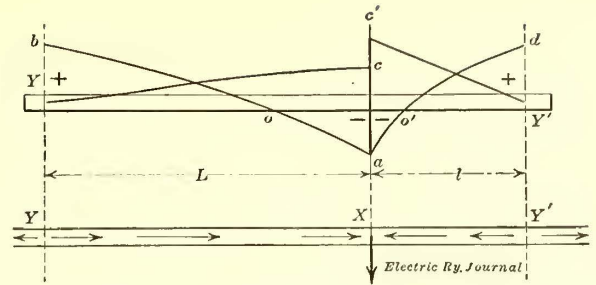


Fig. 2—Edmonton Radial Railway—Voltage Drop Diagram

Fig. 2 as in Fig. 1 excepting that Xc, Xc' = respective sub-section loadings.

In both figures

$$Yb + Xa = Y'd + Xa = \text{section voltage drop, } e.$$

By the above method we obtained a number of points on the system corresponding to X in the diagrams, which should constitute tapping points on the rails for the negative feeders. The voltage midway between these points should be seven with equal loading intensity. After the best points for the taps were found theoretically they were readjusted, where necessary, to fit junction points on the track, to keep the current density in the rails at a minimum value. For the present scheme a density of 13 amp to 14 amp per square inch was arranged for. The rails are all bonded together at junction points and the respective rails are bonded together for 55 yd. and cross-bonded for 110 yd. The tapping points thus determined for the Edmonton system were as shown in Fig. 3, the tapping points being lettered T-1 to T-8.

NEGATIVE FEEDER CALCULATIONS

The next step was to decide upon the voltage drop to be allowed in the negative feeders. As in the present case, the question of capital expenditure was of importance, two estimates were made, one based on a 15-volt drop and the other on a 30-volt drop. In the latter case, an over-all drop on the system of 100 volts was allowed, including the drop in the feeders and the 7-volt drop in the rails, this being a practical value for city work.

When determining the cross-section of negative feeders, the following points were observed:

- (1) The ohmic resistances of all negative feeders should be identical, unless negative boosters are employed.
- (2) The currents returning by all feeders to the generating station should have the same value.
- (3) The currents returning by all feeders to respective substations should be the same.

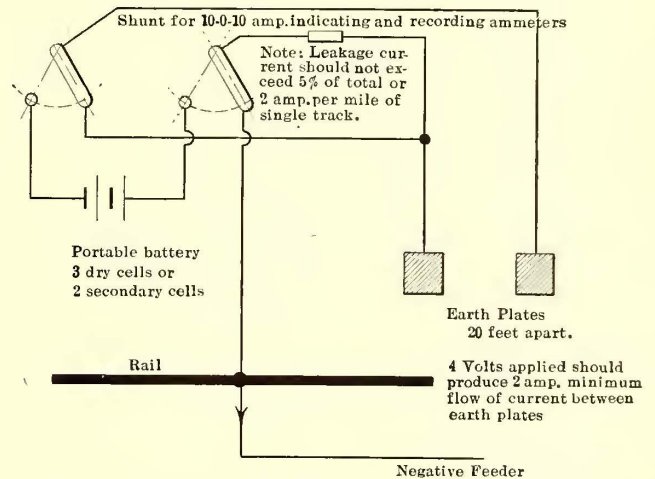


Fig. 4—Edmonton Radial Railway—Diagram of Earth Plate Connections

(4) The over-all drops in all feeders, either to the power house or to the substations should have the same value.

With the insulated system of returns as adopted in this instance, two earth plates were provided at each point where a negative feeder taps onto the rails, the two earth plates at each point being situated 20 ft. apart. Provision was made at an adjacent cast-iron pillar for locating change-over links and leakage detectors, as shown diagrammatically in Fig. 4. It is important to note that no connection is made to earth, either at the power house or the substations. This insures that the track shall be maintained uniformly at earth potential, with the exception of the 7-volt potential peaks in the rails between the feeder tapping points. As mentioned above, two general schemes were developed, one based on a 15-volt and the other on a 30-volt drop. The figures giving the approximate costs are shown below.

Schemes 1 and 2 are based upon a drop of 15 volts. Scheme 1 provides for copper feeders throughout, from which it will be noted that the cross-sections are particularly heavy, and the cost of copper is high, while in Scheme 2 is indicated the reduction effected in the cost of feeders should negative boosters be employed for

feeders T-2 to T-7. Schemes 3 and 4 are based upon a drop of approximately 30 volts. In Scheme 3 negative boosters are not employed, while in Scheme 4 negative boosters are provided for feeders T-4 and T-5, and cast-iron resistors are inserted in feeders T-1 and T-8.

It will be noted from the tables that by employing negative boosters the cross-section of copper in one negative feeder, i.e. T-4, was reduced from 4.55 sq. in. to 0.867. The resulting drop in volts in the feeder, with full current, would be 141 so that, in order to make the over-all drop equal to 30 volts, a negative booster was inserted in series with the feeder which provides approximately 111 volts, the algebraic sum of the volts being equal to 30.

With regard to the use of resistances in negative feeders it will be seen, in the case of feeders T-1 and T-8, that, if the voltage drop is to be maintained at 30 the cross-section of copper in the feeders would have to be made so small that the current density in the feeders would be prohibitive. In order to augment the drop in potential, therefore, cast-iron resistors are inserted in series with them. It will be seen that the whole object of employing negative boosters and resis-

SCHEME 1									
Feeders	Current in Amperes	Length of Feeders in Feet	Resistance of Feeders in Ohms	Resistance per 1000 Feet	Cross-section of Feeders in Square Inches	Current Density in Amperes per Square Inch	Voltage Drop in Feeders	Weight of Copper in Feeders, in Pounds	Cost of Feeders at 22 Cents per Pound
T ₁	867	1,800	0.1732	.00964	.867	1,000	15.02	6,050	\$1,330
T ₂	867	1,960	0.1732	.0035	2.385	363	15.02	18,100	3,960
T ₃	867	6,800	0.1732	.00255	3.273	264	15.02	86,400	19,000
T ₄	867	16,750	0.1732	.00103	8.11	197	15.02	526,000	115,300
T ₅	867	8,357	0.1732	.00207	4.04	214	15.02	131,000	28,800
T ₆	447	5,160	0.336	.00652	1.278	349	15.02	25,500	5,600
T ₇	447	6,690	0.336	.00503	1.658	269	15.02	42,000	9,220
T ₈	447	1,450	0.336	.02315	0.361	1,236	15.02	2,020	443
Total.....								\$37,070	\$183,653

SCHEME 2									
Feeders*	Cross-section of Feeders at 1000 Amperes per Square Inch in Square Inches	Corresponding Voltage Drop	Booster Volts	Booster Amperes	Booster Kilowatts	Cost of Booster	Cost of Switch Gear and Wiring	Weight of Copper in Feeders, Pounds	Cost of Copper in Feeders
T ₁.....	.867	15.02						6,050	\$1,330
T ₂.....	.867	41.3	27	867	23.4			6,580	1,445
T ₃.....	.867	57	42	867	36.2			22,800	5,030
T ₄.....	.867	141	126	867	108.4			56,250	12,380
T ₅.....	.867	70.2	55.2	867	47.8	\$16,000	\$4,770	28,100	6,180
T ₆.....	.447	43	28	447	12.1			8,940	1,960
T ₇.....	.447	55.3	41	447	18.4			11,400	2,520
T ₈.....	.361	15.02						2,020	443
Density here	1236								
Total.....								142,140	\$31,288

*Lengths of feeder same as Scheme 1.

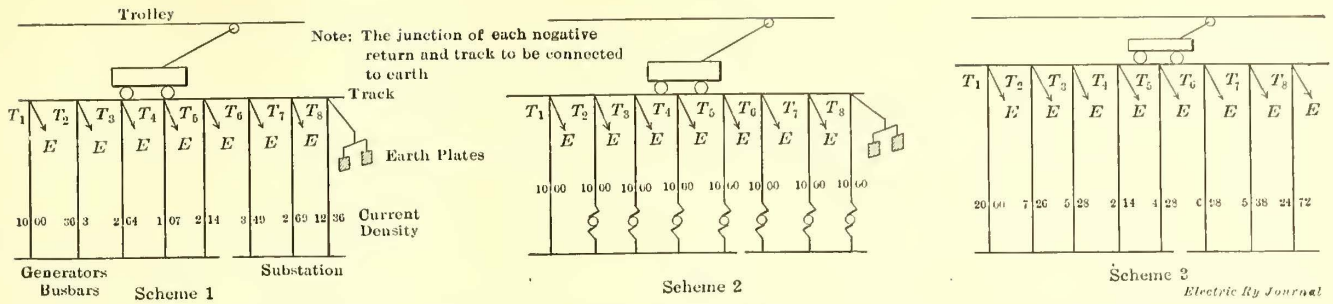
SCHEME 3									
Feeders	Current in Amperes	Length of Feeders in Feet	Feeder Resistance in Ohm	Feeder Resistance per 1000 Feet Ohm	Cross-section of Feeder, in Square Inches	Current Density in Feeders, Amperes per Square Inches	Voltage Drop in Feeders	Weight of Copper in Feeders, Pounds	Cost of Copper in Feeders
T ₁	867	1,800	.03464	.01928	.4335	2,000	30.04	3,025	\$665
T ₂	867	1,960	.03464	.007	1.1925	726	30.04	9,050	1,980
T ₃	867	6,800	.03464	.0051	1.636	528	30.04	43,200	9,500
T ₄	867	16,750	.03464	.00206	4.55	214	30.04	263,000	57,650
T ₅	867	8,357	.03464	.00414	2.02	428	30.04	60,500	14,400
T ₆	447	5,160	.0672	.01304	6.39	698	30.04	12,750	2,800
T ₇	447	6,690	.0672	.01006	8.29	538	30.04	21,000	4,610
T ₈	447	1,450	.0672	.04630	1.805	2,472	30.04	1,010	221
Total.....								418,535	\$91,827

SCHEME 4*									
Feeders†	Cross-section of Feeders at 1000 Amperes, per Square Inches	Corresponding Voltage Drop	Booster Volts	Booster Amperes	Booster Kilowatts	Cost of Resistor or Booster	Cost of Switch Gear and Wiring	Weight of Copper in Feeders, Pounds	Cost of Copper in Feeders
T ₁.....	.867	15.02	15	867	13	\$30		6,050	\$1,330
T ₂.....	.867	41.3						9,050	1,980
T ₃.....	.867	57						43,200	9,500
T ₄.....	.867	141	111	867	95			56,250	12,380
T ₅.....	.867	70.2	40	867	34.68	7,776	\$1,800	28,100	6,180
T ₆.....	.447	43						12,750	2,800
T ₇.....	.447	55.3						21,000	4,610
T ₈.....	.361	15.02	15	447	6.7	20		2,020	443
Total.....								178,420	\$39,223

*Same as 3, with exceptions as given. †Length of feeders as in Scheme 1.

COMPARISON OF COST BETWEEN SCHEMES 1, 2, 3 AND 4, INCLUDING POSITIVE FEEDERS, BOOSTERS AND LABOR

Item	SCHEME 1			SCHEME 2			SCHEME 3			SCHEME 4		
	Quantity	Rate	Cost	Quantity	Rate	Cost	Quantity	Rate	Cost	Quantity	Rate	Cost
Negative cables.....	837,070	22c per lb.	\$183,653	142,140	22c per lb.	\$31,288	179,870	22c per lb.	\$91,827	178,420	22c per lb.	\$39,223
Labor and insulators.....			6,775			6,775			6,775			6,775
Negative boosters.....				1	23.4 kw					1	95 kw	
Negative boosters.....				1	36.2 kw					1	34.6 kw	7,779
Negative boosters.....				1	108.4 kw	16,000						
Negative boosters.....				1	47.8 kw							
Negative boosters.....				1	12 kw							
Negative boosters.....				1	18.4 kw					2	Feeder resistance	50
Booster switch-gear.....				4	867 amp	1,600				2	867 amp	800
Panels.....				2	447 amp	800				2	Motor panel	500
Panels switch-gear.....				6	Motor panels	1,500						
Cable connections for boosters.....						150						50
Erection of boosters and switch-gear.....						720						400
Test panel.....	1		200			200	1		200	1		200
Voltage pilot wire.....	50,000 ft.		800	50,000 ft.		800	50,000 ft.		800	50,000 ft.		800
Earth plates.....	16	40	640	16	40	640	16	40	640	16	40	640
Positive cables.....	268,524	22c per lb.	59,000			59,000			59,000			59,000
Labor and insulators.....			18,636			18,636			18,636			18,636
Totals.....			\$269,704			\$138,109			\$177,878			\$134,850



Figs. 5, 6 and 7—Edmonton Radial Railway—Diagrams of Different Plans for Controlling Rail Voltage Drop

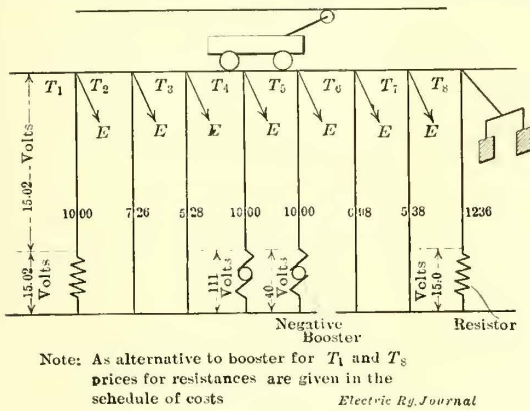
tors is to effect economy in the amount of money to be invested in cables. Without the adoption of resistances in short feeders, the voltage drop would be purely determined by the length of the shortest feeder. This would mean a very large section of copper for the long feeders, in order to keep down the resistance.

Under some circumstances by a little adjustment it may be possible to do away with negative boosters and

serted in feeders T-4; in this instance the corresponding area is supplied with current by positive feeders J, K, L and M, so that, the booster being series wound with the field connected in circuit with the positive feeders, the voltage added by the booster is in proportion to the load. The sum of over-all drop in the feeder and the booster voltage is proportionate to the current, the same as in an unboosted feeder.

Incidentally, it should be noted that provision should be made for preventing the racing of the booster in the event of the motor fuses blowing or the motor ceasing to operate through some cause or other. This racing may be prevented by providing an automatic switch which will short-circuit, consecutively, the booster field and booster armature.

Fig. 3 shows the new system of positive and negative feeders, laid out from the study described above. This study showed that with the adoption of Scheme 4, or of this scheme with a substation in the northwest, the efficiency of distribution will be approximately 15 per cent better than with the present system, and since the present power charges are approximately \$16,000 per month the saving in this direction will be \$28,800 per annum.



Scheme 4

Fig. 8—Edmonton Radial Railway—Diagram of Plan for Controlling Rail Voltage Drop

use resistors for equalizing the potential drop in the negative feeders. Such an arrangement depends on the form of the network and the position of the station relative to it. Where negative boosters are employed it is important that the positive feeders shall supply current to areas corresponding to those which deliver current to the particular negative feeder in which the boosters are inserted. The diagram in Fig. 9 shows the connections for the negative booster to be in-

MEETING OF THE MANGANESE STEEL SOCIETIES

On April 14 a meeting was held in New York of the Manganese Track Society and the Manganese Steel Founders' Society—two open-price organizations of companies engaged in the manufacture of manganese steel. The members of the Manganese Track Society present at the meeting were representatives from the Pennsylvania Steel Company, Cleveland Frog & Crossing Company, Morden Frog & Crossing Company, Pettibone Mulliken Company, and William Wharton, Jr., & Company, Inc. The other members of the track society are the Elliot Frog & Switch Company and the Ramapo Iron Works.

The members of the Manganese Steel Founders' Society in attendance at the meeting were the Edgar Allen American Manganese Steel Company, Taylor-Wharton Iron & Steel Company, St. Louis Steel Foundry Company, Pettibone Mulliken Company and Pennsylvania Steel Company. The general plan of these societies was described in an interview with Arthur J. Eddy which appeared on page 984 of the issue of this paper for Nov. 1, 1913. Mr. Eddy is counsel for the associations and is usually present at the monthly meetings, which alternate in New York and Chicago.

Previous to the regular meeting, the standardization committee, of which Victor Angerer, of William Wharton, Jr., & Company, is chairman, held a meeting April 13. Mr. Angerer reported progress along the lines of standardization, principally of steam railroad special work, with which the committee is working with a committee of the American Railway Engineering Association. The meeting of April 14 was devoted principally to a discussion of steam railroad matters.

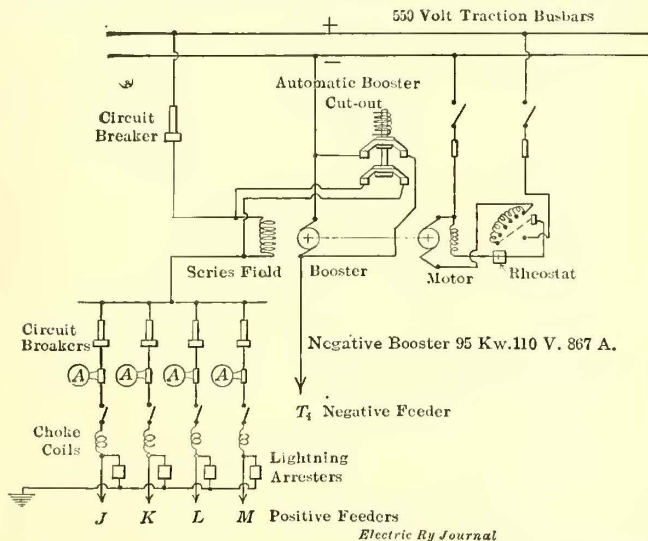


Fig. 9—Edmonton Radial Railway—Diagram of Booster Connections

Traffic Statistics in Pittsburgh

A Department for the Collection of Data Regarding the Loading, Routing and Operation of Cars on This System Is Maintained so That the Service Is Always Adequate to Meet the Changing Requirements of Traffic—An Outline of the Methods Followed by the Pittsburgh Railways Is Published

For some years past the Pittsburgh Railways have maintained a department of traffic statistics which has been organized for the purpose of collecting data regarding the loading, routing and operation of passenger cars on the system. The work is kept going continuously, every line in the system being placed under observation at least once in six months.

The department consists of eight men who work in the office up to 4:30 p. m. of each day and spend their time from 4:30 to 6:30 p. m. either riding on the cars or checking the operation at various points along the lines. This force reports to a traffic agent whose duties are largely supervisory, the title now being held by J. W. Welsh, electrical engineer of the company. The eight observers, when they are on the cars, observe and record the number of passengers on and off at each stop. Each one also records the time of arrival at certain fixed time-points for the purpose of showing whether the car is ahead of or behind its regular schedule. The total running time for the trip is also recorded and notes are made to cover any unusual delays which may be experienced during the course of the run.

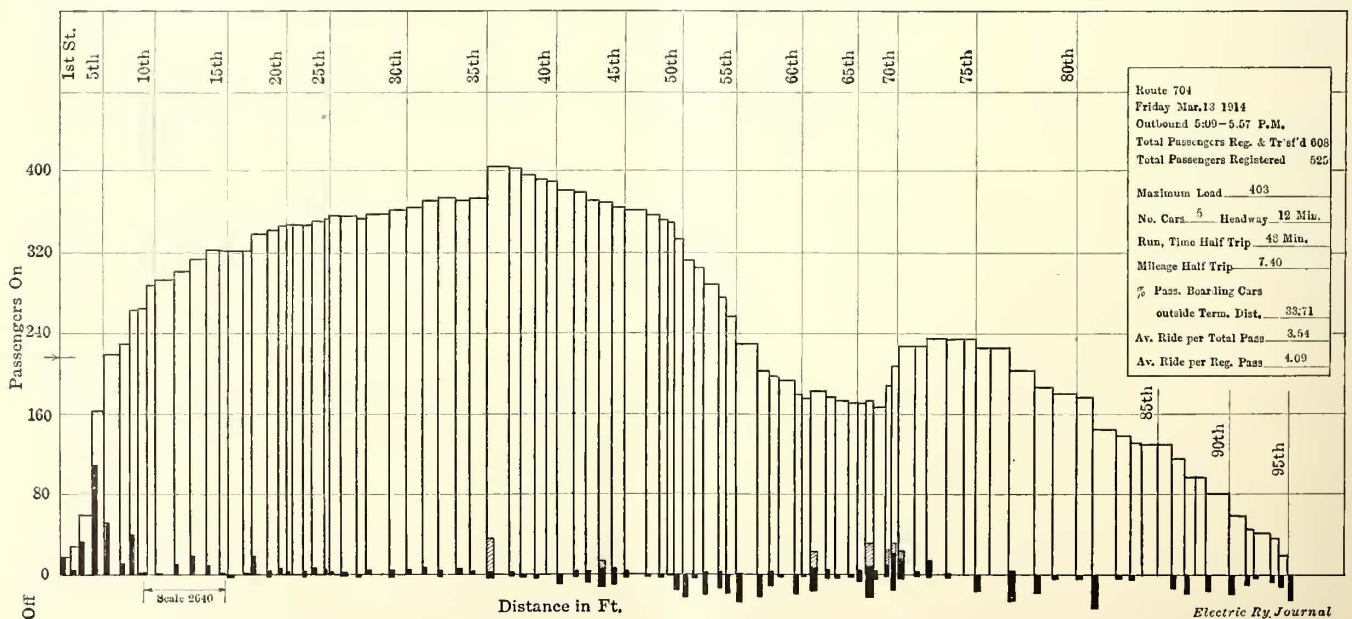
The results of these observations are entered in a "checker's report." The form for this report contains a space for the routing, generally given by number as well as destination, time of starting the trip, the number of the car, the date, the direction, the train number and the weather conditions. The body of the report contains a list of all of the names of street crossings or other points where stops are made. These names are entered by typewriter because only a comparatively few records are made on any one route. Certain stops are permanently established as time-points, and these are indicated in the report by asterisks, the checker putting down the time of arrival whenever the car reaches one of these points. In the report are columns headed "Passengers On" and "Passengers Off," the latter column being divided in half to provide space for the passengers getting off the front of the car and

for those leaving by the rear exit. Transfers are not registered on the Pittsburgh Railways so that in order to obtain the check from the register reading at the end of a trip the passengers who present transfers are reported separately, and the number is circled.

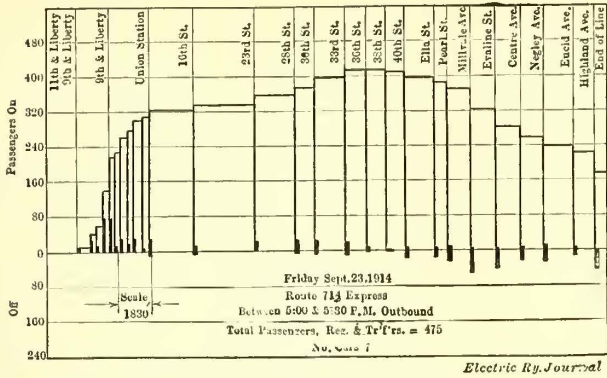
At the end of the line the figures are totaled to show the number of passengers boarding the car, the number leaving by the front exit and the number leaving at the rear. The total number of fares as shown by the cash register is then entered and the number of transfers added to this, the result affording a check against the total number of boarding passengers. Spaces are also provided at the end of the report for the scheduled time and actual time of leaving the city and also for the time when the car is due at the end of the line and when it actually arrives.

On the reverse side of the checker's report the various time-points are written in, and the running time between each successive pair is calculated and entered in a column paralleled by the scheduled running time between the time-points. In addition space is provided for comment regarding the matter of maintenance of headway, whether the service appears to be sufficient, whether the car carried the proper signs, whether the train number is correct and in proper place and whether the car carries proper markers. There is also a space for general remarks by the checker.

From the average of the eight checkers' reports that are turned in each day, the "characteristic curve" of the route under observation is made up. The area inclosed by this curve is obtained by running over it with a planimeter, and then by dividing the area by the height that would be represented by the total number of passengers riding during the trip, as obtained from the conductor's register, the mean length of ride per passenger is calculated. The average of the results obtained from the reports of each of the eight observers riding on different cars during the rush hour on the same route has been found to give a figure which is thoroughly representative of conditions existing on all



Pittsburgh Traffic—"Characteristic Curve" of a Typical City Line Showing Total Results for Five Cars



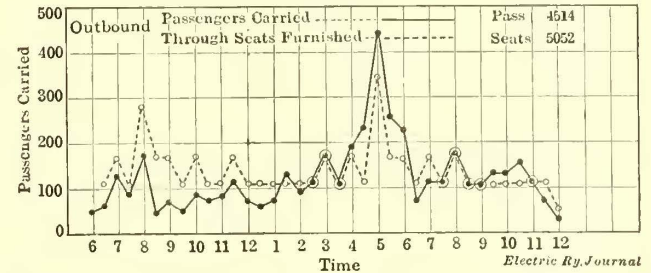
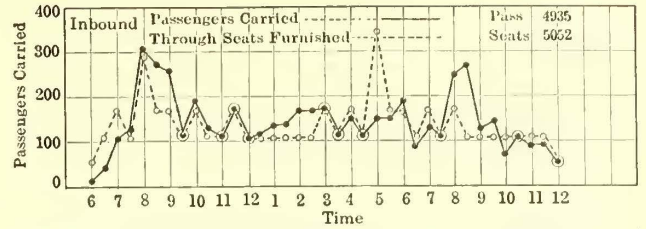
Pittsburgh Traffic—"Characteristic Curve" for Suburban Express Run Showing Total Results for Seven Cars

cars on the route in question and which, in consequence, may be used with confidence.

The "characteristic curve" is also used to establish the relation between the total number of passengers carried during any trip and the maximum load on the car at any one time. This figure is obtained in the form of a percentage by dividing the maximum number of passengers on the car at one time, as shown by the high point in the "characteristic curve," by the total number of passengers boarding the car, as shown by the number of fares and transfers indicated on the conductor's trip sheet. It has been found by experience that this relation between total passengers carried and maximum load at one time is approximately constant for all cars on any particular route. In other words, the percentage of short-riders varies but little on any given route.

Two of the "characteristic curves" are reproduced herewith, one showing the curve for a suburban run with a limited number of stops and the other showing a typical city run. It will be noticed that the curves are made up in accordance with a fixed horizontal scale representing distance so that the mean length of ride may be accurately fixed by the method outlined above.

From the "characteristic curves" for the lines on any one street a "combined characteristic curve" for all lines on the street may be obtained. One of these "combined characteristic curves" is reproduced herewith, and this shows the conditions existing for inbound traffic on Smithfield Street, one of the main lines entering the business district of the city. From this it will be seen that less than 30 per cent of the passengers entering the city on all of the lines on this street ride past Fifth Avenue and that only about 5 per cent ride past Seventh Avenue. Obviously, this curve is an unanswerable argument in case complaint is made about infrequent service on through lines past the latter street, as the convenience of only 5 per cent of the riders should not

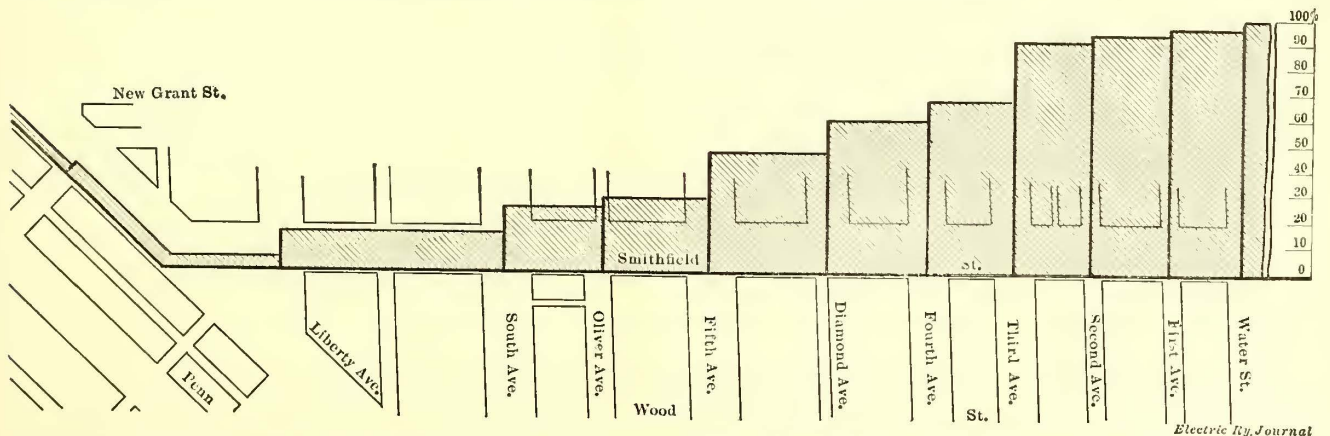


Pittsburgh Traffic—"Half Hourly Load Curve" for Typical Suburban Line

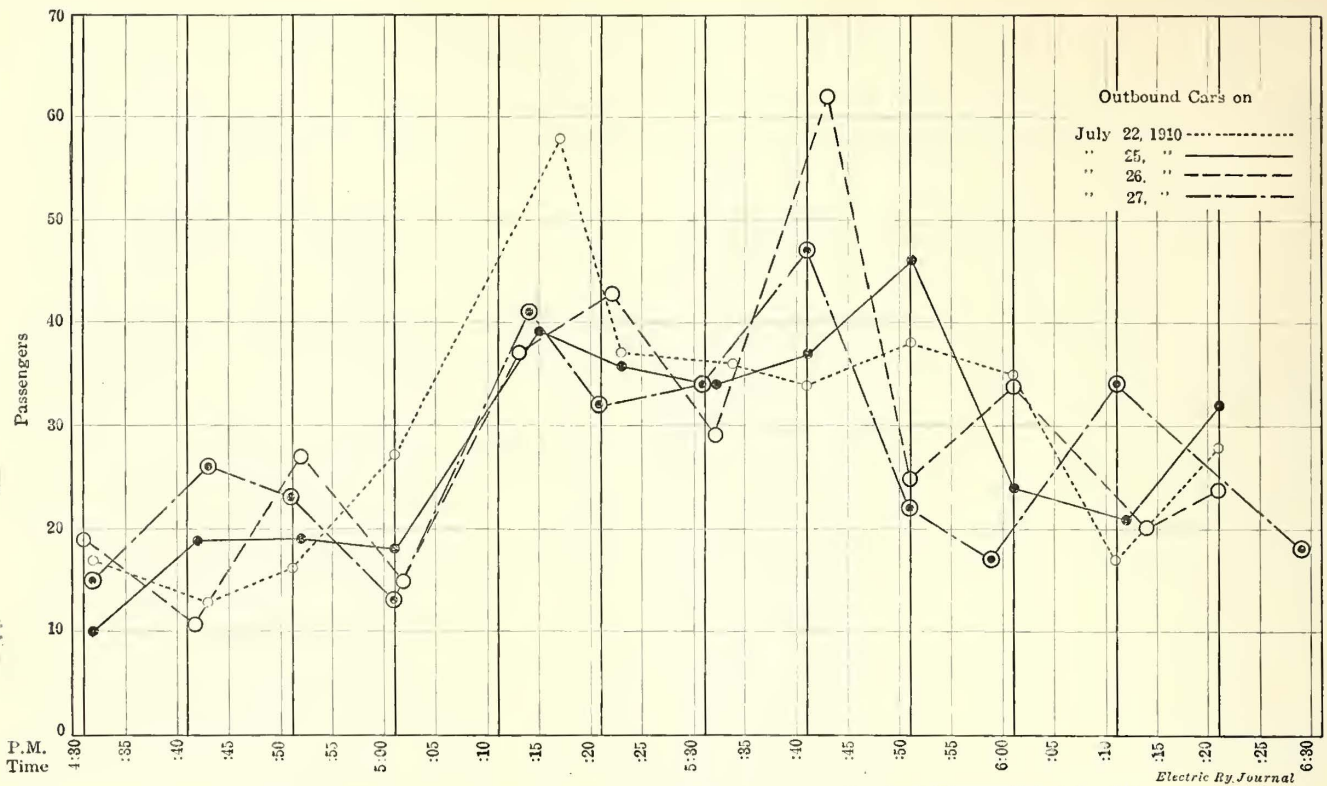
reasonably necessitate the running of all cars that enter the city on Smithfield Street through to Liberty Avenue.

From time to time the characteristic curves on each route are checked by placing men at points of change in the rate of loading, as indicated by a general change in the direction of the "characteristic curve." This work is done only occasionally and not as a matter of routine. Generally, it is undertaken when conditions are changed owing to re-routing or when some other outside influence has been introduced. These checks of the "characteristic curve" for any route are made by having the observers report the number of passengers on every car that passes the point at which they are stationed. When the results of their observations are averaged, a curve is plotted which resembles the "characteristic curve" for the route except that it shows diagonal lines extending between points of observation instead of the broken line of the exact records of the "characteristic curve." The difference between the two is that the check curve applies to every car on the route and is exact only in so far as it applies to the points of observation. The "characteristic curve" is exact with regard to the particular cars upon which observations are taken, but the curves naturally apply to every car on the route only upon the assumption that the records of the cars that are observed are typical of all. As mentioned before, this is a close approximation only.

Observations by men stationed at fixed points are also taken to determine whether the service on any line is ample. Such observers are placed at the point of maximum load indicated by the "characteristic curve" for the route. The observers record the total number



Pittsburgh Traffic—"Combined Characteristic Curve," Showing Percentage of Traffic Off at Various Points on a Main Line



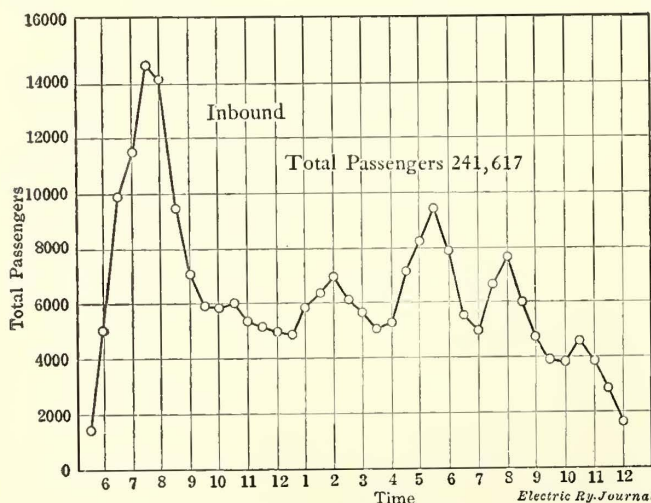
Pittsburgh Traffic—"Time-Load Curve" for Four Days at Typical Times Point in City

of passengers on each car passing the observation points during the evening rush hour, and, as it has been found that they become extremely accurate in their estimates of loads after a comparatively short period of training, they are able to determine very closely the number of passengers on cars which do not even make a stop at the point of observation.

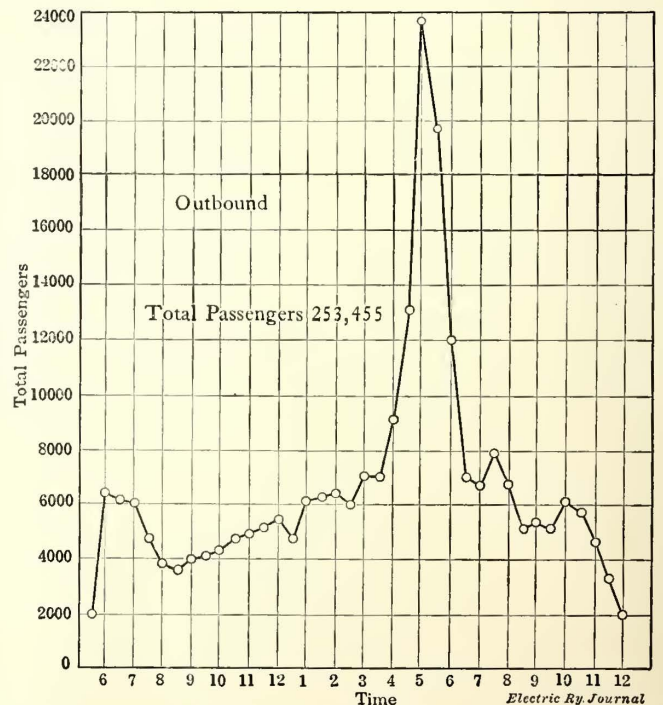
The traffic department also prepares what is called a "half-hourly load curve" for the individual routes by totaling the number of passengers riding on each car on the route as indicated by the conductor's trip report or day card. The points on the curve show the number of passengers riding on all inbound cars leaving the outer terminal of the line during each half hour and on all outbound cars leaving the business district of the city during each half hour. The figures for outbound and inbound cars are separately summarized and plotted. Typical results are shown in the curve reproduced herewith. From time to time the results

obtained on the different routes are summarized and shown in a "half-hourly load curve" for all routes. Two of these curves are reproduced herewith, one for outbound cars and one for inbound cars. These show the total number of passengers carried on the sixty-six routes entering the business section of the city for one day, based on a five-day average.

In some cases the total number of through seats furnished is determined from the number of cars in service during the different half-hour intervals, and the results are plotted on the same sheet to show the rela-



Pittsburgh Traffic—Inbound "Half-Hourly Load Curve" Summarized for Sixty-six Routes Entering Terminal District



Pittsburgh Traffic—Outbound "Half-Hourly Load Curve" Summarized for Sixty-six Routes Entering Terminal District

tion between the two figures during the different hours. Of course, the number of passengers carried does not serve as a measure of the maximum number of passengers on the cars at any one time, but this, as previously explained, has been found to be a reasonably constant percentage of the total number of fares paid and transfers turned in on any particular route. As a result this figure may be obtained directly from the curve and plotted below it, thus showing the number of standees, if any, during the rush hour.

Another curve which is made up by the traffic department is called a "time-load curve." This shows whether each car passing a fixed point of observation is ahead or behind its schedule and also shows the load on the car. The point of observation is generally taken at the point of maximum load for the route as indicated from the "characteristic curve." One of these "time-load curves" is reproduced herewith. The vertical lines indicate the times when successive cars are due at the point of observation. The circles indicate the time when the cars actually pass the point of observation. When the circles lie at the right of the vertical lines it shows that the car in question was behind its schedule. When the circle falls to the left of the vertical line, it shows that the car in question was ahead of its schedule. In general the results from three or four successive days are shown on the same sheet so that conclusions may be drawn without depending upon a single set of results. The "time-load curve" indicates the sufficiency of service and naturally permits the elimination of cases where a car is delayed and thereby carries more than its share of the load.

A limit of fifteen minutes' headway is set for all lines within the various communities served by the system, and when the schedule is not close to this limit cars may be taken off or added, if the service is found to warrant the change. However, the needs of the rush-hour traffic on the various routes, as they change from time to time, are generally supplied by putting on or taking off trailers and leaving the schedules unchanged.

OLD AND NEW FEATURES AT SACANDAGA PARK

BY R. M. COLT, GENERAL PASSENGER AGENT FONDA, JOHNSTOWN & GLOVERSVILLE RAILROAD COMPANY

Sacandaga Park, in the Adirondack foothills of New York State, is almost unique as a resort with a dual personality. Its resident population during the summer is about 3000 persons, who enjoy our two large hotels and some 300 cottages. In addition to this seasonal summer resort feature we solicit and secure a one-day excursion patronage of about 100,000.

The tastes and demands of the long term summer resorters, who come to us for periods varying from two weeks to a season, call for the concerts which are given three times a day by a first-class eight-piece orchestra stationed on the veranda of our large hotel. We also maintain a standard nine-hole 3090-yd. golf course which has grass tees and regulation circular greens 50 ft. in diameter. The course abounds with natural and artificial hazards, and is in charge of a competent professional, who teaches and has general charge of the links and club house. We consider that a golf course is absolutely essential to a successful summer resort, and because of this belief we have spent thousands of dollars in maintaining a standard. In addition to golf the summer resort patrons demand tennis courts, which are largely patronized.

The one-day excursion business, like the general run of amusement enterprises, is the hardest feature to handle, because this business requires changes and inno-

vations from season to season. Last year we eliminated the flat charge of 25 cents for dancing and ran what is known as the "5-cent dance." This allowed people who desire to dance but two or three times to do so for a nominal charge, as the 5 cents includes the dancing of a couple. This change brought about an increase in the dancing revenue of about \$1,000 for the season.

In years past we have tried with varying experiences the playing of vaudeville, dramatic, farce comedy and musical shows. This year we intend to run nothing but moving pictures. Because Sacandaga Park attracts an unusually intelligent class of patrons, as explained above, the visitors coming from New York, Brooklyn, Boston, Chicago, St. Louis and other large cities, we expect to secure the best possible service and first-run pictures. Thus, when a reel is shown for the first time in New York City, for instance, it will appear also at our theater at Sacandaga. This service costs us 50 per cent less than we have been paying for our shows in the past.

As everyone knows, the sentiment among the dancers has changed to such an extent that the waltz and two-step are but rarely danced, and the popular demand is for music suitable for the tango and other dances now popular. Aside from this, I know of no particular change in the sentiment of the public other than the necessity of novelty and innovation in the line of entertainment.

WAR DEPARTMENT GRANTS REVOCABLE PERMIT FOR STREET RAILWAY

In the laying out of San Francisco's municipal street railways one of the lines to the exposition was located across the Fort Mason military reservation, which lies just to the east of the exposition grounds. There was some delay in securing the permit, but it is now in the hands of the city board of supervisors. The time limitations of the permit, which is dated March 30, 1914, are that construction of the railway shall commence within 30 days, and that cars shall be operated on it before Oct. 15, 1914.

Other conditions set forth by the military authorities are that the construction and maintenance of the road through the reservation shall be subject to the commanding general's direction and supervision. Within three months after being notified of the revocation of the license, the city is to remove the railway and restore the grounds to their original condition. Any street railway company that wishes to run its cars over the city's tracks is to be allowed to do so, sharing the expense of operation and installation under such an agreement as may be approved by the Secretary of War. Finally, it is provided that any sum which may have to be expended by the United States in putting the premises in proper condition after the revocation of the license shall be repaid by the city.

The Pennsylvania Railroad has recently issued a record showing the length of tracks as of Dec. 31, 1913, and the increase or decrease during the year 1913, for all the transportation lines owned and operated by or associated in interest with itself. The statistics are compiled from official data on file in the office of the engineer of maintenance of way. The length of tracks in miles of the Long Island Railroad as of Dec. 31, 1913, was as follows: First track, 394.66; second track, 148.29 third track, 29.36; fourth track, 18.58; company's sidings, 233.69; total track, 824.58. The increases in miles for 1913 were as follows: First track, 0.36; second track, 1.19; third track, 3.08; fourth track, 1.44; company's sidings, 4.95; total track, 10.3.

Meeting of Iowa Association

An Abstract of the Technical Discussion at the Eleventh Annual Convention, Held at Cedar Rapids This Week—Abstracts of Two of the Papers Are Presented

There were 120 attendants at the convention at Cedar Rapids this week of the Iowa Street & Interurban Railway Association. It was the eleventh annual meeting of that organization and was held at the Montrose Hotel. Like all previous conventions, it was characterized by great enthusiasm and interest in the work and readiness to exchange experiences to the fullest degree on the transportation matters which came up for consideration. This ideal condition is brought about largely because of the fact that most of those at the convention have attended regularly for a number of years and realize the benefits of association discussions and are well acquainted with each other.

Frank J. Hanlon, president of the Mason City & Clear Lake Railroad and vice-president of the association, presided because President Cass was detained at Waterloo on account of sickness in his family.

At the opening session on Thursday, April 23, the delegates were welcomed to the city in an appropriate address by Louis Roth, Mayor of Cedar Rapids. Mr. Hanlon replied to this address and then called upon M. A. Welsh, Jr., of the Waterloo, Cedar Falls & Northern Railway, who spoke on "Some Results Obtained From the 'Safety First' Campaign."

After the completion of this paper, which described the work being conducted on the Waterloo, Cedar Falls & Northern Railway, R. A. Leussler, assistant general manager Omaha & Council Bluffs Street Railway, complimented the author on both the paper and the work which had been done in Waterloo. He said that his own road had also engaged extensively in "safety first" work and had obtained similarly good results. He believed, however, that such a campaign must be carried on continuously or the good results would fall off because of the tendency of the public to become careless and forget the importance of caring for their own safety. E. C. Allen, general manager Cedar Rapids & Marion City Railway, said that that company had obtained good results from issuing "safety first" notices to the employees. These were delivered to the employees with their pay checks. This insured attention to the folders. Mr. Welsh stated that the cost of the publicity part of their safety campaign alone had been between \$2,000 and \$3,000.

T. E. Wood, of the Omaha & Council Bluffs Street Railway Company, read his paper on "Shop Practice," and the discussion was opened by John Sutherland, master mechanic of the Tri-City Railway Company. This company is planning new shops at present. O. S. Lamb, Waterloo, stated that he considered it cheaper to buy gear cases than to make them, and that the purchased cases gave longer service than home-made ones.

Walter Evans, of the Edgar Allen Manganese Company, Chicago, referred to the new shops in Detroit and C. M. Feist, of the Sioux City Service Company, took up the building of cars by railway companies. The latter stated that the costs of such work were higher in Sioux City than in Omaha on account of the smaller number of cars constructed. He also described the very successful work of the company in reducing brush consumption from 7000 to 500 per year. This was accomplished by utilizing the results of systematic tests, by more careful inspection and by using a lower acceleration rate on the cars.

In the afternoon, by courtesy of the Iowa Railway &

Light Company, Cedar Rapids, the attendants at the convention were taken on a two-car vestibule train to the State University at Iowa City. Here Prof. A. H. Ford lectured on "High-Tension Lightning Protection" and gave demonstrations of lightning arresters, arcing rings and similar devices. These experiments conveyed a vivid impression of the effect of high voltages and disruptive discharges.

On Thursday evening the Sons of Jove initiated sixty new members at a big rejuvenation and afterward the railway men attended a theater party given through the courtesy of the Iowa Railway & Light Company and the Cedar Rapids & Marion City Railway Company.

On Friday morning M. M. Lloyd, master mechanic of the Des Moines City Railway, delivered his paper on "The Cleaning and Disinfecting of Street and Interurban Cars." This paper and Mr. Wood's are given in abstract below. The technical portion of the program was followed by an executive session.

The convention was a most successful one and the papers and discussions showed the value of concentrating attention on the subjects which are of practical importance in every-day work.

THE CLEANING AND DISINFECTING OF STREET AND INTERURBAN CARS

BY M. M. LLOYD, MASTER MECHANIC DES MOINES CITY RAILWAY

The cleaning and disinfecting of cars is a matter that it has not received the care and thought it should. All kinds of diseases are carried into cars by passengers and from there into homes. Any car which has been used by a passenger suffering from a contagious disease should be taken in at once, and disinfected either by the health department or by properly instructed shopmen.

Cars should be swept out nightly. After the dust has settled it should be wiped off of seats, window rails and all other places where it lodges with a clean rag moistened with "O'Cedar" oil, "Yucca Birch Spray" or some good dust allayer. Care should be used not to apply enough oil on the cloth to leave streaks or spots on varnish. Cars will be cleaned more easily if they are housed in a warm shed beforehand. After cars are cleaned and scrubbed they should be left in a warm room where they will be thoroughly dried out before being put in service. Dampness around seat legs and baseboards not only breeds disease, but rots the floor and causes loose seats. Cars should be thoroughly cleaned every six days, scrubbed and disinfected. Ceilings should be scrubbed once between painting periods or every six months. Before sweeping, cars should be sprayed with some dust settler and disinfected to keep the dust on the floor. We use "Chloro-Naphtholeum," three tablespoons to 1 gal. of water for sprinkling floors and cuspidors, and on woodwork one tablespoonful to 1 gal. of water. This compound does not injure the varnish or paint nor does it leave an unpleasant odor.

If there is a toilet on the car, a can of disinfectant should be located above the seat and kept in good order all the time. The toilet should be cleaned and disinfected nightly. The inside of toilets should be kept well coated with lead paint to keep out vermin, and to pre-

vent lodging places for germs from saliva expectorated on the walls. It is good practice to line the interior of toilet with metal. Cuspidors should be thoroughly cleaned and disinfected nightly. The smoking compartment should also be disinfected nightly so that the car will go out in the morning free from the smell of tobacco smoke. Too much attention cannot be given to cleaning the express and smoker compartments.

We find that clear water applied with a brush is the best method to clean the outside of a car. In summer we use the water direct from the hydrant; in winter, it is heated to about 100 deg. Fahr. If the water is too hot it will turn the varnish white and injure it. If there is anything on the outside of the car that clear water will not remove, we have it taken off by a painter, for if the use of "Gold Dust," "Snow Boy," lye or any strong potash soap or powder is allowed, too much of it may be used to the detriment of the varnish.

Nearly all car cleaning preparations contain a large percentage of potash or soda. When they are strong enough to cut the grease or oil they will attack the varnish. The hose is the quickest and most effective and cheapest way of getting dirt out from around the side post, under the windows and around the seat legs. A long-handled brush with a hose connected through the handle with a $\frac{1}{8}$ -in. stream of water through the center of the brush gives a cheap and quick way of washing the outside of cars. The brush is prevented from scratching the varnish by commencing at the top and washing down to soften and wash off the dirt. A separate compartment should be provided for regular car cleaning and scrubbing. I would recommend a building with plenty of light, air and heat. The tracks of such a building should have enough elevation to permit the water to drain off readily while the car is being washed. Some danger exists in using hose on the inside of the car if the car wiring is not in good condition, as short circuits might occur on account of defective insulation.

SHOP PRACTICE

BY THOMAS E. WOOD, MASTER MECHANIC, OMAHA & COUNCIL BLUFFS STREET RAILWAY

It will be my object to present briefly some of the practices in the shops of the Omaha & Council Bluffs Street Railway Company. We have earnestly endeavored to expedite repair work and at the same time reduce its cost, and to accomplish these results we have installed labor-saving appliances wherever possible and have arranged for a careful routing of the work through the shop.

Among the labor-saving appliances worthy of mention, probably the most important are those for lifting. These include cranes, jacks, air hoists, etc. We have equipped every machine which handles parts too heavy for one man to lift, with an I-beam jib crane and air hoist. The repair pit is equipped with a power-driven jack for lifting cars to remove trucks and with hand-operated hydraulic jack for the removal of wheels and motors. The use of templets wherever a number of identical parts are required also saves much time which would otherwise be wasted in measuring and fitting.

To prevent needless travel between the different parts of the shop we have carefully grouped all machines employed in each of the principal operations. For instance, in the wheel department, we have grouped the wheel press, the wheel lathe and the boring machine, and have placed a jib crane in such a position that it can serve all three machines. Wheels and axles are delivered here and assembled. Wheels are then ground and taken directly to the storage tracks near the pits where they can be easily reached when wanted. However, since the

same machines may be used in different classes of work, it is not always possible so to group them that all extra travel is avoided. In such cases, they should be arranged to serve the heavier pieces, and trucks should be provided so that the parts which have to travel any distance can be moved easily and quickly.

We have also done a great deal of experimenting during the last few years to find out how we could maintain machinery adequate for profitable repair work and also to maintain a competent repair force. The result is that we build all of our car bodies, and have been able so far to do this work at less initial cost. The time required to turn out a given number of cars, however, is somewhat uncertain, as we are frequently compelled to transfer the mechanics from new construction work to repair work, which receives the preference at all times.

LIGHTING

Both of our shop buildings have large window areas. The original building, erected in 1905, is lighted from above by means of ordinary skylights, which allow the sun's rays to shine directly into the building, but as this was uncomfortable for the men the skylights have to be covered with curtains, which, during long periods of the day, cut off light needed in adjacent parts of the building. In our new building, erected in 1912, we have used saw-tooth roof construction with skylight windows facing north and have found the lighting from them very satisfactory in every way. Artificial light is provided by incandescent lamps throughout the building, with arc lamps or incandescent clusters over machines or other places where more intense illumination is required. We have recently installed a number of large tungsten lamps for general illumination of the shop floor, and have found them a great help.

SAFETY

The "safety first" spirit is promoted by the fitting of all machines with guards and other safety appliances so far as possible, for we believe that "safety first" pays us, not only by decreasing the number of injuries to workmen but also by increasing the output of the shop. A man will do more and better work when he knows that he is safeguarded in every possible way than when he feels that danger is always near and that he must divide his attention between the work and avoiding the danger.

MACHINE SHOP AND BLACKSMITH SHOP

The shops have many features in each department which I will cover briefly in their respective order.

The blacksmith shop has a small power-driven trip hammer, which has paid for itself many times. Furthermore, a great deal of blacksmith work is saved by the use of our wheel press fitted with dies shaped to press forgings to desired form.

The machine shop is located in the same room with the truck shop in order to avoid unnecessary transfer of heavy parts. All machines, so far as possible, are arranged with this point in view. In most cases, a jib crane with an air hoist serve three machines. In this shop special attention is given to the artificial lighting of each machine. The wheel press, besides being used for wheel work, is also used as a "bulldozer" for all work which is too heavy to be done in the punch and shear. This class of work includes bolsters, platform knees, the straightening and reinforcing of iron poles, etc. Our experience has been that this machine is amply large for our requirements. All wheels, whether new or old, when pressed on the axle are ground with a Springfield grinder. We have recently installed an "oxy-acetylene" welding machine which generates its own gas. Broken repair parts, which were formerly

thrown into the scrap pile, are now welded for a small part of their original cost. We are also using the thermit process for heavy welding, such as motor frames and truck frames. Truck frames are welded without taking the truck apart.

Another feature worthy of mention in the machine shop is the gear case manufacturing department, which represents a very small investment and has proved very profitable. The cases are made of No. 18 sheet steel, double seamed and reinforced where necessary with $\frac{1}{4}$ -in. iron. The front end bracket is forged steel, and the rear bracket is crucible cast steel. When completed this case weighs about 40 lb. up to and including cases for 50-hp motors. The cost of these cases is about one-third of the cost of those purchased in the market, and the life is about the same.

The pits in this shop are of our standard design—the open type—concrete pier construction; well lighted, naturally and artificially. Two pits are equipped with, and two others are arranged for, the Pittsburgh car hoist for body removal. Two pits are equipped with the swing-rail wheel-removing feature. For this work, as well as for the removal of motors, air compressors, etc., hydraulic jacks, mounted on wheels, are employed. Air hoists are also employed when necessary for removal to other parts of the shop.

ARMATURE AND ELECTRICAL REPAIRS

The requirements of this department have been arranged to suit our local conditions and might not be desirable for other properties. The armatures and bearings are received from the truck shop on trucks and handled in the armature room by a jib crane arranged to reach all machines. The armatures are tested, then distributed to the winders' stands. After completion they are sent to the turning lathe, where they are turned and undercut and also receive transformer test for short circuits. Our transformer is mounted on the wall directly back of the lathe, so that it takes only a minute or two to make the test. From here they are delivered to the banding lathe, which also has an undercutting device. All armatures are tested first with a d.c. bar test and then with a high voltage breakdown test. When completed they are delivered to the store room.

All bearings are rebabbitted in this room and are fitted to the armatures on the same machine that turns and undercuts commutators. The field coils are also taken care of in this room. First they have a transformer test, after insulating they are dipped and then sent to the store room. The controllers, circuit breakers, resistance and all minor electrical repairs are performed by one man of this department, assuring efficient and effective work. All circuit breakers are calibrated before they leave this department. We have found this work to be very essential, as many breakers vary either way as high as 20 per cent of their setting. All electrical apparatus is given a breakdown voltage test before leaving.

PAINT SHOP

During the past few years many new and quick methods of painting cars have been brought out. We, however, require ten days for finishing a new car. This assures us a job that will last from six to eight years, if revarnished every sixteen or eighteen months with a good grade of varnish. New work is brought up to the last coat of color in the building shop and finished in the varnish room.

We have a wash rack for cleaning old cars which come in for a general clean-up and varnishing. On a job of this kind, it takes about six days to put a car through the shop. In this room we also have a power

sewing machine, used for curtains and destination signs. Our standard glass for transom is chipped. Most of it is cut from scrap, and we do the chipping ourselves. It is nearly all done during the winter months and at times when our regular work is slack.

OTHER DEPARTMENTS

The building containing the erection, cabinet shops and mill room is opposite the old shops, with a transfer table between, and accommodates twenty-seven cars. The cabinet shop is of the gallery type and has a material elevator, electrically operated. We also have a well equipped and conveniently located drafting room.

DIESEL ENGINE ECONOMIES

In a book recently issued by the Busch-Sulzer Brothers-Diesel Engine Company there is a great deal of information regarding the economies to be secured by the use of this type of engine. The following table gives in concrete form a bird's-eye view of the situation from the thermodynamic and mechanical efficiency standpoint.

PRIME MOVER EFFICIENCIES		Efficiency, per Cent
Type of Plant	B.t.u. per Bhp Hour*	
Non-condensing steam engine.....	30,000-38,000	8.4-6.6
Condensing steam engines and turbines using superheated steam at 150 lb. per sq. in.....	17,000-25,000	15-10
Diesel engines.....	7,500- 8,000	35-32

*One hp-hour = $\frac{33,000 \times 60}{778 \text{ b.t.u.}} = 2545 \text{ b.t.u. per hour.}$

The type of stationary Diesel engine built by this company belongs to the four-stroke-cycle type of internal combustion engine, the cycle of each cylinder being completed in two revolutions of the crank or four strokes of the piston. On the first stroke pure air is drawn in or induced. During the second stroke this air is compressed. Oil is sprayed into the compressed air through an atomizer by means of an air blast on the third stroke, entering the combustion space of the cylinder at the point of highest compression, when the air previously drawn in has been compressed to 460 lbs. per sq. in. pressure. At the same time the compression has raised the air temperature to 1000 deg. Fahr., a magnitude three to eight times as great as that required for ignition. Meanwhile the products of combustion are allowed to expand, producing mechanical power. Finally, in the fourth stroke, the exhaust gases are expelled. The engine does not contain an explosive mixture at any time, no explosion occurring in any part of the cycle of operation. On account of the method of burning the fuel oil no carburetor, vaporizer, hot bulb, plane or electrical ignition is necessary. The period of spraying the oil into the cylinder covers from 10 per cent to 12 per cent of the combustion stroke, during which the burning is gradual, continuing for a considerable time after all the fuel has been injected. This combustion then occurs in an incandescent atmosphere under conditions calculated to insure perfect combustion, smokeless exhaust and high thermal efficiency.

Under the old method of ventilating the tunnels of the Underground Railways, London, England, the air was withdrawn by means of an exhaust fan. By the device now being installed at Edgware Road, Euston and the new Embankment stations air will be pumped into the tunnels throughout the day and night. Ordinary air is passed through a washing screen which extracts all impurities, the requisite humidity is next imparted, a proportion of ozone added, and it is then sent into the stations at the rate of 25,000 cu. ft. per minute.

SNOW REMOVAL CONFERENCE IN PHILADELPHIA

Half a hundred municipal and traction company officials met in Philadelphia April 16 and 17 to formulate methods of snow removal. This, the first session of its kind, was inspired by the embarrassment caused many large cities in the East by the unusually heavy snowfalls of the last winter. The trend of the discussion is indicated in the report tentatively submitted at the close of the conference by Capt. Mark Brooke, Corps of Engineers, U. S. A., assistant to engineer commissioner, Washington, D. C., who was chairman of the committee on resolutions. This committee, which was completed by J. L. O'Toole, superintendent bureau of highways and sewers of Pittsburgh; William H. Connell, chief bureau of highways and street cleaning of Philadelphia; William H. Lynch, superintendent department of highways and public improvements, Harrisburg, Pa., and R. B. Hamilton, vice-president Philadelphia Rapid Transit Company, offered the following recommendations:

First—The city should determine zones within which complete or partial snow removal is to be made.

Second—The approved policy is to "fight" the snowfall as soon as it begins.

Third—Studies leading to the utilization of sewers should be made, involving the special location and design of special types of manholes.

Fourth—The co-operation of traction companies and of property owners should be secured, in order that the former may clear a wider section of the street and the latter adopt a uniform system of cleaning sidewalks.

Fifth—Another conference should be held in the autumn of the present year to carry forward the work begun at this time.

In Boston, according to a paper sent by Louis K. Rourke, commissioner of public works, the city is districted into 270 miles of suburban streets and 100 miles in the city proper, from which the snow is promptly removed. In a light fall, machine sweepers are used to sweep the snow to the gutters, where it is loaded into carts by hand. When the snow becomes heavier, road scrapers are called into use, and for exceptional storms the work is turned over to contractors, operating in six so-called snow districts. Each driver is provided with a ticket, divided into quarter hours, which is punched both at point of loading and at the dump. Tally sheets are also kept by inspectors at each point and these are used to check the amount claimed by the contractor, as shown by the punched tickets. Although it is not required to do so, the Boston Elevated Railway removes the snow from a large part of the street, using carts and sleighs through the day and gondola cars at night. The gondolas are hauled to one of the many bridges, where the snow is unloaded into the water—a method recommended by Mr. Rourke as most efficient. Sewers are used to a limited extent.

John W. Doherty, Belmont Construction Company, Philadelphia, was strongly in favor of using large scoops—say, of 1-cu. yd. capacity—and stated that the ordinary cost may be cut in half by means of scoops, ploughing, and the use of sewers.

J. L. O'Toole, superintendent of the bureau of highways and sewers of Pittsburgh, inquired whether it had been proved that autos could get sufficient traction for operating snow plows, but unfortunately no one present was able to give any information on this point.

The side of the traction company was presented by Martin Schreiber, engineer maintenance of way, Public Service Railway Company of New Jersey. He explained that the company operated some 865 miles of single track, through 140 municipalities, having a population of about 2,000,000. The territory was divided

into six divisions, extending from Jersey City to Camden, N. J., with an approximate area of 1100 square miles. The procedure in each division varied somewhat on account of local conditions, but generally the principles were the same, as the property was operated from a central office through a departmental organization. No special supervisory organization was required in handling snow, but the regular force of employees was enlarged. The snow-fighting equipment consisted of seventy-six snow sweepers, twenty-one shear plows, two rotary plows and seven work cars equipped with levelers. Early in the fall all of the plows and sweeper assigned to particular trackage were actually operated on those lines on trial trips and all troubles were promptly remedied.

As soon as a storm set in, all of the departments marshalled their crews and extra men at the various yards and carhouses in each division. Ordinarily one trackman inspected 10 miles of track, but during a storm at least six men were kept busy, cleaning switches and special work on a section of this length. The crews for the plows and sweepers were kept on waiting orders at full pay, so that no time would be lost in getting into action. As soon as the snow reached a depth of about 2 in., the sweepers were brought out and operated continuously during the entire storm.

As soon as the snow collected on the sides of the tracks, through the plows and sweepers being operated over the roadway, it was forced away from the tracks, if the storm continued, by means of levelers attached to the side of the sweepers and plows, or special work cars. Depending on the severity of the storm, two or more track laborers were assigned to each plow or sweeper for the purpose of digging out snow and ice by hand shovels whenever drifts were encountered. The rotary plows were reserved for handling the extra heavy drifts which occurred more frequently on outlying districts or suburban lines. When the snow began to collect faster than it could be handled with the snow-removing apparatus, the outlying lines were abandoned first and the apparatus concentrated on the city service.

As soon as the snow was piled in any quantities along the side of the tracks, the work of removing it was started. The largest part was hauled away by teams and dumped into sewers, rivers or meadows; and in one community a great quantity was dumped into a canal. Definite schedules were mapped out so that the railway company removed all the snow on certain highways between building lines, and the city all the snow on other streets. Some municipalities removed all the snow themselves and the railway company was billed for its portion of the cost on streets having car tracks. One of the customs of the company is to follow up the men on snow removal with special provision car, so that the men are supplied with hot coffee and sandwiches.

Mr. Schreiber thought that it was doubtful, under present conditions, if the railway company could make many more improvements for cleaning track and roadway of snow. It might be considered possible to haul snow to established dumps with work cars at least on streets where tracks exist, as it could be done much cheaper than with teams, but no one would finance an investment for established dumps and equipments to use for hauling snow only, and the possibility of the snow-fighting equipment being used for so short a time would always be the cause of strong argument against the development of any special machine for melting or removing snow. Improvement was possible through further co-operation of the railway company and municipality. Stations and dumps could be established and the railway company could contract with the municipality for hauling all the garbage and refuse. In the winter, in case it was required to haul snow, all

the equipment for garbage disposal, including the stations and dumps could be pressed into service for disposal of the snow without any extra investment expense. Another plan would be to design streets and roadways with special gutters equipped with flushing apparatus, which could be used for cleaning and draining streets as well as getting rid of the snow.

The intelligent use of large sewers was advocated by F. H. Clark, superintendent of streets, Springfield, Mass., who had found great success in this method. George S. Webster, chief engineer bureau of surveys of Philadelphia, also added his approval of the use of sewers, if care was not taken to admit dirt or ice.

The conference was presided over by Morris L. Cooke, director of the department of public works, of Philadelphia.

WORK OF COMMITTEE ON LIFE OF RAILWAY PHYSICAL PROPERTY

At the meeting of the American Society of Civil Engineers on April 2, reported in the issue of this paper for April 11, Martin Schreiber, Public Service Railway, Newark, N. J., co-chairman of the joint committee on the life of railway physical property of the Engineering and Accountants' associations, described the history and work of that committee. The following is a more extended abstract of Mr. Schreiber's remarks than was published in the issue of April 11.

About three years ago the American Electric Railway Association, appreciating the importance of depreciation, through its allied associations (American Electric Railway Engineering Association and American Electric Railway Accountants' Association) appointed a joint committee of six members, comprising three accountants and three engineers, to investigate the subject. This committee is still in existence and is known as the joint committee on life of railway physical property. The subject was taken up with serious thought and energy, using sincere and earnest endeavors to comply with its purpose. The data secured from the properties with which the individual members were connected were not only examined, but the committee got in touch with qualified representatives of most all of the large electric railway companies in the United States. Amplified inquiry forms were sent out and personal solicitations made, in an attempt to get figures expressing the life of railway physical property or definite tables which would accomplish the same results.

In general, it was found from those having practical experience and, in many instances, the responsibility of a particular item of railway property which was under investigation, felt that any attempt at present to express the life of railway property explicitly was at best a guess.

After three years of study of the life of railway physical property, from every source obtainable, including the accumulation of a more or less complete bibliography of the subject, this joint committee reached the following conclusions:

1. That the basic elements which determine the life of railway physical property which affect its usefulness are: *a*, use; *b*, climatic and soil conditions; *c*, maintenance; *d*, inadequacy; *e*, obsolescence; *f*, the human element; *g*, the public demand; *h*, earnings.

2. That it is not practical or even theoretically possible compositely to assemble these several elements into any form of a logical "life table" that will apply equally in Maine and in California, in Minnesota and in Louisiana, or on different routes or lines of the same system embracing such physical property.

3. That the ultimate solution of depreciation of railway physical property is insured earnings.

Anyone interested may find a full report of the committee, with discussions, in the 1912 and 1913 annual proceedings.

It has happened that a great many of the points covered in the conclusions above have practically been acquiesced in this afternoon. It seems that the only way to consider depreciation, if at all, is as suggested by Professor Swain—to designate or set apart a certain portion of the earnings each year to be used for that purpose. Depreciation is an operating problem and is simply deferred maintenance, and, generally, if the amount is proper, allowing for reasonable contingencies, it is used up year by year. This is because the railway physical property does not have to be replaced all at one time, but on a piecemeal basis, as it were.

Now, as to the important subject of proper general methods for valuation for the purpose of rate-making, it is the speaker's firm opinion that there is only one consistent method to follow, and that is, the cost of reproduction new, and that depreciation should not be taken into account. All the user is concerned about is proper service, and he doesn't care a whit about depreciation if the service is not impaired. My attention has just been called to a recent decision of one of the commissions which I think is pertinent in connection with the report before us. It is contained in the sixth annual report of the Public Service Commission of Montana for 1912 and 1913, in the case of J. F. Edwards vs. the Helena Light & Railway Company, in which the commission says:

"Assuming that rates were being made for a new plant, it would be the total capital that must be considered as entitled to bear interest, as there would be no accrued depreciation. Depreciation is a liability against the property which must be accounted for, but in making allowance for future depreciation it is not the intention to provide for accrued depreciation which, it is assumed, has been taken care of. To simplify the matter, let us assume that an investment is made in 1903 of \$100,000 under a twenty-year franchise, rate of interest allowable 10 per cent per annum, and figuring 5 per cent per annum depreciation. At the end of ten years, or in 1913, the property will have depreciated \$50,000 and has a remaining value of a like amount. Then, if rates are made, based on the depreciated value, they must be one-half of the original rates, although the service may be just as efficient as it ever was, and in ten years more, the physical value of the plant would be nil, and likewise upon the same basis of reasoning, the utility would not be permitted to charge anything."

In conclusion, the speaker thoroughly appreciates the great task which the committee on valuation for the purpose of rate-making has undertaken. He thinks that this committee deserves a great deal of credit, and he agrees with a considerable portion of the report. He is quite sure that the committee of the American Electric Railway Association will be very glad to co-operate in every way with the committee of the American Society of Civil Engineers and will furnish any information and data on the particular subject of depreciation which it has at its disposal. The National Electric Light Association would also probably have pertinent data which it would be willing to furnish on the subject. Certainly no conclusions on the whole report should be accepted until the utilities, which are so vitally interested in the question, could at least have an opportunity properly to present their views.

A dynamometer car which has been designed for the Imperial Government Railways of Japan by Prof. E. C. Schmidt, of the railway department of the University of Illinois, is expected to be received at Urbana, Ill., this month, when the final assembling will be done.

COMMUNICATIONS

LIMITED DEFINITION FOR SIGNAL FAILURE ADVOCATED

MADISON, WIS., April 21, 1914.

To the Editors:

The question of "What constitutes a signal failure?" should certainly be "thrashed out," and all roads should use the same standard in preparing their signal reports.

Signals are installed to indicate the condition of the block, and if the block is not safe for a train to proceed according to schedule it is proper for the signal to indicate stop. Primarily signals indicate the presence or absence of a train on the main track within the block. A train on a siding, fouling the main track, may cause just as serious an accident as though it were on the main line. So also may an open switch or broken rail cause just as serious an accident as a collision. Therefore it does not appear to be proper to say that a signal has failed when it does indicate stop for any of the above reasons. Neither is it proper to call such stop indication "creditable failures," as is done in some cases.

Webster says that to fail is to come short; to miss. Surely a signal does not come short or miss when it does the very thing it is designed to do. Signal apparatus is manufactured and installed according to specifications which require that the failure of any essential part, or the loss of power, shall cause it to give a stop indication. It therefore follows that a broken wire must cause the signal to indicate stop. The feeder panels, transformers and line wires are a part of the signal system, and their failure is as much a failure of the signal system as would be the failure of a relay or signal mechanism. Comparative reports are, of course, highly desirable, but to be of any value they must be made up on a comparative basis, and in view of the wide differences of opinion that now exist the question should be put up to the signal committee of the American Electric Railway Association for a decision.

M. H. HOVEY, Consulting Signal Engineer.

ELECTROLYSIS MITIGATION

STEVENS INSTITUTE OF TECHNOLOGY
HOBOKEN, N. J., April 20, 1914.

To the Editors:

I have read with interest the articles which have recently appeared in your valued journal relating to electrolysis mitigating systems and would like to call attention to a number of points referred to in these articles in regard to which there is frequently considerable misunderstanding.

It is often not realized that all voltage drop which exists in the tracks must likewise exist in the earth in contact with these tracks. The insulated track return feeder system, as described in previous articles of your journal, has for its purpose the minimizing of the voltage drop which can occur in the tracks in contact with the earth, so that the stray currents through earth from these tracks are reduced to such low values that they are not sources of serious danger to underground metallic structures. This reduction in earth voltage drop is accomplished, (1) by making the track network a conductor of the lowest possible electrical resistance by means of adequate track and cross bonding and by interconnection of neighboring tracks, and (2) by removing current from the tracks at selected points on the track network and returning this current to the power supply station by means of insulated

return feeders. The voltage drop in these return feeders cannot produce stray currents through earth because these feeders are not in contact with earth. By installing a sufficient number of properly proportioned insulated feeders, the voltage drop in the tracks, and consequently also the stray currents through earth, can be reduced to any desired minimum values. The effectiveness of this method of reducing earth currents is independent of the amount of copper used above that actually required to carry the current, but the economy depends on the copper losses. The amount of copper to be used in the insulated return feeders is determined in the usual manner by making the fixed charges plus the cost of the energy losses in the feeders a minimum.

This system of insulated track return feeders is frequently confused with the method of paralleling the tracks with uninsulated return feeders, which latter method has been most commonly used in American electric railways. From the standpoint of reducing track voltage drop the two systems are however totally different. With copper feeders paralleling the tracks, the voltage drop in the tracks is reduced only in the proportion that the conductivity of the track circuit is increased. For example, an amount of copper paralleling the tracks equal in conductivity to the tracks could at best only reduce the drop in these tracks to one-half. It is therefore evident that where the voltage drop in tracks is high, this method would require a prohibitive amount of copper to reduce their voltage drop to reasonably low values. With insulated track return feeders, on the other hand, the voltage drop in the insulated feeders is removed from contact with earth and therefore this drop in the return feeders may be made as high as economy dictates. It should be emphasized that with insulated feeders, the tracks in the immediate neighborhood of the power supply station should be connected to the negative bus-bar only through a suitable resistance, as a direct connection at this point would practically convert the insulated feeders into uninsulated feeders, because both ends of these feeders would then be in contact with earth.

Many also believe that with insulated return feeders the conductivity of the tracks is practically lost. This is not so, because by properly selecting the voltage drops in the various return feeders, the tracks are used as return conductors, but the voltage drops in the tracks are not allowed to become excessive. In other words, the insulated feeders are used to remove the excessive current from the tracks, and the tracks themselves are used to return as much current to the station as they can carry without producing excessive voltage drop in the earth.

Since voltage drop in the tracks is the direct cause of stray currents through earth, and since the insulated track return feeder system aims to mitigate electrolysis by reducing the voltage drop in the tracks, it is desirable to watch the track voltage conditions, and for this purpose it is essential to measure periodically the over-all voltage drops in the tracks. Such measurements may advantageously be made between the point of lowest potential and the points of highest potential in the track network. For these measurements it is most convenient to have specially installed pilot wires extending from the tracks to some central point and so terminated that suitable voltmeters may be readily connected to these wires to indicate the voltage drop in each of the track lines. Such pilot wires can in most cases consist of No. 14 bare copper-clad steel wire, supported by insulators on poles or suspended with insulators from the span wires. These

pilot wires need not cost more than \$25 per mile installed, so that the installation of the required pilot wires does not generally involve a large expense. In some cases existing telephone or other line wires can advantageously be used for these tests instead of special pilot wires. With such pilot wires or other available wires, periodic tests of the voltage drops on each of the track lines should be made. The results of these tests are the best possible indication of the condition of the track work and of the entire return circuit. In England, such pilot wires are generally installed on electric railways, and recording voltmeters are employed to obtain records of the track voltage drop.

The writer feels confident that if the above matters have careful consideration it will be found that practically all serious cases of electrolysis trouble can be satisfactorily taken care of by proper track bonding and by adequate insulated return feeders. Periodic tests of track voltage drop made by means of pilot or other test wires and voltmeters also furnish a valuable and useful indication of the maintenance of the track bonding and of the distribution of currents in the return feeders, and, in fact, will furnish an indication at all times of the condition of the return circuit and of the track work.

ALBERT F. GANZ,
Professor of Electrical Engineering.

THE ACCIDENT PREVENTION ENGINEER

BY WALLACE WATT FULLER, CHIEF ENGINEER AND GENERAL SUPERINTENDENT OF THE CHARLESTON-ISLE OF PALMS TRACTION COMPANY

Accident prevention and the work of the accident prevention engineer should not be confused with the present "safety first" movement. The latter is largely, if not entirely, dependent upon agents, the public, moving picture shows and lecturers for its success, and, as a result, it has inherent weaknesses and limitations. Real accident prevention is based upon the knowledge and experience of men who are really trained and experienced in real safety work—the engineers—and upon this fact depends the true value of such work. A number of the larger electric railways are aware of the importance of this work and are already making some headway. Thus far, however, the results are generally indirect, and there still is a large opportunity for the use of an engineer who does not specialize in everything not pertaining to safety.

Boiler insurance, the parent of modern fire insurance, is perhaps the oldest and most successful form of well established accident prevention work. Accidents from boiler explosions were at one time very common; in fact, hazard from this source was accepted commonly as a necessary evil. A few saw that possibilities existed in the correction of this evil and that considerable profit could be made in making a legitimate sale of a little specialized knowledge where there had been lack of knowledge. The same may be said of modern fire insurance with its innumerable specialists, engineers, inspectors and others, searching out the weak spots for the purpose of correcting them. Such men as these are doing important work and are the forerunners of that real accident prevention work which will eventually become a large part of our economic system.

To get efficient results accident prevention work should be carefully planned to fit requirements and should be properly organized, especially in large work. It should be in charge of an experienced engineer, assisted by two or three student engineers, who could be trained in the work and otherwise made specialists

in this field. There should be, in addition, two combination clerks and stenographers who could soon be trained in all the work of the office, such as the making and keeping of records and files and the performance of other routine clerical duties.

The chief engineer would investigate all safety requirements and improvements in safety appliances and would approve or disapprove of their value for his use. Tests would be conducted by this department in the work of promoting safety, in sanitary conditions and in meeting certain special requirements arising in safety work. The chief engineer should make reports and recommendations direct to the vice-president or the president of the company, and copies of all resulting orders should be forwarded to the official heads of the operating, construction and maintenance forces. A department so arranged would quickly eliminate a large percentage of all avoidable accidents, and eventually these would become things of the past. The work would meet a popular demand, and in many instances would bring immediate benefit and relief to the interests served.

The education of employees should necessarily be an important factor of accident prevention work. This feature would eliminate the mentally, morally, physically and socially unfit and at the same time advantageously serve the fittest and effectively raise the general standard of men and service. The instruction should be given in regard to all weaknesses pertaining to the operation and maintenance of the property and the proper methods for the correction of these weaknesses.

The instruction should apply to all employees, whether in machine shops, repair shops, freight or passenger depots, or track or operating forces. In fact, the work would provide sensible safety in all respects and would extend to fixed inspections of bridges, trestles and special work, with a complete and accurate record of all, together with suggestions for improvements. The work should be subdivided as to the results to be obtained from each department, and booklets or pamphlets along educational lines should be compiled in simplified and attractive forms. In general the work should aim toward increased system, order and regularity in all aspects of the daily work of protecting employees and the public.

One of the many features in connection with such work would be the establishment of a bureau of safety suggestions, to which all employees and the public would be encouraged to send in suggestions on safety. Prizes might be offered to good advantage for the best and most acceptable ideas and suggestions.

The saving effected by such a department at the close of the first year's service should approximate \$50,000 for a large railway system. This would be followed by a large annual increase. In addition to the savings in actual property, there would be an increase in revenue that would more than offset the expense of installing and maintaining the department.

In the railway as well as the industrial fields, there is practically no limit to the application or scope of usefulness of real accident prevention. The benefits of such work can well be summed up as follows:

1. It would stop wastefulness and useless destruction of millions of dollars of property yearly.
2. It would possess almost illimitable value as a humane agency.
3. It would at once fulfill and meet a proper popular demand for real safety.
4. It would eventually eliminate the enactment of safety laws that might prove ruinous or hurtful.
5. It would be the safest, surest and most efficient form of insurance to cover all.

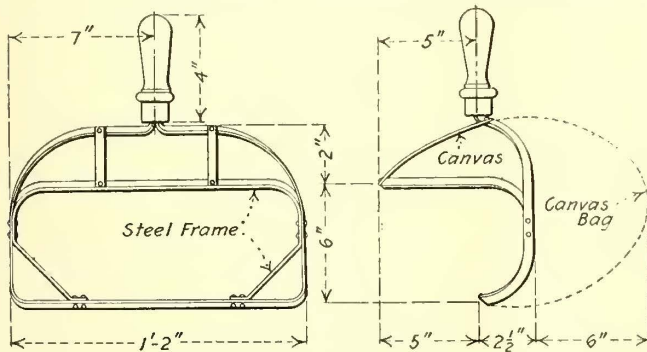
Equipment and Its Maintenance

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

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

A PAINTER'S RUST CATCH-ALL

The way and structure department of the Brooklyn Rapid Transit System has developed the rust catch-all shown in the accompanying sketches. This outfit is used by the painters to prevent rust or dirt from falling into the street after it is scraped from the elevated railway columns. The painter holds the bag with one hand



Painter's "Catch-All" Bag

and brushes the rust off with the other. The materials of the bag are canvas and a steel frame, the whole being made for 50 to 60 cents.

MAINTENANCE OF CARS AT ROME, GA.

BY A. WADE, MASTER MECHANIC ROME RAILWAY & LIGHT COMPANY

This company has 11 miles of single track with a number of 5½ per cent grades and many curves, some of which have 35 ft. radii.

In the table given below car maintenance includes inspection, oiling, cleaning, repairing, rebuilding and painting old and rebuilt cars, and all material used for car bodies, electrical equipment and trucks in all the work done and also includes the replacement of all derailed cars and taking cars out of service for trouble.

Total car miles.....	1912	1913
Total cost of maintenance of cars.....	548,966	607,100
Total cost of oil for cars and track curves.....	\$7,816.83	\$8,892.78
Cost of oil per 1000 car miles (cents)...	159.88	153.61
Total maintenance of cars per car mile (cents).....	29.12	25.31
Average mileage made by 33-in. chilled iron car wheels.....	1,424	1,465
Average power required to operate cars per ton mile (watts).....	no record	46,700
Derailements.....	179.2	182.9
Car failures.....	78	56
	14	10

The item "car failures" includes only the failures that delayed service for 10 minutes or more.

To obtain the energy required to operate the cars, meters were installed on the high tension side of the transformer for the converter; therefore, the figures given in the table as average energy required for operating cars per ton mile include the entire losses in the transformers and converters and the d.c. circuit and also the energy used in heating and lighting the cars.

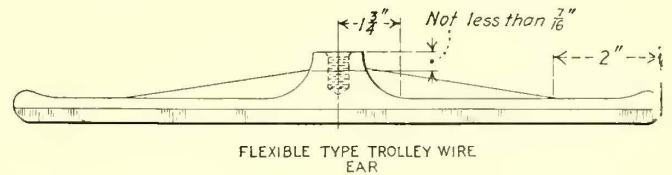
All cars are mounted on single trucks and have geared hand brakes only.

OVERHEAD LINE PROBLEMS--SPLICES, EARS, CLIPS, HANGERS AND ANCHORS

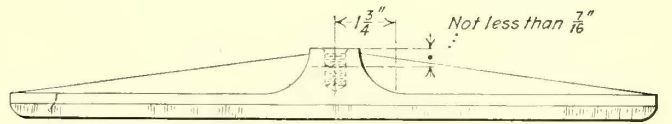
BY CHARLES RUFUS HARTE, CONSTRUCTION ENGINEER THE CONNECTICUT COMPANY

The splicing sleeve has always been an important—and aggravating—element in both construction and operation. The Philadelphia sleeve is admirable in all respects except one, but to a large and growing body of distribution men the necessity for soldering is the best of reasons for putting it in the obsolescent class, for the old-time lineman who could pour a sleeve without on the one hand annealing the wire, or on the other hand freezing without holding, has either taken up plumbing or has been bodily translated. Mechanical types of sleeve there are in many forms, but the lopsided ones are apt to twist over, while strength considerations practically prevent symmetrical forms. The splicing of ears at the outset involves waste of trolley except in the rare cases where the end of the wire falls at a span, and the thoughtless tendency of breaks to occur away from a span makes them of little value in maintenance.

The perfect splice must add the least possible weight and size increase to the lines; must develop full strength of wire; must have no tendency to weaken the wire; must give indication of any slip; must be easily applied to worn as well as to new wire, and at any point; must permit sag adjustment without the necessity of cutting the wire; and there must be no small parts to lose at a



FLEXIBLE TYPE TROLLEY WIRE EAR



RIBBED TYPE TROLLEY WIRE EAR

Two Types of Trolley Ears

critical moment. So far the devices are like the Italian's business: What he made on the peanut he lost on "da damn banan'."

THE EAR

To one not familiar with the facts the ear would seem to offer little field or occasion for inventive effort, but the number of types extant is only exceeded by the kinds of trouble they develop. Overheating and annealing difficulties have largely excluded the soldered ear from all service except for feed and anchorage. The weakness of the bell-type boss has been met by making the boss wedge shaped, extending it down to the run-

ner and sweeping it out with generous curves, but the tendency of the ends to turn up from the wire is still unpleasantly apparent on many lines; this, however, is undoubtedly less due to ear design than to line conditions. Slack trolley, heavy load at the ear, tight span wire preventing the ear from rocking—all these translate the stress wave from the collector into harmful blows, while improper trolley locations or faulty collector equipments grind down the sides of the runner and cause a maximum of injury. In the attempt to overcome this upturning two types of ear have been developed, one having the rib extended to the end of the runner, the other with the rib meeting the runner about 2 in. from the end and being thickened by a lump of metal on top. Logic would appear to be with the first type, but while a circular letter recently sent out developed strong partisans of each, practically no one answering had had actual comparative experience. The Connecticut Company has since installed a series of each under conditions which should insure equality of service, but sufficient time has not yet elapsed to warrant any conclusions of value.

The installation referred to includes several extruded ears, which are apparently gaining in favor. A new type of hub casting has materially relieved the stubby appearance of the first forms, and the uniform size and character of the extruded portion promise ease of installation and smoothness of wear that is said to be fully realized where such ears have been in use for any length of time.

In the matter of length there is the usual difference of opinion, with 14 in. for general choice on the three larger sizes of trolley, and 9 in. or 10 in. for No. 0. At least one company, however, installs first a 9-in. ear, and when it requires replacement uses the 14-in. size. Theoretically there is everything to commend this, and the user is confident.

CLIPS AND HANGERS

As yet there is no mechanical clip for round wire, but on grooved wire the 7-in. single clip with four screws is almost standard for straight line work, as is the three-screw-per-jaw double clip for curves. Early types gave much trouble by working loose, but by employing screws which project a trifle beyond the back plate when the wire is clamped and by lightly heading these projecting ends this trouble is obviated without seriously interfering with later removal of screw if desired. An exceedingly aggravating feature of the mechanical ear has been the fact that until recently practically every maker used a screw just enough different from his competitors to prevent interchange, and this nuisance still persists to a considerable extent.

For straight line support of the ear the single piece round top hanger is rapidly forcing the multipart cap and cone into the background, although the ability of the latter to grip the ear tightly at the proper angle to the lugs is a strong point. The threads on the round-top stud almost invariably start at the wrong point. Hence the ear, when home, does not make the same angle with the lugs that the trolley wire does with the span, and it is customary to carry on the tower thin steel washers in several thicknesses to be used on the stud as may be necessary. Two or three special types of round type have swiveling studs to obviate the necessity for such liners, but they are of doubtful value.

As turned out by most manufacturers the round top is highly satisfactory, although some types otherwise excellent are much too heavy. There have been, however, instances of poor composition which in hot weather soften sufficiently to let the studs pull out, while the ear seat is sometimes sufficiently above the plane of the rim to permit an ear with high rib to touch

the hanger shell or come so close that the gap is easily bridged. The requirements that the rim of the hanger be not over 1/16 in. below the plane of the stud face plate, and that the rib of the ear, at a distance of 1 3/4 in. from the center be at least 7/16 in. below the plane of the top of the boss, insure the necessary clearance. These requirements are met by the commercial products of most makers.

ANCHORAGE

What to do with regard to the end-on pull of the trolley is a moot question. Where the line is much broken by curves the latter absorb any unbalanced pull even though no special provision be made. Many companies install a special anchor at both ends of each curve and about every 2000 ft. on long tangents, while others use anchors only on bracket work, and still others rely on the line ears and their regular support to do all necessary holding. In the last case each span takes a part of the pull. So long as this portion of the total strain is small the practice works well. However, if the trolley wire tends to "creep" the spans pull sideways and the ear tilts, bending the wire at the lowered rear end so that it receives a heavier blow from the passing trolley wheel, while at the raised forward end the wire tends to pull out of the lips.

Where anchors are employed the double hub ear, soldered to the line with a Metropolitan-type strain plate to guy from, makes the best construction, although the necessary soldering is unfortunate. The half-ears extensively used a few years ago could not be installed without kinking the wire in the vertical plane, and have very largely disappeared; the strain plate is less subject to this trouble, but care must be taken that the guys pull equally or a kink in the horizontal plane will result.

SPlicing BROKEN TROLLEY POLES

BY CHARLES A. INGLE, ASSISTANT PURCHASING AGENT
ROCKFORD & INTERURBAN RAILWAY

A very large economy is effected on the Rockford & Interurban Railway by splicing broken trolley poles in the following manner:

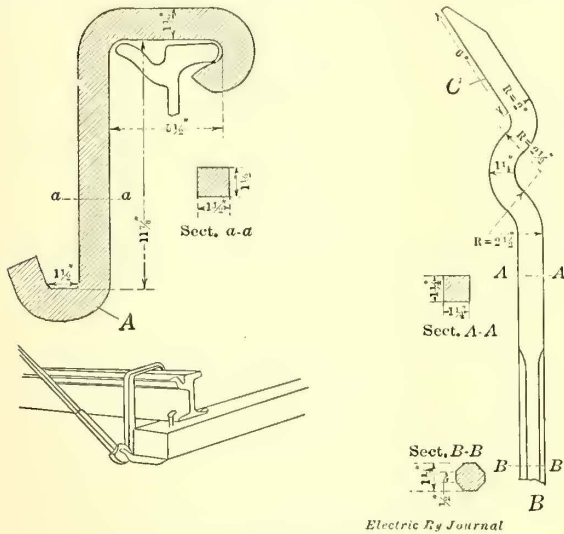
The broken poles are sawed off square at each side of the break, a piece of 1-in. steel tubing is inserted and the ends are heated and shrunk over this tubing, care being taken to cool as quickly as possible to prevent the material from becoming soft. The pole is then drilled on each side of the joint and riveted with a 1/4-in. rivet. The cost is very small, about 6 cents for labor and 6 cents for material, making 12 cents in all. Not more than 3 per cent of these reclaimed poles break at the splice. In general, this practice has cut trolley pole cost on the Rockford & Interurban Railway from 50 per cent to 60 per cent.

The Wisconsin Electrical Association has reprinted in pamphlet form the papers presented at the sixth annual convention of the association held at the Hotel Pfister, Milwaukee, on Jan. 15 and 16, 1914. The contents of the pamphlet include "Some Facts Relating to Depreciation and Rate Making," by Halford Erickson, member of the Wisconsin Railroad Commission; "Voltage Regulation, Its Necessity and How Accomplished," by G. G. Post, electrical engineer of The Milwaukee Electric Railway & Light Company; "Report of the Committee on Standards of Inspection for Overhead Distribution Systems," by S. B. Way, Peter Valier and C. R. Phenicie, and "An Accounting System for Small Central Stations," by H. G. D. Nutting, assistant to the president of the Clement C. Smith properties.

TIE-HOLDER FOR SPIKING NEW TIES

BY WALTER K. TAYLOR

To facilitate the spiking of new ties to the rail, the way and structure department of the Brooklyn Rapid Transit System has been experimenting with the tie-holding bar and fulcrum which is illustrated in the accompanying sketch. This contrivance embodies part "A," an "old man" which is patterned to fit the section of the rail to be laid, the bottom being low enough to be level with the bottom of the tie. The second part, "B," acts as a lever which engages in the lower hook of part "A" to give a fulcrum. To operate, part



Tie-Holder for Spiking New Ties

"A" is put over the head of the rail and the tie is lifted into place with the face "C" engaging the bottom of the tie. The leverage on a 3-ft. arm, as applied by a laborer of average strength, is sufficient to hold the tie in place while it is being spiked. The labor economy due to the application of this tie-holder is quite important, as only two men are required to operate it. It also greatly expedites the work of spiking. The simple arrangement precludes the necessity of repair or the possibility of breakdown. Another attractive feature of this tie-holder is that the cost does not exceed \$1.50.

PROGRESS IN TRUCK DESIGN

A recent publication of the Standard Motor Truck Company, Pittsburgh, Pa., shows the variety of trucks which this company builds for cars ranging from 35,000 lb. to 120,000 lb. capacity. Probably the heaviest electric truck built by the company is the Type C-100-A with quill suspension motors, used on the single-phase motor cars of the New York, New Haven & Hartford. The frame of this truck has a carrying capacity at the king pin of 65,000 lb. Pressed steel channel-shape sections are used for the side and end frames to secure sufficient lateral stiffness, to provide the necessary strength to resist the stresses tending to put the truck out of square and to maintain the principle of a single pedestal. The transoms are also of pressed steel channel-shaped sections.

Type C-80-P is a favorite pressed-steel design for high-speed interurban service. It is used on such lines as the Detroit United Railway and the Terre Haute, Indianapolis & Eastern Traction Company. The total carrying capacity at the king pins is 80,000 lb., or 40,000 lb. per truck. Type C-60-P, which is known as the "Interborough," is a medium-weight truck also for interurban service. These trucks are for car bodies

weighing from 35,000 lb. to 45,000 lb., with a maximum capacity of 60,000 lb. per pair of trucks. The maximum computed operating fiber stress in all parts of this truck, allowing 20 per cent for shocks, is 12,000 lb. per sq. in. of metal. This truck is used on the Seattle, Pittsburgh and other systems. Type C-50-P is a pressed-steel frame motor truck for city and suburban service under car bodies weighing from 18,000 lb. to 30,000 lb.

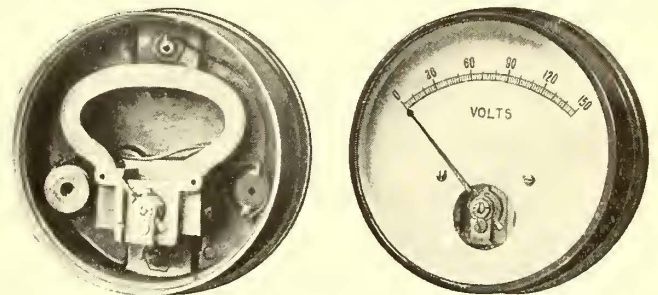
The solid frame short wheel-base double truck known as Type 0-50 is too widely used to require any description. The company also builds solid forged maximum traction trucks such as Type 0-36 for car bodies of 16,000 lb. to 22,000 lb., with a maximum load at king pins of 36,000 lb. per pair of trucks. As a maximum traction truck this design is notable for the use of equalizer bars.

Type AT-22-30 arch-bar, trail-car double truck was especially designed for the Pittsburgh Railways for use with 22-in. driving wheels. These trucks are of arch-bar construction with channel top arch-bars and transoms and with rectangular bottom arch-bars and tie-bars. Roller side bearings are used. Complete with wheels and axles the truck weighs 3900 lb., or 7800 lb. per pair of trucks. This truck is readily convertible to motor service. Other arch-bar trailer trucks are built for carrying capacities of 50,000 lb., 60,000 lb., 80,000 lb. and 100,000 lb.

D.C. METERS OF 5-IN. DIAMETER

A line of 5-in. d.c. ammeters and voltmeters, known as the type FW, has just been brought out by the Westinghouse Electric & Manufacturing Company. These are indicating meters suitable for battery-charging panels, small isolated plants and other places where a high-grade low-price polarized instrument is required. The meters operate on the D'Arsonval principle, having a moving coil and a permanent magnet. As they are of the permanent-magnet type, they possess many points of superiority to the moving-iron type construction found in the usual lower-priced meters.

The complete movement is mounted in the case as a unit. A unique feature is that the moving element can be taken from the movement simply by removing two screws on the side and of the pole-piece support. The entire moving element and bearings can then be lifted out as a unit and can be replaced in exact position. This



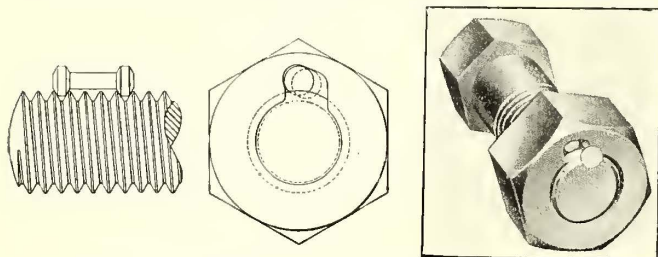
D.C. Meter of 5-In. Diameter. With and Without Dial

makes it possible to repair the meter without disturbing the alignment of the magnetic circuit. Owing to the use of an aluminum pointer, a light counterweight is possible, resulting in a light movement and small wear on the pivot jewels. In proportion to the light weight the high torque insures great accuracy for so small a size. The scales are 4 in. long, which is practically the same length as the scales of many of the 7-in. meters. The full length of the pointer shows on the dial, thus making the meter as easy to read as a clock. The movement is damped to secure dead-beat readings.

AN ABSOLUTE LOCK NUT

A new lock nut, which is said to have been thoroughly tested by several electric railways, is the "Absolute" type of the American Lock Nut Company, Chicago, Ill. The locking principle is quite simple and may be applied successfully to nuts of any size, either hexagon or square, or it may be used on ordinary track bolts or the finest quality machine bolts. The manufacturers either purchase the bolts and add the locking feature to the nuts, or the purchaser may consign the bolts to the American Lock Nut Company, paying only for the application of the locking device.

In principle, the lock is somewhat similar to that of a roller clutch, consisting of a tapered recess machined on the inside of a nut so that one side of it is closed by the bolt when the nut is in place. A small bobbin-shaped pin is set in this recess, and the direction of the flare in the recess depends on whether the threading is right or left hand. If right hand, the forward motion of the nut carries the locking pin along with it into the deeper portion of the recess where it revolves free. Movement in the opposite direction causes the pin to move toward the shallower portion of the recess where the angle is so designed that it automatically wedges



Lock Nut, Showing Locking Pin and Release Nail

the locking pin into the thread of the bolt. An attempt to force the nut in the process of removing it only clamps the locking pin tighter into the threads of the bolt.

To remove the nut from the bolt it is necessary to insert a nail or wire, of approximately the same diameter as the locking pin, into the shallow portion of the recess. This fixes the position of the locking pin so that in moving the nut the pin cannot reach a point in the recess where the clamping action begins. In order to meet possible objection to this method of locking because of the difficulty an ordinary trackman might experience in placing the locking pin in the recess at the time the nut is applied to the bolt, small spring clips have been provided to hold the pin in place.

Results of a five months' test of the absolute lock nut on the Springfield Consolidated Railway, Springfield, Ill., at a busy steam railroad crossing were very satisfactory. Twenty-four lock nuts were placed in one rail of a crossing and twenty-four ordinary bolts in the other rail. After three months the crossing had received attention twice. At the end of the five months all the ordinary bolts had been replaced, while the "Absolute" lock-nut bolts were still in perfect condition. Experience has also shown that after two years' service in a steam road crossing, the locking feature has not lost its effectiveness, but is easily removed in the proper way and may be used elsewhere if the bolt has not corroded too badly.

The Duquesne Light Company, Pittsburgh, has transformed the old street railway carhouse at Fifth Avenue and Atwood Street into a testing laboratory, where tests will be made of meters, incandescent bulbs, arc carbons and other electrical apparatus.

NEW LOW-FLOOR MOTOR FOR PITTSBURGH

The motors for the 100 low-floor cars recently purchased by the Pittsburgh Railway and described in the *ELECTRIC RAILWAY JOURNAL* for April 11, have been ordered from the General Electric Company. These are of an entirely new design which will be known as the GE-247. They are of the box-frame commutating-pole type and have a nominal rating of 30 hp on 500 volts. They are so small that they can be easily used upon wheels of 24-in. diameter. The motors, however, are to be in no way radically different from generally accepted principles of design. They will follow the well-tested and recognized standards of the General Electric Company both in mechanical and electrical detail. In addition to the modifications in mechanical design necessary for adaptation to 24-in. wheels, there has been incorporated a new and still more efficient scheme of ventilation than the method now used in the ventilated motors of this maker.

The field coils are to be asbestos insulated and then impregnated, thus providing a solid structure practically indestructible and absolutely moisture-proof. They are to be supported on spring-metal seats and will be securely held for movement in any direction by spring flanges, resulting in evenly distributed pressure and preventing abrasion of the insulation. The armature shaft will be removable without disturbing the commutator connections or windings and the bearing shafts as usual are to be ground and rolled. The armature will be hot-banded to insure permanently fixed and tight coils. The armature bearing liners are made up of a bronze shell with a thin layer of babbitt. The oil-well covers have deep lips and fit upon machined seats so that water is prevented from entering and flooding the wells. The brush-holders are adjustable and are supported by mica-insulated studs. The motors have a gear ratio of 58:15.

The car axles between the motor axle bearings are entirely inclosed with sheet-steel dust guards. The gear cases are of steel, each upper and lower half being pressed out in a single integral piece. The steel supports for the top and bottom halves of the cases are fastened by means of welding. Both the gears and pinions are made from heat-treated, rolled steel, having an elastic limit between 140,000 lb. and 150,000 lb.

NEW YORK COMMISSION ISSUES BULLETIN

On April 16 the Public Service Commission for the State of New York, Second District, at Albany, issued Bulletin No. 131 containing the statement of the chairman in regard to the volume of cases pending on April 16. The last official statement of unfinished business on March 16 last showed the following cases pending: Grade crossing cases (active), 50; capitalization cases, 93; all other cases, 247; total cases pending, 390; on April 15 the statement is as follows: grade crossing cases, 45; capitalization cases, 88; all other cases, 240; total cases pending, 373, showing 17 less cases in the aggregate than were pending one month ago. From March 16 to April 16 final orders were entered as follows: grade crossing cases, 5; capitalization cases, 11; all other cases, 55; total orders issued for the month, 71.

In the same interval there were filed additional cases as follows: capitalization cases, 6; all other cases, 48; total new cases for the month, 54. On March 16 there were pending informal complaints 1303, to which have been added during the past month 155. Of these informal complaints, 311 have been disposed of during the month, leaving undisposed of on April 16, 1147.

News of Electric Railways

Modifications of Toledo Ordinance Provisions Suggested by City Solicitor

The ordinance submitted to the City Council of Toledo, Ohio, by Henry L. Doherty recently on behalf of the Toledo Railways & Light Company has been redrafted by City Solicitor Thurstin and referred to the franchise committee. The revised ordinance provides for the surrender of all existing franchises and covers all the present lines with the exception of those known as the Maumee Avenue and Huron Street lines. No franchise value is to be included in the appraisal in case the city purchases the property, and the city reserves the right to take over the property by condemnation proceedings. Under the ordinance as modified by Mr. Thurstin the valuation, if the property is purchased by the city, is to include only the power station and the other physical property used in the operation of cars. The city is to regulate interurban traffic within its limits and is to receive 10 per cent of the rentals paid by the interurban companies for the use of the city company's tracks. All interurban cars are to issue transfers to city cars. The company is to pay for the use of tracks on bridges owned by the city and is also to pay one-third of the cost of the removal of snow and ice from the streets in the business district.

Mr. Thurstin's revised ordinance tentatively provides for the sale of five tickets for 15 cents and a 5-cent cash fare for the period covered by the ordinance, but this matter was to be left to the judgment of the franchise committee, which had not decided upon the rate at that time. The term of the franchise was left at twenty-five years, as fixed by Mr. Doherty. The city solicitor favors a flat 3-cent fare.

The ordinance proposed by Mr. Doherty provided for the determination of the value of the property by arbitration, in case the city decided to purchase it, but made no mention of condemnation proceedings. Mr. Doherty did not include the power house as part of the property the city should have a right to purchase. Changes were also made in the provisions for rentals paid by the interurban railways. The new ordinance also extends city supervision over the interurban railways so far as their operation within the city limits is concerned.

Mr. Thurstin did not mention the proposition for the appointment of a commissioner to control the service in behalf of the city during the test year. Neither did he refer to the provision in the Doherty grant to authorize the Council to revise the rate of fare at the end of each five-year period. These matters will be held in abeyance until the franchise committee decides upon the rate of fare which in its opinion will best apply to the situation.

Peter Witt, street railway commissioner at Cleveland, spoke at a mass meeting in Memorial Hall, Toledo, on the evening of April 16. This was the second time he has addressed the people of Toledo within a few days. According to his views neither the plan of Henry L. Doherty nor that of the city was the proper method of settlement of the franchise question. He expressed the opinion that the rate of fare should be made elastic as provided in the sliding scale of fare in Cleveland, to compensate the company for the service demands as made by the city. With a fixed rate of fare the city could not control the service. If the people desired service they must pay for it. Mr. Witt said that the Doherty plan of trial 3-cent fares and periodic revisions meant a postponed settlement or franchise litigation. Mr. Witt said that the Toledo Railways & Light Company was correct in its statement that it could not operate on a fare of 3 cents with its present system. He based his observations of the system on information in the report of Carl Nau.

Mr. Witt stated that the present method of charging a 3-cent fare during the rush hours was vicious. The expense of carrying passengers during the rush hours was higher than in the middle of the day. There was no reason for carrying policemen, firemen and sanitary officers free. Valuation of the physical property was the first step to be taken in securing a settlement. It would be better to allow

the company a few hundred thousand dollars more than might be considered the true value of the property than to prolong negotiations. Mr. Witt said the Cleveland franchise was based on the principles of security of investment, certainty of return and transportation at cost.

On April 21 Mr. Doherty withdrew from the franchise negotiations temporarily until the Council committee has decided on the question of possible competitive franchise bids. Mr. Thurstin so modified the ordinance proposed by Mr. Doherty as to provide for a new franchise instead of for "renewals and extensions" as Mr. Doherty stipulated. Counsel for the company maintained that a new franchise cannot be granted except by the legal formality of advertising for bids and obtaining consent of property owners, but that franchises may be renewed for all its lines and extensions granted without advertising so long as the franchise for any one of its present lines is unexpired. Mr. Thurstin said that the change was made to conform to the decision of the committee to treat the situation from the standpoint of making a new grant. He and the committee doubted whether the franchises could be renewed without advertising. He suggested that negotiations and temporary agreements between the city and the company be construed as continuing the status of the expired franchise so that the limitation would not apply. Mr. Doherty said that until the question is settled it would be a waste of time to continue the negotiations, and he and his counsel withdrew to permit the solicitor and his assistants to investigate the subject.

Favorable Report on Bill for Municipal Ownership in District of Columbia

The Commissioners of the District of Columbia have reported favorably on Representative Crosser's bill providing for the acquisition, ownership and operation by the commissioners of all the street railways located in the district. The report says in part:

"This bill is an important one, having for its object, as its title indicates, the acquisition, ownership and operation by the municipal government of all the street railroads located and operating wholly within the district and those partly within and partly without the District of Columbia; in the latter case, of the part located and operating within the district. To leave to private individuals, as a source of private profit, the performance of such a public function, resting, by necessity, as it does, upon special privileges, is to insure the maintenance of a struggle between public duty and public needs on the one hand and private interest and profit on the other, that in the nature of things grows sharper with the passing years, and in the opinion of the commissioners no amount of 'regulation' by public authorities, accomplished only after the law's delays are over, will end the irrepressible conflict that necessarily arises when the avarice of man is set against a public duty that is laid upon him to perform.

"The management of a street railroad privately owned and operated is chiefly concerned in collecting as many fares and at as low a cost to the company as possible, and this for the obvious purpose of making the largest dividend returns for its stockholders—that is, private profit.

"The passengers are chiefly concerned in securing the largest number of rides and the best service for the least amount of money—that is, the most efficient public service. If this public service is performed by public authorities they can have no other motive than to do those things that the traveling public demands. They have but to maintain a proper relation between efficient service and the cost thereof.

"It may be urged in opposition to this bill that regulation of such public utilities should first be tried under the law, enacted a year ago, creating a public utilities commission for the District of Columbia. But it should be pointed out, in addition to what has already been said in this connection, that there exist in the district two street railroad systems which for considerable distances parallel each other and needlessly duplicate much of the service each system ren-

ders. This condition will undoubtedly render more difficult and perplexing such regulation as the commission may be able to effect, and increase the complexity of the problems involved in dealing with the subject, and it forms, in the judgment of the commissioners, an additional reason for the enactment of the bill into law.

"Referring briefly to the structure of the bill, it may be said that it has the merit of brevity and clearness. Perhaps the requirement in section 2, that the commissioners shall institute, by petition, before the Utilities Commission a proceedings of condemnation, is unnecessary, and the matter might be simplified by directing the commission to proceed to a condemnation of the railroads for the purpose of their acquisition by the municipal government.

"It is suggested also that authority should be given to the commissioners to raise sufficient money, by the sale of bonds as proposed, in addition to the amount required to pay for the properties acquired, to provide a fund available for current expenditures during the first months of municipal operation."

Despite the fact that the railway system in New Orleans is privately owned, the report of the commissioners contained the following statement:

"The municipal ownership and operation of street railroads is no longer in the experimental stage. The old world has long since demonstrated the wisdom and great practical advantages of the municipalization of these public utilities, and at least one large city in this country, New Orleans, has for a number of years shown with what notable success it can be accomplished."

Commenting upon the report sent by the commissioners to Congress, Conrad H. Syme, corporation counsel of the district and legal adviser of the Public Utilities Commission, said:

"Municipal ownership is coming in the District of Columbia, because of all cities Washington is the one in which it is most practicable, where it involves the least risk and where it can be established without injustice."

Akron's Proposed New Terminal

Charles Currie, general manager of the Northern Ohio Traction & Light Company, Akron, Ohio, said recently that the date for beginning the construction of the proposed new terminal station on North Main Street, Akron, depends entirely on the action of the City Council with respect to the extensions which the company proposes to build. The company's proposition was made six weeks ago and is now before the street railway committee. The company asked that it be allowed to extend its lines on Federal Street from North Main Street to Howard Street, in order to secure an outlet to the north. It owns the right-of-way for a direct line between what is known as the gorge and North High Street. This would necessitate the construction of a viaduct across a deep ravine in order to enter the city. Several sets of plans for the terminal building are now in the hands of the company. Mr. Currie said the building would not exceed four stories in height at first, but would be constructed so that other floors can be added as needed.

Delos F. Wilcox, New York, said in his report on the inspection of the Northern Ohio Traction & Light Company's properties that some of the equipment was of the most modern type in use, while some was antiquated. In his opinion limited service was badly needed between Kent and Ravenna. Shelter houses should also be built at certain points. He recommended that the cities connected by the company formulate uniform franchises for all of them. Court action was recommended as a last resort to secure better service.

Dean Cooley as Counsel to Detroit Commission

Dean Mortimer E. Cooley of the University of Michigan has been asked by the Detroit Municipal Street Railway Commission to act as chief counsel for the commission in the appraisal of the property of the Detroit United Railway within the city of Detroit. The commission's proposal is that Dean Cooley will supervise the entire work and advise the commission in all matters connected therewith.

Mayor Marx has approved the resolution of the Detroit Common Council providing for the construction of a new

east and west "workingmen's" belt line, by the Detroit United Railway. The line will be built instead of the Mack-Myrtle line agreed to in the lower-fare agreement of Aug. 7. It involves the construction of some 6 miles of track and is planned to connect on the east side with the existing Harper line and on the west side with the proposed Junction Avenue line, at present held up through injunction proceedings in the Supreme Court brought by residents of the affected district. The new line will be built practically 3 miles north of the center of the city and is expected to relieve a tremendous amount of present downtown congestion.

The Detroit Department of Public Works has filed with the Municipal Railway Commission its report on the cost of the loop built by the Detroit United Railway to connect the Michigan line with the new Michigan Central depot. The line is 4449 ft. long and the department's cost estimate is \$49,096, exclusive of office work and other overhead charges. The company has not as yet filed its figures of the complete cost of the loop.

W. D. Mahon, president of the Amalgamated Association of Street & Electric Railway Employees, has resigned as a member of the Detroit Street Railway Commission, the resignation to take effect at once. In his letter to Mayor Marx, who appointed him, Mr. Mahon does not give any reason for his resignation.

New York Subway Section Contracts Awarded

The Public Service Commission for the First District of New York during the week ended April 18 opened bids for the construction of two sections of the new rapid transit railroads; awarded the contract to the lowest bidder for one of these sections; began advertising for bids for the construction of another section; and sent the contracts for two more sections to the Interborough Rapid Transit Company for criticism and suggestions. Bids for the construction of Section No. 1 of Route No. 33 were received on April 14, and on April 17, the contract for this section was awarded to Booth & Flinn, Ltd., the lowest bidders, for \$2,059,182. Section No. 1 connects the new Broadway subway with the proposed East River tunnel to Montague Street, Brooklyn, and runs from Trinity Place and Morris Street mainly through Whitehall Street to South Street, Manhattan. It will be a two-track line, with a station in Whitehall Street extending from State Street to Bridge Street. It will be operated by the New York Municipal Railway Corporation.

On April 17 the commission opened bids for the construction of Section No. 1 of Routes Nos. 4 and 38, the Seventh Avenue subway in Manhattan, for operation by the Interborough Rapid Transit Company. Section No. 1 begins under Battery Park and extends northerly to Greenwich Street and Vesey Street, where it will connect with Section No. 2. This section will be a two-track line, and at the Battery Park end it will connect with the existing subway. The commission also advertised for bids, to be received May 12, for the construction of Section No. 2 of Route No. 20, the Canal Street crosstown subway in Manhattan, for operation by the New York Municipal Railway Corporation. This subway will connect the tracks coming over the Manhattan Bridge from the Fourth Avenue subway and the Brighton Beach line with the Broadway subway in Manhattan. This line will be the key of the whole Brooklyn rapid transit system. There will only be one station, which will extend from Centre Street to near Broadway. This will be a general transfer point, where passengers coming from lines crossing the Williamsburg Bridge may transfer to the Broadway subway, and vice versa. The station will also have stairway communication with the Canal Street station of the Centre Street Loop subway.

Two additional contracts have been approved as to form by the commission and sent to the Interborough Rapid Transit Company, the operating company, for criticism and suggestions. One is for Section No. 1-A of Routes Nos. 4 and 38. This section covers the connection between the proposed Seventh Avenue subway and the existing subway at the Battery. The other is for Section No. 7 of Route No. 5, the Lexington Avenue subway in Manhattan. Sec-

tion No. 7 extends from about Forty-third Street north to Fifty-third Street, but will not include the proposed connection between the Lexington Avenue line and the existing subway, which will be let as a separate contract.

Appropriation Requested for Audit in Philadelphia

On April 16 Mayor Blankenburg of Philadelphia sent to Councils a message requesting an appropriation of \$10,000 by transfer to provide for an audit of the books of the Philadelphia Rapid Transit Company before closing any negotiations with the company for the construction and operation of the proposed new rapid transit lines. The Mayor's request was referred to the finance committee. The proposal made by the company to the city in connection with the construction of rapid transit lines includes an indemnification of the company from loss of net earnings resulting from the operation of the rapid transit lines. Transit Director Taylor said that on this account it was reasonable that such loss of revenue to the company should be considered in the negotiations, but that the city should have full and impartial information as to exactly what the net earnings of the company are prior to closing any negotiations for the construction or operation of the recommended rapid transit lines.

On April 20 the directors of the company issued a statement saying that the corporation would welcome an audit of its accounts by the city, as suggested by Mr. Taylor, of the Transit Department. The statement of the directors follows:

"In order to correct any wrong impression that may have been created by the recent agitation in connection with transit matters, this management will welcome an additional audit by the City Comptroller of the accounts of the Philadelphia Rapid Transit Company, in accordance with the terms of the city contract of 1907; this audit to not only include the last year, but to cover the entire period of the Stotesbury management, from Jan. 1, 1911, up to and including the present fiscal year, closing June 30, 1914. Every facility will be afforded the Comptroller for the purposes of such an examination."

Decision Affecting Authority of California Commission

Justice Lucien Shaw of the State Supreme Court of California has reversed the decree of the State Railroad Commission of April, 1913, refusing the Oro Electric Corporation permission to enter the city of Stockton. The court rules that the power granted to the commission by the public utilities act to grant certificates of public convenience and necessity is unconstitutional as applied to municipalities. The decision was the outgrowth of proceedings in certiorari brought by the Oro Electric Corporation under the public utilities act to annul an order of the State Railroad Commission.

On Dec. 20, 1912, the city of Stockton granted to the Oro Electric Corporation a franchise to furnish electricity to the city. The Western States Gas & Electric Company was supplying power at that time. On April 29, 1913, the Railroad Commission instructed the last-named utility to reconstruct its system to the commission's satisfaction, agreeing to refuse the rival concern a certificate of public convenience and necessity. In August, 1913, the commission approved the action of the Western States company in conformity to its stipulations, and refused the application of the Oro Electric Corporation. Suit was then begun.

Justice Shaw held that if the State had empowered a city to grant a franchise, it also empowered the grantee to exercise his privilege. The court held that there was nothing to support the contention of the Railroad Commission that the amendment limiting its powers deals only with utilities already in operation, and that if such construction were true it would create a dual system of control never contemplated, and two utilities could operate, one under city control and the other under the control of the Railroad Commission, with different rates and methods. The decision also held that cities have control of their utilities regardless of whether or not they were in operation when the Railroad Commission was created, and, therefore, that the order

denying the Oro Electric Corporation the right to exercise its franchise was in excess of jurisdiction of the commission, and that "the order is null and void, and must be vacated."

Work But No Workers

The Pacific Electric Railway, Los Angeles, Cal., found it necessary to apply to the Board of Public Works of Los Angeles recently for an extension of time in which to complete track work that it has under way, the company being unable to secure the help necessary to enable it to finish the work within the time specified by the board. In regard to the labor situation as it confronts the company with which he is connected, J. McMillan, general manager, commented in part as follows:

"Work for those who want work is plentiful, but there is an increasing scarcity of those who want work. They want money, they want social revolution, but bring the work to them and they flee in haste. It makes an employer tired to see this unemployed problem constantly flaunted before the public, when he knows that the problem that should give us pause is the I-won't-work problem. We need some huskies. We also need men for other kinds of work. For instance, we are always needing skilled mechanics, carpenters, machinists and electricians.

"The Pacific Electric hires Mexicans only because it has to. The Mexican will work, barring a week or so right after pay day, when he must spend his money. Now the Mexican gets \$1.25 a day and we furnish him provisions and bunkhouses, or bunk cars, wherein to sleep. If we could get Americans or husky foreigners, we would pay them twice as much. For instance, when we can get Slavonians we give them \$2.50 and \$3 a day, because they are worth it. We would give Americans the same, because they are also worth it. But your free-born American citizens will no longer demean themselves by doing track work. They won't live in bunkhouses and they won't go away from home. At least your Angelenos won't. I know they won't because the company combed every employment agency in Los Angeles and the Plaza right after the storm trouble. Did we get any Americans? We did not. I pity an industrious man out of work, but I feel that for everybody's good someone should take a club and compel every man jack of these ranters and Kelly followers to go to work or get out."

Change in Secretary's Office.—After May 1 the office of George Allison, secretary of the Wisconsin Electrical Association, will be located in Room 1410, First National Bank Building, East Water and Mason Streets, Milwaukee, Wis.

Not to Electrify Line at Berlin.—E. J. Chamberlin, president of the Grand Trunk Railway System, Montreal, Que., has notified Mayor Euler of Berlin, Ont., that the company will not electrify the Galt and Elmira branches out of Berlin.

Pennsylvania Utilities Must File Tariffs.—Orders have been issued by the Public Service Commission of Pennsylvania that all public utility companies in Pennsylvania file not later than June 1 all tariffs issued by them and in effect on Jan. 1. The corporations must also file all amendments thereto.

New Haven Dissolution Ratified.—At a special meeting held on April 21 the stockholders of the New York, New Haven & Hartford Railroad ratified the agreement between Howard Elliott, chairman of the board, and the government for the segregation of the various properties of the company in accordance with the terms published in the *ELECTRIC RAILWAY JOURNAL* of March 28, 1914, page 735.

Power Contract Closed by New Jersey Line.—A ten-year contract has just been closed by the Jersey Power Company, one of the affiliated companies of the Atlantic Gas & Electric Company, to furnish electric power to the lines of the Morris County Traction Company, extending from Boonton to Lake Hopatcong and from Denville southeasterly to Morris Plains, N. J., a total distance of about 25 miles.

Injunction in Omaha Fare Case.—Judge Spears in the District Court at Omaha, Neb., has granted a temporary

injunction on the application of the Omaha & Council Bluffs Street Railway restraining the city from enforcing the ordinance to require the company to sell seven tickets for 25 cents. The steps leading up to the passage of the ordinance were reviewed in the *ELECTRIC RAILWAY JOURNAL* of March 28, 1914, page 738.

Electric Ferry at Lafayette, Ind.—The Fort Wayne & Northern Indiana Traction Company has been authorized by the county commissioners to establish an electric ferry on the Wabash River between Lafayette and West Lafayette. The floods in the Wabash River Valley of a year ago last March carried away the bridge over which the company operated, and this spring a temporary structure which was serving until a new one could be built was also washed out.

Reduction of Assessment Asked.—The Metropolitan Street Railway, Kansas City, Mo., has asked the Kansas City, Kan., tax commission for a reduction of \$1,000,000 in its valuation on the Kansas side. The property of the company, including the elevated road, in Kansas City, Kan., is valued at \$3,574,000. The franchise under which the company is operating on the Kansas side provides that the company shall pay 8 per cent of its earnings to the city, and the latter shall pay all taxes out of this amount.

Agreement for Interurban Entrance to New Orleans.—It is reported that an understanding so mutually satisfactory that only minor details remain for negotiation has been reached by Harry K. Johnson, engineer of the Orleans-Kenner Interurban Railway, and J. S. Pevear, vice-president and general manager of the New Orleans Railway & Light Company. The route of the interurban railroad within the city is understood to provide for a terminal in University Place. Johnson & Company, Inc., are building the Orleans-Kenner Electric Railway.

F. S. Pearson on Mexico.—F. S. Pearson, president of the Mexico Tramways and the Mexican Light & Power Company, is reported to have said in an interview which appeared in a financial paper that war with Mexico would last ten years and cost the United States \$1,000,000,000. He is quoted as follows: "I have always thought President Wilson was wrong at the beginning in the way he treated Huerta. It looks to me very much as though Mr. Wilson is ignorant of foreign affairs and of Mexico in particular. He doesn't understand the intense pride of the Latin-American race."

Mr. Mellen as Head of Railway Workers.—It is stated that Charles S. Mellen, former president of the New York, New Haven & Hartford Railroad, will be offered the presidency of the Federated Railroad Employees, representatives of which are to organize in Boston shortly. Mr. Mellen is reported to have said in this connection: "If the great body of railroad union labor men with whom I had been associated for years as railroad president should regard me as a worthy man to lead them as their chief executive in their federation, I should regard it as the greatest honor that had ever come to me."

Mr. Busby on Chicago's Problems.—Leonard A. Busby, president of the Chicago Surface Lines, says: "I stated several months ago that there are several steps involved in the solution of our transportation problem. First is the unification of the surface lines, second the construction of the initial subways for the relief of congestion in the downtown district, and, third, the unified operation of the surface and elevated lines. My opinion is not only unchanged, but strengthened, by the recent vote on the subway matter. The city voted against a comprehensive \$130,000,000 subway system, but can construct a downtown subway loop."

Penstock Bursts at Spiers Falls.—As a result of the bursting of a penstock at the electric plant at Spiers Falls near Troy, N. Y., on the evening of April 21, the entire city and adjoining towns were plunged into darkness and the lines of the United Traction Company tied up. The waters of the Hudson River were still rising on April 23 and part of the United Traction Company's tracks on the west side of the Hudson was said to be inundated. At Fort Edward, Glens Falls and Corinth the water reached on April 21 a point almost as high as that of last year. The State road at Corinth was inundated to the depth of 12 in. and the tracks of the Hudson Valley Railway were under water, upsetting service.

Subway Ordinance Competition in Pittsburgh.—A. A. Ford-

ing, counsel for the Pittsburgh (Pa.) Subway Company, declines to enter into competition with other companies for a franchise to construct a subway in Pittsburgh. In a letter to S. S. Woodburn, chairman of the Council committee on public service and surveys, Mr. Ford says in part: "The Pittsburgh Subway Company is still willing to co-operate with the city in finding a way in which a subway can be built to the advantage of the city and with profit to the company, but my clients are not interested in anything resembling an auction. When it is finally found that competition will defeat its own object the Pittsburgh Subway Company will willingly take up the matter as a business proposition."

Pennsylvania Commission Against Duplication of Facilities.—In the matter of the application of the Schuylkill Light, Heat & Power Company to furnish service to Ashland, Schuylkill County, the commission held that the district had been well served for twenty-nine years by the Eastern Pennsylvania Light, Heat & Power Company, and the entrance of a competing utility would be of very doubtful benefit to the public. On this showing the commission dismissed the application of the competing company to enter the territory. In the case of the Harmony Electric Company, which asked for the right to compete with the company at Ellwood City, similar action was taken, the commission holding that vested rights and investments made in good faith must be protected.

United States Civil Service Examinations.—The United States Civil Service Commission announces an open competitive examination for junior structural engineer, junior electrical engineer, junior mechanical engineer and junior railway signal engineer, for men only, on May 20. From the register of eligibles resulting from these examinations certification will be made to fill vacancies as they may occur in this position in the Interstate Commerce Commission, under the act providing for the valuation of the property of common carriers, at salaries ranging from \$1,080 to \$1,500 per annum. Appointments to these positions will be principally for duty in the field, but some appointments will be made for duty in the general office in Washington, D. C. Persons who desire to take the examination should apply for application form 2039 to the United States Civil Service Commission, Washington, D. C.

Electrification of Erie Branch.—The Northwestern Pennsylvania Railways is preparing to take over and electrify the old main line track of the Erie Railroad between Meadville and Cambridge Springs, Pa. This line offers a short route and good grade between these two points, and when electrified will permit a reduction in the running time from three hours to an hour and forty-five minutes. The Meadville property has been thoroughly overhauled, and it is planned to install a parlor car service on the line. A new high tension transmission line has been installed from Erie to Meadville, and a new freight and passenger station has been built at Edinboro. The company connects with the Pennsylvania Railroad at Linesville for the transfer of passengers and it also meets the Erie Railroad at Cambridge Springs, where it will take over the Erie freight trains under its own motive power. It is expected that the new electrified service over the Erie will be in operation late next fall.

Authority of Illinois Utilities Commission Questioned.—The opportunity to test the Illinois public utilities law, for which the city of Chicago has been waiting, was presented when the commission appointed by the Governor made the city a party to a petition for the revision in street-car fare between Berwyn and Chicago. Corporation Counsel Sexton of Chicago declared that the commission is without power of any kind and that any ruling it may make in this particular case is null and void. The corporation counsel's answer also contains a statement in regard to the law as a whole, declaring that the act violates the constitution of the United States. The situation demanding answer on the part of the corporation counsel was brought about by the city of Berwyn demanding a reduction of fare to the city of Chicago from 10 cents to 5 cents. It was asserted that the Chicago & West Towns Railway was discriminating against Berwyn because certain other points equally distant from Chicago were accessible for a 5-cent fare.

Financial and Corporate

Stock and Money Markets

April 22, 1914.

Although much interest was manifested in the Mexican situation to-day on the New York Stock Exchange, this was not an important market factor. General recessions occurred in the morning, but the final prices were only slightly below those of the day before. Delaware & Hudson sustained an early loss, but recovered vigorously. Rates in the money market to-day were: Call, 2 per cent; sixty days, 3@3¼ per cent; four months, 3¼ per cent; six months, 3¼@3½ per cent.

The changes on the Philadelphia Stock Exchange to-day were irregular. Final prices were 14½@15 for Philadelphia Rapid Transit and 42½@43 for United Traction.

The Chicago market exhibited a generally easier tendency to-day. The bond market was steady and sales were fair.

On the Boston market to-day there were losses of a point or more. Mining and industrial securities headed the list of sales.

In Baltimore a fair degree of activity prevailed on the Stock Exchange. Sales totaled 1890 shares and bonds \$65,600, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Apr. 15	Apr. 22
American Brake Shoe & Foundry (com.)	87½	84½
American Brake Shoe & Foundry (pref.)	137	134½
American Cities Company (com.)	a35½	35½
American Cities Company (pref.)	61¾	60¾
American Light & Traction Company (com.)	348	342
American Light & Traction Company (pref.)	105¼	105½
American Railways Company	37¾	37
Aurora, Elgin & Chicago Railroad (com.)	37	36
Aurora, Elgin & Chicago Railroad (pref.)	*77	37
Boston Elevated Railway	80	78½
Boston Suburban Electric Companies (com.)	7	7
Boston Suburban Electric Companies (pref.)	*63	*63
Boston & Worcester Electric Companies (com.)	*6¼	*6¼
Boston & Worcester Electric Companies (pref.)	37	37
Brooklyn Rapid Transit Company	91¼	89½
Capital Traction Company, Washington	100	100
Chicago City Railway	170	135
Chicago Elevated Railways (com.)	20	20
Chicago Elevated Railways (pref.)	65	65
Chicago Railways, pteptg., ctf. 1	90½	90
Chicago Railways, pteptg., ctf. 2	31¾	31½
Chicago Railways, pteptg., ctf. 3	5	6
Chicago Railways, pteptg., ctf. 4	1½	2
Cincinnati Street Railway	105	103
Cleveland Railway	103½	103¾
Cleveland, Southwestern & Columbus Ry. (com.)	*4	*4
Cleveland, Southwestern & Columbus Ry. (pref.)	a23	*2
Columbus Railway & Light Company	13	13
Columbus Railway (com.)	53	53
Columbus Railway (pref.)	79½	79½
Denver & Northwestern Railway	*71	*71
Detroit United Railway	a80	a80
General Electric Company	144½	143
Georgia Railway & Electric Company (com.)	126	120
Georgia Railway & Electric Company (pref.)	86½	86½
Interborough-Metropolitan Company (com.)	14½	14
Interborough-Metropolitan Company (pref.)	60¾	60¾
International Traction Company (com.)	*80	*80
International Traction Company (pref.)	a85	*85
Kansas City Railway & Light Company (com.)	*15	*15
Kansas City Railway & Light Company (pref.)	*35	*35
Lake Shore Electric Railway (com.)	5	*5
Lake Shore Electric Railway (1st pref.)	92	*92
Lake Shore Electric Railway (2d pref.)	22	22
Manhattan Railway	131½	131
Massachusetts Electric Companies (com.)	10½	9
Massachusetts Electric Companies (pref.)	59½	59
Milwaukee Electric Ry. & Light Co. (pref.)	*95	*95
Norfolk Railway & Light Company	25¾	25¾
North American Company	75	74
Northern Ohio Traction & Light Co. (com.)	60¾	70
Northern Ohio Traction & Light Co. (pref.)	a101	101
Philadelphia Company, Pittsburgh (com.)	41	40
Philadelphia Company, Pittsburgh (pref.)	40	38
Philadelphia Rapid Transit Company	16½	14¾
Portland Railway, Light & Power Company	51	51
Public Service Corporation	112	112
Third Avenue Railway, New York	42½	40
Toledo Traction, Light & Power Co. (com.)	20	a20
Toledo Traction, Light & Power Co. (pref.)	70	a70
Twin City Rapid Transit Co., Minneapolis (com.)	104	103
Union Traction Company of Indiana (com.)	11½	11½
Union Traction Company of Indiana (1st pref.)	75	75
Union Traction Company of Indiana (2d pref.)	14	14
United Rys. & Electric Company (Baltimore)	27	26½
United Rys. Inv. Company (com.)	17	15
United Rys. Inv. Company (pref.)	42	43
Virginia Railway & Power Company (com.)	51	50¾
Virginia Railway & Power Company (pref.)	96	96
Washington Ry. & Electric Company (com.)	87¾	87¾
Washington Ry. & Electric Company (pref.)	85½	85½
West End Street Railway, Boston (com.)	a70	68
West End Street Railway, Boston (pref.)	90¼	90
Westinghouse Elec. & Mfg. Company	72¼	73
Westinghouse Elec. & Mfg. Co. (1st pref.)	117½	117

ANNUAL REPORTS

United Railways & Electric Company

The income statement of the United Railways & Electric Company, Baltimore, Md., for the year ended Dec. 31, 1913, follows:

Gross earnings:	
Revenue from transportation	\$8,912,586
Revenue from operations other than transportation	133,506
Total	\$9,046,492
Operating expenses:	
Maintenance of way and structures	\$456,033
Maintenance of equipment	417,482
Traffic expenses	8,722
Conducting transportation	2,557,695
General and miscellaneous	706,499
Total	\$4,146,431
Net earnings from operation	\$4,900,061
Income from other sources	6,945
Total net income	\$4,907,006
Fixed charges, etc.:	
Interest on bonds	\$2,050,305
Park and other taxes	866,229
Ground rents and other rentals	7,734
Interest on car trust certificates, Series "A"	3,062
Interest and discount	138
Total	\$2,927,468
Balance	\$1,979,538
Deduction from income—rental account—1¼ per cent sinking fund, Maryland Electric Railways 5 per cent bonds	60,000
	\$1,919,538
Extinguishment of discount on securities	37,950
Interest on income bonds, dividend on preferred stock	\$1,881,588
Surplus	560,000
Dividends paid on the common stock in 1913	\$1,321,588
	791,362
Balance carried to the credit of depreciation reserve	\$530,226

The increase in gross earnings during 1913 was \$475,003, or 5.5 per cent, while the increase in operating expenses was \$277,555, or 7.2 per cent. The decrease in fixed charges was \$16,947, or 0.58 per cent. The operating ratio was 45.83 per cent, as compared with 45.14 per cent in 1912. If the charges for depreciation were included in the operating expenses the operating ratio would be 51.7 per cent.

For maintenance of way, structures and equipment the company expended during the year \$873,516. During the year there was also credited to depreciation reserve \$530,226, or nearly 6 per cent of the gross earnings. Of this amount there was expended \$499,898 and the balance of \$30,327 was carried to the existing reserve, making the depreciation balance of Dec. 31, 1913, \$79,786.

The total taxes and public charges for 1913 were \$1,065,168, an increase of \$72,772, or 11.77 per cent of the gross revenue and 21.74 per cent of the net income. The 1913 tax payments represent the total net earnings (after paying costs of operation only) of about one car in every five. After exchanging its stock for convertible notes, the company during 1913 reduced its bond interest \$83,655. The net reduction in fixed charges during the year was \$16,947.

The current assets as of Dec. 31, 1913, were \$2,844,913: in excess of the current liabilities, an increase over 1912 of \$1,312,102. The accounts payable increased \$3,185 and cash on hand decreased \$36,683. The average earnings per car mile were 29.95 cents, an increase of 0.87 cent, and the cost of service (exclusive of depreciation) was 13.73 cents, an increase of 0.60 cent. The car miles run during the year were 30,203,185, an increase of 730,648. The total number of revenue passengers carried was 182,180,767, an increase of 9,947,426. The number of transfers used was 74,634,030, an increase of 5,289,202. The company now operates 403.3 miles of single track. The report states that during 1913 sixty double-truck semi-convertible pay-as-you-enter cars were placed in service.

An interesting feature of the report is the detailed analysis by a certified public accountant which is appended. Another important part is the declaration of the company in regard to dividends. It is stated that during the past fourteen years the company has expended approximately \$20,440,000 in improving its property. Before inaugurating the declaration of dividends the directors re-

* Last sale. a Asked.

quired that the company should be in fine physical condition, that it should be entirely free from floating debt and that the wages of employees should be increased. When these conditions had been complied with in 1912 the directors began paying dividends with a feeling that they were based upon a sound and conservative foundation. During 1913 the dividends amounted to 4 per cent of the common stock.

General Electric Company

In the year 1913 the business of the General Electric Company exceeded in volume the record of any previous year. The value of orders received was \$111,819,142. The amount of sales billed was \$106,477,438. The profits from sales and the income from other sources amounted to \$14,065,789. The interest and discount on debentures and notes payable amounted to \$1,007,910, and the dividends paid to \$8,149,204, leaving \$4,908,674 to be carried to surplus account.

The condensed profit and loss account of the company for the year ended Dec. 31, 1913, follows:

Sales billed	\$106,477,438	
Less: Cost of sales, including all operating, maintenance and depreciation charges	96,207,833	
		\$10,269,605
Interest and discount, royalties and sundry profits	\$1,478,721	
Income from securities owned	1,281,462	
Increase in value of securities of companies owned, due to additions to the surplus of those companies	1,036,000	
		\$3,796,184
Less:		
Interest on debenture bonds	\$576,432	
Balance of discount on debenture bonds issued in 1912	37,438	
Discount and expenses on note issue	394,039	1,007,910
		2,788,273
		\$13,057,879
Dividends paid		8,149,204
Net surplus for the year	\$4,908,674	
Surplus at Jan. 1, 1913	12,031,144	
Surplus at Dec. 31, 1913		\$16,939,819

The condensed balance sheet as of Dec. 31, 1913, follows:

ASSETS		
Patents, franchises and good-will		\$1
Cash		\$14,844,210
Stocks and bonds	\$25,964,317	
Notes and accounts receivable	26,210,459	
Due from subsidiary companies	6,817,563	
Installation work in progress	2,012,514	
		\$61,004,853
Merchandise inventories:		
At factories	\$31,697,055	
At district offices, in transit, etc.	4,010,538	
Consignments	2,083,145	37,790,738
		98,795,592
Manufacturing plants (including all lands, buildings and machinery)	\$29,427,168	
Real estate, buildings, warehouses, etc. (other than manufacturing plants)	1,058,386	
Furniture and appliances (other than in factories)	2	
		30,485,557
		\$144,125,360
LIABILITIES		
Debenture bonds:		
5 per cent series of 1892	\$16,000	
3½ per cent series of 1902	2,047,000	
5 per cent series of 1907	88,500	
5 per cent series of 1912	10,000,000	
		\$12,151,500
Notes payable, due on April 16, 1914	\$8,000,000	
Accounts payable	2,846,656	
Accrued taxes	302,133	
Advance payments on contracts	279,561	
Accrued interest on debentures	197,016	
Dividend payable on Jan. 15, 1914	2,027,472	
		13,652,840
Capital stock issued		101,381,200
Surplus:		
At Jan. 1, 1913	\$12,031,144	
Added during year	4,908,674	16,939,819
		\$144,125,360

C. A. Coffin, chairman of the board, says in part:

"The tendency toward an increase in the number of orders and a reduction in their average value has continued during the past year, more than 600,000 orders having been received. This feature of the business, together with increased competition, has caused an unavoidable addition to the expense of securing and filling orders.

"The number of employees engaged in factories, offices and subsidiary companies on Dec. 31, 1913, exceeded 65,000. As heretofore, the expenditure for the purchase of patents, for applications and licenses under patents and for miscellaneous expenses in connection therewith, amounting to \$662,925 for the year, has been charged to income account, and the patent account is carried at \$1. Stocks and bonds are carried at a valuation of \$25,964,316, of which \$17,574,843 represents stocks of subsidiary companies and \$8,389,473 the stocks and bonds of public utility and other companies.

"The current accounts and notes receivable have been carefully reviewed and conservatively valued and are carried at \$26,210,458. The total amount due from subsidiaries is now \$6,817,563.44, making the aggregate balances of all accounts and notes receivable \$33,028,022.

"During the year additional manufacturing floor space to the amount of 1,740,000 sq. ft. was provided. The expenditures during the year for additions and improvements to manufacturing plants aggregated \$11,373,118, and the amount written off was \$6,502,060."

In July, 1913, an issue of \$8,000,000 of nine-months notes maturing on April 16, 1914, was sold at a discount rate of 6½ per cent per annum, for the purpose of meeting demands due to a large increase in business during the first half of the year and other burdens incident to the very unsettled financial conditions then existing. Money was deposited for the payment of these notes at maturity out of current funds. The company has no other note payable, nor is there any paper outstanding bearing its endorsement.

Hudson & Manhattan Railroad

The comparative income statement of the Hudson & Manhattan Railroad, New York, N. Y., for the eleven months ended Dec. 31, 1912 and 1913, is as follows:

	1913	1912
Gross revenue—passenger fares	\$3,168,727	\$3,103,697
Miscellaneous revenue from railroad operations	244,606	207,665
Total railroad revenue	\$3,413,222	\$3,311,362
Operating expenses of railroad	1,337,160	1,183,820
Net operating revenue from railroad	\$2,076,173	\$2,127,542
Taxes on railroad operating properties	245,484	249,237
Net income from railroad operation	\$1,830,689	\$1,878,305
Total net income from outside operations	860,177	875,619
Total net income from all operating sources	\$2,690,867	\$2,753,924
Non-operating income	31,665	29,626
Gross income	\$2,722,532	\$2,783,550
Income deductions other than bond interest	245,078	210,409
Net income applicable to bond interest	\$2,477,454	\$2,573,141
Deductions on bond interest	1,857,678	
Balance of net income for the period, available for interest on adjustment income bonds		\$619,776

The above statement is given for eleven months for the reason that the provisions of the readjustment plan with respect to bond interest became effective on Feb. 1, 1913, and the results of prior periods are not fairly comparable with the subsequent operations.

The income statement of the company contained various details of the miscellaneous revenue from railroad operations as follows: Advertising, for 1913, \$150,040; for 1912, \$139,573; other car and station privileges, for 1913, \$60,034; for 1912, \$54,872; sale of power, for 1913, \$6,980; for 1912, \$8,310; miscellaneous transportation revenue, for 1913, \$2,194; for 1912, \$13; other miscellaneous revenue, for 1913, \$25,358; for 1912, \$4,898.

The operating expenses of the railroad were also itemized in the statement, as follows: Maintenance of way and structures, for 1913, actual expenditures, \$204,227, reserve, \$56,600; for 1912, actual expenditures, \$175,621, reserve, \$9,685; maintenance of equipment, for 1913, actual expenditures, \$138,467, reserve, \$57,999; for 1912, actual expenditures, \$82,864, reserve, \$4,934; traffic expenses, for 1913, \$1,754; for 1912, \$9,639; transportation expenses, for 1913, \$726,282; for 1912, \$765,492; general expense, for 1913, \$151,831; for 1912, \$135,587.

The gross revenues from passenger fares showed an increase of \$65,030 over 1912, while the total railroad revenue increased \$101,971. The operating expenses increased \$153,-

340. In connection with the operating expenses it should be noted that beginning with February, 1913, a new plan for the amortization of capital was inaugurated. This plan necessitates setting aside in actual cash each year a sum which invested at 4 per cent interest compounded annually will provide sufficient funds for the replacements of the various property units at the end of their anticipated lives. In 1912 only \$31,928 for amortization reserves was charged to operating expenses, while in 1913 these charges amounted to \$148,391, an increase of \$116,463. This fact must be borne in mind in making comparisons of the operating expenses for the two years.

Owing to the increased provision for amortization, the total net income from all operating sources decreased \$63,057. The non-operating income, however, increased \$2,039, therefore reducing the gross income decrease to \$61,028. The income deductions showed an increase of \$34,669 owing to increases in the interest on real estate mortgages and loans payable and the federal income tax on bond interest. The net income applicable to bond interest showed a decrease of \$95,687 as compared with 1912.

The report states that the readjustment plan has fully rehabilitated the company's finances. The net income available for interest on the first lien and refunding first mortgage 5 per cent bonds for the eleven months ended Dec. 31, 1913, was approximately 40 per cent in excess of the amount required for that purpose. The report calls attention to the fact that the first mortgage 5 per cent thirty-year bonds of the New York & New Jersey Railroad, the first lien and refunding first mortgage 5 per cent bonds, series A, and the adjustment income first mortgage 5 per cent bonds have been listed on the New York Stock Exchange, and the statement is made that an application will also be made to list these issues on the London Stock Exchange.

The report contains a table of outstanding bonds and outstanding equipment obligations as well as a completely detailed account of the operating revenues and operating expenses for 1912 and 1913 and analyses for the different months of the year. According to the table of traffic statistics, the number of passengers increased from 58,079,194 in 1912 to 59,434,152 in 1913. The revenue car miles operated increased from 7,950,153 in 1912 to 7,991,953 in 1913, giving an increase from 7.31 to 7.44 in the number of passengers per revenue car mile. The passenger revenue per revenue car mile increased from \$0.4282 in 1912 to \$0.4352 in 1913; the gross railroad operating revenue per car mile advanced from \$0.4566 in 1912 to \$0.4684 in 1913. The operating expenses (excluding taxes) per revenue car mile increased from \$0.1645 in 1912 to \$0.1820 in 1913, giving a decrease in the net railroad operating revenue per revenue car mile from \$0.2921 in 1912 to \$0.2864 in 1913. According to an income statement for the Hudson & Manhattan terminal buildings, the net income for 1913 amounted to \$920,754 as compared with \$946,370 in 1912.

New Officers of West Penn Traction Company

At a meeting held on April 18 Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, was elected president of the West Penn Traction Company. At the same time the following board of directors was chosen: Guy E. Tripp; Samuel Insull, president of the Commonwealth Edison Company and Middle West Utilities Company; J. D. Mortimer, president of the North American Company; William B. Schiller, president of the National Tube Company; J. F. Finley, president of the Colonial Steel Company; A. H. Wiggin, president of the Chase National Bank, New York; H. Hobart Porter, member of the firm of Sanderson & Porter and president of the American Water Works & Electric Company; Henry R. Platt, Chicago, and George T. Wood, Louisville, Ky.

The election of this board represents the first step in the active development of the West Penn properties following the reorganization of the old American Water Works & Guarantee Company. Mr. Tripp will at once assume active management of the company and he is expected soon to make his first official inspection of the property. When this is completed a plan for the future development of the

properties will be submitted to the board of directors. W. E. Moore will continue in immediate charge of the operating department as general manager of the West Penn Traction Company.

A. B. Leach & Company, New York, N. Y., and the Continental Commercial Trust & Savings Bank, Chicago, Ill., are heading a syndicate that has purchased \$6,000,000 of three-year 6 per cent tax exempt notes of the West Penn Traction Company. It is expected that at least \$4,000,000 of the proceeds of these notes will be spent for betterments, improvements and new construction. Each note is secured by \$1,250 of West Penn Traction Company first mortgage bonds. The sale of the notes is conditioned upon certain covenants insuring the closest supervision of the property and its management by the bankers represented by the syndicate managers. One of these covenants says: "The management of the West Penn Traction Company shall be placed in the hands of officers and directors satisfactory to the bankers, and the bankers through the syndicate managers are to have such representation on the board of directors of the company, including if desired a majority of the executive committee, as will enable them effectually to supervise the expenditures of the note issue."

The sale of the notes is also conditioned upon the procuring by the West Penn Traction Company of a valid and binding agreement on the part of the West Penn Traction & Water Power Company, the holding company, that it will, while any notes are outstanding, cause such directors to be elected to the board of directors of the West Penn Traction Company as will at all times conform to the requirements embodied in the syndicate agreement.

New York, New Haven & Hartford Railroad Short-Term Notes

The New York, New Haven & Hartford Railroad is said to have arranged with its bankers for an issue of three series of new short-term notes for \$60,000,000. Of this amount \$40,000,000 is to run for a single year and pay 5 per cent. The remaining \$20,000,000 will run for three years and will bear interest at 6 per cent. They are to net the railroad 98, and will be offered to the public at 99. Of the three issues, \$20,000,000 is to consist of New Haven one-year 5 per cent notes, which will be secured by collateral. Another \$20,000,000 will be in one-year 5 per cent notes of the Harlem River & Port Chester Railroad indorsed by the New Haven. The balance are to be three-year 6 per cent notes of the New Haven Navigation Company, secured by collateral. The proceeds will be about \$5,000,000 above the present cash needs of the company. The financing is being handled by J. P. Morgan & Company, the National City Bank, the First National Bank, Kidder, Peabody & Company and Lee, Higginson & Company.

As referred to elsewhere in this issue, at a special meeting held on April 21 the stockholders of the New York, New Haven & Hartford Railroad ratified the agreement between Howard Elliott, chairman of the board, and the government for the segregation of the various properties of the company.

The announcement of the appointment of trustees for the several properties of the company in accordance with the dissolution plan was made in the *ELECTRIC RAILWAY JOURNAL* recently.

Bangor Railway & Electric Company, Bangor, Maine.—An initial dividend of one-half of 1 per cent has been declared on the \$2,000,000 of common stock of the Bangor Railway & Electric Company, payable on May 1 to stockholders of record of April 20.

Calumet & South Chicago Railway, Chicago, Ill.—The Merchants' Loan & Trust Company, Chicago, Ill., is placing at 95 and interest first mortgage 5 per cent gold bonds of the Calumet & South Chicago Railway of 1908, due on Feb. 1, 1927, of which \$5,175,000 are now outstanding.

Cities Service Company, New York, N. Y.—The stockholders of the Cities Service Company have voted to increase the authorized capital stock of the company from \$50,000,000 to \$65,000,000. The \$50,000,000 of stock was divided into \$30,000,000 of preferred and \$20,000,000 of

common. The \$65,000,000 of stock will be divided into \$40,000,000 of preferred and \$25,000,000 of common.

Boston (Mass.) Elevated Railway.—The Public Service Commission of Massachusetts has approved an issue of \$600,000 of thirty-year bonds by the West End Street Railway and 5600 additional shares of common stock, the proceeds to reimburse the Boston Elevated Railway for improvements made in accordance with the terms of the lease between the companies. Additional common stock is to be sold at auction. The commission has also approved the application of \$24,888, realized as part of the proceeds of bonds issued in February, 1913, by the West End Street Railway, toward the cost of additions and improvements on property made under terms of the lease to the Boston Elevated Railway.

Bowling Green (Ky.) Railway.—The Bowling Green Railway, the property of which was sold under foreclosure as noted in the *ELECTRIC RAILWAY JOURNAL* of Jan. 3, 1914, page 57, has been succeeded by the Southern Traction Company, Inc. The officers of the Southern Traction Company, Inc., are: Charles Roemer, president; P. C. Jessee, vice-president and general manager; J. S. Lewis, second vice-president; J. W. Ford, treasurer; Lon D. Hanes, secretary; C. G. Cox, superintendent; A. T. Kinnaman, Charles Roemer, P. C. Jessee, B. H. Dalton, H. L. Davis, J. S. Lewis, J. W. Ford and L. D. Hanes, directors.

Brooklyn (N. Y.) Rapid Transit Company.—The Brooklyn *Eagle* says: "According to the records of the office of the secretary of the Brooklyn Rapid Transit Company the amount of 4 per cent convertible bonds of the company now outstanding is only \$15,334,000. The amount authorized under the terms of the mortgage was \$150,000,000, but only \$50,199,000 have been issued, of which something like \$15,360,000 had been held in the company's treasury. These bonds are convertible into stock of the same par value up to July 1 next. The capital stock of the company has been commensurately increased of late, the amount now outstanding being \$64,406,000. This stock pays 6 per cent against only 4 per cent paid on the convertible bonds, and at the close of the market on April 17 there was a difference in the price of only one point in favor of the stock. At 90 the bonds yield 4.4 per cent and at 91 the stock yields 6.6 per cent, so that there is adequate incentive for the rapid conversion of the bonds before the expiration of the conversion privilege."

Chardon, Jefferson & Meadville Interurban Railroad, Cleveland, Ohio.—The Public Utilities Commission of Ohio has denied the amended application of the Chardon, Jefferson & Meadville Interurban Railroad for permission to issue \$250,000 of capital stock and \$575,000 of thirty-year first mortgage bonds to the Stanley Construction Company. The commission held that the amount of stock and bonds sought to be issued was in excess of the cost of constructing and equipping the road. The company plans to build a 30-mile line to connect Chardon, Hampton, Fontville, Rock Creek and Jefferson, Ohio, with Linesville, Pa.

Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.—The Public Utilities Commission of Ohio has authorized the Cleveland, Painesville & Eastern Railroad to issue its forty-year 5 per cent refunding and extension mortgage gold bonds of the total principal sum of \$54,000, said bonds to be sold for not less than 80 and accrued interest. The proceeds arising from a sale of the bonds are to be devoted to reimburse the income account of the company for money expended therefrom during 1913, aggregating the sum of \$54,671, for additions, extensions and improvements.

Columbus, Marion & Bucyrus Railway, Marion, Ohio.—A first mortgage deed of trust for \$100,000, bearing 6 per cent and made to the Guardian Savings & Trust Company of Cleveland, was filed at Marion and Bucyrus on April 9. The proceeds are to be used for defraying the expense of the bondholders' committee in operating the road from the time it was brought into court until a reorganization was effected. On April 10 a second deed of trust for \$350,000, in favor of the Knickerbocker Trust Company, New York, was filed. It is due January 2, 1944.

Delta Electric Light, Power & Manufacturing Company, Greenville, Miss.—It is understood that negotiations are pending for the transfer of the property of the Delta Elec-

tric Light, Power & Manufacturing Company to the Delta Light & Traction Company, recently incorporated by N. B. Claggett, S. J. Lenz and F. N. Robertshaw.

Denver (Col.) Tramway.—Forty-eight first mortgage 5 per cent gold bonds of the Denver Tramway Power Company have been called for payment at 105 and interest at the office of the International Trust Company, Denver, on May 11.

Grafton Light & Power Company, Grafton, W. Va.—The Grafton Traction Company and the Grafton Gas & Electric Light Company have been consolidated as the Grafton Light & Power Company. Both companies have been controlled by the same interests.

Jackson Light & Traction Company, Jackson, Miss.—The Chicago Savings Bank & Trust Company, Chicago, Ill., is offering at 97 and interest a block of the original issue of \$700,000 of first mortgage 5 per cent bonds of the Jackson Light & Traction Company of 1902, due on April 1, 1922.

Lake Shore Electric Railway, Cleveland, Ohio.—The Lake Shore Electric Railway has been authorized by the Public Utilities Commission of Ohio to pledge its 5 per cent general mortgage bonds of the principal sum of \$70,000 as collateral for a loan of not less than \$42,000. The company recently notified the commission that it had been unable to sell at 85 the \$70,000 of bonds recently authorized by the commission.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The Railroad Commission of California has authorized the Los Angeles & San Diego Beach Railway to issue refunding promissory notes, the first in the sum of \$15,000 bearing interest at the rate of 6 per cent, and the second in the sum of \$19,000, bearing interest at the rate of 7 per cent, both due in four months. The notes are to be sold at their face value.

Mesaba Railway, Virginia, Minn.—W. H. Newbold's Son & Company and Graham & Company, Philadelphia, Pa., are offering the unsold balance of Mesaba Railway first mortgage sinking fund 5 per cent gold bonds at 94 and interest, yielding over 5½ per cent. The bonds are dated March 1, 1912, and are due on March 1, 1932. Interest is payable March and September. The bonds are redeemable at the option of the company as a whole on any interest date by lot for account of sinking fund at 105 and interest.

Northern Ohio Traction & Light Company, Akron, Ohio.—The Public Utilities Commission of Ohio has authorized the Northern Ohio Traction & Light Company to issue \$481,600 of its 6 per cent cumulative preferred stock to be sold for not less than 95, the proceeds from the sale to be devoted to reimburse the income account of the company for money expended during 1913 for reconstruction, additions, extensions and improvements. The commission has also authorized the Canton & Akron Consolidated Railway and the Northern Ohio Traction & Light Company to issue general consolidated 5 per cent bonds of the Canton & Akron Consolidated Railway to the amount of \$58,000, the bonds to be sold at not less than 80. The proceeds of the sale of the bonds are to be devoted to reimburse the Northern Ohio Traction & Light Company for 85 per cent of the cost of additions, extensions and improvements made by that company to the property of the Canton & Akron Consolidated Railway during 1913.

Pittsburgh & Butler Street Railway, Pittsburgh, Pa.—A special meeting of the stockholders of the Pittsburgh & Butler Street Railway will be held on June 12, to vote on a proposed increase in the bonded indebtedness of the company from \$2,000,000 to \$4,000,000.

Washington Railway & Electric Company, Washington, D. C.—The Public Utilities Commission of the District of Columbia has approved the application of the Washington Railway & Electric Company for authority to issue \$1,000,000 of bonds under a mortgage to the United States Mortgage & Trust Company, New York, N. Y., bearing the date of March 1, 1902. The bonds will be used to retire \$500,000 of first mortgage gold bonds and \$500,000 of extension mortgage bonds of the Columbia Railway, falling due on Oct. 1, 1914. The new issue will bear interest at 4 per cent, while the bonds which are to be replaced bear 6 per cent.

Dividends Declared

Bangor Railway & Electric Company, Bangor, Maine, one-half of 1 per cent.
 Brazilian Traction, Light & Power Company, Toronto, Ont., quarterly, 1½ per cent, ordinary.
 Cape Breton (N. S.) Electric Company, Ltd., \$3, preferred; \$3, common.
 Commonwealth Railway, Power & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.
 Cumberland County Power & Light Company, Portland, Maine, quarterly, 1½ per cent, preferred.
 Denver & Northwestern Railway, Denver, Col., quarterly, 1 per cent.
 Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.
 Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine, quarterly, 1½ per cent, preferred.
 Montreal (Que.) Tramways, quarterly, 2½ per cent.
 Public Service Investment Company, Boston, Mass., quarterly, \$1.50, preferred.
 Railways Company General, Philadelphia, Pa., quarterly, 1 per cent.
 Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, quarterly, 1¼ per cent, preferred.
 Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.
 West Penn Railways, Pittsburgh, Pa., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Mar., '14	\$23,196	\$20,519	\$2,676	\$674	\$2,002
1 " " '13	25,674	19,409	6,266	466	5,800

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m., Feb., '14	\$67,918	*\$63,623	\$4,295	\$15,977	†\$11,682
1 " " '13	63,919	*64,707	789	12,960	†13,749
8 " " '14	685,852	*598,367	87,486	122,331	†34,845
8 " " '13	653,878	*588,754	65,124	100,546	†35,422

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Feb., '14	\$556,533	*\$458,789	\$97,744	\$88,366	\$9,378
1 " " '13	540,536	*407,224	133,312	86,484	46,828
8 " " '14	5,584,045	*4,032,557	1,551,488	713,893	\$37,595
8 " " '13	5,227,659	*3,586,308	1,641,351	692,376	948,975

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE

1m., Feb., '14	\$168,062	*\$114,456	\$53,606	\$63,465	\$9,859
1 " " '13	157,324	*94,399	62,925	56,714	6,211
12 " " '14	2,377,457	*1,351,056	1,026,401	727,867	298,534
12 " " '13	2,161,772	*1,214,293	947,479	657,376	290,103

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m., Feb., '14	\$19,761	*\$22,235	\$2,475	\$7,801	†\$10,276
1 " " '13	20,743	*21,170	427	7,436	†7,860
8 " " '14	252,791	*201,958	50,834	61,694	†10,860
8 " " '13	250,201	*224,880	25,320	56,827	†31,507

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m., Feb., '14	\$27,647	*\$45,180	\$17,533	\$11,124	†\$28,657
1 " " '13	25,395	*43,273	17,877	13,992	†31,869
8 " " '14	283,863	*391,052	107,189	75,991	†183,180
8 " " '13	201,263	*371,959	170,696	101,933	†272,629

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1m., Mar., '14	\$1,949,519	\$1,187,592	\$761,927	\$802,946	†\$41,019
1 " " '13	2,009,443	1,219,268	790,175	765,093	25,082
9 " " '14	17,974,593	10,622,574	7,352,020	7,204,020	148,000
9 " " '13	17,712,793	10,638,715	7,074,078	6,862,519	211,559

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Feb., '14	\$538,236	*\$259,989	\$278,247	\$174,880	\$103,367
1 " " '13	530,071	*247,357	282,714	152,509	130,205
12 " " '14	6,760,919	*3,318,019	3,442,900	2,051,234	1,391,666
12 " " '13	6,675,837	*3,304,478	3,371,359	1,791,038	1,580,321

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m., Feb., '14	\$359,139	*\$321,680	\$37,459	\$110,314	†\$72,855
1 " " '13	361,504	*266,799	94,705	102,056	†7,351
8 " " '14	3,685,585	*2,693,768	991,817	858,171	133,646
8 " " '13	3,627,693	*2,344,631	1,283,061	816,464	466,615

WESTCHESTER STREET RAILWAY, MOUNT VERNON, N. Y.

1m., Feb., '14	\$14,922	*\$20,435	\$5,514	\$1,164	†\$6,678
1 " " '13	14,618	*18,816	4,199	958	†5,157
8 " " '14	169,505	*170,127	522	8,744	†9,266
8 " " '13	160,500	*168,143	7,643	6,727	†14,370

* Includes taxes. † Deficit.

Traffic and Transportation

Public Relations in Baltimore

In the report of the United Railways & Electric Company, Baltimore, Md., for the year ended Dec. 31, 1913, William A. House, president of the company, discusses the subject of public relations in part as follows:

"There is perhaps at this time no one subject of more importance to the company than its relations with the people it serves, or what might be designated the public relations of the company. The question of public relations to those not directly interested in the company's affairs may be presumed to be a matter for occasional consideration, but those in the company's employ have been taught to realize that if there is one subject that is paramount with respect to the aims and purposes of the company, it is covered by the term public relations.

"The public relations of a corporation of the character of the United Railways are many-sided and complex. To be able to render to the public the most efficient service possible, the company's affairs must be managed economically and yet liberally. This statement may seem somewhat paradoxical; however, money must be saved that costly improvements may be effected, and at the same time money must be freely spent in producing a higher grade of the commodity it has for sale, namely, transportation.

"The company has learned as a consequence of this condition to subject every suggestion that comes to it, from whatever source, to the test: What will be its effect on the general service? It is believed that this policy has resulted in establishing a more cordial relationship between the company and its patrons than is usual under like conditions. It is also believed that the public is willing to express its appreciation of what the railways company is endeavoring to do for it and for the city, realizing that their interests are interdependent. Naturally, the stockholders of the company are desirous of the continuance of this friendly feeling. That intangible something which is known as the 'good will' of a concern is with most business enterprises treated as a valuable asset. A public service corporation that has the good will of practically all the people can still be placed in a false position by the unfriendly attacks and ill-advised criticisms, often anonymously, of a few dissatisfied citizens. To paraphrase a well-known saying of President Lincoln, we can please all the people some of the time, we can please some of the people all the time, but we cannot please all the people all the time. Anyone who took the trouble to watch the dispute which arose and continued for years between the 'near-side' and the 'far-side' advocates in a situation in which the company offered to submit itself to public opinion will know what is meant. Again, the more recent Callow Avenue dispute and the disagreement as to heated cars evidence the difficulty the company has in discovering at times what is really public opinion.

"Beneath the figures and details of much of this report evidence will be found of a constant striving to give the people as perfect a transportation service as is practicable. Capital backed by confidence, enterprise and judgment has been the chief factor in this upbuilding, and these four elements constitute a partnership that will always succeed with the co-operation of the people. As a result of this striving, there has, it is believed, been a steady growth in the cordiality of the public relations of the company.

"To maintain this condition the company is bending every effort, realizing that from the people it obtains its income—that it is their servant—and there is no better investment than a satisfied public."

Brief Filed in Lawrence, Mass., Fare Case

The Bay State Street Railway, Boston, Mass., through James F. Jackson, its general counsel, has filed a brief with the Massachusetts Public Service Commission setting forth the company's reasons for opposing a recently heard petition of the Lawrence Chamber of Commerce asking for the establishment of free transfer privileges in that city to and from the Haverhill-Lawrence line. The company points out that although there is a difference in the transfer privileges

given in Haverhill and those given in Lawrence in connection with travel between the two cities, no unjust discrimination exists against Lawrence. A comparison of fares in Lawrence with those in other cities shows that Lawrence receives more liberal treatment. Lawrence and Methuen now have the longest ride for one fare in eastern Massachusetts, a maximum of 9.74 miles throughout the day, compared with a maximum of 9.44 miles in Haverhill.

Quoting similar cases, the brief points out that the distance between Lawrence and Reading is 13.08 miles and the fare 15 cents, transfers being given in Lawrence and none in Reading. The distance between Lawrence and Haverhill via Methuen is 9.53 miles and the fare is 10 cents, transfers being issued in Haverhill only. From Lowell, Mass., to Nashua, N. H., 15 miles, the fare is 20 cents, with transfers in Nashua, but none in Lowell. From Lawrence to Malden, 21 miles, the fare is 25 cents, with transfers in Lawrence only. No transfer is issued in either city in connection with the 21-mile, 25-cent ride between Lawrence and Salem. Other lines between cities without transfer in either are those connecting Gloucester and Beverly, Lowell and Malden, Reading and Lynn. Travel between Lawrence and Lowell is accompanied with transfer at each end, but the fare is 15 cents, while that between Lawrence and Haverhill, practically the same distance, is only 10 cents. A petition for an extension of transfer on this line was denied in the order of the former Railroad Commission on July 25, 1910. A petition before that board for extension of fare on that line between Lawrence and Lowell was denied on July 19, 1909. With the exception of Brockton and Lynn, Lawrence has more advantages in the way of street railway fares than any other municipality upon the Bay State Company's system of nearly 1000 miles of track. If the transfer requested were granted it would create upon the Lawrence Division a ride of 10.36 miles for 5 cents, a fare in the company's view utterly unreasonable in face of present operating costs. In nine out of twelve cities compared by the company, the maximum distance which can be covered by a single fare and transfer is less than at Lawrence, ranging from 2.77 miles at Newport, R. I., to 9.45 miles at Haverhill. The petition has been taken under advisement by the board.

The Menace of the Motorist

The important question of safety in travel was discussed recently by Paul Shoup, president of the Pacific Electric Railway, at the Sierra Madre Club, Los Angeles, Cal. After explaining the precautions taken by the company to prevent accidents, he cited figures to show how careless the public is in disregarding warnings and failing to co-operate in the "safety first" movement. The company has thus far spent \$40,000 for crossing signals, he said, but motorists persist in disregarding the warnings. In one month there were 1100 accidents in the United States resulting from motorists attempting to cross in front of moving trains. Recently a careful check was made at the Pacific Electric Railway crossings chiefly used by motorists, and it was found that in twenty hours there were 400 cases in which drivers disregarded the moving signals. Mr. Shoup continued in part:

"We try to take every precaution to provide safety, and we train our men carefully before they are entrusted with the responsibility of operating cars. Prospective motorists are taken over their runs as students for three weeks. Then they are examined with respect to 600 questions the answers to which they have been required to study. They receive their final examination at the end of sixty days.

"There are 239 rules with which the men must be familiar before they are entrusted with the management of trains. They are instructed by means of moving pictures and otherwise impressed with the fact that the violation of a rule may result in a tragedy. Lest the men forget, they are examined every three years.

"We use surprise signal tests to learn how well our men are trained. Last year 10,000 such tests were conducted by the superintendent, assistant superintendent and train masters. The tests consist of flagging trains, placing torpedos on the track and otherwise learning how well the men know the rules.

"When a man fails, demerits are charged against him.

If he continues to be negligent he automatically discharges himself when he has received seventy-five demerits. The men receive merit marks for close observation of the rules and these marks are taken into consideration when promotions are made."

Operating Problems in Columbus

H. W. Clapp, general superintendent of the Columbus Railway, Power & Light Company, Columbus, Ohio, in an address to the members of the East Long Street Improvement Association on April 9 made a number of very frank statements in regard to plans for improvements decided upon by the company, and to the burdens imposed upon the company by the ordinance under which it operates. He predicted that the city would grow tired of the franchise awarded the company before it expires in 1926 and would make an attempt to secure the adoption of a new grant less onerous in its conditions. The company is giving the best service possible under the low fares prescribed by its operating grant. It is planning to reduce the congestion on High Street between State and Chestnut streets about 25 per cent by removing cars from this section except during rush hours. According to Mr. Clapp the new routing will not prove profitable to the company for several years, as the cost of the work involved will be \$60,000. In addition 110 cars have been reconstructed into cars of the pay-as-you-enter type. Wages have been readjusted, a co-operative beneficiary association has been established and the equipment has been rehabilitated as a preface to more extensive development.

Interborough Rapid Transit Loan Fund

According to announcement made by H. H. Vreeland, director of welfare, a loan fund similar to that which has been in use for many years on the New York Railways has been inaugurated by the Interborough Rapid Transit Company. This installation is in line with the present policy of systematizing the welfare work of the companies.

The fund is to be administered through the volunteer relief department under regulations prescribed by the welfare department. Applications for loans not to exceed \$50 may be made by the employees to the superintendent of the relief department, and money will be loaned without interest or other charge in accordance with certain regulations. In the first place, the applicant must secure from the head of his department an official application blank, which, when properly filled out, must be approved by the head of the department. After the loan is granted, a weekly deduction of 10 per cent, commencing with the week following, is to be made from the payroll of the employee, provided the amount payable to the employee after the deduction of all charges shall not fall below \$8. In such cases deductions of less than 10 per cent may be made. Provision is also made for a temporary extension of the time of payment in extreme or exceptional cases. Employees desirous of having their payments omitted at any time must apply to the department head who originally approved the loan. If the latter approves, the application is submitted to the relief department superintendent for action according to the merits of the case.

This fund has been inaugurated by the company in the realization that at certain times there arises a need for money which cannot be foreseen and for which an employee cannot always provide from his regular wages, such as heavy expenses caused by sickness or death. The loan department in the New York Railways during 1913 dispensed \$1800 to the employees to meet such emergencies.

Employee Charged With Embezzlement.—The Owensboro (Ky.) City Railway has undertaken the prosecution of an employee accused of systematic "knocking down." Instead of alleging larceny, the company swore out a warrant charging Charles T. Able with embezzlement. Able has been in the company's employ for eleven years as a motorman and as a conductor and in that time, according to the charges made by officials of the company, has embezzled \$3,500 from his employer.

New Agreement in Albany.—The agreement which was entered into in 1912 between the United Traction Company,

Albany, N. Y., and its employees in regard to wages and other terms of service expires on June 30, 1914. The representatives of the men are preparing a modification of the present agreement in which it is said they will ask among other things an increase in wages, time and one-half for Sunday work, seats for motormen on all double-truck cars and protection of motormen on open cars.

New York Employees Entertain.—H. H. Vreeland, director of welfare work of the Interborough Rapid Transit Company, New York, N. Y., secured the use of Carnegie Hall, Seventh Avenue and Fifty-seventh Street, for the evening of April 24, on which date the employees of the company gave a minstrel and vaudeville show for the entertainment of themselves and families. The talent was all drawn from the ranks of the subway and elevated division. The sale of tickets was restricted to employees and members of their immediate families. The company assumed all the expense of the entertainment.

Injunction Against Curtailment of Through Service.—Common Pleas Judge A. J. Pearson has granted a temporary injunction to prevent the Cleveland (Ohio) Railway from discontinuing through car service to Euclid village. The company announced that through cars would be discontinued and that a shuttle service would be installed between the city limits and the village. An effort is being made to have a cross-town line built near 123d Street, between Superior and St. Clair Avenues. Peter Witt, street railway commissioner, favors this plan, but opposition to it has developed in Council.

Remarkable Accident Record.—Reports to the Public Service Commission for the First District of New York show that in three days eleven persons were run down by street cars, and ten of them were saved by the operation of the wheel guards. It is not often that so many accidents occur within such a short space of time. To make the incident further remarkable one of the accidents involved two boys who were picked up together, and another a man forty-five years old who escaped with nothing worse than bruises. The accidents occurred in various parts of the city on April 4, April 6 and April 7.

Boston-Worcester Limited Service Increased.—The Boston & Worcester Street Railway has increased its limited service between the City Hall, Worcester, and Park Square, Boston. The new schedule went into effect on April 18. Under the previous schedule the limited service began at 8 a. m. and ceased at 5 p. m., an hourly headway being maintained in each direction by express passenger cars, with local intermediate service. The new schedule provides half-hourly limiteds from 6:30 a. m. to 5 p. m. The company has been particularly successful in competing with the steam railroad service between the two cities, which are 45 miles apart.

Recommendation for Near-Side Stop Likely in New York.—President McAneny of the Board of Aldermen, Alderman Bedell, chairman of the Aldermanic committee on public thoroughfares, and Ernest P. Goodrich, chairman of the advisory street traffic commission of New York, have received opinions from the police officials of the chief cities of the United States as to the relative advantage of the near-side and the far-side stop of cars at street crossings. It is expected that the advisory commission in making its report to the Board of Aldermen will recommend that the rules of the road be changed to provide for near-side stops at all crossings for surface cars.

Train Robbers Overpowered.—Two bandits who attempted to hold up a car of the Puget Sound Electric Railway between Seattle and Tacoma, Wash., recently were overpowered and beaten into insensibility. The bandits, stationed one at each end of the car, ordered the passengers to gather in the center. While some of the passengers were preparing to obey one of the passengers leaped on the nearest bandit and threw him to the floor. This was a signal for the other passengers to attack the other bandit. This they promptly did with probable dire consequences to their victim. In the scuffle one of the non-combatant passengers was shot and will probably die. Little hope is entertained for the recovery of either of the robbers.

Hearing on Rates Between Seattle and Tacoma.—Hearings are now being held before the Public Service Com-

mission of Washington on the application of the Puget Sound Electric Railway for an increase in passenger rates between Seattle and Tacoma, Wash. James B. Howe, general counsel for the company, says that the company is asking that the order of the old commission, which fixed the present rates, be cancelled and that the company be allowed to put in new rates. Mr. Howe says: "In 1909 the company was compelled to raise its rates and it established a uniform rate of 2 cents a mile and commutation of 1.4 cents a mile, with the exception that from Seattle to Tacoma the round-trip rate was fixed at \$1.25. The commission ordered the rates cut, and it is on this action that a rehearing is asked."

Safety Bureau, Chicago Surface Lines.—At a luncheon of the City Club of Chicago on April 15, H. L. Brownell, superintendent of the safety committee of the Chicago Surface Lines, lectured on how moving pictures are being used to educate street railway employees, passengers and school children toward greater safety. Mr. Brownell displayed moving pictures of accidents and the conditions which led to them. These films included views of boarding and alighting accidents, collisions with teams, splitting switches, over-hang on curves, starting cars with men under them in shops, and others illustrating the dangers arising from having refuse lying about the pits in the shop and carhouses. Mr. Brownell stated that the "safety first" crusade of the last year had reduced the fatal street car accidents to employees by 60 per cent and to children by 75 per cent.

Appeal Against I. C. C. Verdict.—The International Railway, Buffalo, N. Y., will appeal from the verdict in favor of the government in the action brought by the Interstate Commerce Commission against the company, for alleged violation of the federal safety appliance laws which provides that cars in interstate commerce shall be equipped with automatic couplers and grab irons. A fine of \$100 was imposed upon the company by the court for each of the nine offenses named in the action brought by the commission. The government charged that the International Railway was a common carrier in interstate commerce because it honors tickets over the Erie Railroad and transports freight for that company and that for these reasons it is subject to the same laws that govern the Erie Railroad. The company maintained that its cars were strictly street cars and carried city passengers.

Electric Lines in Connection with the Lehigh Valley Railroad.—The Lehigh Valley Railroad, New York, N. Y., has issued a special twelve-page booklet dealing with the electric railways which connect with it. The information is for the accommodation of parties who may wish to reach by electric railway some point contiguous to but not directly on the Lehigh Valley Railroad. It is compiled from information specially furnished by the officials of the lines named. The towns are arranged by states and then alphabetically by cities. There is a key number after each town which serves to identify the connecting electric railway by reference to the key at the back of the book. The fares by electric railway from each town to the principal connecting Lehigh Valley station are given, as are also details in regard to the frequency of the electric railway service and the baggage accommodations which are afforded by these lines.

Proposed Buffalo Terminal.—Plans are being made by the International Railway, Buffalo, N. Y., for the construction on the site of the present Garden Theatre of a twelve-story building with an arcade running through it from Pearl to Franklin Streets. The property was recently purchased by the company for \$375,000. The new building will cost approximately \$1,000,000. The arcade will have four tracks and two broad sidewalks. All of the cars of the following interurban railways operating out of Buffalo will use the arcade as a terminal: Buffalo & Niagara Falls Electric Railway, Buffalo & Lockport Electric Railway; Buffalo, Lockport & Rochester Railway, Buffalo & Lake Erie Traction Company and Buffalo & Lancaster Electric Railway. The second floor will be used as the general offices of the International Railway Company. The offices of the company are now located on the eighth floor of the Ellicott Square Building.

Personal Mention

Gen. George H. Harries, past-president American Electric Railway Association, was among those ordered to report to the War Department at Washington on April 21, in connection with the Mexican trouble.

Mr. W. S. Murray, of the firm of McHenry & Murray, New Haven, Conn., delivered a lecture before the engineering students of Yale University on April 22. His topic was "The Electrification of the New Haven Railroad." The lecture was particularly timely in view of the approaching completion of the electrification of the railroad from Stamford to New Haven.

Mr. Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has been elected president of the West Penn Traction Company, Pittsburgh, Pa. The West Penn Traction is controlled by the West Penn Traction & Water Power Company, which in turn is controlled by the reorganized American Water Works & Electric Company.

Mr. C. C. Chappelle has resigned as vice-president and general manager of the Federal Light & Traction Company, New York, N. Y., to take effect on May 1, 1914, in order to devote his whole time to private business. Mr. Chappelle has been executive officer of the company since early in 1911. He was previously with the Westinghouse Machine Company as Western sales manager, with headquarters at Chicago. Since his graduation from Purdue University in 1895 most of his association has been with the Westinghouse interests. Mr. Chappelle remains as one of the three members of the executive committee of the Kansas City, Clay County & St. Joseph Railway.

Mr. George A. Gaston has been elected president of the Northwestern Pennsylvania Railways, Meadville, Pa., to succeed Mr. H. W. Thornton, formerly with the Long Island Railroad, who has become general manager of the Great Eastern Railway of England. Mr. Gaston was born in Cleveland, Ohio, and was graduated from Washington and Jefferson College in 1899 and later from the Western Reserve Law School. For some time he was connected with the law firm of Fauver, Thomsen & Gaston, but for the last three years or more his attention has been devoted almost entirely to transportation work. He is president of the Ashtabula Steamship Company and director in the American Transportation Company, the Shawmut Steamship Company and the Philadelphia & New Orleans Transportation Company. Prior to his election as president of the Northwestern Pennsylvania Railways Mr. Gaston had served on the board of directors of the company.

Mr. S. B. Way, vice-president and assistant general manager in charge of the lighting department of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has been elected vice-president and general manager, or the company's ranking officer in the absence of Mr. J. D. Mortimer, recently elected president of the North American Company, New York. Mr. Way was the senior vice-president in point of service with the North American Company, having served as vice-president and assistant manager at Milwaukee since 1911. He was born in 1875. After he was graduated from Drexel Institute, Philadelphia, he began his business career with the Electric Storage Battery Company, Philadelphia, as draftsman. Later he was promoted to the position of erecting engineer. He resigned from the Electric Storage Battery Company in 1898 to become electrical superintendent with what later became the Union Electric Light & Power Company, St. Louis. Mr. Way went to the Milwaukee company as assistant general manager in charge of the lighting department, and in May, 1912, was also elected vice-president. In all he has been identified with public utility properties for nearly sixteen years, practically all of which time he has been associated with the North American Company.

Mr. Fred W. Ranno, recently appointed senior civil engineer, for service in the Eastern District, Division of Valuation, Interstate Commerce Commission, with office in Washington, D. C., was born at Washington, Vt., and was graduated from the Massachusetts Institute of Technology in 1889. His first experience was with the Pennsylvania lines where he was employed immediately after graduation

as a member of the engineering corps. After a few months with the Pennsylvania lines, he entered the service of the Lake Shore & Michigan Southern Railway as instrument-man on the Michigan Division, being later promoted to resident engineer in charge of construction of second track and changes of line and track elevation work in and around Chicago. In October, 1897, he entered the service of the Southern Indiana Railway, now the Chicago, Terre Haute & Southeastern, as assistant engineer in charge of reconstruction. He was promoted to engineer of maintenance of way in January, 1900. From October, 1905, to February, 1907, he engaged in manufacturing at Manchester, N. H. From February, 1907, to January, 1911, he was assistant engineer of the Union Pacific Railroad, in charge of second track and other construction work in western Wyoming and Colorado. From April, 1911, to January, 1913, Mr. Ranno was principal assistant engineer of the Missouri, Oklahoma & Gulf Railway, and chief engineer of the company from Wagoner, Okla., to Baxter, Kan., which was constructed during the above period. From January, 1913, to his recent appointment in the Interstate Commerce Commission he was superintendent for Kilpatrick Brothers, general contractors on track elevation and construction for the Wichita (Kan.) Union Terminal Railway. Mr. Ranno is a member of the American Railway Engineering Association.

Mr. Milan V. Ayres, recently appointed senior electrical engineer for the Eastern District, Division of Valuation, Interstate Commerce Commission, with office in Washington, D. C., was born at Hamlin, Kan., on Feb. 14, 1875. Mr. Ayres was graduated from the electrical course of the Massachusetts Institute of Technology in 1898. After graduation he entered the service of the General Electric Company at Schenectady, N. Y., being employed in the testing department and later in the design of alternating current machinery. In 1902 he became electrical and mechanical engineer for the Boston & Worcester Street Railway, South Framingham, Mass., continuing in this position until July, 1911. From July, 1911, to November, 1911, he was assistant to the general manager of the Rockland Light & Power Company, Nyack-on-Hudson, N. Y. In November, 1911, he became chief engineer of the Mobile Light & Railroad Company, Mobile, Ala., but resigned from that company in 1912 to accept a position with Ford, Bacon & Davis, consulting engineers, New York City, in which position he continued until his recent appointment with the Interstate Commerce Commission. While employed with the Boston & Worcester Street Railway, Mr. Ayres was admitted to the Massachusetts bar. Mr. Ayres is a member of the American Institute of Electrical Engineers, the American Electric Railway Association, and the American Statistical Association. He was for several years a member of the publication committee of the New England Street Railway Club, and in 1911 he became a member of the executive committee of the New England Street Railway Club. In 1910-1911 he was chairman of the equipment committee of the American Electric Railway Engineering Association, and a member of the executive committee of the Boston Section of the American Institute of Electrical Engineers.

Mr. John J. Treacy, who was recently appointed by Governor Fielder as a member of the Board of Public Utility Commissioners of New Jersey, was sworn in by Secretary of State Carter on April 14. Mr. Treacy succeeds Mr. Winthrop M. Daniels, who was recently appointed by President Wilson as a member of the Interstate Commerce commission. Mr. Treacy was born in Jersey City about forty-one years ago. He received his early education in St. Bridget's Parochial School, Jersey City, and was graduated from St. Peter's College that city in 1891. In 1894 he was graduated from the New York Law School with the degree of Bachelor of Laws. He was admitted to the New York Bar and became associated with the law firm of Reed, Simpson, Thacher & Barnum, of which concern the late Speaker Thomas B. Reed was the head. He was admitted to the New Jersey Bar in 1901 and has practiced his profession ever since in Jersey City. Mr. Treacy was a member of the House of Assembly in 1902 and 1903 and in the latter year he served as the leader of the democratic minority. In the year 1911 the Legislature legislated out of office the commis-

sion that was engaged in the construction of the new court house in Jersey City and authorized the justice of the Supreme Court presiding in Hudson County to select a new commission to complete its construction. Mr. Treacy was appointed by Justice Swayze as a member of this commission. He was appointed a judge of the Court of Errors and Appeals by Governor Wilson on Dec. 8, 1911. On Jan. 29, 1912, he was nominated for a full term of office and was confirmed by the Senate. For several years he was president of the Mercantile Trust Company, Jersey City, but resigned as president of that institution and as judge of the Court of Errors and Appeals in March, 1913, to take up the active practice of law. On April 1, 1913, he formed a law partnership with Mr. John Milton, the present corporation counsel of Jersey City, which partnership is still in existence.

Mr. Ernest Gonzenbach has been appointed general manager of the Empire United Railways, Inc., Syracuse, N. Y., a consolidation of the Rochester, Syracuse & Eastern Railway, the Syracuse, Lake Shore & Northern Railroad and the Auburn & Northern Electric Railroad. The company controls 138.6 miles of line. Affiliated with the Empire United Railways, Inc., are the Syracuse, Watertown & St. Lawrence River Railroad, the Newark & Marion Railway, the Sagamore Navigation Company and the Skaneateles Lake Transportation Company. The lines of the Empire United Railways, Inc., extend from Syracuse on the East to Lockport on the West, where connection is made for Buffalo and Niagara Falls, and also extend from Syracuse north to Oswego on Lake Ontario. Mr. Gonzenbach was formerly president and general manager of the Sheboygan Railway & Electric Company, Sheboygan, Wis., from which company he retired in January, 1914, following the sale of the controlling interest in the company to local interests in Sheboygan. He took charge of the property at Sheboygan on Jan. 1, 1905, as general manager. Later he was elected treasurer of the company and subsequently vice-president and general manager. Mr. Gonzenbach is Swiss by birth and education, but came to this country immediately after leaving school. After an electrical experience in power-house work in Chicago he completed the Thomson-Houston expert course at Lynn, Mass. In 1895, as electrical engineer in St. Johnsbury, Vt., he constructed several electric light and transmission plants in that vicinity. In 1898 he entered the employ of the Westinghouse Electric & Manufacturing Company, and in 1900 became electrical engineer of the Albany & Hudson Railroad, one of the early third-rail roads. Subsequently he accepted a similar position with the Aurora, Elgin & Chicago Railroad, then under construction, after which he was engaged for two years as consulting engineer, principally in the construction of the Youngstown & Southern Railway. In 1909 Mr. Gonzenbach was elected president of the Wisconsin Electrical Association. Owing to the increased passenger traffic and the rapidly growing package freight and express business, President C. D. Beebe and the directors of the Empire United Railways, Inc., considered it desirable to secure a general manager of the railroads of that company who would devote himself exclusively to their operation independent of the other lines of the Beebe syndicate.



Ernest Gonzenbach

OBITUARY

Alfred Noble, a widely known civil engineer and prominent from his connection with the St. Mary's River improvements, the construction of the Pennsylvania Railroad tunnels in New York City, and the Panama Canal advisory board, died at New York, April 19, following an operation for organic trouble. Mr. Noble had received the John Fritz medal for his work on the Pennsylvania tunnels, and he was a past-president of the American Society of Civil Engineers.

Construction News

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

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

RECENT INCORPORATIONS

*Pekin (Ill.) Street Railway.—Incorporated in Illinois to build an electric railway in Pekin. Capital stock, \$15,000. Incorporators: W. E. Lautz, D. D. Volde and W. P. Herget.

*Kingston-Ellenville Trackless Trolley Company, Albany, N. Y.—Incorporated in New York to build a trackless trolley line. Capital stock, \$5,000. Incorporators: John Purce, 427 East Twenty-first Street, Paterson, N. J.; George J. Giger and Frank Leonard, Paterson, N. J.

*Belmont Electric Company, Dallas, Tex.—Incorporated in Texas to build electric railways in and near Dallas. Capital stock, \$5,000. Incorporators: J. A. Sanders, H. W. Brouse and E. W. Morton, Jr.

*San Antonio, San José & Medina Interurban Railway, San Antonio, Tex.—Incorporated in Texas to build an interurban railway from San José to Kirk on the Artesian Belt Railroad. The company will operate gasoline motor cars on this line with freight trailers in connection. Capital stock, \$100,000. Officers: A. D. Powers, president; C. A. Newton, secretary; A. J. Bell, general counsel, and L. S. Powers, managing director.

FRANCHISES

*Globe, Ariz.—The Globe & Miami Traction Company has asked the Board of Supervisors of Gila County for a right-of-way along county highways, upon the route reserved by the Miami Copper Company for railroad purposes, to build an electric railway in and between the towns of Globe and Miami in Gila County, Ariz. Richard West, Miami, president.

Fresno, Cal.—Following the filing of a petition by this company the Board of Supervisors have given notice that on May 5 it will sell to the highest bidder a fifty-year franchise for an electric railway along the county road on Fresno Avenue for a distance of ½ mile, or from the city corporate line to the boulevard.

Rialto, Cal.—The Crescent City Railway has received authority from the Railroad Commission to transfer to William G. Henshaw certain franchise rights granted by the city of Rialto to this company. Mr. Henshaw has received from the Railroad Commission a certificate of public convenience and necessity permitting him to build and operate an electric line in accordance with a franchise granted by the city of Rialto.

Sacramento, Cal.—The Pacific Gas & Electric Company has received a franchise from the Council to double-track its Tenth Street line in Sacramento.

Santa Barbara, Cal.—The Santa Barbara & Suburban Railway has received authority from the Railroad Commission for certificate of public convenience and necessity to exercise certain rights granted under a franchise from the city of Santa Barbara, permitting it to extend its line in Santa Barbara to the State Normal School.

*St. Petersburg, Fla.—C. J. Morrow, St. Petersburg, has asked the Council for a franchise in St. Petersburg. This is part of a plan to build an electric line between St. Petersburg and Tarpon Springs.

Brunswick, Md.—The Frederick & Brunswick Railroad has received an eighteen months' extension of time on its franchise in which to build its line in Brunswick. This line will connect Brunswick, Frederick and Jefferson. Oscar B. Coblenz is interested. [E. R. J., June 1, '12.]

Detroit, Mich.—The Detroit United Railway has received a franchise from the Council to build the workingmen's belt line in Detroit.

Moberly, Mo.—The Moberly, Huntsville & Randolph Springs Railway has applied to the State Public Service Commission for authority to cross a number of streets and highways in Moberly, Huntsville and Randolph County at grade. This company proposes to construct an electric line from Moberly to Randolph Springs and Huntsville. Charles H. Dameron, Huntsville, president. [E. R. J., Feb. 7, '14.]

St. Louis, Mo.—The St. Louis & Jennings Railway has received a franchise from the Council to extend its tracks from Florissant Avenue and Helen Avenue south on Helen Avenue to Melrose Avenue in St. Louis.

Buffalo, N. Y.—The International Railway has asked the Council for a franchise to rebuild the roadbed of the Buffalo, Kenmore & Gratiwick line using a concrete bed with new 60-ft. rails.

Lewiston, N. Y.—The Niagara Gorge Railroad has asked the Council for a franchise to extend its tracks on Water Street in Lewiston.

Hamilton, Ont.—The Wentworth County Council has passed a by-law giving authority to build an electric railway on Main Street between Ottawa Street and Kenilworth Avenue in Hamilton.

Portland, Ore.—The Portland & Oregon City Railway has asked the Council for a franchise to extend its lines into districts not now covered by the Portland Railway, Light & Power Company in Portland. In the franchise the company asks for the common use with the Portland Railway, Light & Power Company of the tracks on streets covered by the franchise.

Portland, Ore.—Isaac W. Anderson, president of the Washington-Oregon Corporation, has asked the Council for a franchise across the new Columbia River bridge and approaches in Portland. This is part of a plan to extend the line from Vancouver to Portland via the Columbia River bridge when the bridge is completed.

Graham, Va.—The Appalachian Power Company, Bluefield, has received a twenty-year franchise from the Council in Graham to extend its lines to West Graham, a distance of 1 mile, and also to use Norton Street to the southern town limits for the belt line around by the Bluefield-Graham fair grounds.

Racine, Wis.—The Milwaukee Electric Railway & Light Company has asked the Council for a franchise to extend its lines 2 miles south, 2 miles southwest and 4 miles to the north of Racine.

TRACK AND ROADWAY

***Globe & Miami Traction Company, Globe, Ariz.**—This company has been formed to build an electric railway between Globe and Miami. The route has not been definitely decided, three being under consideration. Richard West, Miami, president.

Glendale & Eagle Rock Railway, Glendale, Cal.—This company will improve its lines.

Pacific Electric Railway, Los Angeles, Cal.—Plans are being made by this company to double track its line from San Bernardino through Lordsburg to Los Angeles.

San Francisco-Oakland Terminal Railway, Oakland, Cal.—A new line is to be established by this company between Alameda and Oakland, making three lines to connect the two cities. The new line is to be known as the San Jose Avenue line and will be operated from Fifteenth Street and San Pablo Avenue in Oakland, down Broadway to Water Street and along Webster Street, Santa Clara Avenue, Ninth Street, San Antonio Avenue and San Jose Avenue to High Street.

United Railroads, San Francisco, Cal.—Work has been begun by this company on the extension of its Polk and Larkin Streets cross-town line to North Point Street, a distance of ½ mile. The North Point terminus will enable patrons to reach the Van Ness Avenue entrance to the exposition with a walk of a short block.

***Jacksonville, Fla.**—Right-of-way has been secured and surveys completed for an electric railway to connect Jacksonville, Mandarin and St. Augustine.

Chicago & Oak Park Elevated Railroad, Chicago, Ill.—Plans are being considered for the immediate elevation of this company's tracks from Laramie Avenue to the western terminus in Oak Park.

Chicago & Joliet Electric Railway, Joliet, Ill.—Improvements, costing over \$50,000 will be made in the equipment of this company within the next few months.

Oil Belt Railway, Martinsville, Ill.—It is reported that this company plans to build soon an extension from Bridgeport to Vincennes, Ind.

Fort Scott & Pittsburgh Railway, Fort Scott, Kan.—The Kansas Public Utilities Commission has authorized this company to issue bonds in the sum of \$950,000 for construction and equipment of its proposed electric line from Pittsburgh to Fort Scott. The promoters intend ultimately to connect Kansas City and the lines in the Joplin-Pittsburgh mining district. Surveys have been made and a charter obtained for a line from Fort Scott to Kansas City. Residents along the route are subscribing liberally for this proposed Kansas City connection. A. B. Dickman, Fort Scott, president. [E. R. J., April 11, '14.]

Southern Traction Company, Bowling Green, Ky.—This company, which has succeeded the Bowling Green Railway, plans to improve and extend its lines in Bowling Green. L. D. Haines, Bowling Green, secretary. [E. R. J., Jan. 24, '14.]

Orleans-Kenner Electric Railway, New Orleans, La.—Negotiations are proceeding between this company and the New Orleans Railway & Light Company so that this company may use the tracks of the New Orleans Railway & Light Company over certain streets in New Orleans. This line will connect New Orleans, Kenner and Hanson City. A. S. Bowman, New Orleans, president. [E. R. J., April 4, '14.]

Electric Short Line Railroad, Minneapolis, Minn.—This company has completed 18 miles of its line from Minneapolis to Watertown, S. D., and 26 miles are now under construction. A contract will be awarded within the next sixty days for grading 22 miles to be completed this season.

Minnesota Northwestern Electric Railway, Minneapolis, Minn.—This company has awarded the contract to John Moberg, Bemidji, to construct the roadbed for 20 miles of its line extending east from Thief River to Goodridge. Daniel Shaw, Thief River, Minn., president. [E. R. J., April 18, '14.]

United Railways, St. Louis, Mo.—Work has been begun by this company on the extension of two of its lines in St. Louis County. The Kirkwood-Ferguson line is being lengthened so that its southern terminus will be a point near Woodbine Avenue and Geyer Road, about 1 mile west of Kirkwood. Filling and grading for the construction of a new loop terminal are under way. The Market Street line, which now ends at West End Heights, will also be lengthened to extend through Brentwood and connect with the Kirkwood-Ferguson line.

Ismay, Ekalaka & Southern Electric Railway, Ismay, Mont.—Preliminary arrangements are being made by this company to construct an electric line from Ismay, on the Chicago, Milwaukee & St. Paul Railroad, to Ekalaka, about 44 miles distant, and thence to Camp Cook, S. D. Ekalaka is an inland town without railroad connections, but it is the county seat of the new county of Fallon, and it is the desire of the incorporators and promoters of the railway, who have extensive interests in Ismay and Ekalaka, to provide this means of communication. The railway will be built from a sale of bonds and from popular subscription. J. E. Prindle, general manager. [E. R. J., April 11, '14.]

Reno (Nev.) Traction Company.—Work has been begun by this company laying new ties and improving its lines on Fourth Street and Second Street in Reno.

International Traction Company, Buffalo, N. Y.—It is reported that this company is contemplating an expenditure of more than \$2,000,000 for improvements in general equipment on its lines. The greater part of this construction work will be done, this spring and summer. The company plans to lay new tracks to replace the lighter-weight rails on many of its lines, which item will total about \$1,500,000. Improvements at various grade crossings are to be made and more than \$75,000 will be expended for new trolley wires, new poles, ties, and other material to be used by the company in this work.

Geneva, Seneca Falls & Auburn Railroad, Seneca Falls, N. Y.—Preliminary surveys have been completed by this company for the extension from Seneca Falls to Auburn.

Dayton, Middletown & Cincinnati Railway, Middletown, Ohio.—Right-of-way has been secured by this company for its line from Dayton via the old "Dummy line" to the Soldiers' Home, from there through Miamisburg, Carlisle and

Middletown, then north to Monroe, Bethany, Westchester, Sharonville, Hartwell and Arlington Heights to Cincinnati. E. H. McKnight, Middletown, general manager. [E. R. J., Jan. 10, '13.]

Portsmouth Street Railway & Light Company, Portsmouth, Ohio.—Bids will be received by this company until May 15 to build and furnish material for 22 miles of new track. Plans and specifications may be obtained upon application to the company, for which a deposit of \$10 will be required, to be refunded upon return of plans.

Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio.—Plans are being considered by this company to extend its lines from Toledo Beach to Monroe, Mich., this season.

***Washington C. H., Ohio.**—Plans are being considered to build an electric line from Washington C. H. to Hillsboro and east to Columbus. A. M. Fisher, Indianapolis, is interested.

***Oil Traction Belt Line Company, Stilwell, Okla.**—This company has been formed at Stilwell, Okla., to build an electric railway from Stilwell to Blackwell and north to Miami from Stilwell. From Miami, the proposed line will extend back to Blackwell, forming a triangle.

Hamilton, Ont.—It is reported that the Hydro-Electric authorities in Toronto have agreed to construct a hydro-electric line on the mountain as a branch of the road from Georgian Bay, provided the township of Barton can show that the railway would be a paying proposition.

Peterboro (Ont.) Radial Railway.—This company plans to spend \$40,000 to provide for new trackage, sidings, etc., on its lines in Peterboro.

St. Thomas (Ont.) Municipal Railway.—Negotiations are proceeding between the city of St. Thomas and the officials of the London & Lake Erie Railway & Transportation Company looking to the operation of the municipal system by the company for a term of years.

Willamette Valley Southern Railway, Oregon City, Ore.—Immediate completion of this railway from Oregon City, via Beaver Creek, Mulino and Molalla to Mount Angel, about 32 miles, and the actual operation of the railway before the end of the present year was recently assured when the Portland Railway, Light & Power Company agreed to guarantee a \$700,000 bond issue necessary to finance the project. In consideration for the arrangement the Willamette Valley Southern Railway will purchase its electric power from the Portland Railway, Light & Power Company and will interchange its traffic with the railway at Oregon City. Approximately 7 miles of track have been laid and more than two-thirds of the building completed. In January, 1914, the Portland Railway, Light & Power Company acquired the majority of the stock and has obligated itself to complete the line by January, 1915.

Portland, Eugene & Eastern Railway, Portland, Ore.—This company is asked to extend its lines down the River Road as far as Junction City.

Portland & Oregon City Railway, Portland, Ore.—An extensive system of interurban electric lines is proposed by S. Carver, promotor of the Portland & Oregon City Railway. If carried out, this new system will connect Portland with several well-settled districts that have been asking for car connections with Portland for many years, including Damascus, via Happy Valley, and Stone and Logan, via Harmony, Clackamas and Clear Creek. The general route of these interurban lines tentatively starts at Division and East Twenty-first Streets, and extends south to Powell Street, and thence eastward to about East Twenty-fifth street, when a turn will be made to the Damascus country.

Metolius, Prineville & Eastern Railway, Prineville, Ore.—This company recently announced that bids for the construction of the line from Metolius to Prineville, a distance of 30 miles, will be received in the immediate future. The money to build the line has been raised and active construction will begin next month. H. B. Scheel, Prineville, Ore., president. [E. R. J., Nov. 8, '13.]

Utah Light & Railway Company, Salt Lake City, Utah.—Work will soon be begun by this company to extend the Holiday line to Big Cottonwood Canyon, the Wandamere line to Fourteenth South and west to State Street, and the Davis County line from Centerville to Farmington.

Spokane & Inland Empire Railroad, Spokane, Wash.—This company is asked to consider plans to extend its lines from Recreation Park by East Hillyard to the Morgan Acre Tracts and the Minnehaha Districts.

Southern Wisconsin Railway, Madison, Wis.—This company is asked to consider plans for an extension between Madison and Middleton.

SHOPS AND BUILDINGS

British Columbia Electric Railway, Vancouver, B. C.—It is reported that this company and the Chicago, Milwaukee & St. Paul Railway will build joint terminals in Sumas. The Chicago, Milwaukee & St. Paul Railway is now engaged in the construction of a belt line around Sumas to connect with the lines of the British Columbia Electric Railway, and when the belt line is completed direct connections will be made between the two railways.

International Railway, Buffalo, N. Y.—Plans are being made by this company to build a twelve-story building penetrated by an arcade running through it from Pearl Street to Franklin Street on the site of the present Garden Theatre in Buffalo. The arcade will have four tracks and two sidewalks. The second floor will be used as the general offices of the company. The new structure will cost approximately \$1,000,000.

Empire United Railways, Inc., Syracuse, N. Y.—This company and the Buffalo, Lockport & Rochester Railway will move their passenger station in Rochester from the Court Street and Exchange Street office to the Erie Station in Court Street, Rochester. The waiting room of this passenger station has been enlarged to meet the additional passenger requirements of the two other railways.

Toronto (Ont.) & York Radial Railway, Toronto, Ont.—This company has begun to rebuild its new carhouses which were destroyed by fire a short time ago.

Johnstown (Pa.) Traction Company.—Preliminary arrangements are being made by this company to begin work soon on its new passenger station in Johnstown. The structure will cost about \$4,000.

POWER HOUSES AND SUBSTATIONS

Georgia Railway & Electric Company, Atlanta, Ga.—This company has placed in operation its new substation at Cartersville.

Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.—This company has placed in operation its new addition at the Spy Run power plant.

Southern Traction Company, Inc., Bowling Green, Ky.—This company plans to build a new power plant in Bowling Green in the near future.

Bangor Railway & Electric Company, Bangor, Maine.—The Bar Harbor & Union River Power Company, one of the subsidiaries of the Bangor Railway & Electric Company, will construct an extension of its distribution service line in Ellsworth, to Blue Hill, Maine, a distance of 18 miles. The line will involve many new features and is expected to be put into operation in the early fall.

Morris County Traction Company, Morristown, N. J.—This company has ordered from the General Electric Company seven 300-kw rotary converters together with transformers and switchboard equipment, to be installed in substations at Wharton, Morristown, Millburn and Boonton.

Southern Power Company, Charlotte, N. C.—This company has awarded the contract to the Allis-Chalmers Company for the water-wheels, governors, generators, exciters and transformers, required to generate approximately 26,000 hp at the new power plant that is to be erected at Look-out Shoals on the Catawba River between Iredell and Catawba Counties. The amount of the contract will approximate \$225,000.

Ottawa (Ont.) Electric Railway.—This company will shortly open a new steam auxiliary power plant on Middle Street, near the Chaudiere Falls. This plant will be equipped with a 4000-hp steam turbine, manufactured by the Westinghouse Electric & Manufacturing Company, also three Babcock & Wilcox water tube boilers, marine type, to which will be attached chain-feed stokers. The equipment is now being installed.

Manufactures and Supplies

ROLLING STOCK

Southern Traction Company, Dallas, Tex., is reported to have ordered six double-truck passenger cars.

Buffalo & Williamsville Electric Railway, Williamsville, N. Y., is expecting to purchase two passenger cars.

Yakima Valley Transportation Company, North Yakima, Wash., expects to purchase two city passenger cars and four trailers.

Erie Railroad, Rochester, N. Y., has issued inquiries on prices for seven interurban cars for operation on its Rochester suburban electric division.

Butte, Anaconda & Pacific Railroad, Anaconda, Mont., has ordered four additional eighty-ton electric locomotives from the General Electric Company.

Jersey Central Traction Company, Keyport, N. J., noted in the ELECTRIC RAILWAY JOURNAL of April 18, 1914, as expecting to purchase five cars, has ordered these cars from The J. G. Brill Company.

Memphis (Tenn.) Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Mar. 28, 1914, as having ordered twenty-five closed pay-as-you-enter motor cars and ten trailers from The J. G. Brill Company, has specified the details for this equipment, as shown below.

Motor cars:	Trailers:
Seating capacity 48	Seating capacity 56
Weight (car body only)	Weight (car body only)
17,500 lb.	14,100 lb.
Bolster centers, length 22 ft.	Bolster centers, length
Length of body . . . 31 ft. 6 in.	22 ft. 7 in.
Length over vestibule,	Length of body . . . 30 ft. 3 in.
44 ft. 8 in.	Length over vestibule,
Width over sills . . 7 ft. 5 1/2 in.	39 ft. 10 in.
Width over all . . . 8 ft. 5 1/2 in.	Width over sills . . 7 ft. 5 1/2 in.
Height, rail to sills . . 27 1/2 in.	Width over all . . . 8 ft. 5 in.
Height, sill to trolley base,	Height, rail to sills,
8 ft. 9 3/4 in.	21 ft. 5/8 in.
Headlining Agasote	Height, sill to trolley base,
Roof arched	8 ft. 5 1/8 in.
Underframe metal	Headlining Agasote
Couplers Van Dorn	Roof single arch
Curtain fixtures. Cur. Sup. Co.	Underframe metal
Curtain material. Pantasote	Air brakes,
Destination signs. Hunter	National Brake & Elec. Co.
Hand brakes. drop handle	Couplers Van Dorn
Heaters Consol.	Curtain fixtures. Cur. Sup. Co.
Headlights Crouse-Hinds	Curtain material. Pantasote
Paint Sherwin-Williams	Destination signs. Hunter
Registers International	Hand brakes Peacock
Sash fixtures. O. M. Edwards	Heaters Consol.
Seats. Hale & Kil. No. 199-A	Paint Sherwin-Williams
Seating material. rattan	Registers International
Step treads. Feralun	Seats. Brill, stationary
Trolley catchers,	Seating material. rattan
Trolley Supply Co.	Step treads. Feralun
Trucks. Brill, 39-E	Trucks Brill, 53-D
Varnish Hildreth	Varnish Hildreth
Ventilators Garland	Ventilators Garland
Wheels. Southern Wheel Co.	Wheels. Southern Wheel Co.

TRADE NOTES

Transportation Utilities Company, New York, N. Y., has acquired the entire business of the General Railway Supply Company.

Pantasote Company, Chicago, Ill., has removed its Chicago office from the Fisher Building to the People's Gas Building, 122 South Michigan Avenue.

Fonger Fender Company, Chicago, Ill., has received an order to equip all the cars of the Escanaba (Mich.) Traction Company with its tip-tilting automatic fenders.

Charles P. Williams, who has represented the National Lock Washer Company of Newark, N. J., in Chicago and the West for several years, has left the service of that company.

Gary Screw & Bolt Company, Chicago, Ill., has moved its office from 72 West Adams Street, Chicago, to 1887-1889 Continental & Commercial National Bank Building, Adams and La Salle Streets.

United Gas & Electric Corporation and the United Gas & Electric Engineering Corporation, New York, N. Y., have removed their offices from 40 Wall Street to the new Adams Express Building, 61 Broadway.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has been awarded an order for 340 gears and pinions to be used on the eighty-five recently ordered cars of the United Railway & Electric Company, Baltimore, Md.

Lumen Bearing Company, Buffalo, N. Y., announces the return of E. P. Sharp, manager of its street-railway department, from an extended tour, during which he visited all the principal street-railway systems of the South.

Titan Storage Battery Company, Newark, N. J., has been established to take over the business of the Baltimore Storage Battery Company of Baltimore, Md. The new company will continue under the same ownership and management as its predecessor.

L. S. Brach Supply Company, New York, N. Y., has recently concluded arrangements with the Railroad Signal Supply Company, Hackney Building, St. Paul, Minn., whereby the latter will handle the Brach automatic flagmen, lightning arresters, etc., in St. Paul, Minneapolis, Duluth and Winnipeg. The former company has moved its Chicago office from the Karpen Building to the Lytton Building.

General Electric Company, Schenectady, N. Y., received the order for 400 motors for the 100 new cars which are being built for the Pittsburgh (Pa.) Railways. These motors are of a new type for use with 24 in. wheels, the new design being called GE-247. This company also received an order for 340 GE-200 motors for the eighty-five cars recently ordered by the United Railways & Electric Company, Baltimore, Md., from The J. G. Brill Company.

Hunter Illuminated Car Sign Company, Flushing, N. Y., has received the order for the destination signs on the 125 new cars which the Jewett Car Company is building for the Municipal Railways of San Francisco. These cars were mentioned in this column last week. The equipment will consist of four signs per car, two hood signs with indicating devices and two side-window signs. These signs will be used instead of the signs originally specified and mentioned in the previous note.

United States Steel Corporation, Chicago, Ill., and its subsidiaries in Chicago has removed from its quarters at 72 West Adams street to the new Continental & Commercial National Bank Building, Adams and LaSalle streets, occupying the eleventh, thirteenth, fourteenth, fifteenth, sixteenth and seventeenth floors. The offices removed include those of the Illinois Steel Company, Indiana Steel Company, Universal Portland Cement Company, American Bridge Company, Gary Land Company, Bunsen Coal Company, Elgin, Joliet & Eastern Railway, American Steel & Wire Company, National Tube Company, American Sheet & Tin Plate Company and the Carnegie Steel Company.

Westinghouse, Church, Kerr Company, New York, N. Y., has been awarded a contract by the Taylor-Wharton Iron & Steel Company for the erection of a 25-acre plant in Easton, Pa., and for enlargements to its present plant in High Bridge, N. J. The contract aggregates \$2,000,000, of which more than \$1,500,000 is to be the initial outlay for the new Easton works. On the day that the company begins work the Board of Trade will begin the erection of 100 dwelling houses in the vicinity of the works as part of its agreement with the Taylor-Wharton Company and the Jersey Central Railroad will start construction of its new industrial spur from Hope to the site to be occupied by the new plant.

ADVERTISING LITERATURE

Calculagraph Company, New York, N. Y., has issued a folder describing its working time recording calculagraph.

Buckeye Jack Manufacturing Company, Alliance, Ohio, has issued a catalog describing its compound-lever track and automatic lowering jacks.

Wiener Machinery Company, New York, N. Y., has issued a catalog describing its Hercules bending machines for bending angles, beams, channels, rails and other shapes.

Ford Chain Block & Manufacturing Company, Philadelphia, Pa., has issued a catalog describing its triblock screw gear hoists, differential hoists and plain and geared trolleys.