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The Chicago White Elephant

The municipal authorities in Chicago having at the recent election been presented with a very large and obstreperous "white elephant," in the shape of a demand for municipal ownership of the street railways, are now asking each other what they shall do with it. Mayor Harrison, whose chief aim during his administration has been to obstruct any movements looking to a settlement of the traction question, fails to come forward with any practical plan for realizing municipal ownership, and in his public utterances does not show any great enthusiasm about the municipal ownership scheme. In fact, it is evident that he doubts whether any feasible scheme for municipal ownership can be evolved. The officers of the organization formed for the purpose of municipal ownership agitation, realizing that they must cease to utter glittering generalities and proceed to propose some workable scheme for carrying out their ideas at once, have outlined some plans, which, however, do not seem to be taken very seriously by the Chicago press, as they are manifestly impracticable. The solution of the question toward which events seem to be working now is some kind of a license providing for the purchase by the city upon terms which will be agreeable to the companies.

The Fuse

In the old days of single-truck cars and 25-hp and 15-hp motors, a number 18 copper wire in a wooden box answered all purposes of fuse protection, and gave no trouble, even when it blew on dead short circuit. In these modern times of heavier powered cars, the fuse makes a much more noticeable flash and report. The protection it affords from an engineering standpoint is amply sufficient and the worst that can happen is a burned out fuse contact or a burnt fuse box, and this only occurs when the short circuit is very severe. Unfortunately, however, the legal protection is by no means adequate. Scores of cases are taken into court where the accident is described by the layman witness as a roar and a burst of flame as high as the car. The suit is usually brought to recover injuries which have been sustained in the resulting panic, but which are more often variously ascribed to shock, burn, and the like, the former being the more popular. These suits, while usually won by the company as they should be, are troublesome and expensive to defend, and the money spent upon them would easily hide the inevitable pyrotechnics which accompany the accident, by the simple device of housing the fuse in a strong porcelain enameled steel shell, which, if made long enough and strong enough, will not only hide all the flash from the excitable passengers, but will have sufficient volume to allow the imprisoned gases to escape gradually and muffle the report to a mere puff or hiss. Some forms of gas engine mufflers could be profitably studied in designing such a box, which should be produced, not because of its engineering improvement, but because of its legal importance.

High Tension Trolley Insulation

One of the most important of the new problems now to be worked out in connection with single-phase alternating-current railways is the perfection of trolley wire insulators for potentials of over 1000 volts. Existing over-head material can now be obtained for an operating potential of 1000 volts without difficulty. When we go above that figure we get into a field where there is but little experience to guide us. That trolley potentials of over 1000 volts will and must be used in the heavy railway work of the future, will follow inevitably upon the demonstration of the success of the alternating-current railway motor in commercial work. If there was no other reason, the necessity of reducing the difficulties of the collection of heavy currents will alone require trolley voltages much higher than 1000 volts. The insulation of high-tension transmission lines, however, is such a well-established art that no serious difficulty is to be anticipated in insulating trolley lines at higher voltages than 1000. This does not mean that it is no more difficult to produce a satisfactory insulator for a high-tension transmission line than for a trolley wire. The disastrous effects of the continual hammering of trolley wheels were experienced in the earliest days of the over-head trolley and are well recognized. Mechanical strength to stand this hammering and a cushioning of the hammer blow will be necessary on a 1000-volt line, just as it is on existing over-head construction. The size of high-tension insulators is such as to give them a mechanical strength not possessed by smaller

insulators of glass or porcelain. There is, therefore, good reason to suppose that such large insulators can be used as trolley-wire insulators without the difficulties which would beset any attempt to use smaller insulators of the same material for trolley wire suspension. Whether the trolley wire insulator of the future will be of this type or not is the problem now confronting the manufacturer of this class of appliances.

Preservative Treatment for Ties

Considerable attention is now being given by the railroad companies to the very important problem of timber treatment, and its application to the preservation of ties. Wooden ties are steadily becoming more scarce, and the desirability of obtaining increased life from them is rapidly coming to be felt, especially by the large systems of both steam and electric roads, who use ties in such large quantities. The steel tie has not proven a formidable competitor of the wooden tie either in matter of first cost or in effect upon smoothness of track.

In view of the greatly increasing use of timber and ties by the electric railway systems interest will naturally center in a paper upon "Timber Treatment and Timber Treating Plants," by Walter W. Curtis, before the last meeting of the New York Railroad Club, which is presented in abstract in this issue. Mr. Curtis reviews the state of the art in an interesting manner, and points out the characteristic features of the different processes of treatment, with particular reference to the progress that has been made in the past few years in this line.

He adds important information and data, to that which has previously been published, regarding the actual results that may be expected from treated ties and timber.

A solution is thought by some to have been found for this important problem, in the recent adoption, by some of the larger steam railroad systems, of the method of growing their own ties. An Eastern road is planting large forests of trees of rapid-growing kinds, with the expectation of having timber of sufficient size for tie purposes within twenty or thirty years. Another large system is devoting large tracts of land in waste mountain regions to similar purposes with the expectation of favorable results in somewhat longer periods of time. But, inasmuch as it takes from thirty to sixty years to grow trees of sizes large enough for economical cutting into ties, it may readily be seen that this solution of the problem will not be generally applicable, and it behooves us to give particular attention at present to all possible methods or processes which will increase the life of our present supply of timber. The timber-treating process has proven very efficient and successful, and is, at present, apparently the best solution of this problem. Remarkable results may be obtained in increase of the life of ties by creosoting; the natural length of time in service in the track may, in this way, be more than doubled, although, of course, the saving thereby incurred must not be calculated merely from the resultant increased life—the labor of removing and replacing is by far the more important factor, as it usually amounts to more than the entire cost of the new tie, so that the result of treating may be four-fold, or even more. Furthermore, inferior grades of wood, when properly treated, chemically, may be used for these purposes with as desirable results as can be obtained ordinarily from the best grades of untreated tie timber.

This all applies equally as well to all classes of timber structures, used by our railroad companies, which are subjected to the effects of the weather. The electric railroads are now using timber trestles to a very large extent, and are only too soon confronted with the problem of renewing or strengthening them on account of decay of the lumber. With creosoted timber used for this construction, the life of the structure is not only greatly increased, but the labor required for renewing and strengthening is entirely eliminated—this is a feature that should not be overlooked. The creosoted construction also makes it possible to use the timber deck method of carrying ballasted tracks across trestles, with as little fear of the otherwise inevitable deterioration, as there would be in the best steel construction—this is also a consideration of importance, and should receive careful attention from street railway companies.

One of the most important factors in the problem of timber-treating, which is given considerable attention by Mr. Curtis in this paper, is the method of seasoning the lumber—whether natural or forced. It seems to be very important that timber should receive, for preservative treatment, air seasoning in the usual manner, as in no other way can the sap be removed as effectually; this has an important effect upon the treating process, as it makes possible the same penetration of the chemical into the timber in nearly one-half the time that would be required if green, and it adds greatly to the eventual life of the treated timber.

The Gas Engine Problem

Just now the prime mover most in the public eye is the steam turbine, which in three or four excellent forms is being pushed upon the market with all the energy which great skill and huge resources can muster. Very important it unquestionably is, particularly for certain classes of service, but what its final position in relative economy will be compared with the reciprocating engine it takes a bold man to predict. Even now its inferiority in economy at light load is being questioned, and recent tests have shown that reciprocating engines, when planned with reference to light load service, can give the turbine a run for its money. But the big gas engine, developed in the main abroad, and dismissed almost contemptuously by the extreme conservative wing of the engineering profession, is a power yet to be reckoned with. Bulky it is, and apparently complicated, denounced as costly to maintain and difficult to regulate, but looked at in its larger aspects the great fundamental fact stands out in high relief, that it has double the thermodynamic efficiency of the best steam motors that man has been able to produce. A common little gasoline engine, wheezing and thumping, cheaply built and designed without any of the fine finesse that goes into the planning of a modern steam engine, still utilizes the thermal value of its fuel at double the efficiency of its rivals. This fact there is no dodging, and no amount of argument about high friction losses and difficulties of lubrication will put it out of sight. Setting aside for the present the possibilty of an internal combustion turbine, it is plainly evident that when the reciprocating gas engine has been given anything like the intelligent development that the steam engine has received, it will be a most formidable competitor.

It is difficult just now to say whether this stage has already been reached, but to a certainty by the time the St. Louis Exposition has closed, we shall have new light on the subject. Fuel cost is the court of last resort in power production, and every year sees this item assume a more serious importance. Of course, a great gas engine plant with its gas producers is to-day more costly and complicated than an ordinary steam plant, but what of to-morrow? And gas production is a thing that in virtue of long experience can be reck-

oned with with some degree of certainty. The power of the gas producer to use cheap fuel, and the very low cost of transporting the gas, are matters of serious economic moment. As to the engines, their efficiency is a matter of record, and they require little attention. On the mechanical efficiency and life of very large gas engines we have at present very little light, but it is obviously unfair to judge these qualities by the performance of gas engines of ten or a dozen horse-power, as unfair as it would be to compare a little hoisting engine with the great triple expansion engines of a factory. A thousand kilowatt direct-coupled gas-engine unit is a thing which must be taken seriously, and within the next few years we venture to predict that such machines will be in considerable number in actual commercial service. In railway work, with its traditionally irregular loads and severe service, gas engines will be required to prove their qualities beyond question, and many people are inclined to doubt their usefulness under such conditions. Time changes conditions, however, and it is a fact that on large railway systems the load factors are often good and the irregularities of load are very much less than the traditions of earlier years indicate.

The storage battery too, which is coming into so extensive use as an auxiliary in power stations, and which has proved its usefulness as a load regulator, cannot be denied to gas engine plants. In the case of long lines and systems operating over a large territory, the present practice requires the use of high voltage electrical power transmissions with sub-stations, the latter often equipped with storage batteries to steady the load. How many engineers stop to think seriously of the possibilities of supplying sub-stations driven by gas engines with gas from a central producer. Remembering that the amount of gas to be delivered amounts to, roughly, 20 cu. ft. in horse-power per hour, it is entirely obvious that the supply main, even for a thousand kilowatt sub-station, would be of very moderate dimensions, while if properly laid, the depreciation and liability to interruption of service would also be very small. We are not aware that the details of such a system have ever been thoroughly worked out, and we are not prepared to say the scheme is practicable. But the results of such an investigation would certainly be interesting, and might furnish food for serious thought, particularly in cases where the distances are rather moderate. Within two or three years large gas engines will cease to be curios and will become genuine competitors in power problems. What the outcome will be in the long run we should be rash to predict. However, there is no use in shutting our eyes to the facts and pretending that the steam engine and steam turbine are to fight it out between themselves and divide the spoils. They will have to admit a third party to the melee, one who carries a large club and who is used to hard raps. When the dust of the fray has blown away it may not impossibly be found that the newcomer has escaped the ambulance.

The Flood Year

The past year has been the most disastrous in the way of floods for some time, and interurban railways in Indiana have suffered, especially during the last few months. In cases where interurban roads have followed the river valleys they have this year been confronted with extreme high water conditions, which have demonstrated the desirability of rights of way above high water mark. It is in loss of bridges and their approaches, however, that the most damage has been done, for such emergencies as these it is absolutely necessary for interurban roads in the long run to maintain a reserve and depreciation account. The floods of Indiana have been the greatest since 1875, and will prove a good guide to future interurban railroad construction and financial methods. During the Mississippi and Missouri floods in June last, steam railroads were great sufferers and their reserve accounts were heavily drawn upon for reconstruction at that time. In the June flood, however, the Kansas City street railways were also badly damaged by the temporary flooding of the principal power houses. The lesson of the whole matter is to keep above the highest recorded high water mark wherever possible, and to build bridges and their approaches with a view to floods as well as with a view to carrying the loads that are put upon them.

The Endless Chain of Crooks

The business of systematically swindling street railway companies by a class of men called journeymen railroaders, who secure employment as street railway conductors simply to steal what they can, has long been an established fact. This class of men has a peculiar ability in nearly always keeping employed, and as one caught stealing in one city can usually secure employment in another, another crook taking his place, an endless chain is maintained.

The position of a street car conductor is one that calls for special ability in the man filling the position provided it is to be done correctly, and there are plenty of men to be had to fill all vacancies who will be honest in the work if the proper methods are employed. By this is meant provided that proper care is used to determine their antecedents.

In the case of a resident of the city, the investigator should be able to find out if an applicant ever worked as a street car conductor before by personally seeing the references. In cases where the latter live at a distance, the mail has to be employed and this leaves open several opportunities for misstatements. The writer knows of a case where a man had the record of being discharged twenty-two times in twenty cities, and when a company would write to his references, would secure the letters and personally dictate the reply.

When a road is finding it cannot secure men enough to fill vacancies in its operating department from men that make direct application or feels uncertain of the quality of the men or certain of the poor quality who apply in this way, the method of engaging men should be changed. It might pay in some cases, for instance, to enter into an arrangement with other large employers of labor, such as express companies or large department stores, by which an agent of the railway company could interview their applicants for employment. Such men might often be better fitted for railway service than for that for which they have applied, and they naturally would not include the professional railway grafter. Again, the situation wanted columns of the large dailies often contain advertisements from men desirous of securing employment. These men might be sent an application blank, with a statementment of the class of man desired and the Government statute in regard to the use of mails for fraudulent purposes printed on the blank. In fact, if a reference to this law was printed on all letters of inquiry to references and which makes punishable any attempt to defraud by any use of the mails, it might make some people more careful as to the statements they make about men whom they recommend. It is stated that plan is being used by some jewelry instalment houses with success.

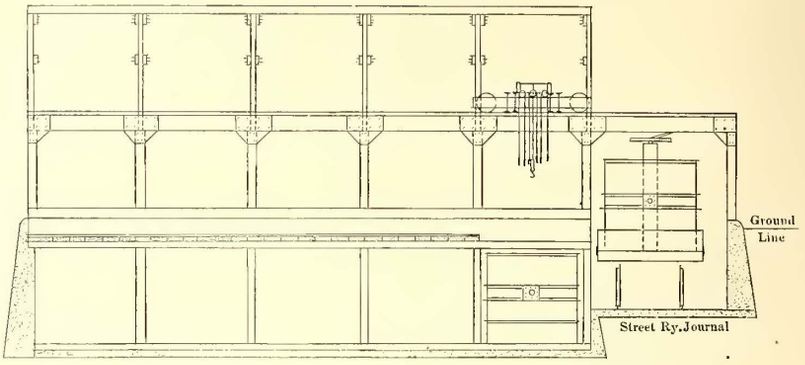
A professional grafter not only appropriates fares, which is bad enough, but holds his car back to pick up passengers and makes it more difficult to detect errors in registration, demoralizes other conductors and motormen and berates the management.

DISPOSAL OF CITY ASHES AS AN ADJUNCT OF STREET RAILWAY BUSINESS IN BROOKLYN

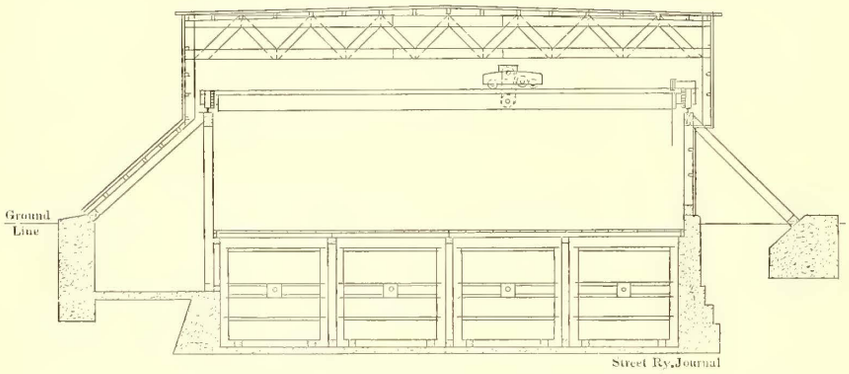
The advisability of the street railway interests of the larger cities contracting with the municipal authorities for the removal of ashes seems to be proved by a very interesting experiment which is now being conducted in Brooklyn. In pursuance to an advertisement published by the Department of Street Cleaning, of New York, for proposals for the disposal of ashes in the Borough of Brooklyn, the American Railway Traffic Company, the operating organization holding license from the Brooklyn Rapid Transit Company, tendered a proposition to the city which was accepted. It provides for the establishment of so-called collecting stations to which the municipal ash wagons deliver ashes, street sweepings, paper and general household rubbish, except garbage, and for the subsequent disposal of the material by the contracting company without further care on the part of the Department of Street Cleaning beyond supervision to see that sanitary methods are maintained.

Besides its aspect as a revenue-producing proposition of satisfactory proportions, as will be discussed later, the project is of interest from the character and equipment of the buildings and rolling stock especially provided, and from the plant and methods adopted for final disposition. The American Railway Traffic Company agreed to build thirteen receiving stations scattered about the borough about 1 mile apart, and to dispose of the material at 35 cents per cubic yard. There was no existing figure under such conditions that would allow the city to make any comparisons, but it was estimated that the average haul by the city wagons would be decreased 50 per cent, so that a less number of carts would suffice, leaving a reserve to take care of the periods of maximum collection, to overcome the delays attendant on bad weather and have an equipment equal to the gradual increase in population for some time to come. From the point of view of cost to date, the Department of Street Cleaning does not expect to show a financial saving, and it would probably not be safe for any street railway company considering such a proposition to estimate on having a proposal accepted at the rate of 35 cents, except possibly where the conditions approach those of Brooklyn. The total quantity of the material to be handled in a given city gives, of course, an index to the figure which a city can afford to pay.

Four of the receiving stations are now in operation and the rest are in process of construction. Each is a timber-frame structure sheathed in corrugated galvanized iron on both walls and roof, but extends below ground in the form of a concrete cellar or pit with a portable flooring at grade. This cellar contains large steel ash bins, into which the Department carts can dump directly, the bins, when loaded, being lifted from the pit by means of an electric traveling crane and placed on a special flat car designed for this service.



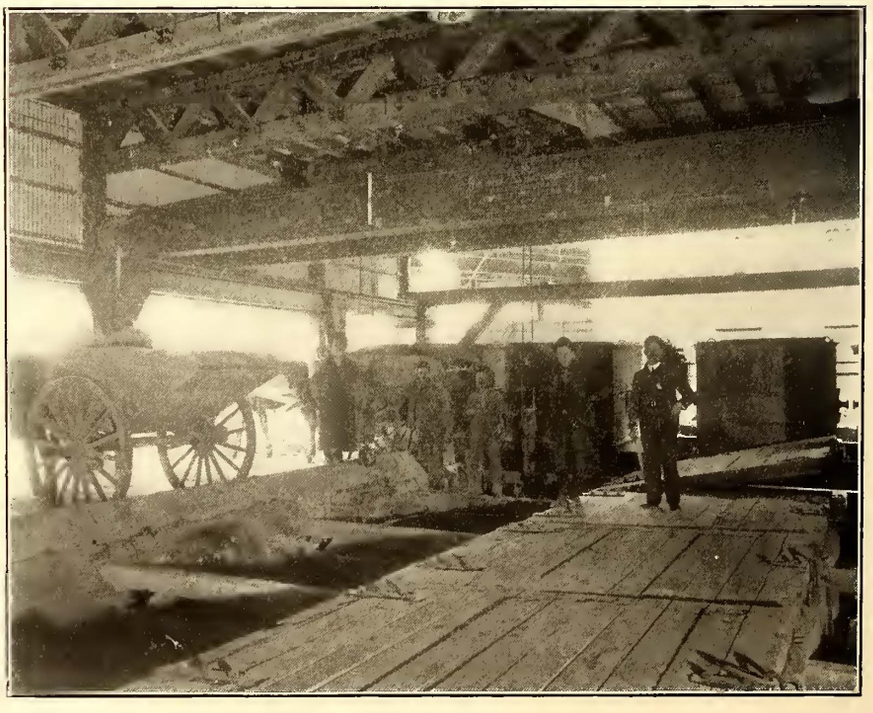
LONGITUDINAL SECTION OF RECEIVING STATION



CROSS SECTION OF RECEIVING STATION

Space for twenty bins is left in each station in five rows of four each, and a timber framework of posts and beams, leaving clear places for the bins, is built in the pit for the support of the portable covers or floor. This is of 6-in. splined planking, built in sections, each large enough to cover one row of bins. Each section is hinged along one side, and when a row of bins is filled and none of the cars is in the station so that they can be carried away, the section of floor is turned over upon them by the electric cranes, uncovering a row of empty bins. On the top of the flooring across the front of the bins to be filled is laid a dumping log. This carries at each end a long, heavy round bar which fits into a hole in the flooring. By this arrangement the dumping log can be lifted by the crane and placed in any section of the floor.

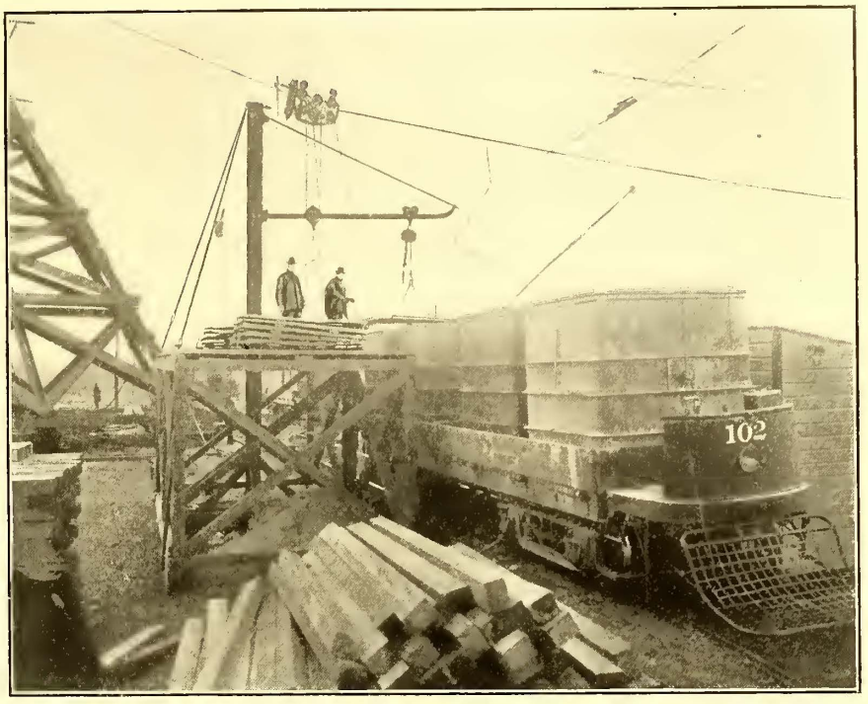
Along one side of the group of bins a concrete constructed depression below ground has been provided for the recep-



VIEW IN RECEIVING STATION

tion of the paper and rubbish collection, the ashes and street sweepings at present being dumped directly into the bins. The paper and rubbish pit serves for sorting. This work is performed by a sub-contractor to the American Railway Traffic Company, who removes about 80 per cent of this portion of the city collection. In brief, then, each station houses a group of portable bins into which the city carts, that are driven in at grade, are dumped without handling, and also a compartment for the sorting of paper, and a length of track for one of the railway cars for transporting the bins. The use of an electric crane has required two lines of timber columns to carry the crane-rail girders, and these are braced to the building columns and are bolted to the top horizontal beams through triangular steel plates, as indicated in the accompanying illustration. Outside of each receiving station is a separate small building for the employee in charge of the station. Here is done such clerical work as may be necessary.

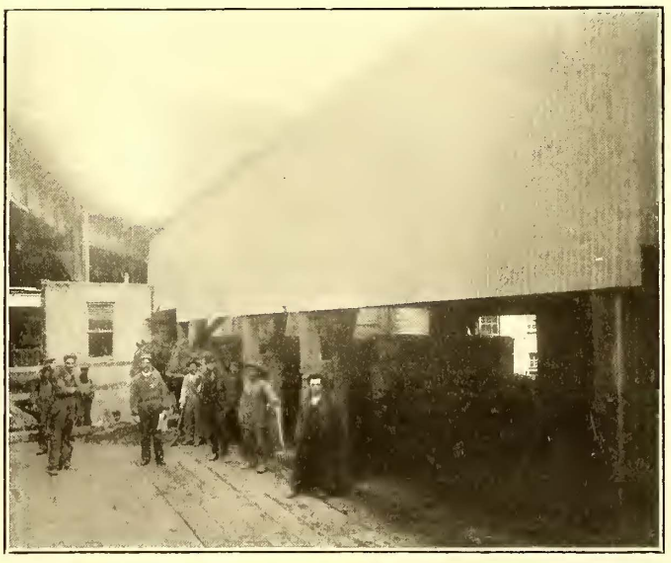
The dimensions and general construction of the bins, 250 of which were built by the Riter-Conley Manufacturing Company, of Pittsburg, are also indicated in the engravings. Each bin carries two trunnions, by which it is lifted with hooks suspended from the crane trolley. The rings at the bottom are for use in dumping, the apparatus for this purpose at each disposal plant having a third cable with a hook for catching the ring. A sheet steel cover is provided for each bin, to prevent the wind from blowing away any ashes in the passage of the cars through the city. It will be found that each bin holds nearly 10 cubic yards filled, or 200 cubic yards for each station. For the thirteen stations the amount is 2560 cubic yards, or about the average collection made by the Department. The cranes were built by the Shaw Electric Crane Company, of Muskegon, and are of 7½ tons' capacity, with a span of 35 ft. It has two wheels on each rail, with a wheel base of 7 ft. 10 in. The controllers for the three motors of the crane are located at one end of the paper sorting pit.



RAISING THE COVERS FROM THE BINS JUST BEFORE THEY ARE DUMPED

STANDARD BIN, HAVING A CAPACITY OF 10 CU. YDS.

The type of car used for this service is a modification of the work cars recently purchased by the Brooklyn Rapid Transit Company. They were built by the Middletown Car Works, Inc., of Middletown, Pa., and are of the 18-in. hinge-side gondola pattern, equipped with four Westinghouse motors of 40-hp each, and with the Christensen air brake. The cars are 38 ft. 6 ins. in length over all, and 7 ft. 10 ins. wide. They are equipped with the Peckham standard M. C. B. truck, with 31-in. wheels, and the trucks have the Peckham combination side frames, double-roller side-bearings, flexible motor suspension and the Taylor non-chattering brake hanger. Instead, however, of a timber post in the center of the car for the trolley carrier, a cast-iron post is employed with the fuse blocks fixed underneath the car. This departure was necessary to obviate the care that would otherwise have to be exercised in lifting and lowering the bins close to the post. Four bins are shipped by each car, and the total load is 26 tons, 6 tons in the bins themselves and the remainder in their contents. As each bin holds 10 cubic yards, it will be noted that the weight of the ashes is calculated on the basis of 1000 lbs. per cubic yard, which has been found to be the average weight of household ashes in the more or less moistened condition in which they are received.



OUTSIDE VIEW OF A TYPICAL RECEIVING STATION

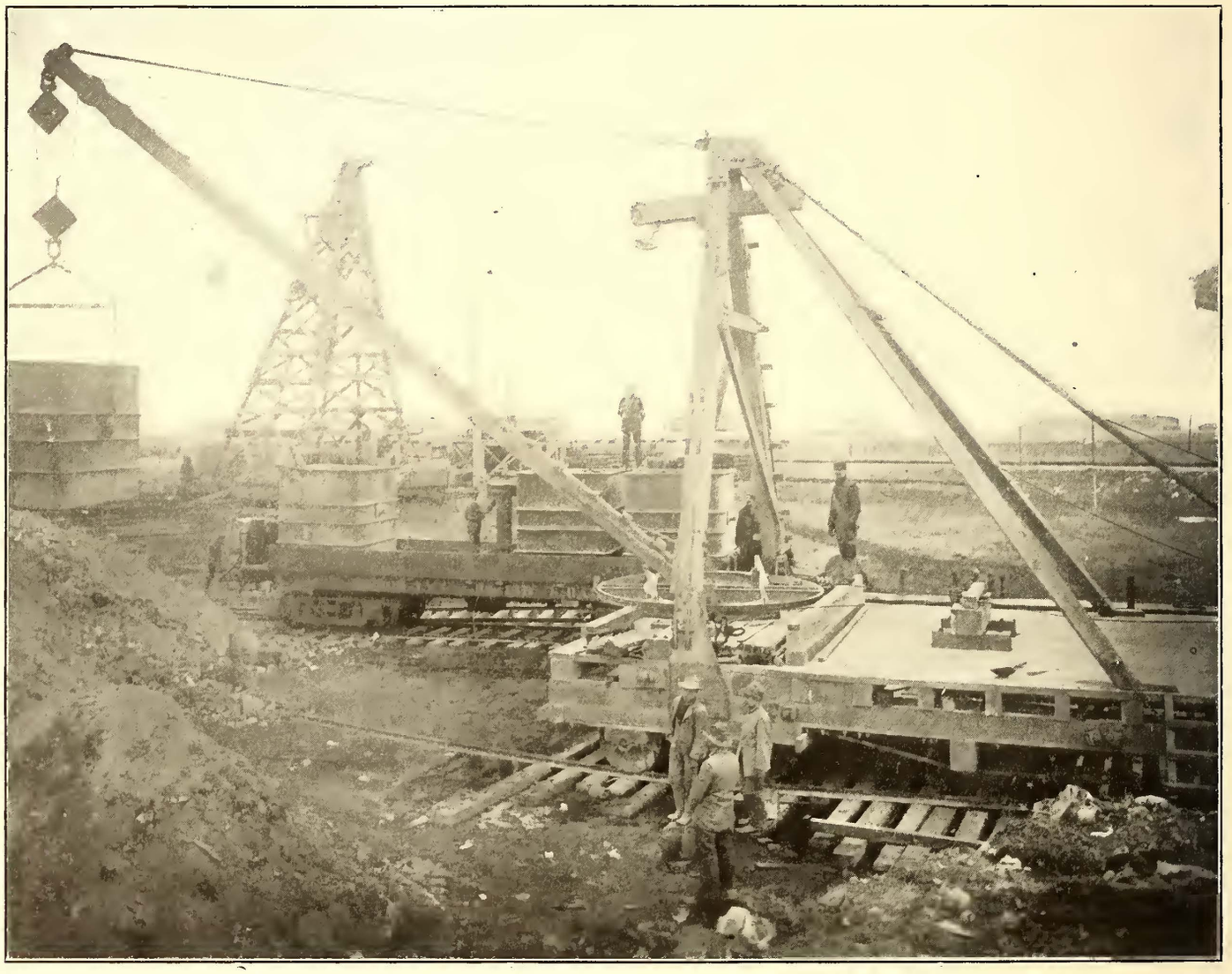
The general scheme for the disposition of ashes is to utilize them for filling or land reclamation. There is a large field for work of this character in the outlying districts of Brooklyn, including, for example, an extensive but shallow body of water known as Jamaica Bay, which is an arm of the Atlantic, protected by sand bars. For fills on a large scale two methods are in operation, one consisting of a large derrick car and the other of a traveling aerial cableway, the latter for specially large fills, as will be outlined.

The derrick car is an 8-ton traveling derrick designed and built by the New Jersey Foundry & Machine Company, of New York. Its general characteristics are shown in accompanying photographs, which are views of a derrick-car at present located at Neptune Avenue, near Brighton Beach. The derrick is of extra heavy wooden construction, reinforced by heavy tie rods and gussets, and designed throughout for severe wear in continuous service. One of the larger sizes of the Lidgerwood electric hoisting engines is mounted on the rear of the derrick, the hoist being operated by a 50-hp General Electric railway motor. The effective radius of action is 30 ft., and the boom swings through 170 degs. The derrick has been working day and night for several weeks, and for a large part of this time has been unloading buckets at the rate of four cars an hour, one bucket every four minutes. The fastest work up to date has been one carload of four buckets in eight minutes. The maximum weight of a loaded bucket would be 8 tons, the average weight, 6½ tons.

An idea of the capital investment and earning capacity of the ash disposal business may be learned from the following figures. In Brooklyn the actual quantities disposed of in 1901 are given in the accompanying table, and according to contract, measurement is based on the standard cart load of 1.55 cubic yards, or truck load of 4 cubic yards or paper cart load of 1.5 cubic yards. To each of the four stations there are allotted four cars, each, it will be remembered, carrying four bins or 40 cubic yards of material. Each car can be counted on to make two round trips daily, so that for the basis of this calculation, it can be assumed that 1200 cubic yards are taken each day from the four receiving stations. As the company receives 35 cents per cubic yard, this means a daily revenue from the city of $420. The company has its own payroll, and for the operation of its cars, that is, for power and trackage, it pays a stipulated sum per car mile, a card being issued for each car, giving its destination and the route, so that the mileage can be calculated in the main office. The total cost for labor, and operating and maintenance charges for each car may be taken at $15 per day, or for the sixteen cars, $240. Each of the receiving stations costs to operate at an outside figure, $8 per day, or $32 for the four stations, and the dump about $50, so that the operating cost is $322 daily. This shows a profit

BROOKLYN STREET CLEANING DEPARTMENT COLLECTIONS IN 1901

	Ashes	Street Sweepings	Paper and Rubbish	Total
Twelve months...	508,280	202,269	330,109	1,040,658
Maximum month..	54,446	18,762	35,762	108,970
Minimum month..	27,760	17,604	21,717	67,081
Maximum day...	2,632	702	1,119	4,453
Minimum day....	876	271	651	1,798



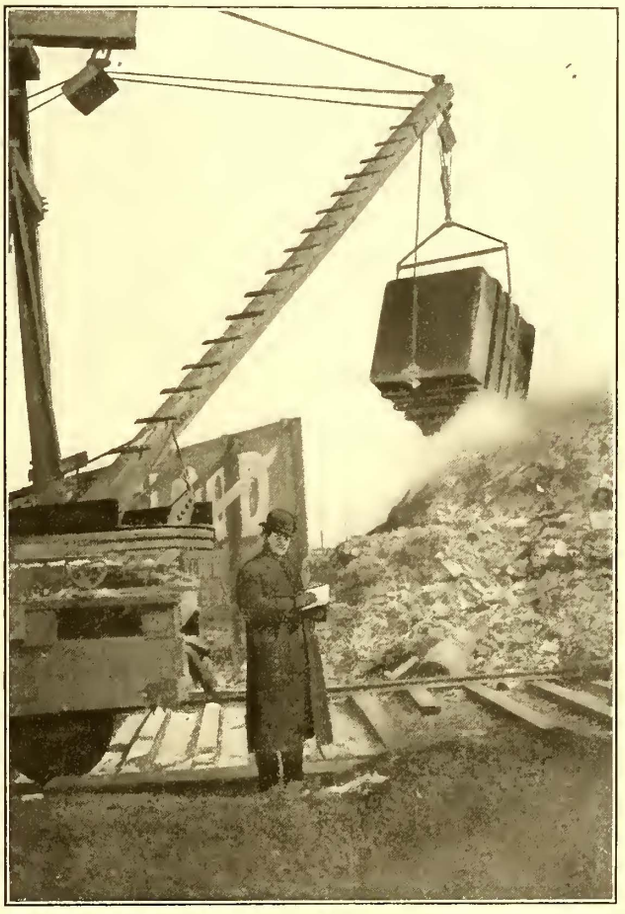
DUMPING THE REFUSE BINS IN THE OUTSKIRTS OF BROOKLYN

of about $100 daily, or $30,000 for the year of 300 working days.

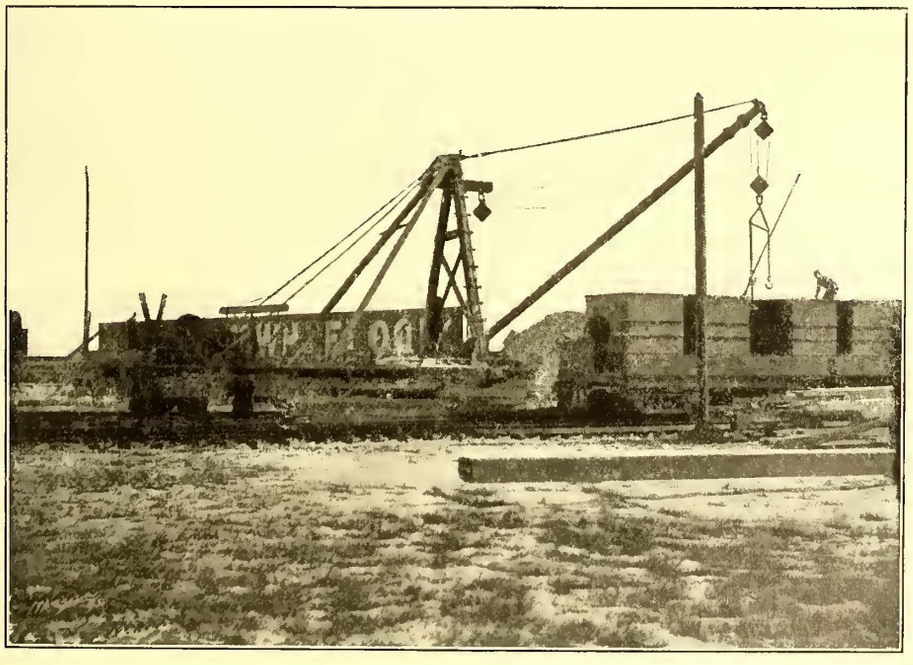
The capital invested in the four stations and equipment is about as follows: Each of the stations completed ready to run, including the ash bins and the real estate, cost about $25,000, or $100,000 for the four. The cars cost $3,700 apiece, or $59,200 for the sixteen. The dump equipment cost $6,000. The total capital invested is thus, in round numbers, $165,000, so that the profit would appear to be at least 18 per cent annually on the investment. If 10 per cent of this is deducted for the maintenance of the plant and machinery, there will be left a net profit of 8 per cent on the investment. At the expiration of the contract, five years hence, the company will then, of course, be better able to compete again, as it may offer the city the economy derived from the short wagon hauls, being the sole possessor, through its relationship with the Brooklyn Rapid Transit Company, of the privilege of using the lines of that company. The ability to take care of the constantly increasing amount of ashes with the steady increase of population is also a point of considerable importance in the consideration of possibilities at the end of the five-year period.

The traveling cableway method of dumping is designed, as stated, for operation on a large scale. Briefly it consists of two timber towers, each mounted on wheels and a traveling cableway connecting the two towers, which are 550 feet apart. The loaded car is brought under one end of the cableway and the bucket is carried from the car to a point along the span of the cableway, where it is dumped. As soon as the lowland immediately each side and below the cableway becomes filled, the two towers are moved along their tracks a short distance further and the filling continued. The plant is particularly well adapted to places where the area to be filled is very great. For example, in the marsh land back of Coney Island, where the cableway is at present in operation, a fill 12 feet deep over the 550 ft. of span for, say, 100 yards, amounts to nearly 75,000 cubic yards, all put in place with a movement of the plant 100 yards.

Each of the towers is 64 ft. high above the rail. They are of a more or less pyramidal form, with one face vertical. This is, of course, on the farther side from the cableway, the more inclined members serving as struts against the pull of the cables. The main timber members of the tower are 12 ins. x 12 ins. in size. Each tower is carried on fourteen pairs of wheels and the base is reinforced with tie rods. The journals are fastened to the underside of 10-in. x 12-in. sills, and the fourteen sets of wheels are disposed of on five lines of rails, one pair at the inner side of the tower and the remaining three vertically under the apex. On one of the towers is mounted the hoisting outfit, which comprises a three-drum Lidgerwood plant driven by General Electric 57-motors. The drums are controlled in the usual way through friction clutches and there is a brake provided in each case. One drum is for the hoisting cable, the second for hauling the trolley and the third for dumping. The two motors drive the same shaft and they are controlled by a General Electric K-11 controller. The cableway outfit was designed by the Lidgerwood Manufacturing Company.



VIEW AT THE DUMP



LIFTING THE BINS FROM THE FLAT CARS

The cars approaching the dumping ground pass alongside an elevated platform on which is mounted a jib crane. This is shown in one of the accompanying photographs. It is used for lifting off the covers from the bins, so that the cars are immediately ready for the dumping plant and for placing the covers back on the bins when the unloaded car passes out. The jib is provided with a hand hoist trolley, and one man is stationed on a platform in charge of this work. He is usually assisted by one of the men having charge of the car. Two men are also employed at each dump for fixing the hooks of the lifting mechanism under the trunnions of the bin, and one of them also sees that the dumping cable is carried around underneath the bin and fixed in the eye pro-

vided for that purpose. In emptying, the dumping cable is pulled when the bin has been brought to the point desired, overturning the bin. It comes back to its original position by gravity, as the trunnions are placed somewhat above the center of gravity.

The credit for the conception of this enterprise and for interesting the American Railway Traffic Company in it is largely due to C. R. Van Etten, general freight agent of the Brooklyn Rapid Transit Company. He originated the

TRAVELING CABLE METHOD OF DUMPING

general method of handling the material, and in collaboration with Hon. J. C. Brackenridge, now Commissioner of Public Works, for the Borough of Brooklyn, and with R. C. Taylor, mechanical engineer of the Brooklyn Rapid Transit Company, perfected the mechanical devices necessary to carry out the contract without requiring manual labor for handling the material from the time it is received until disposed of as valuable filling for waste and swamp land. Edwin W. Winter, president of the Brooklyn Rapid Transit Company, is president of the American Railway Traffic Company, and J. F. Calderwood, general manager of the former company, is vice-president. Captain Alexander R. Piper, formerly Deputy Police Commissioner of New York, and prior to that superintendent of final disposition of the Street Cleaning Department of the city, is general superintendent.

The first train drawn by an engine made a trip through the New York subway from the One Hundred and Twenty-Fifth Street Station to City Hall, on Wednesday afternoon, April 14, a pony engine of the Manhattan Company making steam from an improvised oil burner. Mr. E. P. Bryan, general manager of the Interborough Rapid Transit Company, which will operate the tunnel, was in charge of the train and had as his guests August Belmont, John B. McDonald and officials of the Interborough Company. Stops were made quite frequently to give the party a chance to make a careful inspection of the work that has been done.

PLANS OF THE ELECTRIC RAILWAY TEST COMMISSION OF LOUISIANA PURCHASE EXPOSITION

An outline of the plans drawn up by the Electric Railway Test Commission, under whose authority the tests of electric traction apparatus will be conducted at the Louisiana Purchase Exposition this summer, was published in the Street Railway Journal for March 26, 1904. In the same article the names of the gentlemen comprising the four engineering committees appointed by the Commission to report on the detail tests for different classes of service were given, with the reports recommended by the committee on tests of city and suburban equipments and that on the test of interurban equipments.

Since the publication of that article the Commission has appointed a working committee on tests which will have actual charge of carrying out the tests, and which will carry out the programme recommended by the several committees mentioned and approved by the Commission. The chairman of this working committee is Prof. W. E. Goldsborough, chief of the Department of Electricity at the Louisiana Purchase Exposition, and the services of Prof. H. H. Norris, of Cornell University, have been secured to conduct the tests. Prof. Norris proposes to take up this work as soon as the conditions at the Exposition grounds permit, and will continue the tests until the close of the Exposition at St. Louis, and outside of that city if the Commission should so decide to conduct work of this character elsewhere than in St. Louis. He will have the assistance of two prominent electrical engineers who have not yet been selected, and also several young men from the Cornell University instructing corps and present graduating class and probably a few others from certain other technical institutions. Those in Ithaca have already commenced a special study, preparatory to conducting the tests.

The Commission has also appointed an advisory committee to oversee these tests and represent the manufacturers. This committee consists of A. H. Armstrong, of the General Electric Company, of Schenectady; Clarence Renshaw, of the Westinghouse Electric & Manufacturing Company, of Pittsburg, and Ward S. Arnold, representing the Bullock-Allis-Chalmers interests.

REPORT OF THE COMMITTEE ON TESTS OF HEAVY TRACTION EQUIPMENTS

This committee, which consists of F. J. Sprague, B. J. Arnold, W. J. Wilgus and F. R. Slater, has rendered the following report as to the tests of this class of equipment to be conducted by Professors Goldsborough and Norris.

Complying with your request for the submission of a programme to be followed in the conducting of tests upon heavy traction electric railway equipments at the St. Louis Exposition, your committee begs to suggest as follows:

1. Each party submitting apparatus for test shall furnish a complete written description thereof, setting forth clearly the special features of the design and calling attention to any points that are considered new. The description shall also explain the controlling mechanism, designating its applicability to direct or alternating-current, with proposed working voltage, and if for alternating-current, stating the frequency and phase desired for most successful operation.

2. All tests shall be conducted upon the track designated by the Electric Traction Commission and conducted under actual operating conditions.

3. No tests shall be made upon electric locomotives or other apparatus of less than 500 normal hp, unless specially permitted by the Commission. It is assumed that the term "Heavy Traction" applies to locomotives or motor cars of a total capacity rated on an hourly basis of 500 hp or more.

4. The tests will be conducted with the locomotive or other motor cars running light, and also when pulling trains, with the purpose of studying the following features: (a) motor capacity

in various conditions of operation; (b) acceleration; (c) coasting; (d) braking; (e) heating.

The following curves and diagrams shall be prepared: (f) speed time curves; (g) distance time curves; (h) voltage and ampere time curves; (i) kilowatt input and distance curves; (j) draw-bar pull diagrams made when attached to a fixed anchor, and also with dynamometer coupled between locomotive and trains operated under running conditions.

If alternating-current motors are used the following additional curves shall be prepared; (k) real kilowatt time curves; (l) apparent kilowatt time curves.

5. The tests shall include the determination of heating and the distribution of same in the field, armature and commutator under various loads at different rates of speed. The heating of the bearings shall also receive consideration.

6. The tests of the methods of control and comparison of hand and automatic acceleration shall be made as bearing upon the elements of (a) safety; (b) convenience; (c) economy; (d) smoothness of operation; (e) ability to group into two or more units.

7. The tests of the methods of control shall also be considered as bearing on: (a) smoothness of acceleration; (b) variation of economical speeds; (c) reversibility; (d) action with one or more motors cut out; (e) relation of starting to running current under different rates of acceleration.

8. The equipment will be considered as to: (a) general construction; (b) weight and distribution of same on drivers under static and hauling conditions; (c) relative weights of electrical and mechanical parts; (d) number and size of drivers; (e) acceleration of working parts; (f) influence on track.

9. Tests will be made upon each locomotive or motor car submitted to ascertain (a) watt hours per ton mile with locomotive running light at various speeds; (b) watt hours per train ton mile exclusive of locomotive; (c) watt hours per ton mile with locomotive load and with train under various weights and acceleration.

10. Methods and detail conditions for conducting the tests shall be agreed upon by those who have immediate charge of the tests before the commencement of the trials. These conditions shall be satisfactory to the representatives of those furnishing the apparatus. It is understood that all tests shall be made under similar conditions when possible. When these conditions are necessarily dissimilar, due allowance shall be made in compiling the results, so as to place all apparatus upon the same plane of comparison.

REPORT OF COMMITTEE ON TESTS OF NEW ELECTRIC RAILWAY SYSTEMS

This committee, which consists of B. J. Arnold, P. M. Lincoln, of the Westinghouse Electrical & Manufacturing Company, of Pittsburg, and W. B. Potter, of the General Electric Company, of Schenectady, has made the following report on tests recommended on electric railway systems:

Complying with your request to submit an outline of tests to be conducted upon new electric railway systems at the St. Louis Exposition, your committee begs to submit the following:

Each party furnishing apparatus to be tested shall submit a written or printed description, setting forth clearly and fully the salient points in the system, and the principal advantages claimed for it. He will also completely describe the motors and controlling apparatus, stating whether the system is designed for direct-current or alternating-current or both, and if for alternating-current, whether for single-phase, polyphase, series, repulsion, inductive, synchronous or other type of motor, and state in any case the most desirable voltage to use in the motor, and if alternating the preferred frequency.

In testing any new system we have assumed that the tests should be divided into two principal parts as follows:

1st. Motor, including car equipment.

2d. Line, including all sub-station apparatus and other translating devices interposed between the power house bus-bars and the trolley wheel or contact shoe of the locomotive or car.

Schedule of motor tests to be made with apparatus running stationary upon testing blocks: (a) Test motors to determine efficiency, power factor (if alternating), torque, speed, horse power output under various conditions as to voltage, frequency (if alternating) and current, to be met in the service for which the system tested is intended; (b) the one hour rating of motors to be determined according to the standards outlined by the American Institute of Electrical Engineers; (c) test motors under constant loads to determine rate of heating during continuous operation.

Schedule of tests to be made on equipment when operating upon experimental track: (a) acceleration tests on single cars and multiple-equipped trains; (b) braking tests of single cars and multiple-equipped trains; (c) coasting tests of single cars and multiple-equipped trains; (d) motor heating tests on single cars and multiple-equipped trains.

Prepare the following curves; (e) speed time curves; (f) ampere time curves; (g) volt time curves; (h) real kilowatt time curves; (i) apparent kilowatt time curves (if alternating); (j) distance time curves; (k) tests and curves to determine car and train friction.

Schedule of tests to be made upon line and auxiliaries: determine (a) ohmic resistance; (b) inductive resistance; (c) power factor; (d) efficiency of copper and iron portions of line, separately and jointly, under the following conditions:

1st. When the electrical energy is delivered from the power house bus-bars to the working conductor without translating devices.

2d. When electrical energy is delivered from the power house bus-bars to the working conductor through supplemental transmission lines or translating devices.

If supplementary transmission lines or devices are used in case No. 2, each element shall be tested separately as well as in conjunction with the line as a whole as outlined above.

Tests upon each system shall be made to determine the following: (a) watt hours per ton mile at car; (b) watt hours per ton mile at sub-station bus-bars (in case sub-stations are used); (c) watt hours per ton mile at power house bus-bars.

All tests to be under like conditions, and when conditions are necessarily unlike, due allowance shall be made to reduce the apparatus tested to a fair basis for comparison.

The watt hour per ton mile, as stated above, to be determined from the summation of the specific tests hereinbefore outlined and checked by integrating wattmeters placed on the power house bus-bars, sub-station bus-bars (if sub-stations are used) and the car.

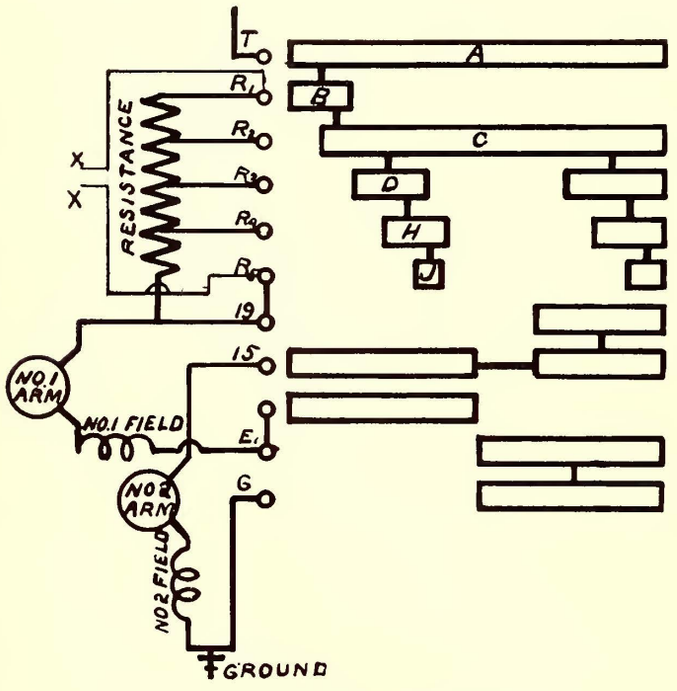
A project for the establishment of a central distributing electric power and light plant in the Reichenberg (Austria) land district has taken definite form. The territory included is about 10 miles square, and twenty-four towns and villages have joined in the movement and subscribed to the capital stock. The population of the district, exclusive of Reichenberg, is about 60,000. Stock is subscribed at present to the amount of $200,000, and this it is proposed to increase to $400,000. The principal purpose of the corporation will be the distribution of electric light and power, with the possibility of installing and operating a system of suburban electric tramways. Tramway and light franchises for the city of Reichenberg are at present owned by private corporations, and at their expiration it has been generally supposed that the city would take over and conduct the enterprises. Negotiations are pending, however, which may change the situation in this respect. Communications regarding equipment, etc., may be addressed to Directors Alfred Ginskey, Maffersdorf and Dr. Richard Pirkl, Reichenberg.

ADJUSTING CAR RESISTANCES

BY CALE GOUGH

To the average car house repair man the most mysterious part of the electrical equipment of a car is the starting resistance. In very few instances will a car shop foreman be found who has a knowledge of the total ohmic resistance required for a car or the ratio that should exist between the different points. His only means of dealing with them is the "cut and try" method and this should certainly be eliminated in car house work wherever possible. In most instances much time and vexation could be saved by the proper use of a measuring instrument along with a knowledge of the required resistance. Several instruments are supplied for this purpose, such as the ohmeter and the well known Wheatstone bridge. Explicit directions for operating are usually attached, so that the workman of average intelligence can learn to use them in a few minutes.

To obtain an idea of the resistance required and the proportioning of the steps, the resistances of an equipment that has by use on the road proven to be well adjusted should first be measured. These resistances can thereafter be taken as a standard for that equipment. The total resistance ordinarily required for a two-motor car with 35-hp or 40-hp motors is



WIRING DIAGRAM OF K-10 CONTROLLER

about 6 ohms. A general rule for proportioning would be that the resistance on each point be half what it is on the preceding one. With a rheostat resistance of 6 ohms this rule would give: first point, 6 ohms; second point, 3 ohms; third point, 1½ ohms, and fourth or last resistance point, ¾ ohm. Measuring the resistances down to a point of laboratory accuracy is not required, as the starting of the car is not affected appreciably for quite a range of variation.

To connect up the most usual form of bridge box it is simply necessary to join to the terminals of the resistance to be measured the terminals on the box usually marked "X." But before connecting the trolley should be removed from the wire to avoid all chance of injury to the instrument. The rheostats should be cool, as a high temperature increases the readings appreciably.

The engraving herewith shows a diagram of a K-10 controller with resistances and motors in their proper position between fingers. The terminals "X" "X" are connected by means of No. 14 wires, shown by the finer line, to the fingers "R_1" and "R_5." All that is necessary now is to throw the controller on successive notches and read the instruments. On the first point it is readily seen that to pass from one terminal "X" to the other, the total resistance of the car must be traversed. On the second and successive points the controller cylinder bridges across part of the resistance and reduces the total resistance between the terminals of the measuring instrument. On the fifth point the finger "R_5" makes contact with the small segment "J." The cylinder then short-circuits all the rheostat resistance. The reading obtained on this point is that of the instrument leads and connections. It should not amount to more than .04 or .05 ohms. To obtain the exact rheostat resistance on the several points this last reading must be subtracted from the previous ones.

A study of the readings so obtained and of the behavior of the car will show that the car jerks on that point between which and the preceeding one an abnormal difference of reading was obtained, and further, that the car shows little change of speed between points with small differences of readings.

If the step variations of the readings are not what they should be, the position of the resistance leads can be changed until the desired differences are obtained.

When newly wound boxes are to be placed under a car they can be readily tested on the floor. If to be connected in series on the car they should be so connected upon the floor. The total resistance should first be obtained. If this is found to be of proper value for the equipment the points for connection of the resistance leads can next be found. To do this leave the instrument lead connected to the last resistance, say R_5 stationary. Detach the other lead and move it by steps towards the stationary one, taking readings all the time until proper points for the attachments for all the resistance leads are found. Now, when the boxes are put up and the leads connected to the points previously marked, it is a certainty that the car will start smoothly.

The trouble saved in changing boxes and "juggling" the resistance leads pays many times over for the time spent in making the tests.

Station buildings of modern appearance and design are to replace the old-fashioned horse-car waiting rooms which have heretofore furnished shelter for patrons of the Pacific Electric Railway Company, of Los Angeles, Cal. The first of these new buildings is nearing completion at the junction of the Pasadena and Monrovia lines. The style of architecture is Mission, and this will be an appropriate feature of all the stations along the company's lines. The building now being erected is a one-story structure, presenting the appearance from a distance of a succession of arches. On the inside is a booth for trainmen, which may also be utilized for ticket selling. The construction is almost entirely of concrete. According to the present plans of the company, similar stations are to be built at all junction points on the various interurban lines. At the junction of the Whittier and Long Beach lines, and at the point where the interurban system follows a private right of way from the East Ninth Street line, new buildings will be erected in the near future, and when the new line to San Pedro has been finished, a station will probably be built at Dominguez Junction, where the two lines from the sea will converge. With the completion of this line, this junction will become a very important point on the system, and, if present plans are carried out, the building to be erected there will be a little more commodious than the others. Facilities are to be provided for handling freight and express, for it is the ultimate intention of Mr. Huntington to make a strong bid for the express business between San Pedro and Los Angeles.

CORRESPONDENCE

MOVING THE PUBLIC FORWARD

Boston, April 18, 1904.

Editors Street Railway Journal:

I note with some amusement a brief note in your last issue regarding moving the public forward in street cars. As a persistent student of tramway conditions and a frequent passenger on crowded cars, I am impelled to remark that the suggestions of the article in question are apparently made from the standpoint of the conductor who would like to move his crowd forward with a hydraulic rammer. In the first place, while there are doubtless many passengers who object on general principles to being compelled to shift their positions at the will of the conductor, there are many more who fully sympathize with his manifold sorrows and would rather oblige him than not if not thereby put to much inconvenience. But I, like most of my fellow beings, object to being put in a position from which I cannot escape at will, and hence decline to move up when, by so doing, I have to force my way the length of a long car in order to avoid being carried by my destination. It is so common an occurrence to see passengers thus carried by or detaining the car for a long stop while worming a way toward the door that it is small wonder that the public often declines to move up. If the tramway companies desire and expect to utilize every square inch of standing room, it is certainly up to them to furnish far better exits than are now available. And it is perfectly safe to say that unless this difficulty is met the case will go from bad to worse with increasing density of traffic and the general use of the otherwise very desirable long cars. It is idle to suggest any means to compel passengers to move up since the immediate result of so foolish a policy would be a no-seat-no-fare agitation, probably successful, and in such case on just grounds of complaint.

The use of the front platform as a regular means of egress is almost equally impracticable, although the front door is undoubtedly a useful adjunct. But until a tramway company is willing squarely to assume full responsibility for the safety of passengers thus using the front platform, it cannot get much help from this source. The motorman has troubles of his own, and it is very doubtful whether more duties could be heaped upon him without injuring his efficiency. Even if an extra conductor were carried to ensure the safety of passengers using the front platform, either one platform or the other would, for half the year, be stopping in mud or snow. Overcrowding is a bad business at best, and it is especially bad in the case of long, closed cars, with vestibules such as are used in many northern cities. Everyone interested in street railway work has racked his brains for a remedy time and again, but no remedy yet appears. I have sometimes thought that the best plan after all is the foreign one of limiting the number of passengers and putting out a "Complet" sign when the number is reached. It would be more or less annoying at first, but in the long run it would save more trouble than it would cause. In particular it would check the present nuisance of a crowd jammed to an amorphous mass in one car and the next car with empty seats, perhaps two minutes behind. Here in Boston cars are announced as full by the conductor, but he is usually good natured enough to let passengers on as long as there is even hypothetical standing room. It would be comparatively easy here to set and enforce a reasonable limit and the public would soon take it without protest. Under such conditions I doubt whether there would have to be any material increase in the number of cars operated, save on some few lines where an increase would be needed in any case. The only other remedy for the difficulty of egress is in some radical departure in car construction, allowing the crowd to move safely and easily in more than one direction. What can be done in this line remains to be seen, but very little of practical value has been yet accomplished.

Boston, April 18. Louis Bell.

ANOTHER IMPOSTOR

General Electric Company.

New York, April 18, 1904.

Editors Street Railway Journal:

A person calling himself George E. McCants, and describing himself on his card as chief electrician of the General Electric Company, Schenectady, N. Y., is traveling in Texas and making representations that he is connected with this company. I should esteem it a favor if you would insert a note to the effect that there is no person of this name on the payroll of the General Electric Company. It is also almost unnecessary to add that there never was any person of this name chief electrician of the company.

E. H. Mullin.

NOTIFYING PASSENGERS AS TO THEIR DESTINATION

Jersey City, April 16, 1904.

Editors Street Railway Journal:

A recent article in your paper spoke of the desirability of furnishing the best accommodations possible to passengers in order to secure and hold their business. This is, of course, desirable, but I think that a company can carry this principle so far that it becomes detrimental to its own interests. For instance, the suggestion was made that the conductors watch out for those passengers who request to be informed when the car reaches a certain point. Now, 99 per cent of a carload of passengers know just where they want to get off and a request of this kind usually causes the conductor considerable worry. In his effort to remember the destination of such passengers his attention is distracted from his main business, which is that of collecting fares. One good way to reduce this annoyance is for the conductor to remind the passenger about five minutes before he reaches his destination that the car will be there soon, and thus throw the final responsibility on the passenger.

It often happens that the conductor has recently gone on the road and is himself unfamiliar with many of the streets. In such cases I believe it would be desirable for the company to supply such conductors with a slip printed on cheap paper, containing the names of all the cross-streets on the line traversed by the cars on that particular division. As on long lines there are usually from 100 to 150 streets, these lists would be of great convenience, while the cost of printing them would be infinitesimal. As matters are now, a strange conductor has to write down the names for reference until he has memorized them.

It would also save a great many disputes and some damage suits if the company had a rule that a conductor who had carried a passenger past the destination point asked for, would be permitted to give him a transfer or otherwise pass him back on the next car going in that direction.

Conductor.

The Cincinnati, Dayton & Toledo Traction Company is adjusting its rates with a view to making them as uniform as possible. The road is a consolidation of several short roads and the old rates have prevailed, making an extremely cumbersome system for auditing accounts. The rates between Cincinnati and Hamilton have been on a basis of 2 cents per mile, and those between Hamilton and Dayton on a basis of 1½ cents. The rates on the northern portion will probably be increased to 1¾ cents. The price on commuters' books will also be increased and equalized.

TIMBER TREATMENT AND TIMBER TREATING PLANTS *

BY WALTER W. CURTIS

One of the important elements affecting the solution of the problem of supplying the demands of the railroads for wood in its various forms is its chemical treatment to prevent decay—and the construction of works to give such treatment as quickly and economically as possible. The old saying that a penny saved is a penny earned is certainly true when applied to the timber question. It takes about sixty years to grow 16-in. diameter pile, of the quickest growing pine; eighty or ninety years may produce an 8-in. x 16-in. stringer of the same quality. If we can secure a twenty to thirty year life for these sticks by treatment at reasonable cost, instead of from two to twelve years if used under like conditions untreated, we can congratulate ourselves as being of some use in the world and as being wealth producers in the truest sense.

Creosoting in this country dates from 1865 and has been principally used for the treatment of piles and timber for marine work, to prevent destruction by worms. While a considerable number of ties have been so treated, the expense has been and still is too great to permit general use for this purpose. Creosoting is by all means the best method of preserving timber known, and wherever the financial conditions are such as to permit the first cost, and where the timber will not be destroyed mechanically regardless of its freedom from decay, there can be no question as to the best treatment to adopt.

Various methods of seasoning wood have been patented. Seely in 1867 was granted a patent on a method of impregnating, consisting of immersing the timber in an iron tank filled with oil, heating it to drive out moisture, replacing the hot oil suddenly with cold oil, whereby it is forced into the wood by condensation. A patent to Hayford in 1872 added to the use of steam for seasoning, the pressure of hot air, to prevent the checking of the timber by the more rapid seasoning of the exterior portions of the wood. S. B. Boulton, in 1881, patented a method of seasoning by boiling the wood in the dead oil of coal tar, keeping the pressure in the cylinder below atmosphere, to permit the water to be removed at a lower temperature than 212 degs. A patent to Messrs. Curtis and Isaacs, of the Southern Pacific Railroad, was granted in 1895, covering a process identical with Boulton's, except that they do not use the vacuum during boiling.

The philosophy of both is that as water is vaporized at 212 degs., while the oil does not vaporize under 300 degs, a temperature maintained between these will drive off all the water, which can then be replaced with oil by pressure. Both of these methods have been used in this country with success.

Preservatives for timber are needed to prevent decay and to prevent destruction by marine worms. As under ordinary conditions, untreated timber will resist decay for a considerably longer period than it will a hungry teredo family, and as the amount of timber used on land and in water differs very materially, the use of treated material for marine work made more rapid and general progress. It was soon recognized that no treatment would avail against the teredo and limnoria, except a large injection of dead oil of coal tar. Treating works naturally sprang up to supply the demand, located along the sea coast and gulf line.

These works doing commerical work principally, orders were placed only at the time the material was needed, which necessitated the use of green timber and, I believe, few if any of these plants have yard room sufficient to store any considerable supply of material. The use of such green stock results in a much longer treatment being required and, in the opinion of some, in inferior work.

From eighteen to twenty hours are required to secure the same penetration as is possible with ten or twelve hours if air-seasoned material is used, the difference being principally in the length of time spent in steaming the timber. If the English and Continental practice of long-time seasoning is followed, requiring storage for from eight to twelve months, the steaming is eliminated entirely and the time of treatment is cut down to about three hours.

The use of creosoted material is now becoming more general for an important purpose, which promises a large market; this is for decked trestle bridges, where the ballasted track is carried directly over the structure. Two types of such structures are in use; one where the deck is of solid timber, constituting the stringers and floor of the structure; the other, where separate stringers are used, covered with a 3-in. plank floor.

Mr. E. B. Cushing, engineer of Maintenance of Way of the Atlantic system of the Southern Pacific Railroad, states that road began using solid deck creosoted bridges in 1885. "The first one built was examined recently and found to be in perfect condition. It has never had a dollar's worth of bridge work on it since it was driven, the surfacing, aligning, etc., being done by section men in ordinary process of track work."

The other type of bridge, using stringers and a plank floor, has been in use on the Louisville & Nashville Railroad for many years. Mr. R. Montfort, chief engineer, recently wrote me:

> I cannot state the length of life of creosoted timber where properly treated. I can, however, say, that during the year 1876 the New Orleans, Mobile & Texas Railroad used a large quantity of creosoted timber as piling for piers of iron bridges over Chef Menteur, Rigolets, Pearl River, West Pascagoula and East Pascagoula Rivers. We are now renewing the superstructures of these bridges; replacing bridges erected by the Phœnix Bridge Company in 1876 with plate girders. At the Great Rigolets we have placed the new superstructure on the piles driven in 1876. Some of these piles are as much as 95 ft. long. At Chef Menteur we used seven piers, each consisting of sixteen piles, or a total of 112 piles, not one of which was found defective, although driven twenty-eight years ago. In this climate an untreated pile could not be counted on to last but about seven years, or at the most eight years. The piles at Chef Menteur vary from 75 ft. to 90 ft. in length.
>
> We have on the Louisville & Nashville Railroad miles and miles of trestles with creosoted stringers that were placed in 1876 and 1878, and are apparently as sound now as they were then. These trestles have, of course, been strengthened by the addition of other stringers so as to carry modern loads.

Mr. Montfort well says, in the face of such results, he can not tell what is the length of life of properly creosoted material.

As between such structures and metal ones, with open floors, the preference would seem to be with the perishable material, wood, provided proper precautions are taken against fire from beneath the structure. To be perfectly safe, however, the combination of steel girders and creosoted wood floor carrying a ballasted track furnishes the best possible structure where masonry is not justified. For elevated tracks over streets, the use of the wood floor is in my judgment decidedly superior to any other construction. This has been used successfully for such locations, the floor being made water-tight by caulking and pitching before the ballast is put on.

The greatest demand of course of the railroads on our forests is for ties. A perfect preservative must be a germicide, which is insoluble in water, non-volatile under usual temperatures, preferably an excluder of air and water, and cheap. In the dead oil of coal tar, we have the first three elements, and the fourth to a considerable degree. By the usual methods of injection, it cannot be called cheap, except in consideration of its ultimate economy through long life.

The life secured from the ties thus treated varies pretty closely with the amount of preservative used.

Creosote in America is worth about 1 cent per pound, delivered at the works. The cost of the ties treated depends upon the amount injected. In Great Britain they use from

* Abstract of a paper read at a meeting of the New York Railroad Club, April 15.

8 to 10 lbs. of oil per cubic foot of timber for Baltic red wood; in France and Germany for beech and pine, from 10 to 20 lbs. On the basis of 10 lbs. per cubic ft., a tie containing 3 cubic ft. would cost here for oil alone, 30 cents.

The usual charge made by treating works for labor, fuel, profit, etc., is from $5 to $7 per 1000 ft., board measure. This adds to the cost of oil 20 to 25 cents. The cost of a 12-lb. treatment would be about 15 cents per cubic ft.

The cost of Burnettizing is about 3¾ cents per cu. ft.
The cost of zinc tannin is about 5 cents per cu. ft.
The cost of zinc creosote is about 7-5 cents per cu. ft.

This high cost of creosote accounts for the many efforts to secure the same results with other materials, or with combinations with other materials which will reduce the amount of tar oil required.

One way of doing this is to put in less oil alone, but the trouble is that the injection is then superficial and any checking of the timber or wearing under the rail destroys the protection, permitting access of air to the unprotected center and early decay. The Southern Pacific Railway made a test in 1895, in West Texas, where 1694 sap pine ties were impregnated with 6 lbs. of tar oil per cubic ft., and laid in track with the same number of untreated ties of the same character. After five and one-third years service, not one of the creosoted ties had been removed, while 16 per cent of the untreated ones had been taken out on account of decay. Unfortunately no later reports have been made on this experiment.

The principal objection to the processes using zinc chloride, sulphate of copper and other mineral salts is that such salts are all more or less soluble in water; some of them indeed hydroscopic. They are effective germicides, and as long as they remain in the wood in sufficient quantity, will prevent decay. It will probably be admitted that the injection of any antiseptic, which at the same time has no directly injurious effect on timber, is beneficial and in proportion to its antiseptic power and its difficulty of removal. The solutions containing metallic salts are more readily injected than oils, and it has consequently been attempted to use them in conjunction and various methods have been patented for this purpose. Mr. J. B. Card, who introduced the Wellhouse treatment, proposed a method of first injecting a small amount of tar oil, then immediately thereafter injecting a solution of zinc chloride. He stated by this means he secured a much better distribution of the oil throughout the wood than was possible with the ordinary injection of the same amount of oil, and at the same time thoroughly protected the interior of the stick with the zinc chloride.

In Germany a method has been used for a number of years in which the solution of zinc chloride is mixed with tar oil and the two injected at one time into the timber. This method requires for its success a very light grade of oil difficult to obtain and of high cost, and there is some discrepancy in the reports of observers as to the uniformity of injection in ties occupying varying positions in the cylinder, the tendency being, of course, in any such mixture for the oil and water to separate on account of their varying specific gravities. This method, however, has given satisfactory results in practice and is undoubtedly an improvement over straight burnettizing.

Mr. Boulton has patented a method of first injecting the zinc chloride, then running out this solution and filling the cylinder with tar oil, boiling the timber in this until the desired amount of water of the first solution has been removed, and then injecting under pressure the desired amount of tar oil.

In April, 1894, the Southern Pacific laid in Western Texas 1824 sap pine ties, which were given an injection of 12 lbs of 2 per cent solution of zinc chloride; then removed, allowed to dry in the air for ten days and replaced in the cylinder and given a second injection of 3 lbs. of creosote, both quantities being in pounds per cubic ft. At the same time, 1694 untreated heart pine ties were placed in the same piece of track. In December, 1903, after nine and two-third years of service, 8 per cent of the treated ties had been removed and 95 per cent of the untreated heart pine ties had been removed.

Another method of doing the same thing has been that of injecting the solution of zinc chloride and immediately following this with a second injection of tar oil, the first injection being stopped at the proper point to permit the injection of about 3 lbs. of tar oil per cubic ft. A number of these ties have been in service for six or eight years with very satisfactory results.

I have given above a statement of the comparative costs of the zinc creosote treatment as compared with others.

There is one other treatment which has been before the public for some years, and which has some very desirable theoretical features about it; namely, the Hasselmann process. This consists in boiling the timber in a solution of several substances, the principal one being sulphate of iron. There have been a number of treatments proposed whose value was based upon the securing of a chemical reaction in the wood itself, but there has been a good deal of skepticism about the securing of such reactions, and the Hasselmann process seems to be the only one in which clear evidence has been given of success in that regard. The process is very cheap and the penetration of the wood thorough and it is to be hoped that the claims of the promoters thereof may be justified by the test of time. The actual value of this process, however, for ties, is still to be demonstrated, as compared with other treatments.

Still another modification of the method of treatment is a zinc-chloride process known as the Wellhouse treatment. This consists of the injection of zinc chloride, followed by injections of solutions of glue and tannin, the object of the latter being to plug up the ducts of the timber.

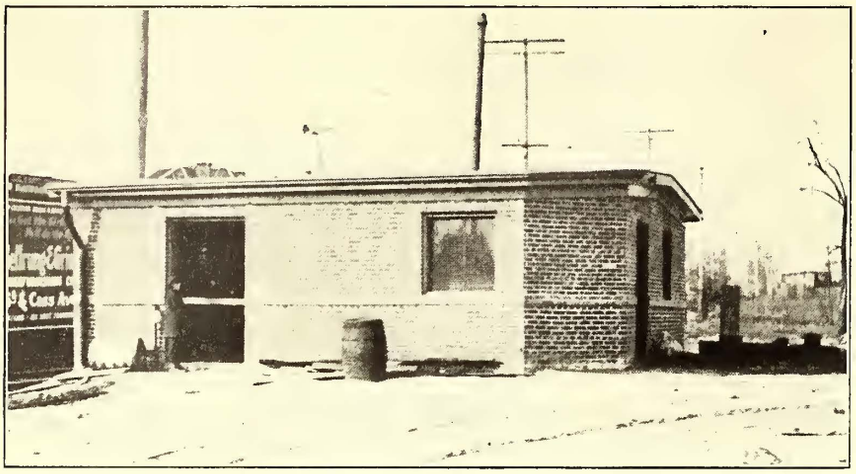
The Atchison, Topeka & Santa Fe Railway, with an experience extending over seventeen years, shows an average life for inferior pines and spruces treated with zinc chloride of eleven years. The Atlantic system of the Southern Pacific Railroad, with the same number of years' experience, shows a life of sap pine ties treated with the same material of nine and one-half years, while the Pacific system of the same road, where treated ties have been used for ten years, report 57 per cent of the ties laid in track in 1895 as being in service after eight years. The Pennsylvania Railroad in a test instituted in Indiana in 1892, where burnettized hemlock and untreated white oak laid in rock ballast, shows an average life to date of 10.58 years for the first and 10.17 years for the second, with 41½ per cent of the hemlock and 33 per cent of the oak still in service. With burnettized tamarack, an average life of 8.84 years, and of untreated white oak, 9.47 years, both laid in gravel ballast and with now all of the ties removed, has been secured.

In a paper read last year before one of our societies, I summarized the situation as follows: "It is safe to say that whenever an inferior tie can be purchased and treated by burnettizing, and then cost no more than a white oak or other first-class tie, the adoption of treatment by that or a better process is justified. It may not be possible to determine which particular treatment is the most profitable, but this should not be considered as justifying the failure to begin treatment. A plant should be designed to treat by either, and if the future necessitates a change, this can be readily made; and in the meanwhile, whichever has been adopted, it is reasonably certain results will be worth the cost."

There are a number of questions in the treatment of timber which are yet unsolved. The subject, however, has been removed beyond the experimental stage and treatment can be adopted with reasonable confidence that benefits commensurate with the expense will be secured, and that further investigations and discoveries will be in shape of developments which will probably enable us with a reasonably increased expense, to secure more permanent and satisfactory results.

COMPRESSING STATIONS FOR STORAGE AIR BRAKES AT ST. LOUIS

In the Street Railway Journal of Feb. 6, 1904, a full account was given of the car equipment and stationary air compressors of the Westinghouse storage air brake system which the St. Louis Transit Company has adopted for its entire equipment of 1500 cars. The present article gives the construction and arrangement of the compressing stations which were not fully decided upon at the time the last article was written.

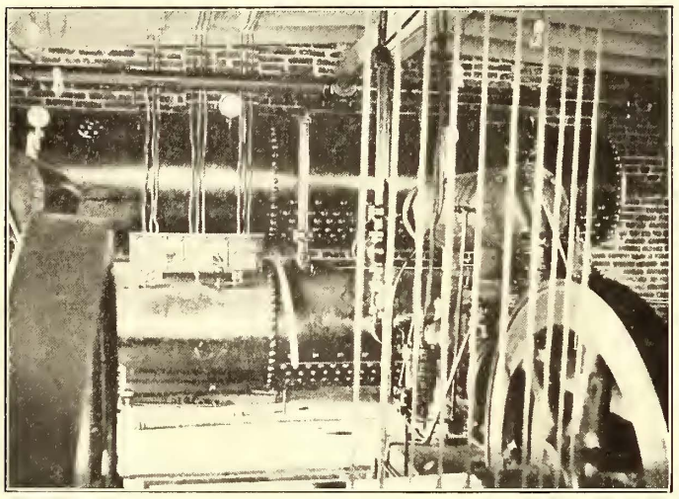


COMPRESSING STATION AT DE HODIAMONT—CAPACITY, THREE COMPRESSORS

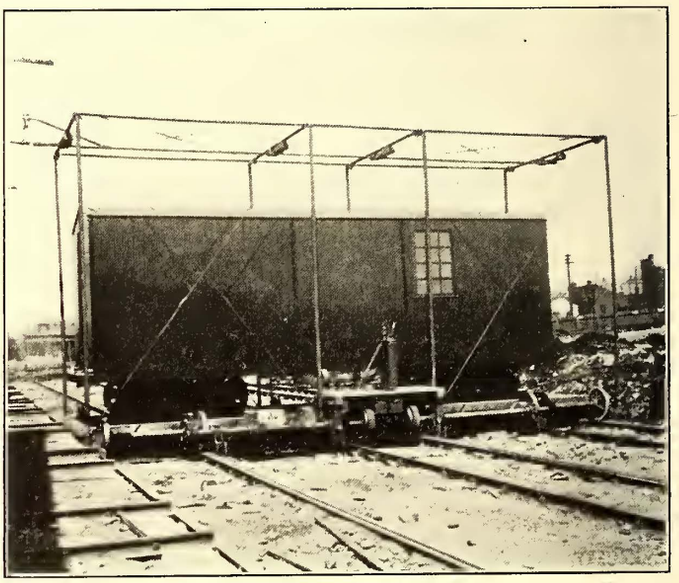
Some compressing stations are located in small brick buildings at the end of the line (one of which is shown), some are in car houses, and in addition some portable stations on box cars are provided for temporary terminals, and as reserves, for use at car houses.

Drawings and photographs both of the standard compression station and standard compressor car are reproduced here, through the courtesy of W. O. Mundy, master mechanic.

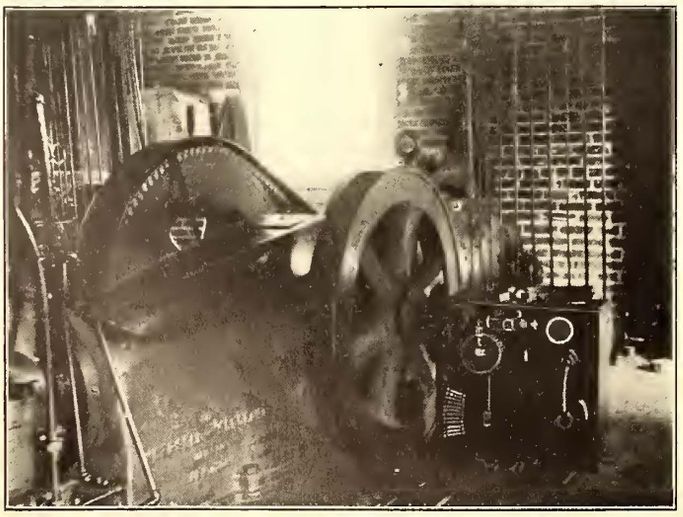
The particular compressor station illustrated happens to have three air compressors. Some others have one or two compressors, but the general arrangement remains the same. This building is 25 ft. square. The storage tanks are located along one wall. A radiator for cooling the jacket water is located along another wall. The water from the cylinder jackets of the air compressors is discharged into a well from which it is raised by an air lift to a small tank above the level of the radiator. From this tank it flows through the coils of the radiator back to the cylinder jackets of the compressors, and so



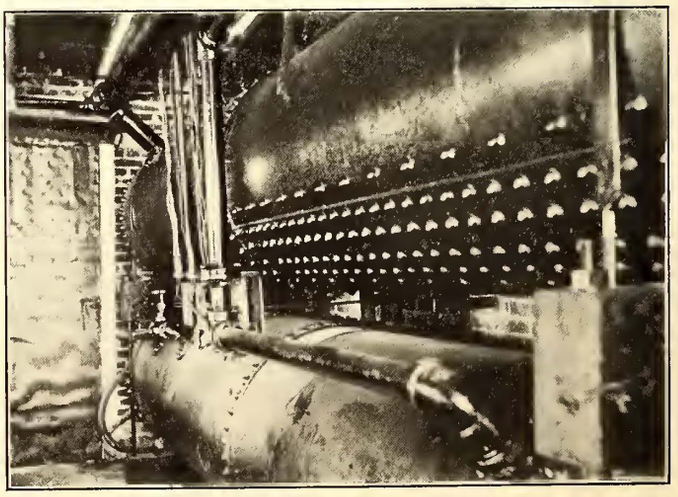
STORAGE TANKS FOR 325 LBS. AND AUTOMATIC PRESSURE-REGULATING SWITCHES IN COMPRESSING STATION



PORTABLE COMPRESSING PLANT ON CAR



COMPRESSOR AT DE HODIAMONT STATION

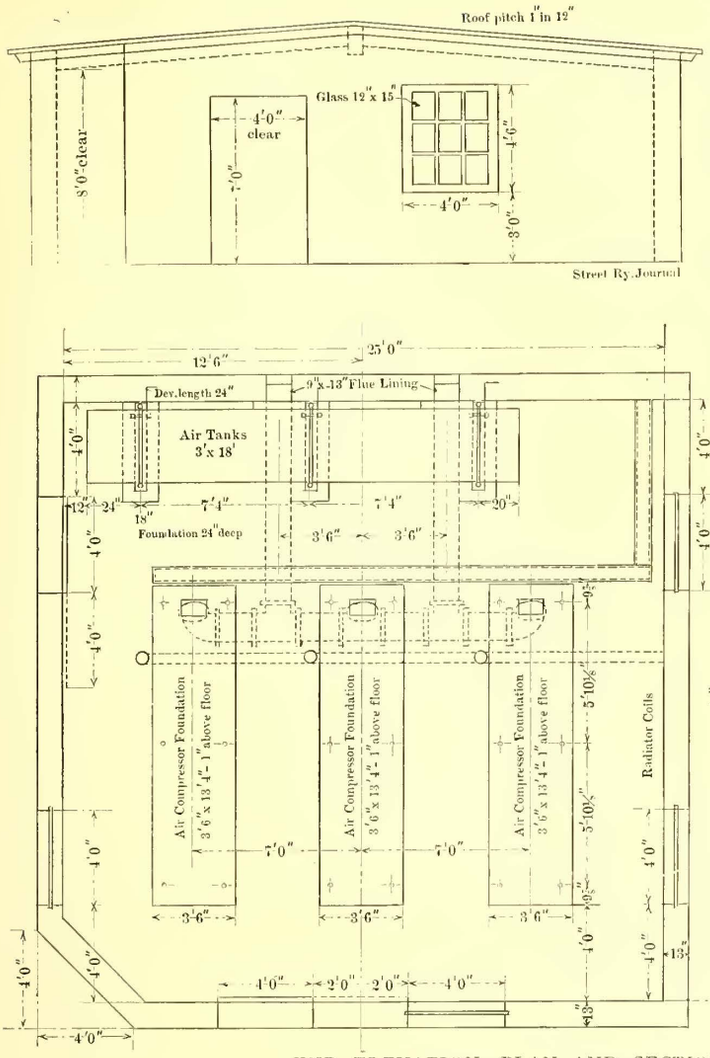


STORAGE TANKS AT DE HODIAMONT STATION

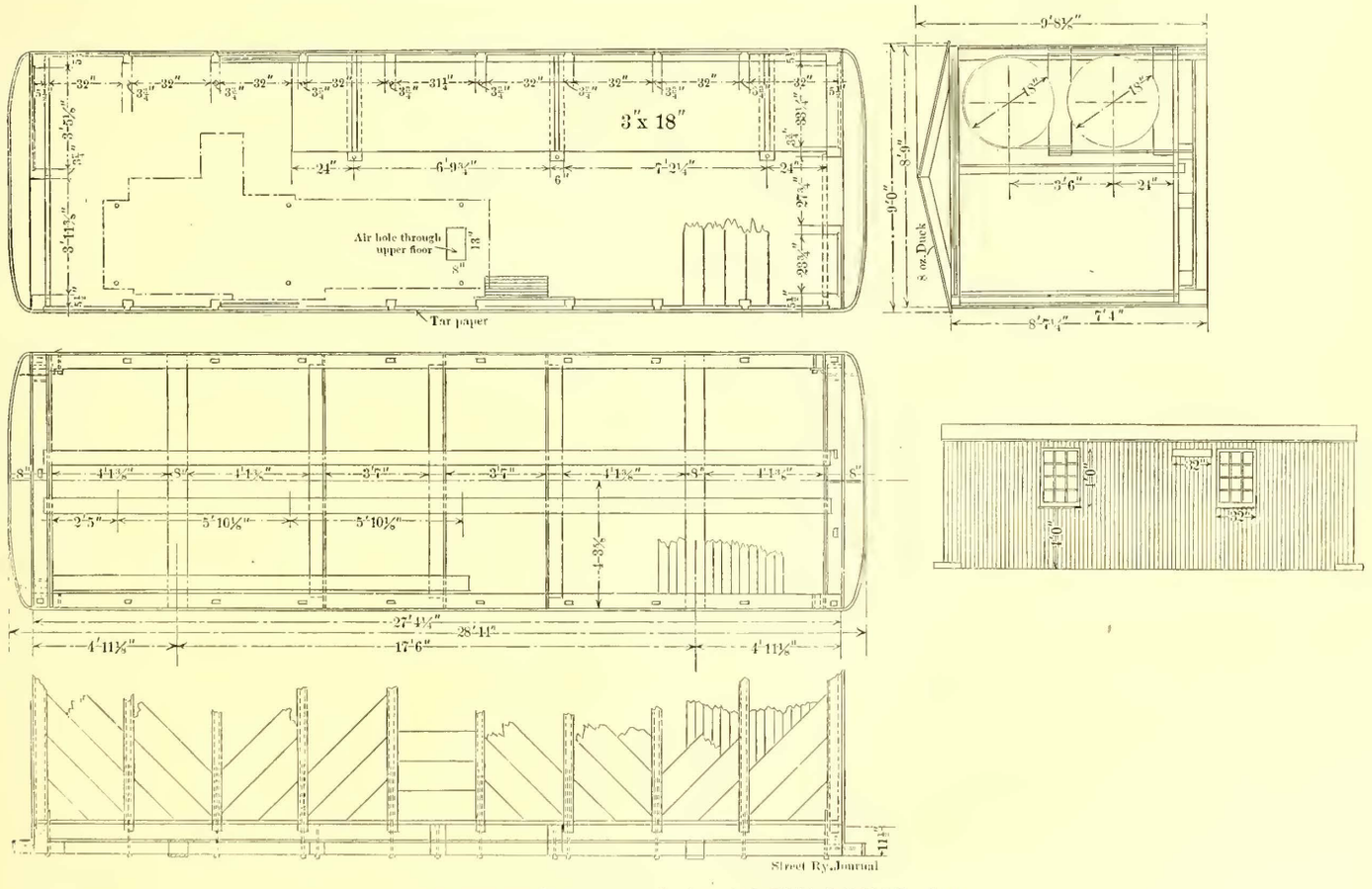
on, being kept in constant circulation. The compressor cars are also all being equipped with air lifts for circulating water, and a radiator, except that as a trial the first car was equipped with a circulating pump. The air lift was finally chosen because it is simpler. It is automatically controlled by an electrically operated air valve which puts the air lift in operation when the compressor starts.

AIR CONSUMPTION PER CAR HOUR

A test made on a car operating on the Olive Street line, which is one of the heaviest traffic lines the company has, showed that the consumption of air per car hour is 100 cubic



END ELEVATION, PLAN AND SECTION OF COMPRESSED-AIR STATION



PLANS AND SECTIONS OF AIR-COMPRESSOR CAR

ft. of free air. Some tests made before the storage air system was decided upon, which were taken as a basis from which to figure the compressor capacity, gave 107 cubic ft. of free air per car hour. The cars are scheduled for over 10 miles per hour.

The consumption of air just given, Mr. Mundy believes, can be materially reduced by the use of an improved brake cylinder which he is designing, which requires considerably less air for a brake application than the ordinary cylinder.

ELECTRIC RAILWAY DEVELOPMENT IN THE FAR EAST

In spite of the large population in the Far East there are now only six electric railway systems in operation outside of those in Japan. A number of other cities have, however, made arrangements for the installation of electric lines and others are proposing to do so, so that within a year or so it is probable that the number of electric roads in operation in the Orient will be considerably increased, if not doubled. From a financial standpoint the electric roads which have been put in operation have been satisfactory, although the track mileage is very much smaller than that for cities of similar population in either Europe or America. This is of course due to the small amount of money per capita, particularly in India and China. In many of the towns of both of these countries an ordinary native can live and keep a whole family on about what the average American pays for car fares during the same period. The native population has, however, to be depended upon largely as patrons of the electric lines and it is found in the Far East, as in other places where electric lines have been built among a poor population, that natives patronize the cars to a greater extent in proportion to their incomes than in more civilized countries. There seems to be a fascination for them in car riding, and while the aggregate amount spent upon electric railway transportation is of course far less than in a town of corresponding population in the West, it is larger than might be anticipated.

As a rule natives are employed as motormen and conductors on the cars and as firemen in the power stations. The managers, power-station engineers and operating staff are usually Europeans or Americans, and as most of the enterprises so far built have been in the English possessions, the operating company is usually an English corporation with headquarters in London. The wages for the native employees are of course quite low, averaging from $3 to $14 per month. On the other hand the white officials have to be paid higher salaries than they would receive in Europe to attract them to the country, and as it is impossible for a European to work continuously in many parts of the Far East, it is necessary to have a larger force than would be required in more temperate countries.

In nearly all cases the cars or trains are arranged for the accommodation of two classes of passengers, as the Europeans and high-class natives will not travel with the coolies. As a rule this is accomplished by having trains of two cars, each consisting of a closed motor car, which is intended for first-class passengers, and an open trailer with cross benches which is for second-class passengers. In some cases combination cars have been run with satisfactory results. The white population does not form a very large proportion of the patrons of the cars, as it is of course numerically insignificant as compared with the native population, and many of the European residents own and prefer to travel in private equipages.

The first city in the Orient, encountered in a trip East, in which electric transportation matters are a live issue at present is Bombay. The street railway system in that city is owned by an American corporation and animal power is employed. The municipality, however, is preparing to introduce an electric road. It has instituted legal proceedings to purchase the existing system, and if this is successful will undoubtedly award contracts before long.

Madras has a short electric conduit system which was installed ten years ago by the Electric Construction Company of London. The road is only a few miles in extent.

Calcutta, which is the principal city in India, has by far the largest electric railway system in the East. The road is some 40 miles in length and 150 cars are in use. It was installed by Dick, Kerr & Company, who took the entire contract for the line, and was put in operation during 1902, so that the first year of electric operation has recently been completed. The road is owned by a company which is capitalized for about £790,000 and last year, which was the first year with complete electric operation, paid a dividend of 7 per cent. The operating expenses during the first period were slightly under 50 per cent of the receipts and the £5 ordinary shares are now selling at about £7 in the London market. The fares are graded according to the English system, the minimum fare being 1 anna, which is equivalent to an English penny. The cars are operated in trains of two each, consisting of a closed motor car, which is used for first-class, and an open trailer, which is used for second-class passengers. These cars are coupled permanently together and operate single ended on loops or Y's.

Directly south of India is the large and populous island of Ceylon, whose capital, Colombo, has an electric railway system owned by the Ceylon Planters' Company and installed by Kincaid, Waller, Manville & Dawson, of London. The electrical apparatus was furnished by the British Thomson-Houston Company and most of the other apparatus came from America. The line is about 8 miles in length and was put in operation in 1898. The capitalization is £130,840 ordinary shares and £120,000 in 5 per cent debentures.

Mandalay, the capital of Burmah, is the next city going east which has or is soon to have an electric railway system. The road, which is being installed by Dick, Kerr & Company, of London, is now being finished and will be in operation in about a couple of months. It is owned by the Burmah Electric Tramways & Lighting Company, Ltd., of London, which is capitalized at £200,000. The track is about 12 miles in length and thirty double-truck cars of the long, open type will be employed. As coal is expensive in Mandalay, costing about $7 per ton, it is proposed to use wood as fuel to a large extent. The engineers for this line are Kincaid, Waller, Manville & Dawson, of London.

Rangoon, the next largest city in Burmah, is the seaport of Mandalay. There is at present a steam tramway system in that city, but the concession for this line has expired, or is near expiration, and the municipality is now arranging for tenders for a new concession.

Siam has the oldest electric railway system in the Orient, the trolley line in Bangkok having been put in operation ten or twelve years ago. The corporation is a Danish one and American apparatus is used. Several articles on this system have appeared in past issues of the Street Railway Journal.

An extensive electric railway system is now under construction at Singapore. It will consist of 27 miles of track and about seventy cars, open and closed, and is owned by an English corporation which anticipates the opening of the line during the early part of 1905. The contractors for the road are Dick, Kerr & Company. One of the most interesting features of this system is that the rails are laid on concrete and thermit rail joints are used exclusively. The same contractors are building an electric line at Hongkong, which is the next city proposing electric equipment encountered traveling eastward. The Island of Hongkong is quite mountainous, but the tramway runs along the coast connecting the shipping and mercantile districts. It is about 13 miles in length and

about thirty cars will be employed. It is owned by an English company. The engineering for both Singapore and Hong Kong is being carried on by A. Dickinson & Co., of London.

Shanghai awarded a franchise for an electric system to an English company about a year ago, but no construction has been commenced and it is doubtful whether the road will be built. Pekin has a short electric line built by Siemens & Halske, of Berlin.

Seoul, the final city on the Continent of Asia of electric railway importance, has a short electric tramway system owned by an American firm and equipped largely with American apparatus. This road has come into considerable prominence during the past few months on account of the war news from Korea and has been described in this paper.

Franchises for the cities mentioned above vary greatly according to local conditions of the governments under which they are issued, but in the districts and countries under English control are for thirty or forty-two years and usually with the provision that at the end of that time the municipality has the right to purchase the road for a price based upon the capitalization of the earnings during the immediately previous three or five year period. Although there is considerable future for electric railway construction in some of the largest cities in the Orient, the lines will necessarily be small and limited in number for the reasons pointed out in the early part of this article.

CHANGES IN THE ELECTRIC PACKAGE COMPANY OF CLEVELAND

Quite an important change has taken place in the affairs and management of the Electric Package Company, of Cleveland, which handles the express business on the various interurban roads radiating from Cleveland. Heretofore Barney Mahler, formerly president of the Lake Shore Electric Railway, has been president and general manager of the company. With a view to retrenching expenses, the offices of president and general manager have been abolished, and the offices of secretary-treasurer and auditor have been combined. In the future the management will be vested in an executive committee composed of three representatives of the various roads interested who will receive no salary. Each road will appoint a member of this committee. The committee appointed at a recent meeting consists of J. O. Wilson, general passenger and freight agent of the Cleveland & Southwestern Traction Company; Charles Currie, general manager of the Northern Ohio Traction & Light Company, and Charles W. Wason, president of the Cleveland, Painesville & Eastern Railway. Mr. Wilson will serve four months and the Lake Shore Electric Railway Company will then appoint a man who will serve one year. Mr. Currie will serve eight months and the Cleveland Electric Railway Company will appoint a man for a year. In this way there will be an expiration and the appointment of a new member every three months. The general offices of the company have been removed from the Electric Building, Cleveland, to the new express station of the Electric Package Company.

The Electric Package Company is rather a peculiar organization. It is not an incorporated company, being in reality an association; it owns no property by its own right. Each road provides its own express cars and pays its own crews with the exception of the messenger, who is paid by the Package Company. Each road owns its own teams at the towns on its own line, while the teams at Cleveland are owned by the various companies. The union express station, which was described and illustrated in a recent issue of the Street Railway Journal, is owned by the Electric Depot Company, and the stock of this company is owned by the various roads interested; the station is leased at a fixed rental to the Electric Package Company. The Electric Package Company maintains the Cleveland station and the teams used at this station, also the stations and teams at the various towns reached by the system; in some instances the express stations are combined with the passenger stations of the various roads, and in these cases the Electric Package Company pays a portion of the expense.

The division of the receipts from the business of the Electric Package Company necessitates a rather complex system of accounting. There are three expense accounts which are taken care of before the division of receipts. The general expense includes salaries of officers and several other items necessary for the operation of the business as a whole. This is divided pro rata among the various roads as to the money earned. In this connection it might be stated that in Cleveland the Cleveland Electric Railway Company is a party to the arrangement, and receives from the suburban companies a pro rata of their receipts based upon the mileage goods are carried over its tracks.

The Cleveland expense includes the rental for the Cleveland station, salaries of office force and teamsters, rental of teams, and other expenses incident to the operation of the Cleveland station. This expense is divided among the various roads in proportion to earnings on goods shipped in and out of Cleveland.

The suburban expense includes the maintenance of the various stations, rental of stations, salaries of teamsters and clerks, and other station expenses are charged to the company on whose lines they are located. Salaries of messengers come out of this fund.

SUBWAY CONSTRUCTION IN PHILADELPHIA

Construction is now well under way upon section No. 3 of the underground system of the Philadelphia Rapid Transit Company, and is progressing rapidly. This section includes the four-track portion of the system on Market Street between the loop station at the City Hall and the Schuylkill River. The portal end of the tunnel, where the tracks emerge to cross the Schuylkill River and join the elevated structure beyond, is nearly completed and is being roofed over, and also the piers for the special bridge at this point are well under way. The tunnel is being constructed eastward from the portal, by the open trench method, as far as Nineteenth Street, and in many portions the roof covering is now being applied.

The construction of the portal end involves a serious problem in changing the grade of the street. The street level will be raised some 10 ft. or 12 ft., which will, however, be greatly facilitated by the fact of its former low level in the two blocks adjoining the street bridge over the Schuylkill River. This change of grade is now being carried out in sections in order not to interrupt the heavy street traffic at this point, the street car tracks and roadway being nearly ready for use upon the fill in side of the street.

As stated in a previous article in these columns, the plans of the rapid transit improvements in Philadelphia include first of all this four-track subway in Market Street, from a central "loop" station surrounding the City Hall, west to the Twenty-Third Street portal, where connections will be made by a special two-level bridge over the Schuylkill River to the surface and elevated lines beyond. This work is now being pushed rapidly, and will, it is claimed, be completed in 1905. The elevated structure will extend from Twenty-Third Street west upon Market Street to Sixty-Third Street and will have two important branches. Besides this, a double-track subway will extend from the City Hall loop station to the Delaware River, with also an extensive branch loop entirely surrounding the shopping district. Other lines are also contemplated but at present have not been definitely defined.

A NEW SYSTEM OF CURRENT COLLECTING FOR HEAVY ELECTRIC TRACTION LINES

BY HENRI SOMACH

The Oerlikon Machine Works, of Switzerland, have equipped an experimental line with a new system of current collection devised by E. Huber, the technical director of that company.

The following article is intended to comprise a description of the details of this system and to display its characteristic points of merit, which appear to the writer to be a great step

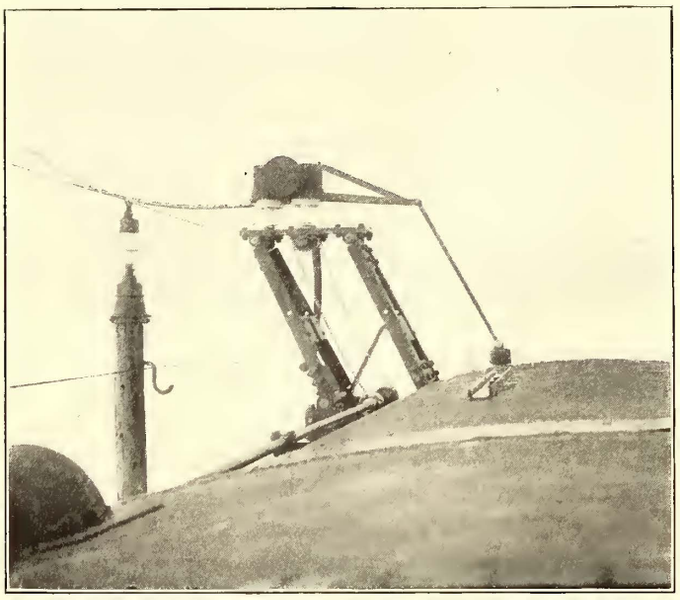


FIG 1.—FLEXIBLE ROD USED FOR COLLECTING CURRENT

toward the solution of the problem of heavy electric traction on long distance lines.

It has been very definitely decided by modern engineers that the solution of the long distance traction problem is to be reached by means of a single overhead conductor supplying alternating single-phase current at high voltage to the car, the return being had through the service rails of the permanent way. There are many objections to the methods already in use when they become applied to long distance service. The third rail must either be raised to prohibitive potentials in order to minimize losses, or an excessive number of substations must be employed, and the third rail, by reason of its proximity to earth, is at any voltage a greater or less source of trouble.

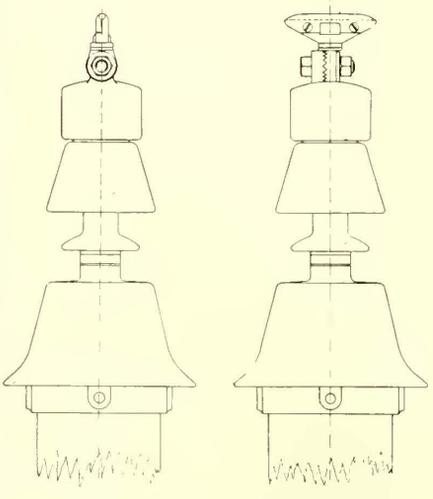


FIG. 4.—INSULATORS USED TO SUPPORT POWER WIRE

Furthermore, in equipping long distance lines the solution of the problem appears to the writer to be that of dealing with the conditions as they now exist, that is to say, we must use the same rolling stock and the same method of train operation and simply replace the steam locomotive by a suitable electric tractor. Many reasons why this system of locomotives versus multiple unit control or individual car equipment could be discussed pro and con and would not be within the scope of this article, which has an intent to discuss simply the means of overhead current collection.

Suffice it to say that the writer, believing fully in a system of locomotive traction for long lines, considers that a successful current-collecting device for such a locomotive is of paramount interest and importance. The efforts of men such as Lamme, of Pittsburg, and of Winter and Eichberg, of the Union of Berlin, and of Dr. Finzi, of Milan, very pointedly show that these prominent engineers believe that the single conductor and rail return is the system of distribution to be

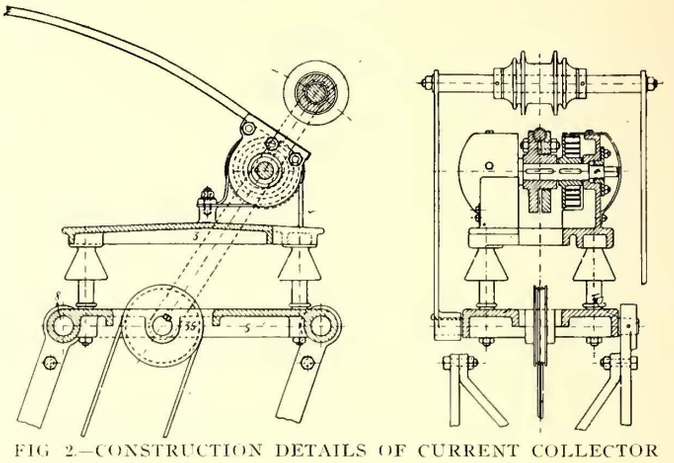


FIG 2.—CONSTRUCTION DETAILS OF CURRENT COLLECTOR

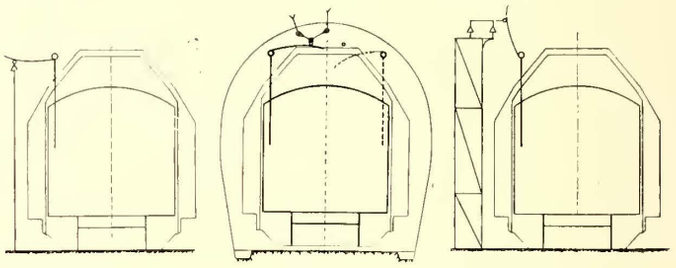
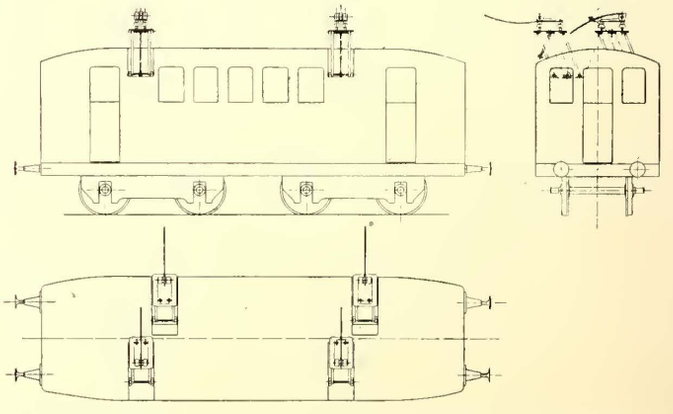


FIG 3.—SHOWING SOME OF THE POSITIONS POSSIBLE WITH FLEXIBLE-ROD CURRENT COLLECTOR

striven for. Messrs. Mordey and Jenkin arrived at the same conclusion in a discussion occurring on Feb. 18, 1902, before the Institution of Civil Engineers of London. Therefore the writer confines his article to the description of the device for single-phase current collection from a single overhead conductor.



FIGS. 5 AND 6.—TWO SETS OF TWO CONTACTORS MOUNTED ON A PARALLEL LINKAGE FOR CHANGING POSITION OF CONTACT STEMS AT CENTERS OF ROTATION

The Oerlikon Machine Company has devised a new apparatus for this purpose capable of adapting itself to the various conditions to be found on existing trunk lines and numerous cross-sections on existing structures, such as bridges and tunnels.

The conditions to be filled on trunk line service are the following:

1. The current-collecting apparatus should not require manipulation during change in the direction of the motion of the train.

2. It should be very light in order to diminish the violent shocks on the overhead conductor.

3. The contact part should be very readily renewable.

4. The arrangement of the apparatus should be such that it is practically impossible for it to damage the contact line.

5. The apparatus should be so arranged as to have a wide range of motion, thereby permitting it to make proper contact in many different relative positions between the overhead conductor and the train, and the apparatus should not come off the wire.

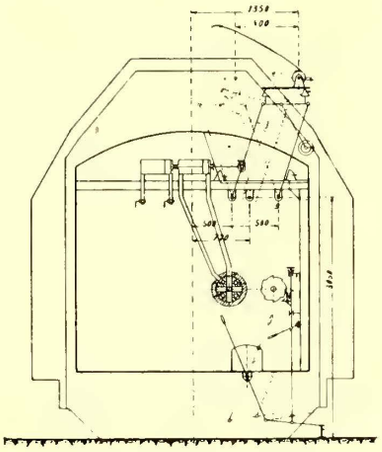


FIG. 7.—COMPRESSED AIR CONTROLLING APPARATUS FOR LATERAL DISPLACEMENT OF PARALLEL LINKAGE MOUNT

6. The overhead line ought to be double, not only for double track but for single track, the two lines being entirely distinct and on separate insulators, the one serving as a reserve in case the other is disabled.

7. The overhead wires ought to be placed at the side of the permanent way so as not to interfere with the rolling stock.

8. The arrangement of the overhead wires and all their insulators and supports ought to be designed in such a manner as to present a minimum surface to the effects of wind and snow.

9. The overhead wires should be capable of being repaired without blocking the service.

10. Branches and crossings on the overhead system should be effective without the use of special apparatus such as commonly employed in the ordinary trolley work.

11. The division of the overhead wires into sections should not require the employment of insulating connectors, which are subject to great deterioration on account of the high tension employed.

12. The overhead wires and their supports should be capable of safe installation no matter what the section of the permanent way may be, that is, independent of whether there may be tunnels or any other special arrangements along the route.

13. All of the material in the overhead construction should be specially constructed on account of the high tension employed.

It is proposed to show how the current-collecting apparatus

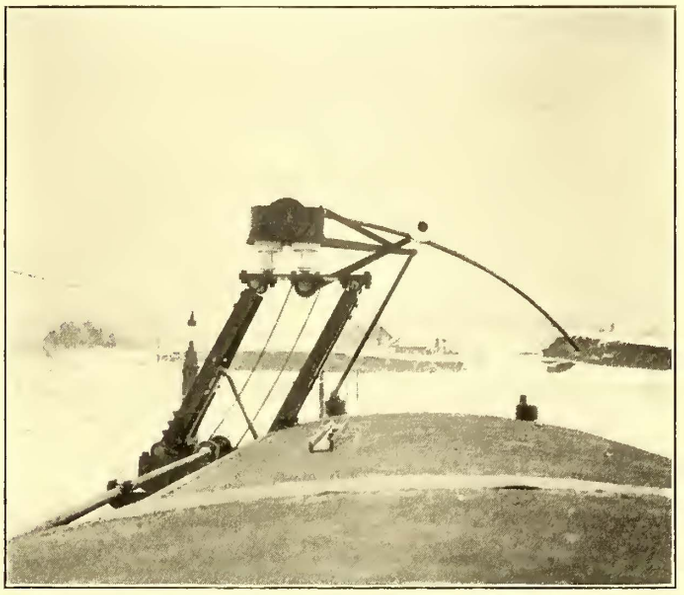
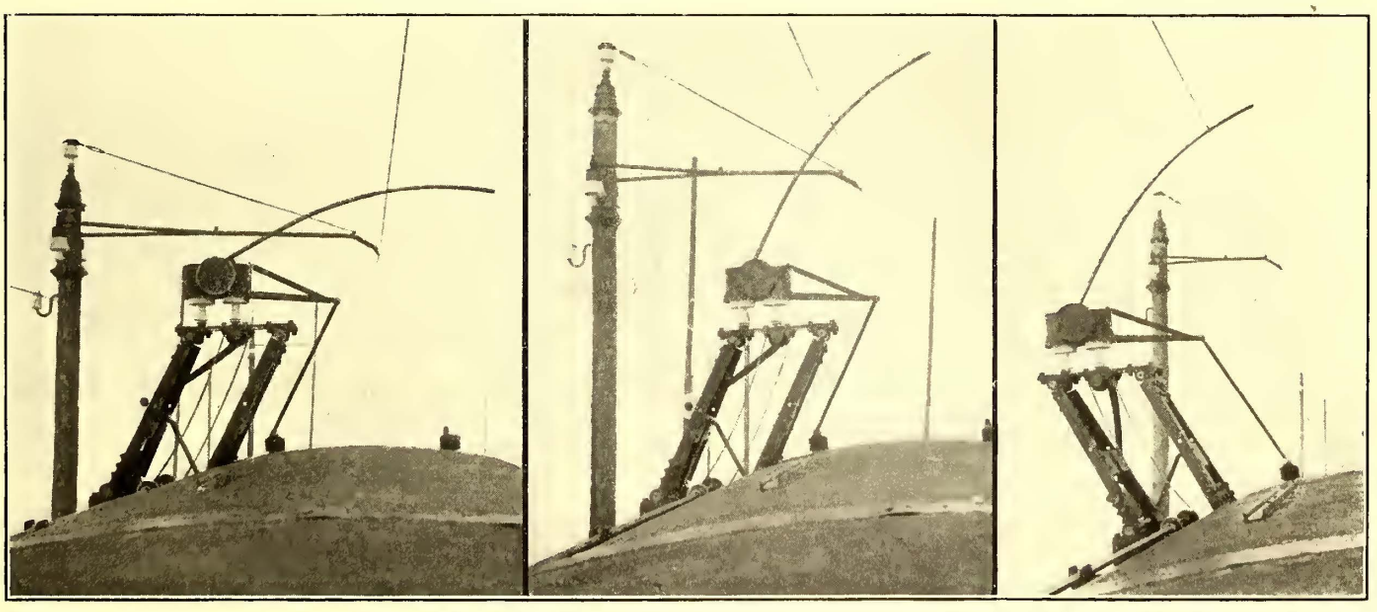


FIG. 9.—CURRENT COLLECTOR OPERATING AT ITS LOWEST POINT

referred to and the overhead construction used in connection therewith fits these various conditions.

The new current-collecting apparatus is of the bow type made of a metallic stem, having a slight curvature and rubbing with its convex surface on the single overhead wire. The stem is arranged so that the forces applied will permit its lower extremity to move on an axis parallel with the track, which gives it rotary motion in a plane perpendicular to the track.



FIGS. 10, 11 AND 12.—SOME CHARACTERISTIC CASES, SHOWING FLEXIBILITY OF CURRENT COLLECTING DEVICE

The mount of the collecting stem is attached in place by bolts which permit its ready renewal in case of need.

Spiral springs are arranged so as to cause the stem to press firmly against the overhead conductor and insure a good contact thereon in any position in which it may be rotated. The various positions of the stem are practically directed by the

overhead conductor, which conforms in height and lateral arrangement more or less to the requirements of the track. The current-collector is insulated as a whole by means of heavy porcelain insulators. An insulated knob of porcelain mounted on the end of the lever which appears in a pendent position in Fig. 1, swings on an axle which is manipulated by a chain

FIG. 13.—VIEW OF AERIAL CONSTRUCTION OF SINGLE-PHASE RAILWAY

under the control of the motorman. By operating this chain the contact stem can be lifted from the wire and placed out of commission. This apparatus is shown in diagram in Fig. 2, the chain being numbered 35, the lever 3 and the porcelain knob raised.

Fig. 3 shows a number of diagrams which display the various positions that the overhead line may have with reference to the collecting device. The first cut shows the normal position. The contact wire is arranged outside the profile of the car where there is a free space of about 2.3 meters. where the overhead wire is above the track and the bow rubs beneath the wire. The great laxitude of this apparatus with reference to the position of the contact wire can readily be seen.

It is only necessary in order that a contact shall be made that the line intersects the surface generated by the collecting stem in its rotation from 0 to 180 degs. However, to augment still further the extreme limitations of position in space for the contact wire, the apparatus is mounted on a parallel linkage by means of which the position at the center of rotation of the contact stem can be moved up or down. This is displayed in Fig. 5 and Fig. 6, in which two sets of two contactors are shown, both of which can be placed in service and allow the car to run from one section on to another without an are on the contact wire. The lateral displacement of the parallel linkage-mount can be effectively controlled by the hand or by means of compressed air, as shown in diagram in Fig. 7.

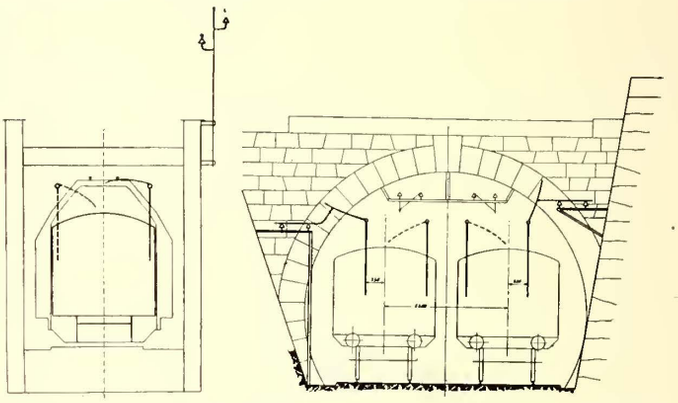


FIG. 8.—ARRANGEMENTS OF CONTACT WIRE IN VARIOUS CASES

This lateral displacement of the current-collecting device is necessary only in traversing tunnels on a double track, and it is possible to effect this automatically on entrance and exit to the tunnel. This can be done most simply by means of a bar suitably placed on the track which engages with a mechanism under the car at different heights and operates the air-controlling apparatus. Fig. 8 shows various arrangements of contact wire in various cases of permanent way construction. Figs. 9 to 15 are photographs representing the various positions of the contact device on the experimental line of the

FIGS. 14 AND 15.—FLEXIBLE-ROD CURRENT COLLECTOR IN USE ON EXPERIMENTAL LINE

The contact stem slides underneath the wire contact on its upper surface. The contact wire is supported on porcelain insulators shown in detail in Fig. 4, which are mounted directly on the supporting poles without the use of cross-arms. The middle diagram shows a position of contact which is employed in tunnels or in other engineering arrangements, such as crossings and branching with other lines. In this last position the current-collector operates like the ordinary bow system, Oerlikon Company. Fig. 13 gives a general view of the aerial construction of this experimental line on which single-phase alternating-current is employed at a pressure of 14,000 volts. It will be noted that the insulation of the line is exclusively of porcelain, even where the contaet wire is supported by transverse suspension. This is accomplished simply by a metallic connector and the transverse wire is insulated from the poles, that is to say, the earth, by porcelain insulators. This ar-

rangement has been seleeted beeause of its peeuliar fitness to resistanee and high pressure.

The line is not doubly insulated, but each porcelain insulator is suffieiently large for the pressure employed. These insulators are individually tested to 30,000 volts after having been thoroughly soaked with water. The entire line has been tested as a whole to 16,000 volts and the insulation has been found to be perfect. This arrangement is to be preferred to several insulators plaeed in series, eaeh of whieh is insuffieient alone.

Following the deseription of the line and the eurrent-collectors for high tension whieh has just been made, a resumé of the advantages whieh obtain will be in order.

The eurrent-colleeting apparatus requires no manipulation when the ear is operating.

The contact stem is very light, readily interchangeable and preferably covered with a composition softer ,than copper thereby avoiding undue wear of the contact wire. The weight of this contact stem is only 1.5 kg (3.3) lbs; its length 130 em (51.2 ins.) and the maximum pressure against the contact wire only 3 kg (6.6 lbs.).

Because of its curved form the stem can not become engaged between eontact wires and suspension wires when there are any. As a further eonsideration the stem is construeted to be the weakest part so that entanglement will not damage the line. The stem ean not eome off the wire because its length exeeeds by 350 mm (13¾ ins.) the furthest position of the contaet wire from the eenter of rotation of the eontact system. It will appear from thedeseription and the arrangements and from Figs. 1 to 16, that the eontact wire and the current-eollecting apparatus are well adapted to any constructional seetions that are met with on trunk line railroads.

The prineipal advantage of this system ,appears to the writer to obtain in the possibility of establishing contaet in the first diagram of Fig. 3, that is to say, on the side of the track

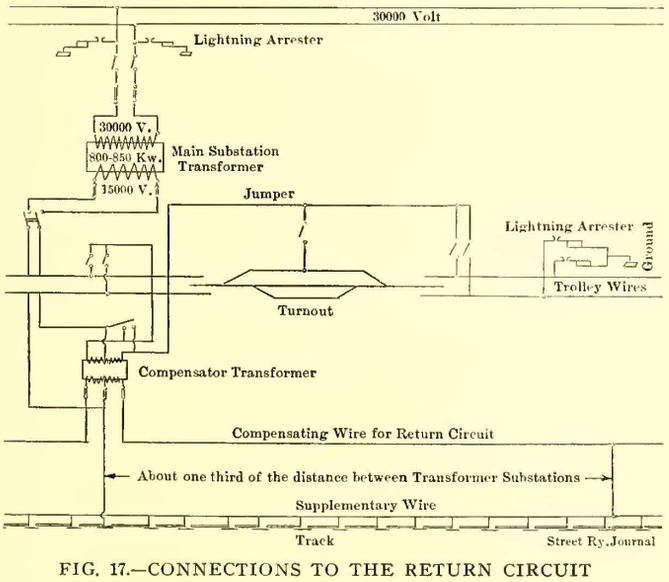


FIG. 17.—CONNECTIONS TO THE RETURN CIRCUIT

at a distanee of 725 mm (29 ins.), with the contact wire supported direetly on insulators on the extremities of the pole, and the eontact stem riding above the wire. It is worthy of remark that on at least 90 per cent of most railroad lines sueh a system of eontaet following this section ean readily be established. This arrangement of the line is very advantageous from the standpoint of solidity of eonstruetion and ease of proteetion. It is possible when neeessity arises to provide massive supports under the eontact wires adapted to the high tension without interfering with the eurrent-eolleetor, beeause the latter makes contaet from above. For the same reason the construetion is less liable to sleet troubles, the sleet being generally thicker on the underside of the line wire.

Finally it is possible to install two contaet lines on a single traek, one on each side of the track and to take current from one or the other wire, aeeording to circumstanees. One seetion can be repaired while the other is in operation and the repair work can be carried on without interrupting the service because the line is arranged on the side and does not interfere with the rolling stoek. The locomotives ought to have then four contact-collectors, two on each side.

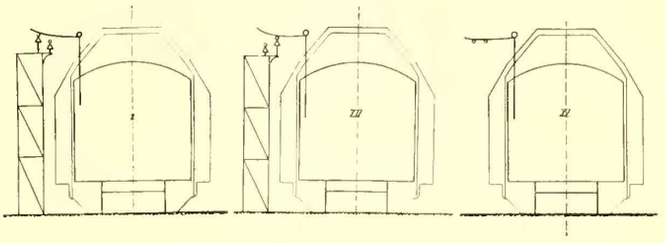


FIG. 16.—PASSING FROM ONE SECTION TO ANOTHER

For double track lines it is not necessary to have two independent lines of contact for each. It suffices to have for each track a single lateral line arranged as shown in Fig. 3 The space between the tracks is not sufficient for the installation of poles for the support of a line of contact and transverse suspension above the tracks is not to be recommended. It is therefore preferable to have two lines of lateral contact, one on either side of the track whieh form a sufficient reserve upon one another, being mechanieally and electrieally eompletely independent. It is not diffieult to conceive of arrangements permitting in case of aceident on one section of a eontaet line to eontinuing operating on the other track, using the current on the other line.

In closing the deseription and discussion of this new system of current colleetion, the writer wishes to again call attention to the facilities whieh this system offers to the separation of the contact line into sections when they can be easily insulated one from the other without necessitating the employment of insulating eireuit breakers inserted in the contact wires themselves, which are subjeet to rapid deterioration. This separation of sections is obtained in this system by an air gap between the contact wire of one section and that of the following section, the wires overlapping each other without touehing. The eontact stem makes contact for an instant with both wires at onee in such a manner that the passage of one section to another makes no interruption even momentarily in the eurrent supply. Passage from one section to another is diagrammatically illustrated in several forms in Fig. 16.

Inasmuch as the use of a track return has been criticised as offering exeessive impedanee to the alternating-eurrent, it is well, in closing this artiele on a system of contaet which depends upon this principle, to make mention of some practical results which the writer has been fortunate enough to secure. In one ease, with a frequeney of 42 eyeles per seeond on the Burgdorf-Thun line, the apparent resistance was eight times the ohmie resistanee at the rails, and this effect with the smaller currents on the high-tension system of distribution proposed is less. To obviate this ineonvenience, it is possible to effect the return of eurrent equally well by a copper wire arranged along the rails and connected at each joint by means of a very simple connection of a clamp of serrated copper and a bolt. Good eonneetion is not necessary in this case, because the greater part of the current is conducted by the copper wire entering the same by the connection of the nearest joint, and the drop which is due to bad contact is but a small percentage of the total. This arrangement for return current is advantageous beeause the return is independent of the condition of the eleetrieal eonneetions of the rails and a rail can be removed in case of repairing the track without interrupting the return circuit.

Even with a return circuit reinforced by a continuous copper wire such as has been described, the effect of self-induction because of the proximity of the rails is apparent.

In a test made by the Oerlikon Company on a track with two rails of 28 kgs per meter and with a wire 8 mms in diameter laid along the rail and connected in the manner indicated above, the following losses of voltage were obtained with a current of 100 amps.:

50 cycles, 70 volts per kilometer.

16 cycles, 42 volts per kilometer.

With continuous current, 30 volts per kilometer.

The effect of self-induction in the return can be compensated for, and the loss reduced to a very small amount by a system of compensation based on the employment of booster transformers.

This is accomplished by substituting for the return booster which would be used with a direct-current system a series transformer in which the primary is in series with the trolley wire and the secondary therefore has a compensating action proportional to the primary current, as shown in Fig. 17. This line can be supported on the same poles as the high-tension contact line, but the current which it conducts is at much lower voltage.

It has been found in the experiments with this system of compensation by the Oerlikon works to reduce the losses in the rails to 10 per cent of that which would have obtained without such compensation.

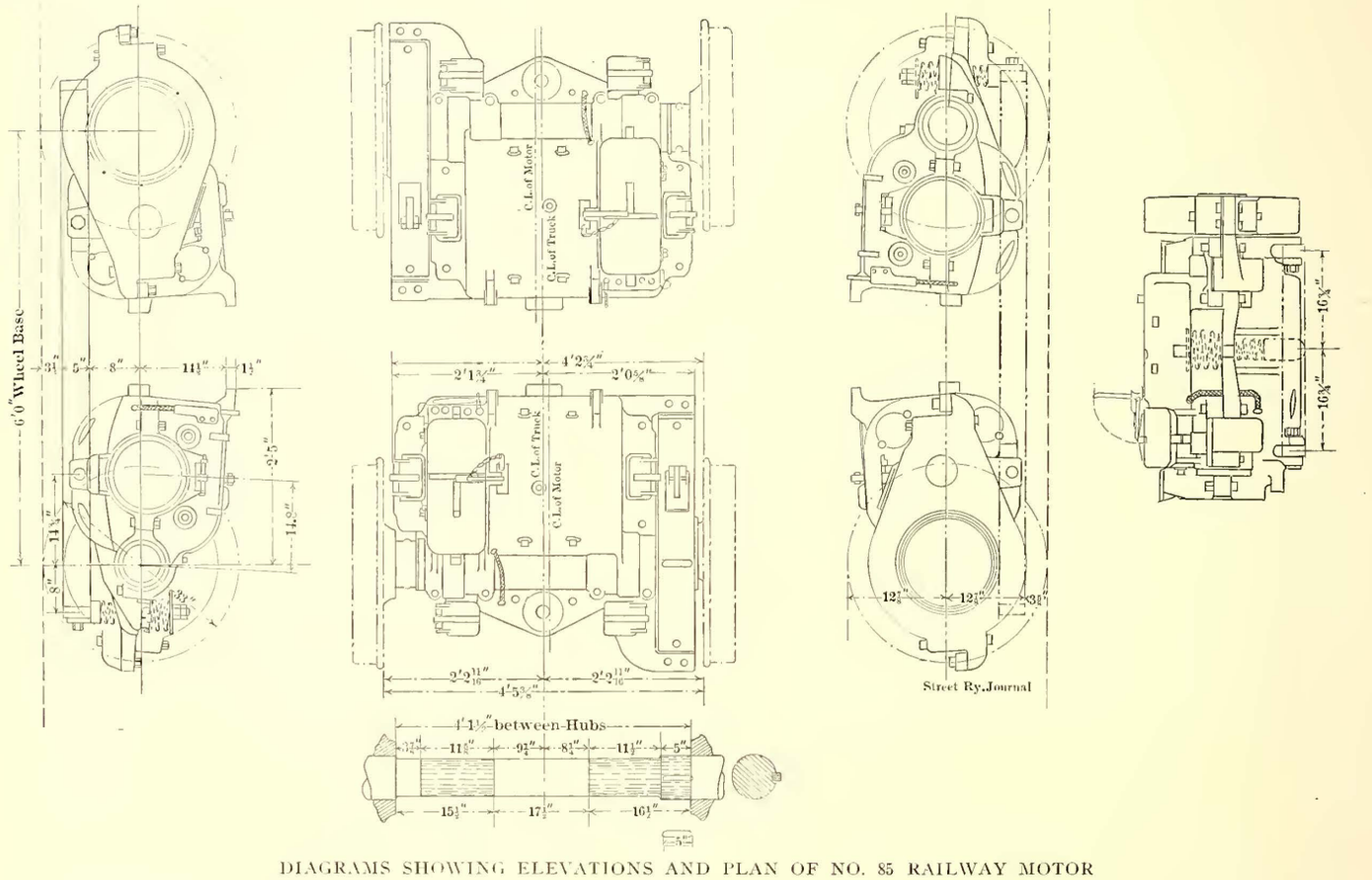
F. T. Chandler and P. M. Chandler, of Chandler & Company, bankers and brokers, of Philadelphia, in company with President George F. McCulloch, of the Indiana Union Traction Company, in the latter's private car recently spent a week inspecting the various lines of the company, and by courtesy passed over other traction lines of Indiana. Chandler & Company are heavy handlers of the stock of the above company and the Fort Wayne Traction Company and other traction companies of Indiana.

WESTINGHOUSE NO. 85 RAILWAY MOTOR

The new Westinghouse railway motor known as No. 85, is of similar capacity and performance to the No. 76 motor of the same company, which has been found particularly adapted to suburban and interurban service. In outline and appearance the new motor follows lines recognized as standard in Westinghouse practice, but mechanical modifications have been introduced, so that the No. 85 motor possesses many features of advanced construction.

The frame is made of cast-steel divided horizontally in two parts, securely bolted together and forming a field which is wholly iron-clad, and approximately cylindrical in shape. The design is such that when mounted on the truck the holding bolts may be withdrawn and the upper field lifted off. To this end the suspension lugs and projection for the support of the gear case are cast with the lower field. A large opening with a spring locked cover is provided in the upper casting, which permits access to the commutator and brushes. Hand-holes are provided in convenient locations about the motor frame. The four pole pieces are built up of soft steel punchings riveted together between end plates of wrought iron and are held to the motor frame by bolts. The poles project radially inward at angles of 45 degs. with the horizontal. Two bolts, secured by lock washers, hold each pole piece in place. They do not penetrate the pole face, but terminate in heavy rivets inside the pole made for this purpose. A smooth and unbroken pole face is thus presented to the armature. The poles are made with projecting tips, which properly distribute the magnetic field, and also serve to retain the field coils, which are held firmly in place by steel spring washers. The coils are wound with asbestos-covered wire. They are heavily taped and are treated with specially prepared insulating compounds, which render them practically moisture proof. Leatheroid washers provide adequate protection against mechanical injury.

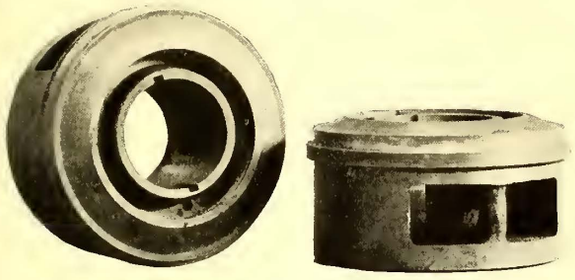
The armature core is formed of circular punchings of soft



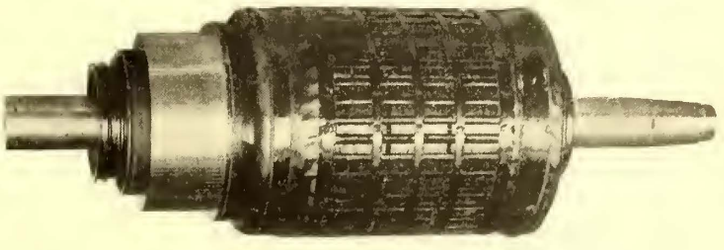
DIAGRAMS SHOWING ELEVATIONS AND PLAN OF NO. 85 RAILWAY MOTOR

steel, built up upon a cast-iron spider. Ventilating spaces are provided in the core at right angles to and parallel with the shaft. The spider is pressed on and keyed to the shaft. The commutator also is mounted on the same spider, and the shaft can thus be taken out and renewed, should this be necessary, without disturbing any other part.

The armature is wound with machine formed coils imbedded in rectangular open slots and held in place by band wires sunk in grooves. It is, therefore, wholly iron-clad, and the winding protected against mechanical injury. Canvas caps protect the



ARMATURE BEARINGS



COMPLETE ARMATURE AND COMMUTATOR

winding at both ends, completely covering the parts of the windings outside of the armature core. The end plate at the pinion end is provided with a bell-shaped flange upon which the windings rest. This flange also holds the ends of the coils rigidly in place. The ends of the coils and the back of the commutator are thoroughly protected from carbon and copper dust. The complete armature is 15¾ ins. in diameter. Wiper rings, of approved design, pressed upon the shaft outside the armature revolve in spaces in the motor frame inside the bearing boxes and prevent oil working its way along the shaft to commutator or winding. Oil thrown off by these rings is drained off through suitable openings.

The commutator consists of 117 hard drawn copper segments with short necks, separated by prepared mica sheets, built up upon a cast-iron bushing and clamped between two V-shaped surfaces, from which they are insulated by similarly shaped rings of moulded mica. The complete commutator measures 12 ins. in diameter x 4¾ ins. in width, and has a wearing depth of approximately 1 in. It is pressed on and keyed to the armature spider.

Brush-holders of the sliding shunt type are mounted on cast brass arms, which are secured to the motor frame by vulcabeston headed bolts. These arms admit of radial adjustment to compensate for wear of the commutator. The tension springs may be thrown back and fastened out of the way, facilitating the inspection of the brushes. Each arm carries two carbon brushes ½ in. x 2 ins. section. The tension springs for each brush are independently adjusted. Flexible leads of rubber-insulated cable are brought out through bushings of semi-hard rubber set in the motor frame.

The armature bearings consist of solid bushings of cast-iron, lined with babbit metal, and keyed in place within heavy housings. The bearing at the commutator end of the motor is 7¾ ins. long, and that of the pinion end, 9 ins. long. Both are bored for a 3⅝-in. shaft. The axle bearing shells are made of cast-iron divided horizontally and held between projections cast solid with the upper and lower halves of the motor frame. The bearings are 11 ins. long, and lined with babbit metal. They will accommodate a shaft 6½ ins. or less in diameter. The bearing boxes are packed with wool waste and are lubricated by means of oil, similar to the journals of a railway car.

The pinion is made of forged steel with machine cut teeth. It is keyed in place and held on a tapered seat by a special nut and lock washer. The gear is made of steel, in one piece, and is pressed on the car axle. The gear and pinion have a diametral pitch of 2½ per inch and faces 5 ins. wide. Standard pinions are made with from fifteen to twenty-nine teeth, and corresponding gears with from fifty-nine to forty-five teeth.

The gear case is of malleable iron, cast in two parts, which are bolted together. It is mounted on lugs projecting from the lower half of the motor frame, and is therefore not disturbed when the upper field is lifted off.

The No. 85 motor is designed for either nose or Baldwin-Westinghouse suspension, as indicated by the outline drawing on the opposite page.

Before leaving the works each motor is run under load and the insulation is submitted to an alternating potential of 3000 volts. This final running test supplements a long series of tests and inspections of each and every part during construction.

SIDE AND END VIEWS OF NO. 85 RAILWAY MOTOR

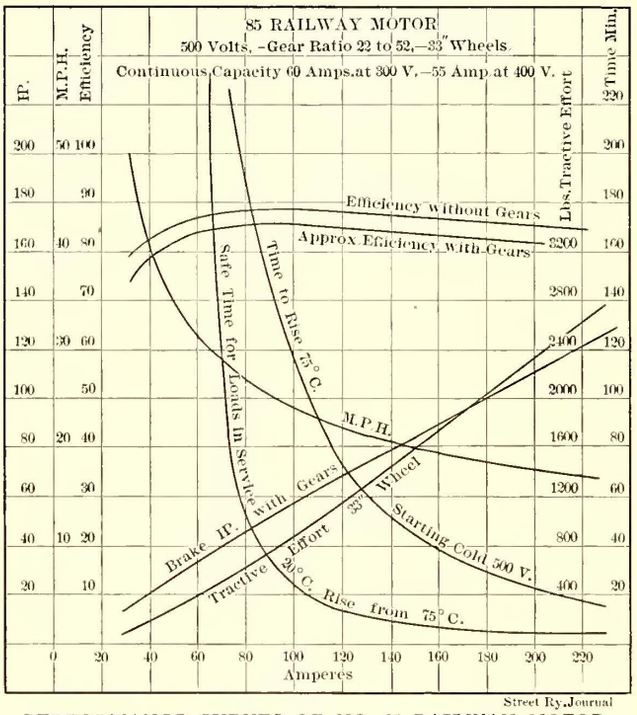
The Westinghouse No. 85 motor, complete with gear and gear case, weighs approximately 4500 lbs. The motor alone, without gears and gear case, weighs approximately 4000 lbs. The complete armature, with commutator and shaft, weighs approximately 995 lbs. The weight of a complete double equipment, including motor, controllers and the usual details, is approximately 10,780 lbs., and that of the corresponding four-motor equipment approximately 21,640 lbs.

When mounted on 36-in. wheels, the clearance between bot-

tom of motor and top of rail is 4⅝ ins.; between bottom of gear case and top of rail, 3⅝ ins. The diagram shows the general outline and principal dimensions of this motor.

The operating characteristics of this motor are clearly indicated by the performance curves, one of which, for a gear ratio of 22 : 52 is published herewith. A quadruple equipment is well adapted to the operation of a car of from 20 to 25 tons (without equipment or load) at a schedule speed of approximately 25 miles per hour, with stops at intervals of 1½ to 2 miles. With 36-in. wheels, and gears of standard ratio, a maximum speed of 45 miles per hour may be maintained.

The Westinghouse No. 85 motor is nominally rated at 75-hp. It is, however, now recognized in well informed railway circles that nominal rating is not the proper basis for motor selection. Conditions of service differ so largely and so many elements enter into the problem that it is necessary to predetermine



PERFORMANCE CURVES OF NO. 85 RAILWAY MOTOR

actual working requirements as closely as possible, and study performance characteristics of the motors considered with special reference to these requirements in order to properly determine the size and type best suited for any particular service. Fortunately, these problems are rapidly becoming more generally understood, though many a road is still paying heavy repair charges, due in no sense to the design and construction of the motors, but solely to the fact that a good motor is being abused by conditions it was never intended to meet. With the curves such as are now supplied with motors, it is possible to determine accurately whether or not a motor is suited to a service whose main characteristics are known. The Westinghouse No. 85 motor has a continuous service capacity of 60 amps. at 300 volts, or 55 amps. at 400 volts, these voltages being selected as representing a fair average of the voltage at the motor terminal under usual conditions. In ordinary railway service the manufacturers recommend it as being able to carry safely any load within the range shown on the performance curves, provided the integrated heating effect does not exceed that caused by the continuous application of either of these currents at the corresponding potential.

With a load of 60 amps. at 300 volts, or 55 amps. at 400 volts carried continuously during a shop test, the rise in temperature of the motor windings, as measured by thermometer, after ten or twelve hours, or after a constant temperature has been reached, will not exceed 75 degs. C. With equivalent load under a moving car the temperature rise should not exceed 55 degs. C. Heavier loads may be carried for shorter periods, as indicated by the time temperature curve. If, for example, the motor has been working at a load of 60 amps. at 300 volts, and has reached a temperature of 75 degs. C., it may then carry a load of 72 amps. at 300 volts for one and one-half hours, with additional rise in temperature not exceeding 20 degs. C. Speed, tractive effort, efficiency and power developed are also indicated for different gear ratios and under conditions ranging from currents of 30 to 240 amps. at the normal potential of 500 volts.

MULTI-CURRENT FEED-WATER HEATER

The multi-current feed-water heater shown in the accompanying illustration is the latest design of the Blake-Knowles type for horizontal or vertical setting made by the International Steam Pump Company. In the horizontal form the steam enters the upper opening and travels through a passage whose area is equal to one-half of the cross-section of the whole heater.

HORIZONTAL MULTI-CURRENT FEED-WATER HEATER

This passage is formed by a diametrical baffle plate extending from the end where the steam enters nearly to the opposite end. At the opposite end the steam turns downward and traverses two segmental passages at either side, each having one-sixth of the total cross section. Each of the latter passages is formed by a radial baffle plate placed below the large diametrical baffle plate. On arriving again at the end where it entered, the steam remaining uncondensed passes back through a passage having one-sixth of the total area of the heater and at the exhaust end the remaining steam and air escape through the discharge opening to the condenser or the atmosphere, as the case may be. The water traverses six radial nests or tubes, each forming a segmental group. The cold water entering the heater passes through the tubes occupying the discharge steam compartment. Arriving at the other end it passes back through the next segmental group, and so on, backward and forward, until it reaches the outlet. This gives the rapid circulation and thorough mixing of the feed-water by which is obtained the maximum heating effect possible in an apparatus of this character.

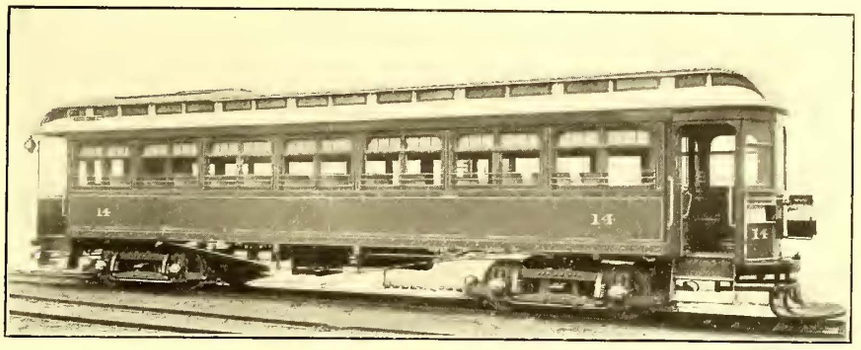
Access to the heater is had by removing the heads. The tubes of the vertical heaters can be cleaned from the top and the horizontal heaters from either end. Feet or saddles are provided as the case requires. Mud blows are employed to keep the heater clean and free from sediment. Entrained water is removed by drip-pipes. Every heater is tested under 250 lbs. pressure per square inch, giving a safe working pressure of 175 lbs. The heaters are made in sizes of 5000-hp in both the horizontal and vertical styles.

The Railway Commissioners of New South Wales, who operate the tramways in Sydney, Australia, are planning to change all of the existing cable lines in that city to electricity. The Sydney tramway system now consists of 206 miles of track employing 33 grip cars, 576 electric motor cars, 96 steam locomotives, 123 steam passenger cars, 53 electric trail cars and 37 electric freight and work cars.

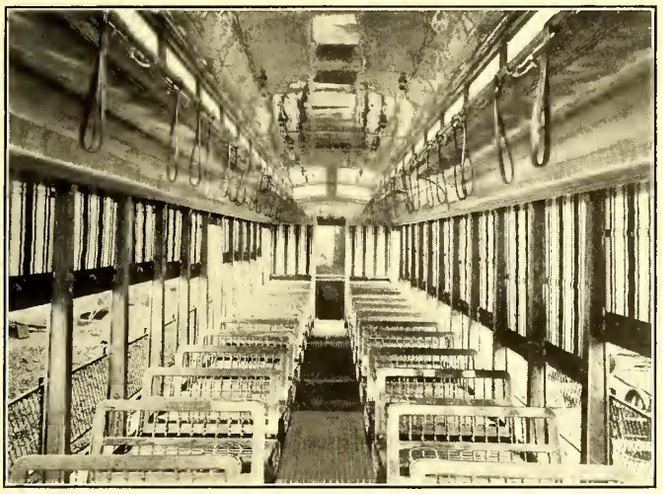
CARS FOR THE NORTHERN TEXAS TRACTION COMPANY

The Northern Texas Traction Company through the Roberts & Abbott Company, of Cleveland, has recently purchased from the Northern Texas Traction Company, of St. Louis, a number of large closed and open cars for service between Dallas and Fort Worth. The railway company operates all the lines at Fort Worth and one of the systems in Dallas. The interurban system consists of 58 miles of track with an equipment of over fifty cars. An amusement park situated at Handley, about 5 miles from Fort Worth, is reached by this division. Dallas is the second largest city in the State, having a population of nearly 45,000. Fort Worth is one of the chief live stock centers and has a population of nearly 30,000.

As will be seen from the illustrations, the cars have steam car roofs, twin windows and vestibules at the forward ends. The lower sashes of the windows are arranged to be raised their full height and may be held at any point by the locks being released against serrated bronze bars set into the posts. The seats are 35 ins. long and have fixed backs; width of aisles, 20 ins. The total seating capacity is fifty-six. The smoking compartment is located in the forward end and seats sixteen passengers. A toilet room of standard steam car character is placed in the corner at the rear end. The interiors are finished in cherry rubbed to a smooth dead finish and paneling inlaid with white holly and ebony. The ceilings are of three-ply poplar veneer with rafters in semi-Empire style.

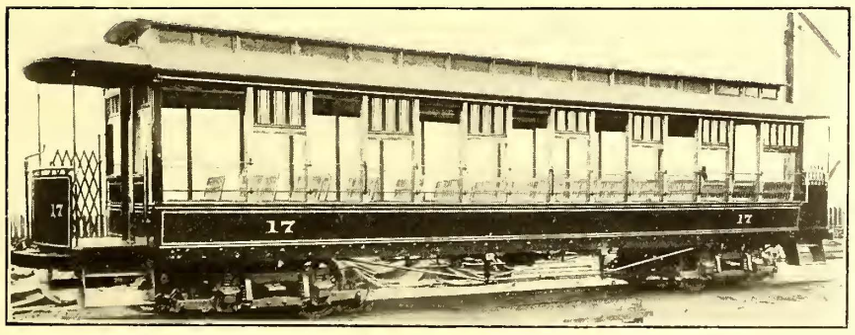


EXTERIOR OF CLOSED CAR FOR THE NORTHERN TEXAS TRACTION COMPANY



INTERIOR OF OPEN CAR USED BY THE NORTHERN TEXAS TRACTION COMPANY

INTERIOR OF CLOSED CAR USED BY THE NORTHERN TEXAS TRACTION COMPANY



OPEN CAR FOR THE NORTHERN TEXAS TRACTION COMPANY

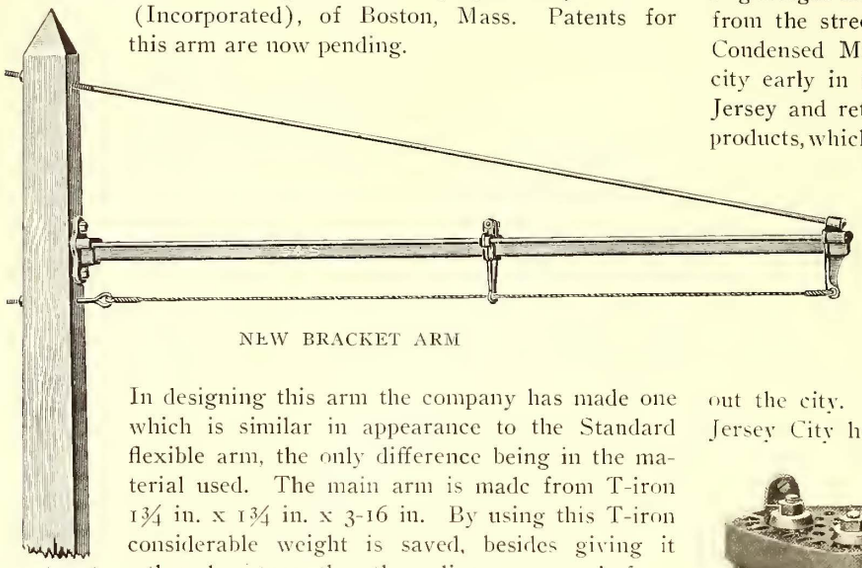
The length of the cars over end panels is 40 ft. 9 ins.; over vestibules, 50 ft. 1 in., and over bumpers, 51 ft. 9 ins.; from panels over vestibules, 4 ft. 8 ins.; width over sills, 8 ft. 5 ins.; centers of posts, 2 ft. 10 1-16 ins.; size of side sills, 5¾ ins. x 7¾ ins., plated on the outside with 7 in. x ⅝ in. steel; thickness of corner posts, 4 ins. x 4½ ins., and side posts, 2¼ ins. x 4 ins. The cars are mounted on Brill No. 27-E-2 trucks, with 33-in. wheels, 3-in. tread and ⅞-in. flange. The trucks have solid forged side frames bracketed to the transoms with 1 in. double and single corner brackets. The motor equipment consists of four 50-hp motors per car.

The open cars are of quite an interesting type, as will be seen by the illustration. They are intended for use as trailers for the cars just received. As the speed will be too high to permit the sides to be entirely open, they are paneled to 20 ins. above the floor and heavy net guards 15 ins. wide prevent the passengers from leaning out. The curtains reach to the paneled portion and the edges extend into deep grooves in the posts so that when down the passengers are completely protected from rain. The seats have reversible backs and are 33 ins. long, leaving the aisle 21¼ ins. wide. The total seating capacity is sixty. The inside finish is cherry and white ash, with ceilings of decorated birch.

The length of the cars over the end panels is 37 ft. 4 ins.; over crown pieces, 44 ft. 4 ins.; from end panels over crown pieces, 3 ft. 6 ins.; width over sills and sill plates, 7 ft. 8 ins.; over posts at belt, 8 ft.; centers of posts, 2 ft. 6 ins.; thickness of corner posts, 3⅝ ins., and of side posts, 2¾ ins.; size of side sills, 4½ ins. x 6¾ ins., with 7 in. x ⅝ in. sill plates; end sills, 4¾ ins. x 6¾ ins. The cars are mounted on No. 27-F trucks, with 33 in. wheels.

BRACKET ARM

The new type of bracket arm shown in the accompanying illustration has been brought out recently by Swazey & Smith (Incorporated), of Boston, Mass. Patents for this arm are now pending.



NEW BRACKET ARM

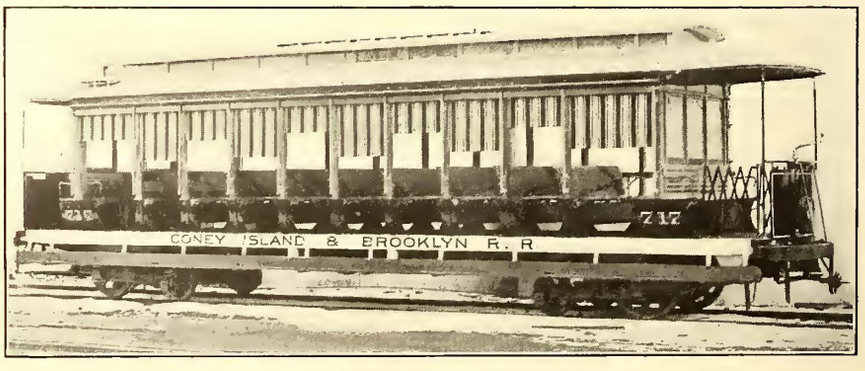
In designing this arm the company has made one which is similar in appearance to the Standard flexible arm, the only difference being in the material used. The main arm is made from T-iron 1¾ in. x 1¾ in. x 3-16 in. By using this T-iron considerable weight is saved, besides giving it greater strength and neatness than the ordinary arm made from pipe.

OPEN CARS FOR THE CONEY ISLAND & BROOKLYN RAILROAD

The Coney Island & Brooklyn Railroad Company has lately received from the J. G. Brill Company, fifty thirteen-bench open cars of the type illustrated in the accompanying cut. The cars measure 37 ft. 6⅞ ins. over the crown pieces and are 6 ft. 10 ins. wide over sills and sill plates. The width over the posts at belt is 7 ft. 7½ ins.; from center of corner posts over crown pieces, 4 ft. 5¼ ins.; centers of side posts, 2 ft. 8 ins., and distance between centers of corners of posts and side posts, 3 ft. 5 ins. The side sills are 4¾ ins. x 7 ins., with 7 in. x ¾ in. sill plates on the outside. The crown pieces are 2¾ ins. x 11 ins.; thickness of corner posts, 3⅝ in., and side posts, 2¾ ins. The truss rods are brought up over the body bolsters and extend the entire length of the car along the inside of the side sills, being anchored outside the crown pieces. The running boards are 19 ins. from the rail and from running boards to car floor is 17 ins.

The cars are finished in cherry and ash. The curtains may be drawn to the floor, as seats are provided with Brill round-corner seat end panels. Pockets are provided for the bulkhead sashes. Among other specialties of the builder's make with which the cars are equipped are angle-iron bumpers, ratchet brake handles, radial draw-bars, folding gates, "Dedenda" gongs and signal bells. Ash entrance guards extend the entire length of the car in one piece. The cars are mounted on "Eureka" maximum traction trucks, with 4-ft. wheel base, 33-in. driving wheels, 20-in. pony wheels and 3¾-in. axles. The motors are 35-hp each.

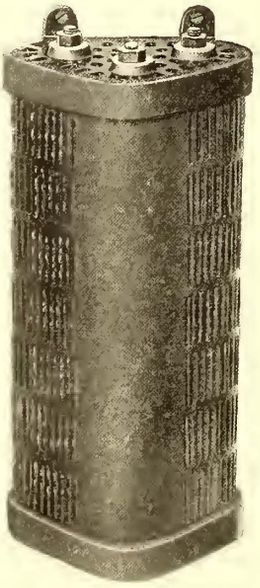
The J. G. Brill Company recently has furnished twenty-five fourteen-bench open cars mounted on "Eureka" maximum traction trucks to the Union Railway Company, of New York City, which is controlled by the New York City Railway Company. The Union Railway Company operates principally through the rapidly growing Borough of the Bronx, New York, and Westchester County, its lines extending to the Long Island Sound on one side and the Hudson River on the other.



OPEN CAR FOR CONEY ISLAND & BROOKLYN RAILROAD

TROLLEY FREIGHT IN BROOKLYN

The plan of the Brooklyn Rapid Transit Company for handling freight includes a contract that will almost entirely remove from the streets the large double-team trucks of the Borden Condensed Milk Company, which now thunder through the city early in the evening on their way to the milk depot in Jersey and return in the early morning hours with the dairy products, which are then loaded on single-horse wagons and distributed to householders. Hereafter the cars which bring the milk into Jersey City will be floated by the Bush Terminal Company to South Seventh Street, Brooklyn, where the cans will be transferred to the cars of the Brooklyn Rapid Transit Company and transported by the latter to the several distributing stations of the Borden Company throughout the city. At present, the wagons in making the trip to Jersey City have to cross the Brooklyn Bridge or the East River Ferries, drive across New York City and then across by ferry to New Jersey. The economy of the new move is thus readily apparent.



ELECTRIC CAB HEATER USED IN NEW YORK SUBWAY CARS

CAB HEATER FOR NEW YORK SUBWAY CARS

The accompanying illustration shows the heater designed by the Consolidated Car-Heating Company for motormen's cabs in the cars of the Interborough Rapid Transit Company, of New York. This heater is placed in a vertical position close to the controller. It has three coils, with all of the lead wires coming out of the heater case at one end. The heater case is of heavy steel, perforated, except in front, as shown in the cut. These cab heaters are wired in series with the car heaters and arranged for three intensities of heat.

The Consolidated Car-Heating Company is now filling an order from the Brooklyn Heights Railroad for 165 heater equipments for elevated cars; 610 heaters (450 being of special size of panel type) for motormen's cabs and 149 switchboards, and for the International Railway, of Buffalo, for heater equipments for thirty-five interurban cars. The compact construction of the heater makes it very suitable for cab service.

FINANCIAL INTELLIGENCE

Wall Street, April 20, 1904.

The Money Market

A further accumulation of bank reserves is the principal development to be noted in the week's money market. Last Saturday's bank statement showed an increase in surplus of over $4,000,000, due entirely to an addition of over $7,000,000 to specie and legal tender holdings. The enlargement of cash resources has come about through the same causes which have been observed for the last several weeks. On the one hand the banks are gaining both in their routine transactions with the Treasury, and with their interior correspondents; on the other hand, they continue to receive large consignments of gold from Japan, which are transferred via San Francisco. This latter movement is to be accounted for partly by the large purchases of war supplies which Japan is making in this country and partly by the transfer of deposits by capitalists in the Orient, who evidently prefer to have their funds in a safer market. It is a question, however, whether this migratory capital can be considered as more than a temporary addition to our bank reserves. In the present state of the exchanges the result is likely to be a much larger exportation of gold to Europe than would otherwise have occurred. Sterling has now risen considerably above the price at which the first exports were arranged a fortnight ago. At this writing, although no definite engagements have been made, it is expected that more announcements will be heard of before the end of the week. The Bank of England has reduced its rate of discount, and the price of gold has fallen in London. Notwithstanding these changes, however, the situation continues to be wholly favorable to further large transfers of gold to France in the immediate future. Our market, of course, can afford to view these probabilities complacently. However heavy gold shipments may be, they will not bear very severely upon our surplus supply. It is even doubtful whether they will lead to any appreciable hardening of money rates. It is well to anticipate, none the less, a considerable reduction in local bank reserves during the next month or six weeks. It is also well to look forward to a further increase in the loan account, as the natural consequence of the recent railway borrowing. Call money on the Stock Exchange is abundant at 1½ per cent and under. For time loans rates are unchanged at 2½ per cent for sixty days, 3 per cent for three months, and 3½ to 3¾ per cent for six months.

The Stock Market

This week's market has had none of the exciting incidents which abounded in its predecessors. Generally, it has been a dull professional trading, with the tendency of prices downward. The decline has occurred more through the market's own inertia than for any other cause. Yet various outside reasons appear which have played their part in the downward movement. More has been heard of the Harriman intervention suit before the St. Paul court than anything else. But it now seems probable that this matter has been overrated as an immediate speculative influence. Decision was rendered yesterday against the Harriman petition to prevent the dissolution of the Northern Securities Company, on the terms proposed last month by the Hill-Morgan party. It was announced at once, however, that the suit would be renewed, probably in the New Jersey court; consequently, the whole affair seems likely to remain in statu quo for an indefinite time. Whatever else may be in doubt, it is clear that the controversy over the disposition of rival interests in the Western railroad territory is not going to lead to any immediate results which the stock market need seriously dread. The most effective reason against a sustained bull campaign in stock lies now, as it has all along, in the indifference of investment capital toward ordinary market ventures. The demand is active enough for the high-grade investments or for high-class securities promising a large return. But toward the great mass of what may be termed speculative issues, the public temper is still as cautious as it has been at any time during the last eighteen months. Speculators for a rise have found that after a certain point their operations arouse no response. This seems to be the real explanation for the termination of the recent advance, and for the reaction which has ensued during the last two weeks. Uncertainty over the approaching presidential nominations, and over the outlook which is at present unsatisfactory for the wheat crop, are minor causes working toward the same end. On the other hand, there are no strong incentives for holders of stock to sell. What with easy money and better business prospects, the situation at bottom is undoubtedly sounder than it was six months ago. A dull market fluctuating within comparatively narrow limits is what most good judges now foresee.

A sharp break in Metropolitan Street Railway stock was one of the episodes of yesterday's dealings. The price was driven down nearly seven points from the high level of two weeks ago. In the absence of any explanation bearing upon the value of the property itself, the decline is attributed to sudden liquidation of some large holdings, based entirely on purely personal grounds. The rest of the traction group suffered sympathetically. Brooklyn Rapid Transit, in which there has been recently some very lively speculation, reflected the hurried overthrow of a number of weak accounts. Manhattan dropped less than the rest, no doubt because it had shared to a less extent than the others in previous operations for the rise.

Philadelphia

No very important changes have occurred among the Philadelphia stocks during the week. Such fractional variations as there have been, have been about equally divided between advances and declines. Phildelphia Electric, which a week ago went as high as 6 3-16, fell to 5½. Philadelphia Company common sold down from 38¾ to 38⅛, and rallied to 38⅜. On the other hand, Union Traction rose from 49½ to 49¾. Philadelphia Traction, after dipping to 95⅝, returned to 96. American Railways gained a fraction to 44. Dealings in all these stocks were only moderately active. The heaviness of Philadelphia Company issues was explained by the quarterly report of the company made public yesterday. Although gross earnings were $175,000 larger than in the period a year ago, working expenses increased sufficiently to leave a decrease of $26,000 in net earnings. On top of this a heavy cut was announced in other income, and a considerable addition to fixed charges, in consequence of which this year's surplus reached the paltry sum of $1,067, against $1,421,000 in the first three months of 1903. Other sales for the week comprised 100 Philadelphia Rapid Transit at 13¾, 200 Rochester Passenger at 96¾, and 58 shares of Thirteenth & Fifteenth Streets Passenger at 299 to 298.

Chicago

Now that the first excitement has subsided over the vote in favor of municipal ownership, the financial community in Chicago is disposed to regard it as a good thing for the values of street railway shares. In the case of Union Traction more particularly, the shares selling as low as they are, it is felt that if the city were to purchase the terms could hardly be below, and might very possibly be above prevailing quotations. On this comforting theory, the Union Traction stocks have advanced this week, the common selling in New York as high as 6¼ against 5⅝ a week ago, while the preferred rose in the Chicago dealings from 30½ to 30¾. The improvement has not extended, however, to the securities of the affiliated properties. Heavy selling, on the contrary, has been resumed in West Chicago, a thousand shares changing hands at declining prices between 42 and 41. In the elevated group, Metropolitan preferred has again been the feature, rising from 46 to 47½ and quickly relapsing to 46. Odd lots of Metropolitan common sold at 15¼ and 15. One hundred South Side sold at 91¾, and later a fractional lot at 91½. Lake Street Elevated receipts were heavy, declining from 3¾ to 3½.

Other Traction Securities

On the Boston Exchange Massachusettts Electric common showed the effect of some rather large speculative realizing, the stock declining from 21⅛ to 19½. The preferred fell a half-point in sympathy from 75 to 74½. On the other hand, Boston Elevated maintained its recent advance, selling at 140 and 140¼, while the West End shares were exceptionally strong, the common going up from 92 to 93, and the preferred from 111½ to 112¼. Some further liquidation appeared in the United Railways issues on the Baltimore Exchange, and all of them sold at the lowest prices since the day when business was resumed after the fire. The income bonds dropped from 52¾ to 51, and the general mortgage 4s from 90¼ to 89¾. The stock, after touching 7⅛ rallied to 7½. Other sales for the week comprised City & Suburban (Washington) 5s at 98, Anacostia & Potomac 5s at 96, Lexington Street

Railway 5s at 99 and 99¼, City & Subruban (Baltimore) 5s at 113⅞ and Charleston Consolidated 5s at 84.

Cincinnati Traction resumed its old-time activity at Cincinnati last week. It opened at 136½ and advanced to 139 on sales of nearly 1000 shares. Miami & Erie Canal weakened, about 200 shares changing hands at 1½, with more offered at that figure. Detroit United lost a point, closing at 64 for a few small sales. Cincinnati, Newport & Covington was comparatively inactive, a small lot of the preferred sold at the old price, 85½, and a small lot of the common at 30½. The first consolidated 5s of this company sold at 109½ for $50,000 worth, and the second 5s at 106½ for $6,000 worth, Cincinnati, Dayton & Toledo 5s sold at the old figure 81½.

At Cleveland, Cleveland Electric held at 75 and then declined to 74½, with bidders indifferent at this figure. A small lot of Northern Texas Traction sold at 35, and sellers are asking 37 for more, the stock being in good demand. Miami & Erie Canal stockholders seemed panic stricken, and the stock sold down to 75 cents for small lots. Northern Ohio Traction & Light sold down as low as 13½, due to an assessment of $36,000 imposed upon the company by the City Council of Akron.

Sales of traction issues on the New York curb were very few during the week. Interborough Rapid Transit was the active stock, about 800 shares selling on a declining scale, from 109½ to 107¼. Washington Electric 4s sold at 75, Nassau Electric 4s between 78½ and 79¼ and New Orleans 4½s at 76.

Security Quotation

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

	Closing Bid	
	April 12	April 19
American Railways	43	44
Aurora, Elgin & Chicago	—	a15
Boston Elevated	140	140
Brooklyn Rapid Transit	46⅝	44¾
Chicago City	160	a162½
Chicago Union Traction (common)	5½	5¾
Chicago Union Traction (preferred)	30½	30¼
Cleveland Electric	74⅞	73½
Consolidated Traction of New Jersey	63	64
Consolidated Traction of New Jersey 5s	105	105¾
Detroit United	64	62
Interborough Rapid Transit	108	107½
Lake Shore Electric (preferred)	—	a40
Lake Street Elevated	3½	3
Manhattan Railway	142¾	141¾
Massachusetts Electric Cos. (common)	20¼	19
Massachusetts Electric Cos. (preferred)	75	74¼
Metropolitan Elevated, Chicago (common)	15	15
Metropolitan Elevated, Chicago (preferred)	45	46½
Metropolitan Street	115½	111¼
Metropolitan Securities	80	77¼
New Orleans Railways (common)	9½	9½
New Orleans Railways (preferred)	28	28½
New Orleans Railways 4½s	74	75
North American	85	81
Northern Ohio Traction & Light	13	13
Philadelphia Company (common)	38⅝	38⅜
Philadelphia Rapid Transit	13¾	13⅜
Philadelphia Traction	95¾	95¾
St. Louis (common)	11½	11¾
South Side Elevated (Chicago)	91½	91
Third Avenue	120½	120
Twin City, Minneapolis (common)	93¼	91
Union Traction (Philadelphia)	49½	49⅝
United Railways, St. Louis (preferred)	53	53
West End (common)	92	92
West End (preferred)	111½	111

a Asked. * Ex-dividend.

Iron and Steel

A further remarkable recovery in pig iron production has been reported for last month. On April 1, according to the compilation of the "Iron Age," the weekly blast furnace capacity had risen to 337,257 tons, as against 308,751 tons on March 1. This brings production back to about the normal overage of a year ago. Notwithstanding this very rapid enlargement, the stocks of pig iron have gone on decreasing, so that they amounted altogether to 455,673 tons on April 1, as compared with 597,904 tons on January 1. The inference is, of course, that great as are the forward strides which the iron output has taken, the increase of consumption has been even faster—a fact which is especially striking, because of the very slight expansion of exports. The improving position of the whole iron and steel trade could not be more strongly confirmed than by these figures. Quotations are as follows: Bessemer pig iron $13.85, Bessemer steel $23, steel rails $28.

Metals

Quotations for the leading metals are as follows: Copper 13⅜ cents, tin 28 cents, lead 4⅝ cents, and spelter 5¼ cents.

ANNUAL REPORT OF THE LIVERPOOL TRAMWAYS

The annual report of the Liverpool Corporation Tramways for the year ending Dec. 31, 1903, was presented March 24 to the tramways committee by General Manager C. R. Bellamy. The report shows: Capital expenditure, £1,863.485; total receipts, £531,483; operating expenses, £341,463; interest and sinking fund, £107,014. The balance, £96,242, was divided as follows: Reserve, renewals and depreciation, £64,161; transferred to general rate account, £32,080. The report refers to the increase in speed of cars which was secured by application to the board of trade, and which now amounts to 14 miles per hour for 10 per cent of the length of line, 12 miles per hour for 54 per cent, 10 miles per hour for 26 per cent and 8 miles per hour for 10 per cent. The experimental top covered car which was introduced in September, 1902, has proved very satisfactory and 150 cars of this type have been ordered. The sides can be removed in summer. Experiments are also being conducted with steel-tired wheels, but the results so far obtained do not warrant their general adoption at present. The net cost of the chilled-iron wheels now in use is 20s. each, and they had an average life during 1903 of 33,500 miles. The wheel guard, which is used in place of a fender, and which has been illustrated in these columns, has proved very satisfactory. Of the 111 persons who were knocked down and caught under the platform during the year, only thirty required medical attendance and only three were killed. Some interesting diagrams of traffic, seating capacity, etc., are contained in the report, as well as a large map of the system. The management during the year has published an official handbook of sixty-eight pages, which is sold for one penny. It contains two or three maps showing the routes of the cars and principal places of interest in the center of the city, and also reading matter giving particulars of different routes, hints to travelers, etc.

PROGRESS IN PREPARATION OF INTERCHANGEABLE FARE COUPON BOOK FOR OHIO INTERURBANS

The transportation committee of the Ohio Interurban Railway Association, composed of F. W. Coen, of Cleveland, J. H. Merrill, of Lima, and J. A. Adams, of Fostoria, met at Fostoria last week and perfected a plan under which the interchangeable coupon book already adopted by a number of roads, is to be handled. The original plan provided that the books be issued by the association, but it was found that the association was not authorized under its charter to sell transportation and become responsible for same, so it was decided that each road should issue its own interchangeable book and that the contract be made between the purchaser and the individual road from whom he purchased the book; but for the sake of convenience and uniformity, the secretary of the association will purchase the books in bulk, the name of the road issuing the book to be left blank. A road desiring a supply of books will make requisition on the secretary for a certain number of books and the numbers on these books will be charged to the company. The company will then have its name printed on the face of the book and on the coupons. It was decided that it would not be necessary to establish a clearing house to balance accounts. At the end of each month each auditor will make a draft against each company whose coupons have been collected during the month, the basis being the face value of the coupons less 16½ per cent, which is the discount given in the sale of the book. In the contracts signed by the companies it will be agreed that these settlements be made in cash upon receipt of draft. The question has arisen as to what would be the status of such an agreement and the money due another company, in case a certain company became financially embarrassed or went into the hands of a receiver. Legal talent retained by the transportation committee has expressed the opinion that such a claim would be a first lien upon an embarrassed road and would even come ahead of labor claims. It is stated that a claim of this kind would not be regarded as a debt, but would be considered as money belonging to the claimant and held in trust by the company selling transportation.

Secretary Merrill states that the roads throughout the Central West are evincing decided interest in the interchangeable coupon book plan, and he feels satisfied that at the Cleveland meeting a number of additional roads will become parties to the agreement.

THE DEMANDS OF THE UNION AT SAN FRANCISCO

At this time there is no telling what the outcome will be of the demands of the employees of the United Railroads of San Francisco for a new working agreement with the company to date from May 1. The men presented their ultimatum early in the present month, and since then negotiations have several times been discontinued with an abruptness that seemed to preclude all possibility of a resumption of the conferences with any hope whatever of a peaceable adjustment. The feeling with which the company comes to this conference may readily be judged when it is remembered that only a year ago it was in the throes of just such a state of suspension, and that now the union, more arrogant than ever before, proposes an agreement with conditions that almost to a unit are impossible of adoption.

The demands of the union are in ten sections, and will be given here only in abstract. The first and second propose arbitration in regard to grievances or complaints. The third does away with the wage schedule recently fixed by Messrs. Mahon and Straus, and also relates to badges, suspensions and uniforms. The fourth, fifth, sixth, seventh and ninth propose different runs, time-tables, hours and wages from those fixed by the awards referred to. The eighth makes it obligatory upon all employees eligible to the union to join the organization within sixty days, and also makes it obligatory upon the company to discharge all non-union men who are eligible to the union. The tenth provides that no employee of the company shall suffer a reduction in his wages because of or through the operation of this proposed conditional agreement.

Of special interest are the demands for increased wages and for the complete unionization of the system. The increase in wages asked is for an advance of from 1 to 2½ cents an hour for platform men not included in the terms of arbitration of last year. Last year thirty-seven days were consumed in taking testimony in the arbitration of wages and three days were spent in argument in New York. On Nov. 3 a decision was rendered in favor of the men, although it was shown that the wages then being paid in San Francisco were from 10 to 15 per cent higher than those paid elsewhere, except in a few small towns in the mining district of Montana.

The company has replied to the demands cautiously, and while rejecting practically all of them, has made an alternate proposition. The company is willing to leave to the arbitration at present provided the interpretation of any clause of the contract to be entered into, but refuses to treat with complaints that involve the abdication of the management. Of course, the clause to compel membership in the union of all men in the company's employ is flatly rejected. Clause ten is agreed to, but clauses four, five, six, seven and nine, all relating to wages, hours, runs, etc., are rejected. The agreement proposed by the company follows:

This agreement, made and entered into this —— day of ——, one thousand nine hundred and four (1904), by and between the United Railroads of San Francisco, a corporation duly organized and existing under the laws of the State of California, hereinafter designated "the company," and the Carmen's Union of San Francisco, known as the Amalgamated Association of Street and Electric Railway Employees of America, Division No. 205, and hereinafter designated "the union."

Witnesseth, That the agreement heretofore entered into between "the company" and "the union," and which by its terms is to continue in force until the first (1st) day of May, 1904, is hereby expressly renewed and agreed to by the parties thereto, and said agreement and all the terms thereof are hereby expressly continued in force until the first (1st) day of May, nineteen hundred and five (1905), with the following exceptions, additions and changes, namely:

1. Platform men shall receive the following wages:

(a) For the first year, twenty-five cents (25c.) per hour; overtime, thirty cents (30c.) per hour.

(b) For the second year, twenty-six and a quarter cents (26¼c.) per hour; overtime, thirty-one and a half cents (31½c.) per hour.

(c) For the third year, and thereafter, twenty-seven and one-half cents (27½c.) per hour; overtime, thirty-three cents (33c.) per hour.

2. All members of "the union" other than platform men shall receive the wages awarded by the recent board of arbitration, readjusted as to length of service, in the manner above set forth in respect to platform men.

3. Nothing in this agreement shall be so construed as to lower any rate of wages now being paid by "the company" to any member or members of "the union."

4. Section twenty-eight (28) of the agreement above referred to and continued in force by this agreement is hereby stricken out of said agreement, and shall no longer continue a part thereof. Said section twenty-eight (28) relates to interest on deposits made by car men, which deposits are no longer required by "the company."

5. This agreement shall continue in effect until May first (1st) one thousand nine hundred and five (1905), and the wage rate herein agreed upon shall be deemed to be in effect as of May first (1st) one thousand nine hundred and four (1904).

The reply of the union to the propositions of the company was a flat refusal to consider the overtures. Several conferences have been held since then, but they all ended without results. The company says that its position is clearly set forth in its reply and proposition to the men. The union seems to be determined to hold out for its demands. There the matter now stands.

One feature of the negotiations that has attracted especial attention is the refusal of the regular employees, pending the signing of a new agreement, to instruct new men in performing their duties. The ridiculous contention is made by the employees that an unusually large number of new men are being broken in for the sole purpose of utilizing them in case a strike is declared.

ARRANGEMENTS FOR THE ST. LOUIS CONVENTION

The secretary of the American Street Railway Association is mailing this week to the members of the association three pamphlets which will be of great convenience to all who expect to attend the convention this year at St. Louis. One gives a list, description and rates of the different hotels, boarding-houses and rooming houses in St. Louis during the convention period; the second is a circular relating to the "Inside Inn," which has 2257 rooms, while the third gives various facts about the Louisiana Purchase Exposition and a map of the grounds. In addition, there is a copy of a report of the Electric Railway Test Commission, signed by J. G. White, chairman, describing the tests proposed, and a circular issued by the association on the convention. The latter is reprinted below.

ANNOUNCEMENT

Dear Sir: The twenty-third annual convention of the American Street Railway Association will be held in Recital Hall, Festival Hall Building, World's Fair Grounds, St. Louis, Mo., Wednesday and Thursday, Oct. 12 and 13, 1904. One session each day, 10 a. m. to 1 p. m. The Mechanical and Accountants' associations will meet the same week at the same place, so all members will have an opportunity of attending all the conventions and visit the exposition at the same time. No exhibits will be displayed by this association this year. The headquarters of the association will be at the Southern Hotel. A limited number of rooms will be reserved for us at the downtown hotels, if applied for before June 1, 1904. The rates are as follows:

Southern Hotel, $10 to $15 per day per room with bath, American plan.

Planter's Hotel, $10 per day per room with bath, European plan.

Jefferson Hotel, $10 to $15 per day per room with bath, European plan.

St. Nicholas Hotel, $7 to $10 per day per room with bath, European plan.

Lindell Hotel, $5 per day per room with bath, European plan.

Rooms can be occupied by three persons if desired at same price, the charge being for the room whether occupied by one, two or three persons. It must be understood to reserve rooms in these hotels, that they must be paid for from Oct. 8 to end of the convention, two days in advance of convention week, and whatever revenue is received by the hotels for these rooms during the 8th and 9th will be rebated to you. Make your reservation early in order to secure suitable rooms. Enclosed please find pamphlets regarding hotels in St. Louis, one of which is issued by the exposition authorities and gives the location and prices of all hotels, boarding and lodging houses in St. Louis.

Wednesday, Oct. 12, has been set apart as "Street Railway Day," and special attractions of some kind will be furnished by the exposition authorities. The banquet will be held Thursday evening, Oct. 13.

The following resolution was unanimously passed by the executive committee:

Whereas, The experience of the association has demonstrated that the custom of issuing gratuitously to each company two banquet tickets has proven unsatisfactory at former conventions,

Resolved, That hereafter all banquet tickets be sold to delegates and others at actual cost

Papers will be presented that will interest all members.

The following resolution was directed to be sent to all members, viz.:

The secretary is directed to request the chief officers of the different companies to notify delegates and heads of departments attending the convention for the companies they represent that they will be expected to attend each session and take part in the discussion; that hereafter at each session of the convention the roll of delegates will be called at the time meeting is called to order, and that the roll call will be published in the minutes of the meeting.

Make a special effort to be present at this convention, as you will have an opportunity to attend the sessions of the association and also visit the greatest exposition the world has ever seen Reduced rates will be given by all railroads during the exposition.

THE COUNCIL BLUFFS, TABOR & SOUTHERN RAILWAY

President Dobbs, of the Council Bluffs, Tabor & Southern Electric Railway, is preparing a detailed statement of the cost of construction and equipment and an estimate of the earning power of the proposed road from Council Bluffs, Ia., to Rockport, Mo. As soon as these figures are prepared it is the intention to go East and close up the bond negotiations, preliminary arrangements for which have already been made. It is the hope of the officials to have the line completed from Council Bluffs to Tabor, Ia., next fall. The construction work will commence at Council Bluffs and will extend southward. The central power house will be erected at Tabor. The preliminary plans for this building and plant, if carried out, will mean the expenditure of $250,000. Brick sub-stations will be erected at the School for the Deaf, southeast of Council Bluffs, at Glenwood, Sidney, at some point between Riverton and Rockport and at Rockport. The line potential will be 30,000 volts. At the sub-stations the voltage will be stepped down to 3000, and then converted and fed to the line at 600 volts. Depots are to be constructed at Council Bluffs, Manawa, Island Park, Henton's Station, Pacific City, Glenwood, Hillsdale, Tabor, Sidney and Riverton, in Iowa, and Rockport and Langdon, in Missouri. A branch line will be constructed later from Rockport to Tarkio. The contracts will call for 130 miles of trackage, of which 88 miles will constitute the main line. The balance will be made up of branch lines and side tracks. Seventy-pound rails will be laid and 2640 ties used to the mile. At least 1,800,000 cubic yards of dirt will have to be moved to reduce the grades to the maximum of 1 per cent. On one stretch from Hillsdale to Glenwood, a distance of 4½ miles, the maximum grade will be 1½ per cent. On some parts of the road there will be cuts 37 ft. deep and fills 20 ft. and 25 ft. high.

The most expensive part of the construction work will be the erection of the steel overhead crossing by which the line will enter Council Bluffs over the Rock Island & Milwaukee tracks. The crossing will be fully 360 ft. long and 30 ft. high. It is planned for the fast mail trains to consist of three cars and the local passenger trains of two cars. Motor cars and two electric locomotives will be used to haul these trains.

UNITED ENGINEERING BUILDNG

The conference committee on the United Engineering Building has selected Professor W. R. Ware to act as its professional adviser in the matter of the architectural competition. His preliminary report on the subject is to be made to the committee during the present week. Four equal prizes will be awarded to the best four designs.

LESSONS FROM THE INDIANA FLOOD

The recent floods in Indiana have demonstrated the necessity of properly protecting interurban and city railway tracks against the flood tide. The engineers of the interurban lines operating in the White River and the Wabash River Valleys have been carefully going over the districts in which their lines were submerged and report that much has been learned from the ravages of the recent flood. Of the eight lines operating out of Indianapolis, all were more or less damaged and put out of business from two to five days. At Indianapolis, Anderson, Philadelphia and Morgantown the flood entered the power houses, put the fires out and left the systems without power.

Earth fills with small culverts to permit the water to escape are not regarded adequate, and steel trestleing will be deemed far more advisable for future construction, because it affords ample escape for the rushing torrents. What is true regarding the companies operating in the White River Valley was found to be true of the companies operating in the Wabash Valley. The lines between Fort Wayne and Logansport were submerged and more or less damage done to the companies' properties. The Union Traction Company lost a costly steel bridge between Logansport and Peru. The water rose 7 ft. above the bridge and swept the four spans into the bottom of the river, twisting the beams so that the entire structure will have to be rebuilt.

A warning has been afforded the Murdock syndicate, which is to build a line from Logansport to Lafayette along the old Wabash & Erie Canal towpath. The flood established a danger line, as the towpath route was under water nearly the entire length of the proposed line.

The interurban lines, however, did not suffer materially greater damages than the steam lines. Both systems were compelled to weight down their bridges with iron and engines and employ thousands of bags of sand to strengthen levees and fills and to keep water out of the power houses.

A DIFFICULT PIECE OF ENGINEERING IN CALIFORNIA

The Pacific Electric Railway Company, of Los Angeles, is building a branch line to Newport Beach by a coast line route quite as full of engineering difficulties as the Ogden-Lucin cut-off across the Great Salt Lake. The time over this line is to be fifty minutes for the 39 miles between Los Angeles and Newport Beach. That schedule includes stops. A speed of 100 miles an hour, it is calculated, may be maintained for considerable distances along certain sections of the road with the utmost safety to passengers. It is hoped to have this new line in operation by June 1. The portion of the line now incomplete is from Ocean Beach to Newport Beach, a distance of 15 miles. From Ocean Beach to Los Angeles the Long Beach line will be used. Leaving Ocean Beach the new line has a matchless ocean view its entire distance, with a pleasing background of rising hills and broken fields. The unique construction feature of this line is a fill of a marsh of more than 2 miles, south of Alamitos Bay, which must be crossed to maintain a coast line. Across this marsh now is a trestle, serving as a temporary roadbed for the work trains. On either side of this trestle is now being built a fill of dirt, stones and gravel. Three dirt trains, each with a capacity of 850 yards daily, are now busy filling in a permanent roadbed along the trestle. The track is to be standard gage, laid with 60-lb. rails. The poles used are 45 ft. in height, set 9 ft. in the ground and fifty poles to the mile.

PUBLIC SERVICE EMPLOYEES GAMES

During the last few weeks the employees of the street railway department of the Public Service Corporation, of New Jersey, have been engaged in a pool tournament at their clubrooms in Montclair and Paterson to decide for club teams to meet in contest for a handsome silver cup offered by President McCarter, of the company. On Monday evening, April 11, the competing teams met at the Paterson clubrooms, and, after a hotly contested game, the Montclair men won by a score of 137 to 128. General Superintendent Stanley, of the company, was referee. District Superintendent T. W. McAndrews made the presentation speech when the cup was delivered into the keeping of the winning team. The Montclair representatives were taken to Paterson in a special car, and were entertained by the Patersonians with music and refreshments. The members of the winning team were: J. L. Barde, J. H. St. Clair, J. J. Sanders, G. M. Gould, all of whom are conductors, and F. H. Merkle, who is a motorman. The cup is to be contested for every six months.

ANNUAL REPORT OF THE LODZ, POLAND, ELECTRIC RAILWAY

The Lodzer Elektrischen Strassenbahn has published recently its report for 1903, containing some interesting data which may be taken as indicative of electric street railway development in Russian Poland. Lodz is about 75 miles distant from Poland's ancient capital, Warsaw, and is an important linen and woolen center. The electric railway has been in service about four years. Its traffic has increased quite rapidly, this increase amounting to nearly 10 per cent in 1903.

The aggregate length of the line is 9 miles, of which one-third is single track. Overhead construction is used throughout the city. The rolling stock comprises ten double-truck cars, each seating thirty passengers, and forty-two trailers, each seating twenty passengers. Each motor car carries two 25-hp motors. The power house contains three Lancashire boilers, two Worthington pumps and three 340-kw, 550-volt steam-electric sets.

The gross earnings for 1903 were approximately $296,250, and the net earnings, including balance carried over from 1902, $132,218.

MORE ELECTRIC TRACTION FOR BUENOS AIRES

The Buenos Aires Grand National Tramways Company, Limited, a British capitalized concern, whose head offices are at 6 Eastcheap, London, E. C., and whose consulting engineers are Sir George Bruce & White, London, is about to convert its extensive horse car system in the Argentine Republic capital into electric traction. The company operates about 50 miles of line. The estimated cost of conversion is put at $4,000,000 gold. The managing director—C. Dawney—resides at Buenos Aires, as does J. H. Wale, the general manager.

NEW YORK MEN VOTE AGAINST PENSION PLAN

The employees of the Interborough Rapid Transit Company have all voted against a pension plan proposed by the company some time ago. The first organization to vote was the Relief Association of the employees, which is not a labor union, and which voted against it. The motormen, who are still a local of the Brotherhood of Locomotive Engineers, also voted against the plan, and the remainder of the employees on the elevated roads who are organized as Local 332 of the Amalgamated Association of Street Railway Employees, afterward met and voted against it. The principal objection to the plan was that the employees themselves paid all the money into the fund from which the pensions and benefits were to be drawn. The plan was a graded one, based on monthly dues ranging from 50 cents to $2.50. The death benefits ranged from $100 to $1,000, and the sick or accident benefits ranged from $4 a week to $1 a day. The employees said that in case of their discharge or resignation they would have lost the money they had put into the fund.

SNOW PLOWS DO SERVICE IN WESTERN NEW YORK

A heavy snowstorm swept Western and Northern New York April 15. In North Tonawanda the snow was 14 inches deep. Up to midnight 5 inches of snow had fallen in Buffalo, and street car lines were kept in operation by the constant use of snow plows. In Syracuse the snow was 3 inches deep, and Oswego County reported good sleighing. Street railway travel there was maintained under difficulty. Rochester reported several inches of snow. At 11 o'clock April 15, the Rochester Railway Company there had fourteen snow plows out in order to keep traffic open. Railroad trains ran about an hour behind time.

STILWELL-BIERCE & SMITH-VAILE COMPANY

The Stilwell-Bierce & Smith-Vaile Company, of Dayton, Ohio, has taken a lease of the commodious ground floor and basement premises at 93 Liberty Street, now being vacated by Stanley & Patterson, and will take possession next week.

An extensive stock of pumping machinery—power, steam and marine—will be carried, also Victor turbines, air compressors, feed-water heaters and other specialties of the company. A full line of spare parts will also be on hand. Each department will be under separate supervision. The local sales organization of the company will be considerably enlarged. Six new men will be engaged immediately and machinists will be on the spot so as to erect and overhaul machinery.

The present New York offices in the Washington Life Building will be moved to 93 Liberty Street. The management of the local end of the company's business will be as heretofore in charge of G. W. Neff, the Eastern manager.

FOR THE EXTENSION OF THE SANDUSKY SOUTHWESTERN RAILWAY

F. O. Olsen, vice-president and general manager of the Sandusky Southwestern Railway Company, of Lima, Ohio, announces that he has completed a deal with the United States Investors' Security Company, of Wall Street, New York, for an issue of $1,500,000 first mortgage twenty-year gold bonds which are to be subscribed by English capitalists. It is stated that the first payment in the sum of $150,000 will be made through the Cleveland Trust Company, as trustee, on July 15 of this year. It is claimed that this transaction insures the building of the section of the road between Lima and Bellefontaine, with another line crossing the same and extending from Wapakoneta to Kenton. It is stated that the contract provides that 40 miles of the road shall be completed by December, 1904, and that work shall be pushed immediately. It is claimed that 24 miles of roadbed have already been graded. The officers of the company are: John VanFleet, president; F. O. Olson, vice-president; G. A. Smith, treasurer; L. N. Means, secretary. The headquarters of the company are in Lima.

The Birmingham Railway, Light & Power Company has inaugurated a package delivery system in several of the suburbs. For 10 cents packages weighing twenty-five pounds or less are delivered to East Lake, Woodlawn, Avondale, East Birmingham, Kingston or North Birmingham.

SPECIAL POLICEMEN ON THE ELEVATED IN NEW YORK

Special policemen have been placed at a number of the most important stations on the Third and Sixth Avenue Elevated lines of the Interborough Rapid Transit Company, of New York. The special officers wear uniforms that may be easily distinguished from the familiar police blue. The company hires the men, though as a matter of form each must report once a month at Police Headquarters. The introduction of the three-platoon system lessened by nearly one-third the number of policemen on active duty at one time, and the recent death of a woman caused by being dragged along the Sixth Avenue elevated structure by a train, made it imperative that police should be assigned to duty at congested elevated traffic points.

TROLLEY AND STEAM STATISTICS COMPARED

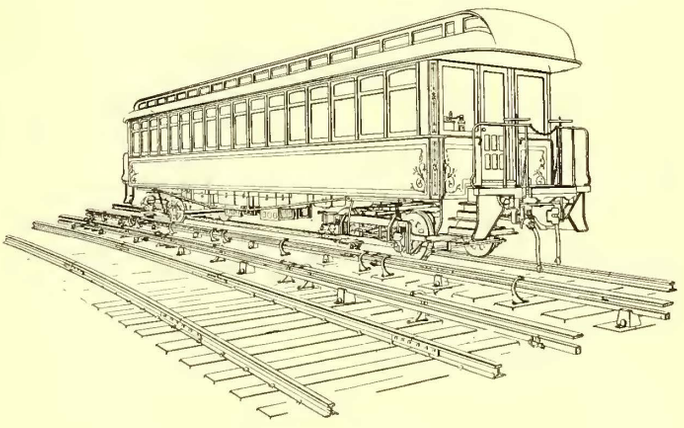
The statistics of street railways are compared by the "Wall Street Journal" with the statistics of the steam roads in the United States for the same year. Already the mileage of the electric street railways amounts to 11 per cent of the steam mileage. The capital stock amounts to 21 per cent; the funded debt to 13 per cent; the dividends to 18, and the interest on bonds to 14 per cent. When one remembers that electric street railways are a development of a very few years, and the steam railroads of the United States are a development of three-quarters of a century, this showing seems little less than marvellous. It appears, however, that the total capitalization of stocks and bonds of the street railways amounts to $96,287 per mile, while the total stock, bonds and unfunded debt of the steam railroads amounts to $64,371 per mile. The dividends paid by the electric street railways amounted to 2.5 per cent of the total outstanding stock, while the dividends paid by the steam railroads amounted to 2.9 per cent, the comparison being for 1902. From this it would appear that the steam railroads are on a better basis as regards earning power than the street railways. The latter, however, are essentially passenger traffic lines. In 1902 they carried nine times as many passengers as all the steam railroads of the United States. These, while carrying over 655,000,000 of passengers, nevertheless obtained the bulk of their revenue from the carriage of freight.

STREET RAILWAY PATENTS

[This department is conducted by W. A. Rosenbaum, patent attorney, Room No. 1203-7 Nassau-Beekman Building, New York.]

UNITED STATES PATENTS ISSUED APRIL 12, 1904

756,820. Automatic Switch-Shifter; Leon Blower, New York, N. Y. App. filed Aug. 7, 1903. Tread-plates arranged near the track rail are operated by pressure-rolls sustained upon the car



PATENT NO. 756,980

platform and depressed to engage them, whereby the switch is actuated at the pleasure of the motorman.

756,859. Trolley Catcher; Montgomery H. Johnson, Utica, N. Y. App. filed July 15, 1903. Details of a cord-controlling device consisting of a spring drum and ratchet.

756,870. Electric Railway Switch; Melbourne A. Marks, Jr., Brookline, Mass. App. filed Feb. 4, 1903. Details of a switch-

throwing mechanism wherein a circuit-closer applied to the wire directs the current into solenoids that actuate the switch point.

756,980. Electric Railway; William B. Potter, Schenectady, N. Y. App. filed July 5, 1902. A metallic cover for third rails, made in insulated sections so as to localize the escape of the current into the cover.

757,006. Brake; Michael A. Wodal, Camden, N. J. App. filed Oct. 29, 1903. Details of a track-brake for emergency purposes.

757,070. Rail Bonding Construction; Edward G. Thomas, Waltham, Mass. App. filed March 19, 1903. The ends of the bond are secured to the respective rails at points extremely diagonal with respect to the joint of the rails, so that the amplitude of the expansion and contraction is lessened.

757,138. Third Rail for Electric Railways; Patrick T. McGowan, Avoca, Pa. App. filed Dec. 22, 1903. The rail has a brush-engaging side surface that inclines downward and inward.

757,195. Rod Grasping Arm or Handle; Henry H. Huff, Boston, Mass. App. filed Dec. 5, 1903. Details of a handle for operating the rod or rock-shaft used to actuate a fare-register.

757,264. Electric Railway; Davis J. Cable, Lima, Ohio. App. filed March 11, 1903. Relates to the mounting and covering of a third rail.

PERSONAL MENTION

MR. DANIEL M. BRADY, of New York, president of the Brady Brass Company, manufacturers of motor and car journal bearings, has been elected vice-president of the National Car Wheel Company.

MR. JOHN N. ACKERMAN has been appointed traffic manager of the Public Service Corporation of New Jersey. Mr. Ackerman formerly was in charge of the real estate department of the company.

MR. G. R. PIERCE, who was general manager of the Mexican Traction Company prior to the merging of that concern with the Federal District Railway Company, of Mexico City, is now on a visit to New York.

MR. F. R. PHILLIPS has been appointed master mechanic of the South Covington & Cincinnati Street Railway Company, of Covington, Ky. Mr. Phillips formerly was connected with the Cleveland Electric Railway Company.

MR. HENRY GUTZWILER, of Mansfield, Ohio, has been appointed general superintendent of the Cincinnati, Milford & Loveland Traction Company, of Cincinnati. Mr. Gutzwiler started in the business some years ago as a conductor in the employ of the Cincinnati Traction Company.

MANAGING DIRECTOR TAYLOR, of the New Zealand Electrical Construction Company, the concern which has secured the contract for the construction of the Christchurch electric traction system, is now on his way to the United States in connection with the placing of contracts for material, equipment, etc.

MR. BARNEY MAHLER, formerly president of the Lake Shore Electric Railway and the Electric Package Company, of Cleveland, has opened an office in the Electric Building, that city, where he will conduct a general brokerage and bond business, making a specialty of handling traction securities.

MM. DESPREX, BARREL and GRAND, engineering experts of the Underground Railway system of Paris, France, are now on a visit to this country for the purpose of studying American electric traction methods. They inspected the Boston subway last week, having been conducted over the system by Chief Engineer Carson.

MR. F. HUBERT CHAMBERLAIN will have charge of the construction of the Christchurch, New Zealand, municipal electric traction system, reference as to which was made in the STREET RAILWAY JOURNAL April 9. Mr. Chamberlain is an old General Electric man. Prior to his present position he acted as construction engineer of the Sydney City & Suburban Tramways, which are operated by the New South Wales Government.

MR. CHARLES HARRISON SMITH, superintendent of overhead construction of the Eastern Ohio Traction Company, of Cleveland, died last week as the result of injuries received while on a trip of inspection. He was on a regular car and was leaning out from the door looking at the overhead work, when he was struck by a telephone pole that stood close to the track. His skull was crushed, and he died in a special car that was hurrying him to Cleveland.

MR. HENRY E. HUNTINGTON, president of the Los Angeles Railway Company, Los Angeles Interurban Company and Pacific Electric Railway Company, of Los Angeles, Cal., has returned to New York and may not get back to California until fall. When he went to the Pacific Coast last September, he expected to remain about two weeks, but business prolonged his stay through seven months. During the last few months his systems have been greatly extended in Southern California.

MR. E. W. CLARK, head of the banking house of E. W. Clark & Company, of Philadelphia, Pa., is dead. Mr. Clark was seventy-seven years of age, and had been prominent in financial circles for many years. The company with which he was connected made a specialty of street railway securities, and as a result Mr. Clark became known to many street railway men. The Columbus Railway & Light Company, Scranton Railway Company and East St. Louis & Suburban Railway Company are prominent among the companies in which the Clark Company is interested.

MR. R. G. ARNOLD, secretary and treasurer of the Arnold Electric Power Station Company, of Chicago, was married on April 5 to Miss Hazel McLane, daughter of Mr. George A. McLane, of New York City. After a short trip East, Mr. and Mrs. Arnold are to return to Chicago, and for the summer will take up their residence in Lake Bluff. Mr. Arnold has for several years been connected with the Arnold Company, of which his brother Mr. Bion J. Arnold is president, and has formed a very wide acquaintance among the electrical and mechanical interests of the East and Middle West, who extend to him their hearty congratulations.

MR. WALTER T. COOK, superintendent of motive power of the St. Louis Transit Company, of St. Louis, Mo., who resigned his position some time ago to take effect April 15, was visited on the evening of April 12 by many employees of the company, who gathered at his home to express regret at his leaving the company. As a token of esteem a chest of silverware containing 152 pieces was presented to Mr. Cook by his co-workers. Mrs. Cook was not forgotten either. She received an ivory-handled silk parasol. Mr. William Mundy made the presentation speeches. Mr. Cook has under consideration two offers from Eastern companies and a local proposal, but thus far has not decided as to the future.

MR. SAMUEL ANDREWS, a very prominent citizen of Cleveland, died at Atlantic City a few days ago. Mr. Andrews was one of the founders of the street railway system in Cleveland and was the father of Mr. Horace E. Andrews, who is president of the Cleveland Electric Railway and is interested in a number of projects in New York State. Mr. Andrews was one of the pioneer oil men of the country, and in the early 60's, in company with John D. Rockefeller, organized the firm of Rockefeller & Andrews, which in 1870 was merged into the Standard Oil Company. He was prominently identified with that company for a number of years. With Joseph Stanley he organized the Broadway & Newburg Street Railway, which in 1892 was consolidated with the East Cleveland Street Railroad, forming the Cleveland Electric Railway. Mr. Joseph Stanley, who died a few years ago, was father of Mr. J. J. Stanley, the present general manager of the Cleveland system. It is interesting to note that the sons of these two pioneers are in control of the property their fathers founded.

MR. FRANK T. C. BRYDGES, master mechanic of the Chicago Union Traction Company, died of spinal meningitis at his home in Chicago, April 14, at the age of forty-four. Mr. Brydges had been in the service of the Chicago Union Traction Company and its preceding underlying West Side companies in Chicago for eighteen years. He was an architect by training, and practiced this profession in his native city, Detroit, for some time. Later he was connected with a car building company at Buffalo. He came to Chicago to practice his profession and, through work done for the Chicago West Division Railway Company, became favorably known to the management of the company. In 1886 he was put in charge of the company's shops. In 1889 he designed and built the company's car repairing plant at Fortieth Avenue, Madison and Lake Streets, which, when built, was far in advance of its time. Besides this shop, he designed a number of the company's car houses. At the time of the consolidation of the North and the West Side lines under the Chicago Union Traction Company, he was made master mechanic of the entire property. He was a most conservative man, extremely modest and unassuming, and for that reason was probably not as widely known as many others in his profession. That his worth was appreciated by the interests with which he was connected is shown by his long term of office during the various changes in the company's organization. He was a man of the strictest integrity and utmost loyalty, and one beloved by all who had close relations with him. A widow, a daughter and four sons survive him. The eldest child, a son, is twenty-one years old.