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All matter intended for publication must be received at our office not later than Tuesday morning of each week, in order to secure insertion in the current issue.

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The Ninety-Nine Year Case at Chicago

At last, after many years of negotiations and attempts at compromise, the famous case, involving the rights of the Chicago street railway companies on certain important streets, was last week heard in court in Chicago, able attorneys appearing to represent both the city and the companies, as noted elsewhere in this issue. This whole case hinges on whether, by an act of legislature, passed in 1865, the franchises, as well as the charters of the existing street railway companies in Chicago, were extended ninety-nine years. That this act of legislature extended the charters, and therefore the corporate life of certain of the Chicago street railway companies in existence at that time, is admitted by all parties to the controversy. The uncertainty lies in whether the act is to be interpreted as also extending the franchises of the companies at the same time and to the same extent as the charters were extended.

The contention of the city, as already outlined in these columns, is that the act was not so intended, and if it was so intended that part of it would be unconstitutional. The city's position is that the Ninety-Nine-Year Act extended the corporate life of the companies, and therefore authorized the city to grant them franchises during their corporate lives, but that the power of granting specific franchises was still left with the city. As to what the act really meant it is not for us to assume the role of a court of law and decide. Stripped of all confusing details, however, the question to be decided is as above outlined, and is comparatively simple. That the language of the act is somewhat ambiguous goes without saying. Otherwise there would be no controversy over it.

Trolleys

The standard American trolley wheel has come into such general use on this side of the Atlantic that considerable interest attaches to the new form with which the cars of the Key route in Oakland are equipped, and which was recently described in these columns. As cars were to be operated in multiple-unit trains, and as a third rail was out of the question, it is not strange that the builders of this road cast about for something which would be more satisfactory for multiple-unit operation than the regular trolley wheel, with its disadvantages in the way of possibilities of leaving the wire and damaging both overhead line and trolley pole. The trolley adopted at Oakland consists of a long cylinder with bearings at each end. It involves some slight changes in regular overhead line work, in order that the ends of the cylinder (the cylinder being, of course, at right angles to the trolley wire) may not hit the span wire. It will be interesting to learn the performance of this new trolley and the wear of trolleys and trolley wire as compared to the standard trolley wheel and wire. It will not be surprising if the trolley wire wear is much less than with the regular grooved trolley wheel. It is well known that the principal wear on a trolley wire is due to the flanges of the trolley wheel, reducing it to a V-shape. So convinced was the management of a large city system a few years ago that an unnecessary amount of trolley-wire wear is caused by this milling or grinding action of the trolley wheel flanges, that an appropriation of several thousand dollars was set aside to make a thorough test on one of the company's lines with trolleys without flanged wheels, either of the European bow form or some rolling contact form like that now used at Oakland, and on the Valtelina single-phase road in Europe. Owing to the death of the president of the company and a complete change in the management, the experiments were never carried out, and it has been left for later generations to determine whether, after all, the standard American trolley wheel gives the best results for the money expended.

Our own opinion is that the trolley wheel, when properly designed for the shape of the wire under which it is to run, has far greater capabilities that those with which it is usually credited. Abstractly considered, the area of contact between the wheel and wire is so small that great difficulty should be encountered in attempting to pass a heavy current from one to the other. Practically, however, no serious troubles have arisen from the frequent, though not continuous, conduction of several hundred amperes in interurban service through one trolley wheel to the motors.

The advent of the single-phase alternating-current motor, which will make it desirable to retain the overhead trolley wire

for heavy and high-speed work, where, otherwise, a third rail would have been used, makes a thorough investigation of the best form of trolley a matter of much importance just at the present time. The standard American trolley wheel has done such a service under all kinds of extremely trying conditions, and has proved itself so well adapted to the work that the burden of proof "lies with the other fellow." It does not necessarily follow, however, that the standard trolley wheel is the best thing that can be devised for taking current at high speed from an overhead trolley wire.

Improving the Service

Perhaps the prosperity of an electric railway company depends more upon the quality of its service than upon any other single factor. The roadbed, track, rolling stock and electrical equipment may be representative of the most expensive practice in the art, but these count for little in the public esteem if the service, as a whole, is not first-class. A surly conductor can do more harm in one day than several well-mannered men can do good, because the public lets good service go by as a matter of course, while it is quick to notice the slightest departure from the best. While the standards of service vary greatly between different cities, it is true in every case that we consider good service is made up of close and painstaking attention to details of operation by every employee of the company.

It is true that the people of every large city must do a certain amount of car riding, regardless of whether the service furnished is excellent or intolerable. It does not necessarily mean that a street railway company is going into bankruptcy if its service is inferior to the best, but it is indisputable that the dividend rate is directly affected by the character of the service, and from this standpoint alone it pays to give the public as much for its money as liberal practice will allow.

Nothing is lost in making the transportation system of a city intelligible to the stranger within its gates. In a great metropolis like New York, Chicago or Boston this is a difficult problem, but it is by no means beyond solution, and in a smaller city is much simpler. A good map of a city, with the different car lines plainly marked upon it, helps wonderfully when a stranger desires to get his bearings, and is practicable in many cases. To place such a map in a glass-fronted wooden case at railway stations, in hotels, clubs, restaurants, saloons and other public places would not be a matter of heavy expense, and whether one were in Boston or Cripple Creek it would be of inestimable value to the traveling public. Again, the careful and accurate articulation of street names by conductors is a point of great importance in maintaining good service, while the courteous answering of questions about the geography of the city is equally essential. In still smaller communities it is not unreasonable to expect a conductor whose car connects with, or runs to, railway stations, to be posted upon the time of through trains to neighboring cities, and if he cannot carry them in his head the company might provide him with a pocket guide or Pathfinder, with whose pages he is required to be familiar. In this connection it is well to emphasize the vital importance of making train connections on time, and of seeing to it that cars are at the station when through trains arrive. If a company cannot afford to meet trains with cars that have schedules designed to accommodate steam railway travelers it can, at least, provide some sort of waiting room or shelter, instead of leaving the stranger stranded at the entrance to the depot, with the clock marking 11:50 p. m., the thermometer clinging to the zero mark, and no time-table or bulletin to show at what time relief may be expected to heave in sight.

The importance of equipping cars with legible signs that stand out in bold letters or figures by day and night, cannot be easily overestimated in its effect upon the service. Colored lights are of little assistance to the stranger, but a plain, readable sign, which a person of average eyesight can take in at a glance, is one of the best appreciated adjuncts to street railway travel. There is little or no excuse for a company's leaving any car signless. Even if the cars run upon but one street, the name of that street and the destination of the cars should be shown.

It may seem that the foregoing comments are unduly critical, but it is only by unceasing vigilance in watching every detail of the service that high standards of operation can be reached and maintained. While it is true that the public often demands refinements of service that pass the limits of reason, it should be the aim of every street and interurban railway manager to give the very best which long and constant study makes possible.

Tests at the St. Louis World's Fair

From the plans that are now being made it looks as if one of the features of the Louisiana Purchase Exposition which will mark a distinct advance over previous Expositions, in an engineering way, will be the facilities for testing the efficiencies of the various pieces of apparatus on exhibition. This is in line with the announcements made by the promoters of this exposition at the outset that this exposition was to be preeminently an operating exposition. Special interest attaches to the electric railway tests which are to be carried on under the direction of a commission of well-known electric railway men, under the chairmanship of J. G. White. One testing track, 3000 ft. long, has been provided and another of half that length. As is eminently proper, electric railway exhibits, even if located in and near the Transportation Building, are to be under the chief of the electrical department, Professor W. E. Goldsborough, and not under a steam railroad department of transportation, as at previous expositions. The United States Bureau of Standards will occupy a laboratory in Electricity Building, and a corps of the bureau's experts, together with many of the instruments of the new national laboratory, will be available for testing during the exposition.

It goes without saying that in this year of the single-phase alternating-current railway motor an unusual interest will attach to both electric railway exhibits and tests, because we have the assurance that at least three of the new single-phase alternating-current types of railway motors will be on hand for exhibition and test.

More About the Track Association

A letter from Mr. Simmons, of Milwaukee, in our correspondence department in this issue outlines a plan for a proposed reorganization of the American Street Railway Association, which has received strong endorsement, and which will certainly be interesting. There are many arguments in favor of a step of this kind, not the least of which is that it will give co-ordination to the work of the different associations, and there will be no danger of any subject being carried on by two associations in divergent directions, or the omission from consideration of any important topic in railway work. These are important considerations, especially in view of the tendency toward standardization of different parts of the equipment and the obvious necessity of further advance in this direction. Another argument in favor of united work is that there should be a reduction in expense in administering the affairs of one large organization of this kind as compared with that of several

organizations. The subject is likely to come up at the next meeting of the American Street Railway Association, and before this time there will be plenty of opportunity to study the proposition thoroughly and determine whether anything can be definitely accomplished in this direction.

An Impending Deadlock

We have often had occasion to consider the effect of the ownership of electric lines by steam railway systems, but there is one phase of the matter which is now beginning to assume something of importance, and to which attention should be directed. We believe it is within bounds to say that upon the whole the electric roads operated by steam railroad companies are among the very best of the interurban class. Their managers bring to the work of construction and operation the best precedents of railroad practice, too often neglected by the independent roads, and the general results are worthy of high commendation. But for the full development of the usefulness of electric traction, so far as the public is concerned, and for the maintenance of earning capacity it is highly desirable that interurban lines, now generally run in a very heterogeneous fashion, should work in harmony and deal with through traffic of the less important kind at least. What is the use of having great electric railway networks, covering scores of hundreds of miles, if they cannot be fully utilized for want of proper management? The managers of interurban lines are rapidly finding out that through cars are a paying part of the equipment, and that it pays to use connections instead of disregarding them. Now, these connected systems, when properly operated, give to the public much better service than is generally given by the steam lines which cover more or less thoroughly the same territory, and are, therefore, competitors in the proper sense of the term. What shall be done about through connections in case the steam system acquires, by hook or by crook, one of the essential links in the electric interurban network?

This is a matter in which the public is vitally interested, since reasonable competition may properly be called one of the inalienable rights of the body politic, which sooner or later it will fight to maintain. There is no use shutting our eyes to this fact, which is becoming daily more evident. It is extremely nice to be on the inside of a successful combination for the suppression of competition, but it is deucedly unpleasant to be on the outside, and the outsiders being in a very large majority will, in the long run, win out. Now, it is perfectly clear that if a steam road gets a strategic point on an electric railway system it will use that point for the purpose of blocking any general traffic which would mean competition for long-distance traffic, and the problem of adjusting the triplicate relation between the steam road, the electric road and the public becomes a very difficult one. In the case of ordinary railroad systems, which were gradually built up from a tangle of warring lines, the situation was relatively simple. The public, after suffering past endurance, took things into its own hands, and when the several lines would not come to an amicable agreement for interchanging traffic, took steps to compel them. Now, in a railroad system which runs trains at relatively long intervals, it is a comparatively easy matter for a railroad commission, or its equivalent, to get at the equities of the case, and to enforce such regulations for the exchange of cars, or of track privileges, as may seem desirable for the protection of the public. But the coming of the electric railway has raised a totally new set of issues with respect to competition. In the good old days of rate wars and rebates, two competing lines had sooner or later to come to about the same tariff in order to live, and savage rate cutting hurt both parties grievously. Now, however, it has been pretty effectively demonstrated that for moderate distances and speeds the electric lines, if well administered, can live in peace and prosperity on a tariff that would very quickly put the steam line into the clutches of a receiver.

It has, therefore, become necessary for the railroads to do one of two things, adopt electric traction for so much of their service as is feasible, or to block, at all hazards, the competition of the electric roads. Most roads have, from sheer conservatism, adopted or attempted the latter course. But in spite of temporary and apparent success, a fight against improvements is always in the long run a losing one. The people have the last word, and will sooner or later realize that modern rapid transit must not be throttled for the sake of letting a few big railway systems pay dividends upon watered stock. The flank movement executed by the railroads in securing important links in the electric railway network is a very adroit one, and will certainly block the union of interurban lines for through business in numerous instances. As a matter of public policy this attack must be in some way met, but it is rather difficult to settle on a course of action which will be both effective and unobjectionable. The general interests of the community are served by an increase in the facilities for transportation, and the fact that such an increase will injure somebody's previous monopoly of them is not a thing that should be considered any more than the introduction of improved machinery should be hindered, because it destroys the monopoly secured by an earlier patent. But whatever steps are taken to prevent the crippling of the development of interurban roads must be taken cautiously and without prejudice or malice.

The ordinary process of enforcing common rights over tracks or a proper interchange of rolling stock, is peculiarly difficult to apply to electric roads, which run through the streets of towns and cities, operate no or few trains, and at times work the local traffic to its limit, shortening the headway of the cars until serious congestion ensues. With such conditions it is a difficult task to arrange for through traffic even under the guidance of harmonious co-operation. An attempt to enforce co-operation between owners whose interests are opposed must, in the nature of things, be vastly more difficult. There can be certainly no such easy remedy as in the case of ordinary railroads. Some States have provisions for a compulsory exchange of track privileges between electric roads, and while this may now and then work hardships, it can generally be carried out without serious inconvenience, the more rapidly because there is usually no real competition between the parties to the exchange. In case of electric roads acquired and operated by steam roads for the sake of averting competition, no such favorable situation can be expected, and the problem of devising means of escape from the difficulty is most formidable. If the prevention of the organization of through traffic were the only result of such ownership the situation would be annoying enough, but there is a tendency also to use the electric lines not to increase the total facilities for travel, but to replace the local trains, already in operation, so that the net result is a merely nominal increase in the rapid transit service. The natural and proper function of certain electric roads is to serve as feeders for trunk lines, and these cases take care of themselves, but the great electric networks which are now being built in all parts of the country, are a part of the growth of the community, and must not be suffered to fail of their purpose. Certain recent events indicate that the question is not one of academic interest only, but is worthy the most serious consideration of publicists.

POWER STATION, ROLLING STOCK AND DISPATCHING SYSTEM OF THE PACIFIC ELECTRIC RAILWAY COMPANY

The present main source of power supply of the Pacific Electric Railway Company is a steam station known as Station No. 1, located on Central Avenue, between Sixth and Seventh Streets, in Los Angeles. This is really two stations, as it combines a power plant, owned by the Los Angeles Railway Company, and erected over twelve years ago, and a new station, Fig. 1, begun by the Pacific Electric Railway Company in 1902, and not yet completed. Both plants are connected and operated together, and distribute their direct-current output in one network for all the city lines of both companies, so this description will include both.

A second steam station, combined with a motor-generator sub-station, is located at Pasadena, and is designated as No. 2 on the accompanying map, Fig. 2, which shows the present high-tension line and station of the company. A large water-power development is now being made on the Kern River by the Pacific Light & Power Company, a lighting company in which Mr. Huntington is largely interested, and, when completed, a portion of the power will be transmitted to one of the sub-stations of the Pacific Electric Railway Company, and be distributed over its 15,000-volt transmission lines. The transmission distance will be upwards of 130 miles, and it is planned to have 10,000 hp ready for delivery in a few weeks.

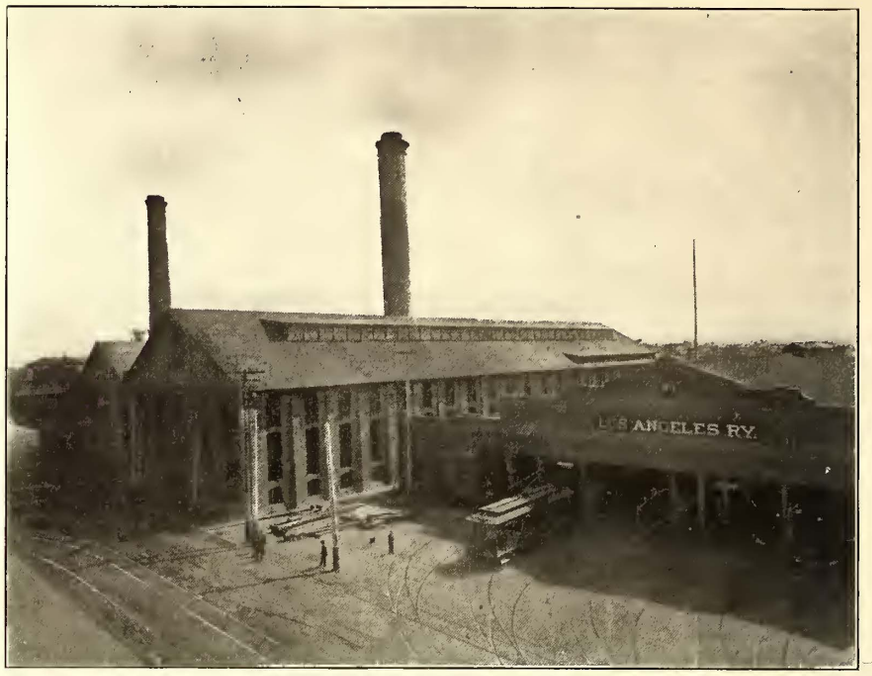


FIG. 1.—STATION NO. 1 OF PACIFIC ELECTRIC RAILWAY COMPANY, WITH STATION AND CAR HOUSE NO. 3 OF THE LOS ANGELES RAILWAY COMPANY

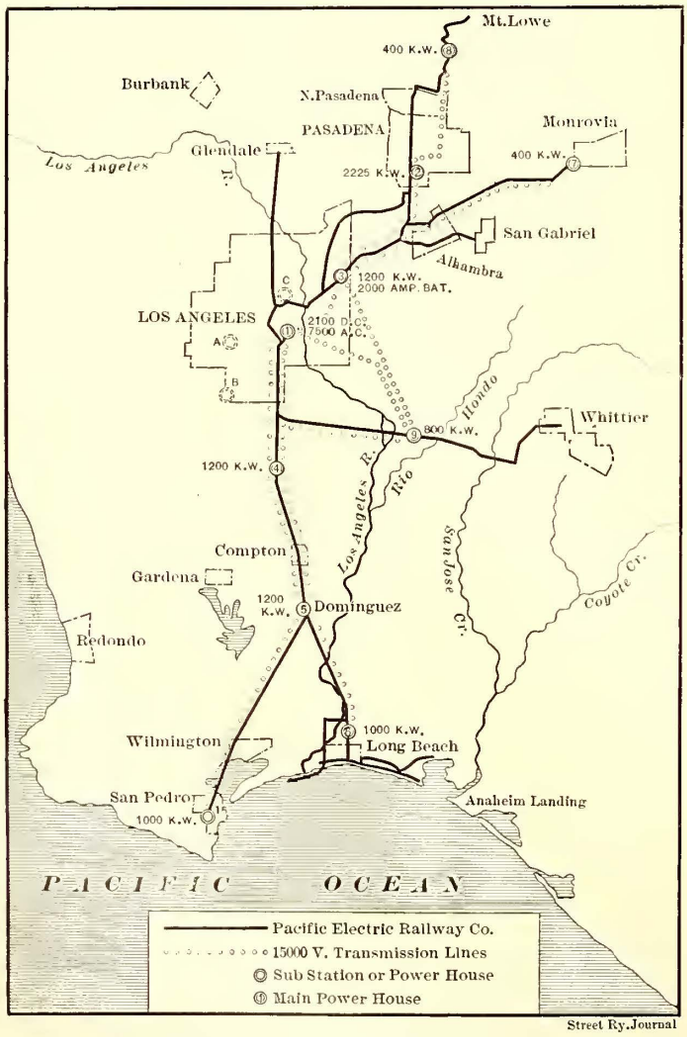


FIG. 2.—MAP SHOWING TRANSMISSION LINES OF THE PACIFIC ELECTRIC RAILWAY COMPANY, WITH LOCATION OF MAIN POWER STATION AND SUB-STATIONS

MAIN POWER STATION

The general arrangement of buildings and apparatus in Station No. 1 is indicated by the plan, Fig. 3. It is seen that the old power plant and the new one adjoin. The older equipment is all direct-current, and comprises two 800-kw Walker generators, direct-driven by Allis-Chalmers horizontal cross-compound engines; a 200-kw and a 300-kw generator, rope-driven by a 500-hp I. F. Thompson slide-valve Corliss engine; two 270-kw Thomson-Houston generators, rope-driven by a 750-hp Risdon-Corliss engine and a 200-kw Edison bipolar generator, belt-driven by a vertical cross-compound Ball engine. In the new plant are installed five direct-connected generating units and one direct-current and four three-phase alternating current, all of the engines being of the MacIntosh & Seymour horizontal cross-compound condensing type. The direct-current generator is a 1050-kw Westinghouse machine. The four alternators are 1500-kw, 50-cycle machines, generating at 2300 volts, two being of the Stanley type and two of the Bullock manufacture. Orders have been placed for the sixth unit, which will complete the present engine room equipment. This last unit will consist of a 1500-kw Bullock alternator, driven by a Nordberg full-stroke gear cross-compound condensing engine. Motor and engine-driven exciters are provided.

All the engines are run condensing, and the new ones are equipped with individual Wheeler surface condensers. One of the Allis engines in the old plant has a surface condenser, and the other old engines are equipped with jet condensers. The pumps are motor-driven, those in the new plant by 2200-volt induction motors. For cooling the condensing water an elaborate cooling tower and reservoir system has been installed. The water is stored in large concrete reservoirs back of the station, as shown in Fig. 3, the larger one having a capacity of 1,500,000 gals. Each reservoir is covered by a wooden cooling tower of the company's own construction, the water being conducted to the tops of the towers by means of wooden troughs. In the case of the new station the space between the roofs of the engine and boiler rooms is utilized for a main trough, into which the condenser pumps discharge. The arrangement of the cooling water system is indicated in Fig. 4.

The boiler equipment of the old plant comprises ten 250-hp

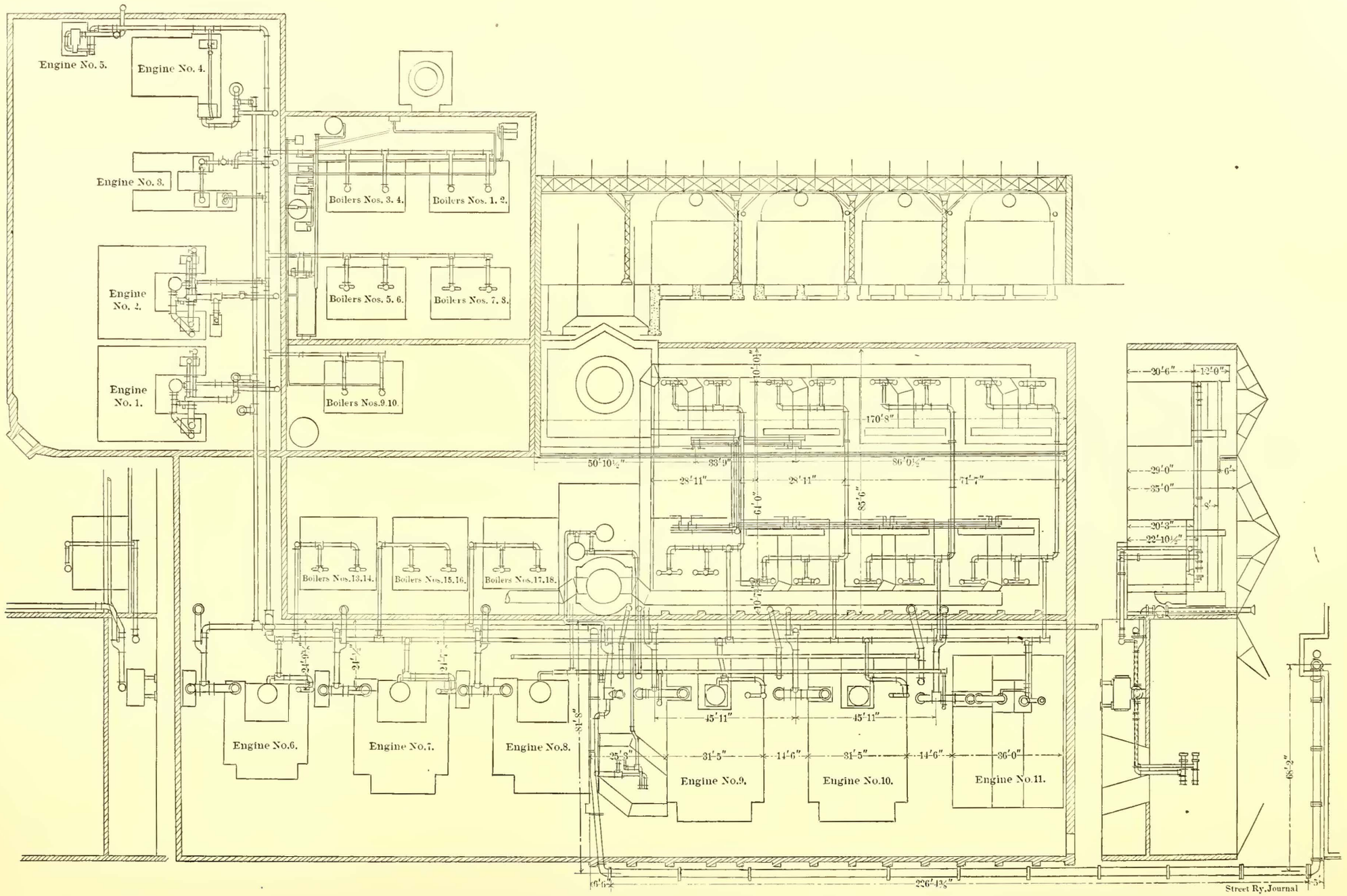


FIG. 3.—PLAN AND SECTIONS OF POWER STATION, SHOWING OLD AND NEW PARTS

Stirling boilers, mounted in batteries of two. In the new plant are installed fourteen 400-hp Babcock & Wilcox boilers, and in an addition are being placed ten 400-hp Edgemoor boilers, all arranged in batteries of two. The old boilers discharge their gases into a brick stack, and the new ones into a concrete stack. The latter is said to have been the first concrete stack of any size erected in this country. It was built of California cement, and is designed to provide draft for 6000 hp of boilers, and to withstand a wind pressure of 50 lbs. per square foot. Above the boiler room floor it is 159 ft. high, and above the base 175 ft. 6 ins. The stack rests on a foundation 35 ft. in diameter, and has an interior diameter of 11 ft. and an exterior diameter of 15 ft. 2 ins.

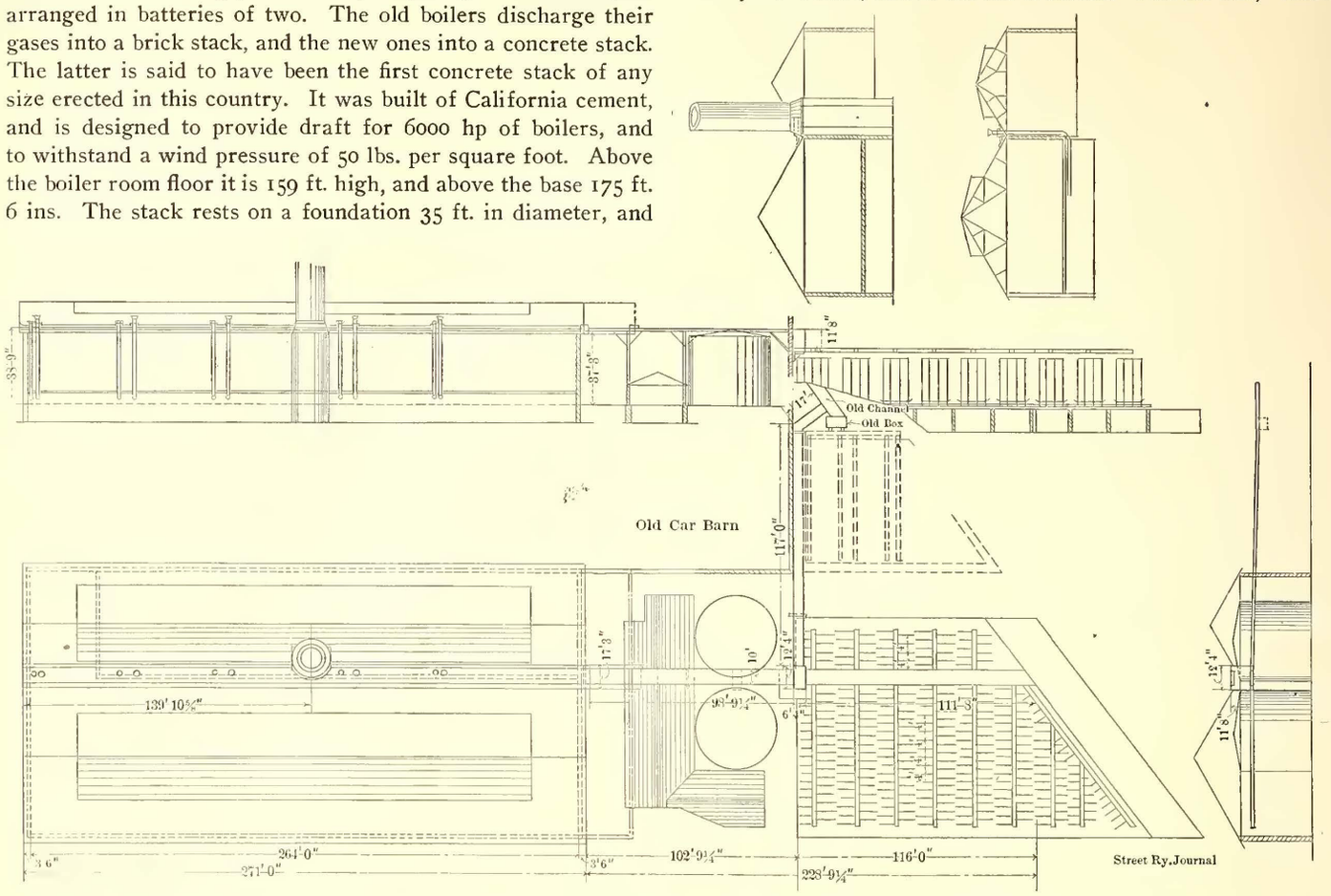


FIG. 4.—PLAN AND SECTION SHOWING GENERAL ARRANGEMENT OF WATER-COOLING SYSTEM

FUEL OIL SYSTEM

Crude oil is used exclusively for fuel in the power houses, and the daily consumption at present is about 950 barrels a day. During the holiday season over 1000 barrels were consumed daily. The consumption of oil at this station has shown an increase of 100 per cent for each of the last two years. In the Pasadena station about 130 barrels are consumed daily.

The oil is obtained from the wells located in Los Angeles and from the oil districts immediately surrounding the city. It is hauled to the station by standard tank-line cars on the steam roads and by wagon; but principally by means of oil-tank cars operated over the local electric railway lines. One of the oil cars used is shown in Fig. 5, as it is loading at the company's own wells in the western portion of the city. This car contains a fifty-barrel tank, and is a standard combination baggage and passenger car that was fitted over for the purpose. Oil tanks were formerly run through the streets without any covering, but as the people objected the tanks were placed in regular passenger car bodies, as shown. The windows are painted black, and the only thing which would indicate the purpose for which the car is employed is a capped pipe opening on each side of the roof, about midway of its length. As these are hardly noticeable, and as the car is labeled "Private Car," there are few citizens who know what it is used for, and so it goes through the streets without causing complaint. A similar car, with a forty-barrel tank, owned by the Los Angeles-Pacific Railroad Company, will also be used soon.

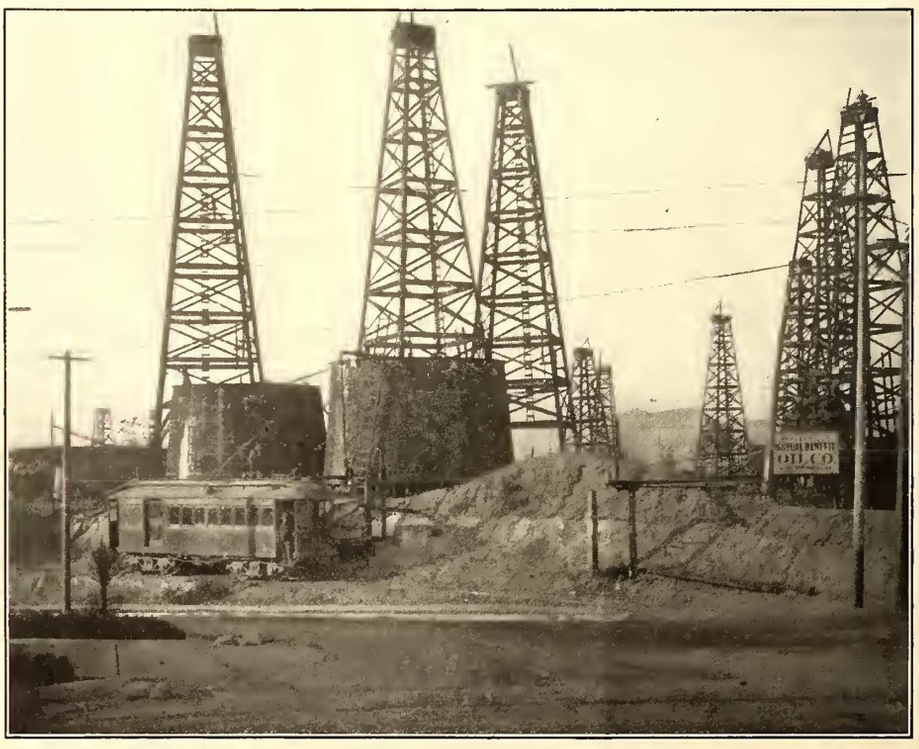


FIG. 5.—OIL-TANK CAR LOADING AT COMPANY'S OIL WELL IN WESTERN PART OF CITY

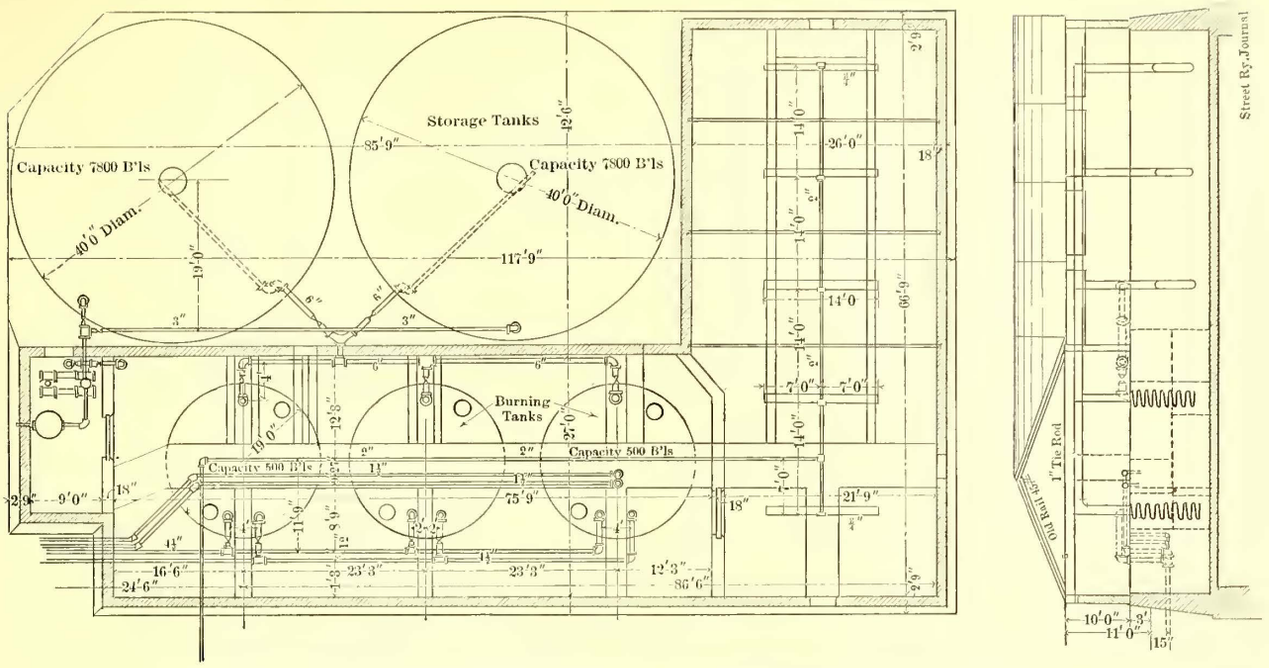


FIG. 6.—PLAN AND CROSS-SECTION OF OIL SYSTEM FOR OIL HOUSE

At the power house the cars are emptied by gravity into oil houses. When the oil is of a heavy grade and also in cold weather live steam at boiler pressure is run into the cars to hasten the flow. At present an oil house, that has been in service some time, is used, but a new house, back of the Pacific Electric boiler room, has been completed, and will shortly be put into service. The arrangement of the new house is shown in Fig. 6, while Fig. 7 gives the arrangement of the oil system for the boilers. The lower part of the house consists of a concrete tank, with walls 8 ft. high, the flow being on about the level of the condenser pit in the power house. This pit is divided by cross walls of concrete, in which the oil is allowed to settle, the lighter oil being run off into the last pit, from which it is pumped into the two storage tanks. Each of these tanks is 40 ft. in diameter, 35 ft. high and has a capacity of 7800 barrels. The oil flows by gravity from these storage tanks to the three burning tanks situated in the oil house. Each of the burning tanks holds about 600 barrels. They contain steam coils which heat the oil to about 124 degs., and it is then pumped to the boilers. Deflecting plates are located in the tanks so as to aid in circulating the oil.

A double-pipe system is used for distributing the oil to the boilers, the oil being kept in constant circulation under about 35 lbs. pressure. The fuel is supplied to the boilers through Hammel burners with steam at boiler pressure, 150 lbs.

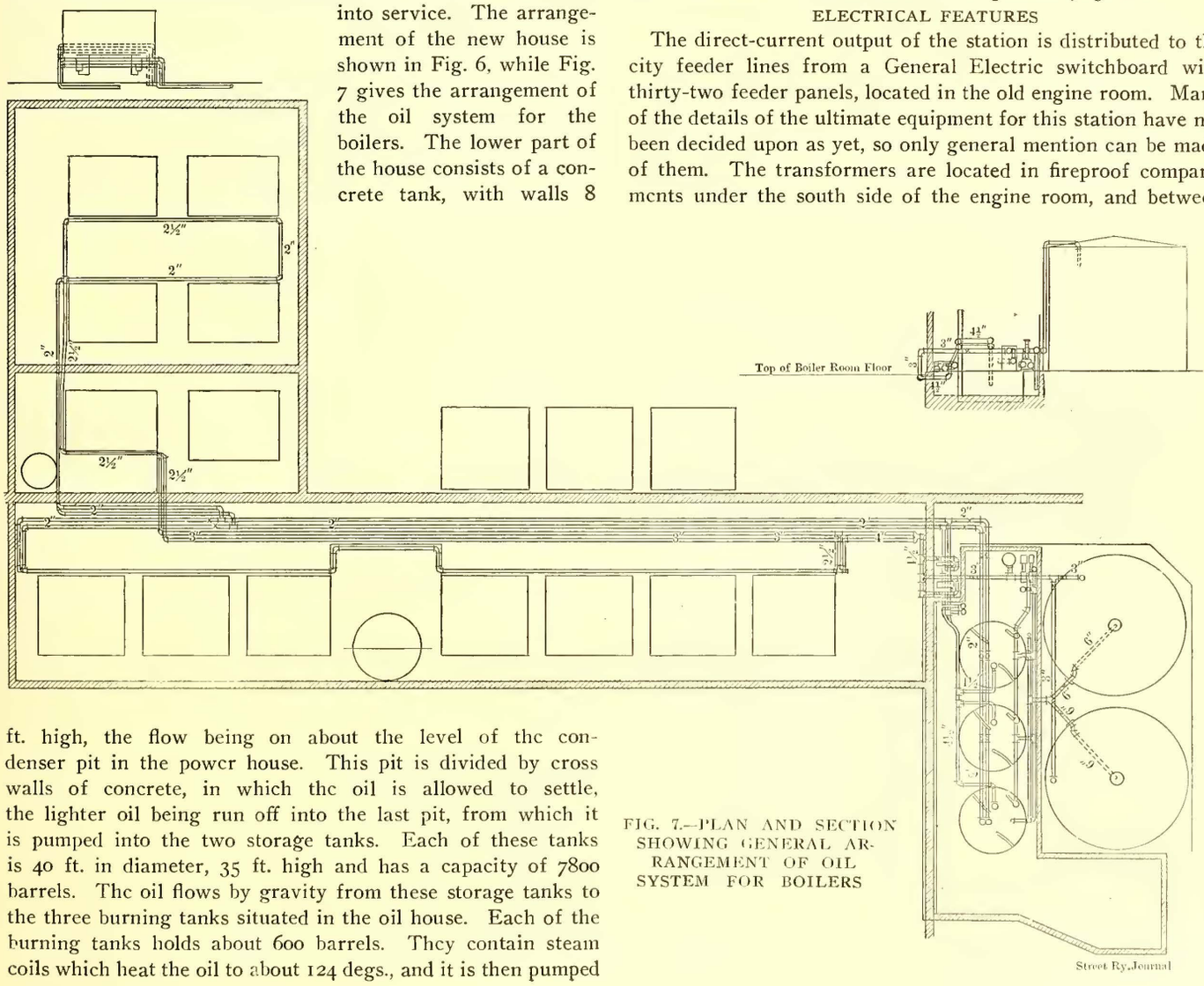


FIG. 7.—PLAN AND SECTION SHOWING GENERAL ARRANGEMENT OF OIL SYSTEM FOR BOILERS

ELECTRICAL FEATURES

The direct-current output of the station is distributed to the city feeder lines from a General Electric switchboard with thirty-two feeder panels, located in the old engine room. Many of the details of the ultimate equipment for this station have not been decided upon as yet, so only general mention can be made of them. The transformers are located in fireproof compartments under the south side of the engine room, and between

these compartments will be placed the oil switches and operating gear. The transformers will raise the machine voltage of 2300 volts to 15,000 volts for transmission. The high-tension wires will be carried up the wall in fireproof conduits to the

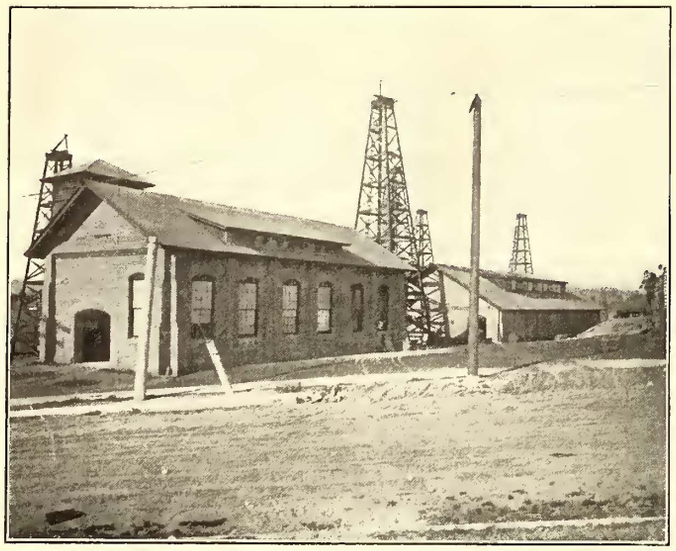


FIG. 8.—WESTLAKE PARK SUB-STATION IN OIL DISTRICT; A TYPICAL SUB-STATION

high-tension gallery, which extends nearly the entire length of the south side of the engine room. This gallery is 15 ft. wide, and has a concrete floor. The high-tension switchboard consists of a partition wall erected along the center of the gallery, and constructed of concrete and expanded metal. The board

FIG. 10.—HIGH-TENSION GALLERY OF SUB-STATION, SHOWING HIGH-TENSION BUSSES, OIL SWITCHES AND HIGH-TENSION LINE SWITCHES

will be equipped in duplicate with high-tension busses and oil switches on each side. The control of all electrical apparatus will probably be done electropneumatically from a small operating board on the main floor. From this station 15,000-volt high-tension lines extend as indicated on the map, Fig. 2, to the different sub-stations of the system.

SUB-STATIONS

At this writing there are nine sub-stations on the Pacific Electric Railway Company's lines, which are operated from station No. 1, they being located as indicated on the map. Stations A, B and C belong to the Los Angeles Railway Company, but are fed from the same transmission system. A standard type of sub-station has been adopted, and with the exception of stations 3, 8 and 6, located respectively at Pasadena, Echo Mountain and Long Beach, the general design and equipment is the same, the difference being principally in capacity of apparatus installed. The accompanying illustrations are of the Westlake sub-station (marked "A" on the map) of the Los Angeles Railway Company. Fig. 8 shows the exterior of the station. In this case the station room proper and the battery room had to be separated on account of the oil well between, but usually the battery room is built directly in rear of the station. Fig. 9 is a general interior view of the station, and shows the arrangement of motor generator, switchboard, high-tension gallery, etc. The high-tension wires enter the station

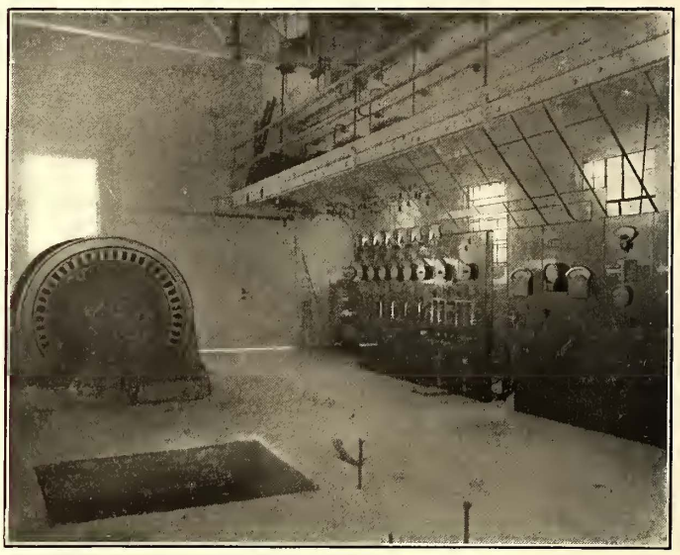


FIG. 9.—INTERIOR OF SUB-STATION, SHOWING MOTOR-GENERATOR, STATION SWITCHBOARD AND HIGH-TENSION GALLERY

through sewer-pipe openings under a separate roof, and are carried to the air switches shown in Fig. 10, and then to the high-tension busses, as shown. These busses are of solid copper with rubber insulation and braided covering, and are supported on porcelain insulators. The insulators are mounted on iron or locust pins, which are cemented into the concrete partition wall of the gallery. The high-tension oil switches are also mounted in this gallery, as shown. Everything is in duplicate, the other set of high-tension busses and switches being mounted on the rear of the partition wall. The transformers, which, in this case, are of the Stanley oil-insulated and water-cooled 150-kw type, are located on the station floor below the oil switches, the wires being carried through the floor of the gallery in porcelain bushings, as shown in Fig. 11, to emergency or selector switches. These switches have four copper blades, opening radially from the center. Two of the terminals are connected to the high-tension busses above, and the other two are connected to the transformer leads, so that the transformer may be cut in on either the front or rear bus. These switches are never opened under load. They serve as an additional safeguard when open for working on the transformers or oil switches.

The switchboard comprises six standard General Electric feeder panels, two generator panels, three panels for the storage battery and two for the alternating-current motors that drive

the generators. Each of these alternating-motor panels is equipped with a three-phase ammeter and indicating wattmeter, designed by R. S. Masson, consulting electrical engineer of the company, and built by the Wagner Manufacturing Company; a Weston field ammeter, two switch gear handles for operating the oil switches on the high-tension gallery, rheostat and exciter switch. On brackets are mounted a Lincoln synchronizer and a voltmeter. The engineers have adopted the policy of making everything as simple as possible and having everything standardized. With this object in view all superfluous apparatus has been done away with, including all fuses. As a special feature

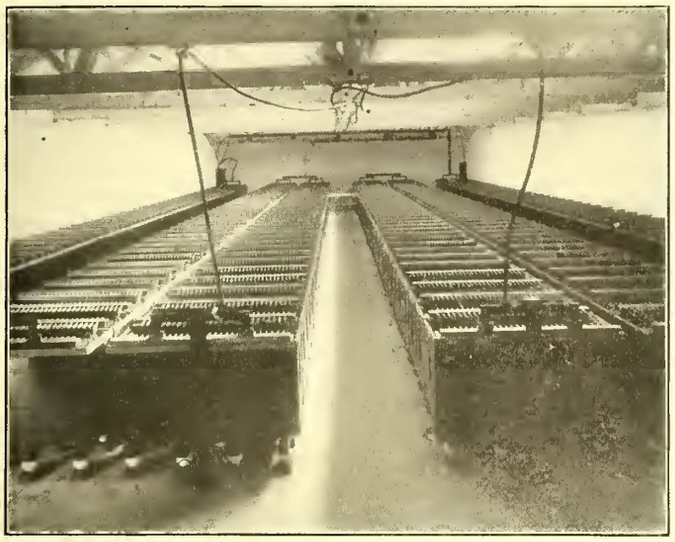


FIG. 12.—SUB-STATION STORAGE BATTERY OF 2000-AMPÈRE HOURS

the bus-bars on the rear of the feeder panels have been designed so that they can be easily enlarged or replaced. The bus-bars consist of circular-bar copper, 1 in. in diameter, covered with circular loom, and held in place by special copper plates. These plates are provided to accommodate one or two rods, and as more bus-bar capacity is needed more bars are added with the necessary plates to hold them in place. The bus-bar rods can

FIG. 13. PASSENGER CAR OF "100" CLASS

be quickly detached from the feeder connections, and all that is then necessary to remove a panel is to unscrew a few nuts with a wrench. This construction permits the switchboard panels to be drilled and equipped in the shops, and then quickly mounted on any switchboard when they are needed. When additional feeder panels are required the bus-bar rods are simply extended. All wires in the sub-stations are run in iron conduits, and no wood is used in construction, everything being of steel, concrete, glass or porcelain.

The motor-generator set shown in Fig. 9 consists of a 425-kw, 50-cycle, 2200-volt Stanley synchronous motor, driving a 400-kw S. K. C. railway generator. The standard motor-generator sizes adopted for the sub-stations are 200 kw, 400 kw

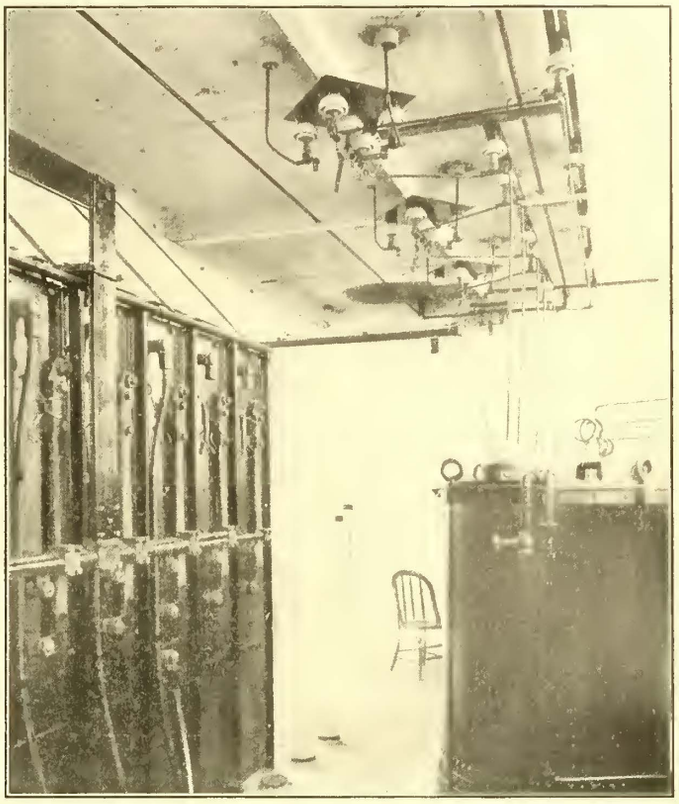


FIG. 11.—REAR OF SUB-STATION SWITCHBOARD, SHOWING FEEDER PANELS, WITH ROUND COPPER BUSSES, TRANSFORMERS AND SELECTOR SWITCHES ON CEILING OF HIGH-TENSION GALLERY

and 600 kw, and twenty-four sets of Westinghouse manufacture are now being installed.

Storage batteries have been installed at station 3 of the Pacific Electric Railway, and at stations A, B and C of the

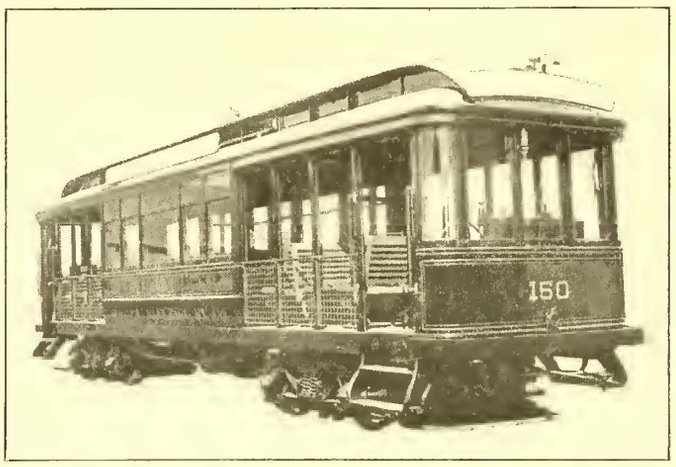


FIG. 14.—PASSENGER CAR OF "150" CLASS

Los Angeles Railway. These are all of the chloride type with 264 cells, and are provided with differential boosters. Station A battery has 1000-amp. hours capacity, and the other three 2000-amp. hours. The battery at station 3 is illustrated in Fig. 12.

ROLLING STOCK

The company is engaged in standardizing its passenger cars to four or five types, each being fitted for a different service. Most of the cars are of recent manufacture, and those of older construction are being remodeled, as time and occasion permit, to conform to the standard of the newer types. The cars of

the "100" class, Fig. 13, are 42 ft. 2 ins. long, seat fifty-two people and weigh 35,400 lbs. They are mounted on the company's own trucks, and are equipped with two No. 38-B motors and K-11 controllers. The car bodies are of the Hammond manufacture. These cars are used on the Los Angeles-Pasadena lines, and also for local Pasadena service.

The "150" type of car, Fig. 14, are 39 ft. long, seat forty-four people, and weigh 40,300 lbs. The equipment consists of four

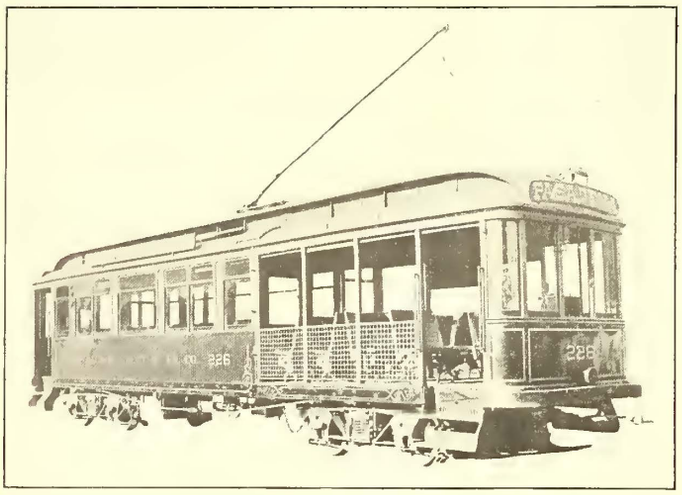


FIG. 15. PASSENGER CAR OF "200" CLASS

38-B motors and K-14 controllers. Five of these cars are used on the Rubio line for Mt. Lowe service, where grades of 8 per cent are encountered, so the gear ratio of the motors is low. Westinghouse magnetic traction brakes have recently been installed on these cars on account of the heavy grades. Other cars of the same type are used on the city lines in Los Angeles.

The "200" type, shown in Fig. 15, has a length of 41 ft. 2 ins., seats forty-eight passengers, and weighs 41,000 lbs. The equipment is the same as the "150" class cars except that the gear ratio is higher. These cars are used on the lines of the

FIG. 17.—PARLOR CAR "POPPY"

Northern division, especially on the Pasadena Short Line, the Pasadena regular line and the Monrovia and San Gabriel branches.

The latest type of car to be put into service is the "250" type, shown in Fig. 16. The company has fifty of these cars, and it is with them that the high-speed schedule to Long Beach and Whittier is maintained. They will also be used for the San Pedro and Newport Beach branches, twenty new cars of the same type now being built by the St. Louis Car Company for that purpose. These cars are 48 ft. long, seat fifty-six passengers, and weigh 64,700 lbs. The equipment consists of four No. 76 75-hp motors and L-4 controllers. The company has equipped all of these controllers with a stop on the running point, to prevent the motormen from using the multiple and series section improperly. The cars are equipped with the Greenamyer pneumatic trolley controller, which will be spoken of later. The air pressure carried on the "250" cars for the operation of the air brakes is 80 lbs.

The company's parlor car "Poppy," Fig. 17, is of the general type of cars used on some of the city lines, it being 36 ft. 3 ins.

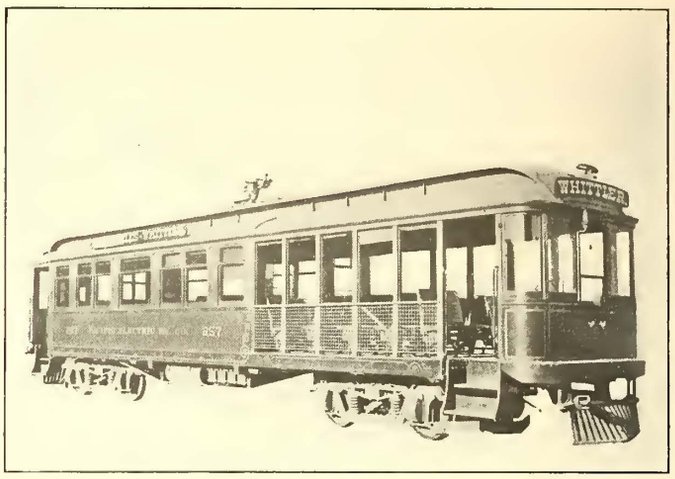


FIG. 16.—PASSENGER CAR OF "250" CLASS

long, seating forty people and weighing 32,400 lbs. The equipment consists of four No. 12-A motors and K-11 controllers. The parlor car was refitted by the company and is luxuriantly furnished with easy chairs, carpeted floor, silk curtains, etc. It is used for trolley parties, and recently has been employed daily for an "Orange Grove Route" observation car, as will be mentioned later.

President Henry E. Huntington is also having a magnificent private car constructed for him in St. Louis, which will be a model of its kind. It will be equipped with staterooms, buffet,

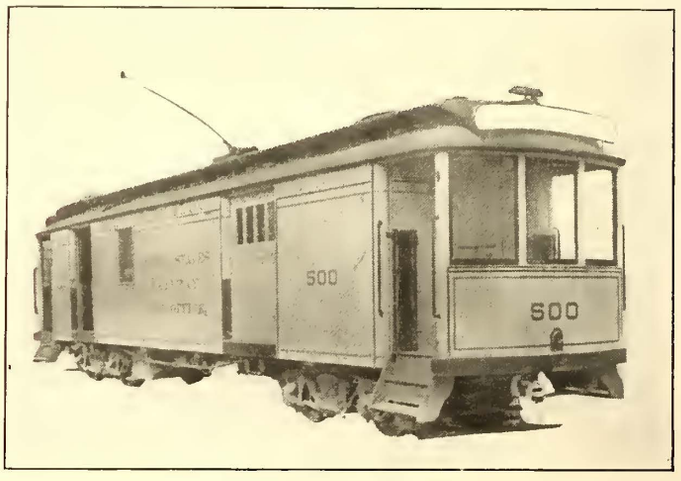


FIG. 18.—MAIL CAR

parlor, etc., and will be built so that it can be operated equally well on the interurban lines of the Pacific Electric Railway Company and the steam railroad lines. Mr. Huntington owns several desirable tracts on his lines near Los Angeles, and it is probable that he will erect a handsome residence on one of them. In that case he will have a spur track run into his grounds, so that he can board his private car at his door and go to his office in Los Angeles, and if he desires to make a trip to San Francisco or other point in the State his car will be attached to a regular train, as in the case of any private car.

All of these standard passenger coaches, of which the company has 136 in service, are painted a dark, rich red, the

official color of the Pacific Electric Railway Company. Large destination signs, painted with white letters on a blue background, are used on the ends and sides of the roof. The cars are built in the style that has come to be known as the Los Angeles type, with both closed and open sections, as may be noticed in the illustrations. Christensen air-brake equipments are installed on all the cars in addition to the hand brakes, with the exception of the Rubio cars, which have the magnetic traction brake, as already mentioned. Other furnishings include walk-over seats (wood seats outside and plush seats inside), Anderson & Smith arc headlights and interior lights, trolley pole catchers, and the company's own type of sand-boxes. Some of the cars are fitted with Stanwood steel steps, and others with wooden steps, built in the company's shops.

The platforms of all the interurban cars are equipped with the combination gate and trap-door, illustrated and described in the STREET RAILWAY JOURNAL of Nov. 21, 1903. These are made in the company's shops and have proved very satisfactory additions to the equipment of the cars. The screens of crimped iron, used on the open sections of all the cars on the Pacific Electric Railway as well as the Los Angeles Railway, are also built by the company. All cars are now fitted with the Ohmer recording fare registers. The Long Beach, or "250"

FIG. 19.—LOCOMOTIVE FOR SWITCHING PURPOSES

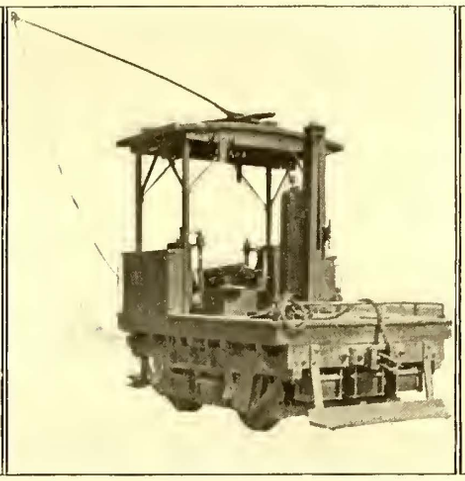


FIG. 20.—SHORT SWITCH CAR

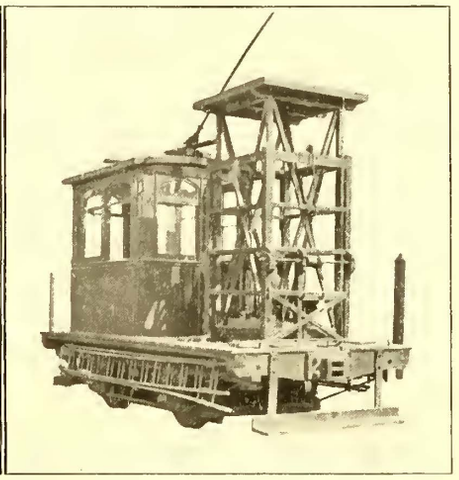


FIG. 21.—TOWER CAR

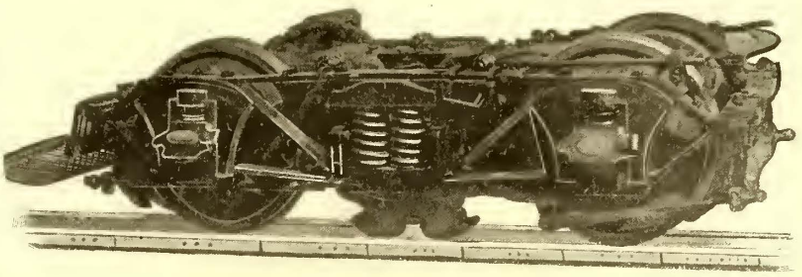


FIG. 23.—STANDARD P. E. TRUCK EQUIPPED WITH ELECTRO-MAGNETIC BRAKES

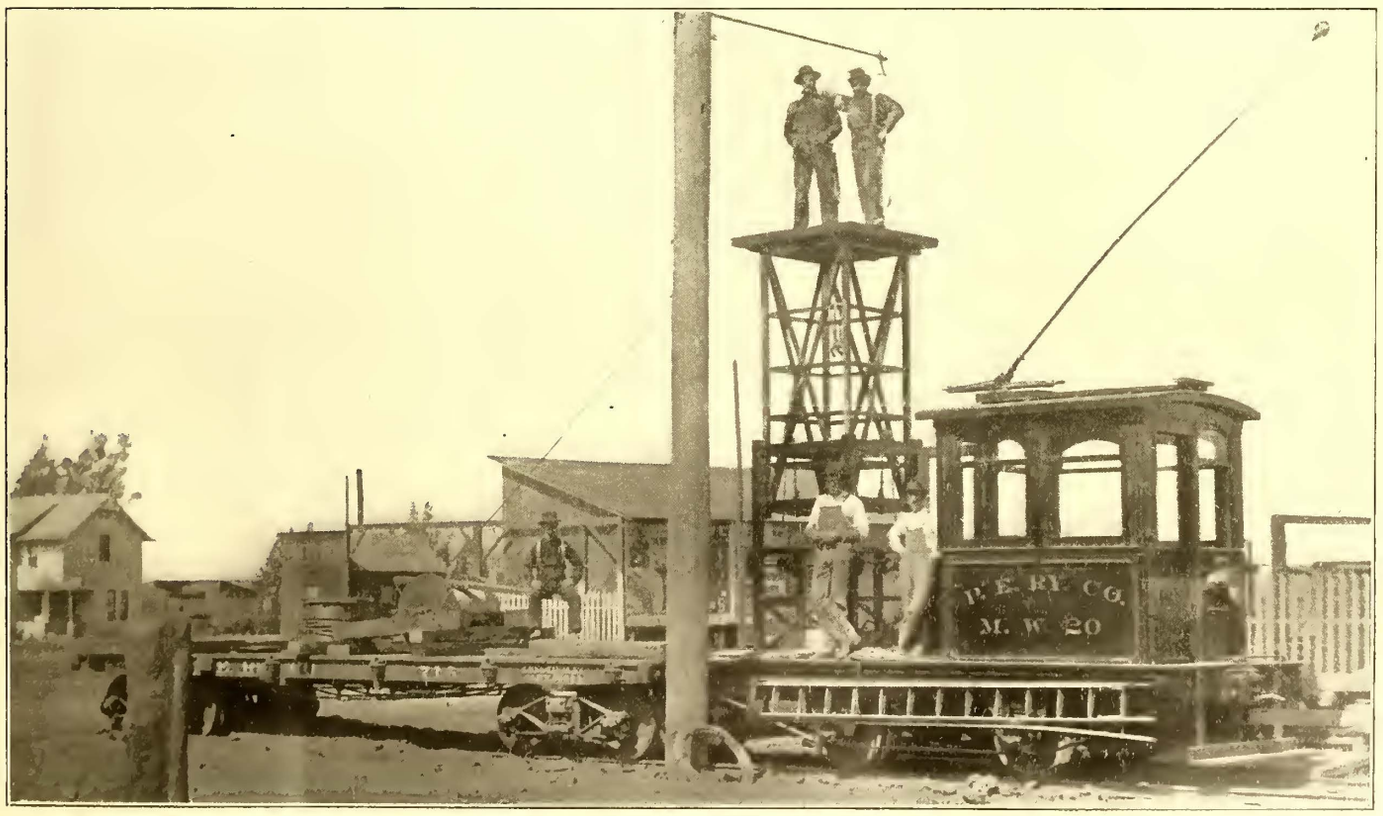


FIG. 22.—STRINGING LIVE TROLLEY WIRE WITH TOWER CAR

type, cars are fitted with wooden pilots, fashioned after the standard steam railroad pilots. All city cars and the other interurban cars are equipped with fenders of the company's manufacture.

The company has a regulation 42-ft. 5-in. mail car, Fig. 18, fitted up with all the fixtures for handling and sorting of mail enroute. It is used between Los Angeles and Altadena. Two combination passenger and mail cars are also used for carrying mail in closed pouches.

The Pacific Electric Express Company, a concern not allied with the railway company, uses two baggage and express cars in handling express and baggage between Los Angeles and Pasadena. It handles its business between brick depots, built in the

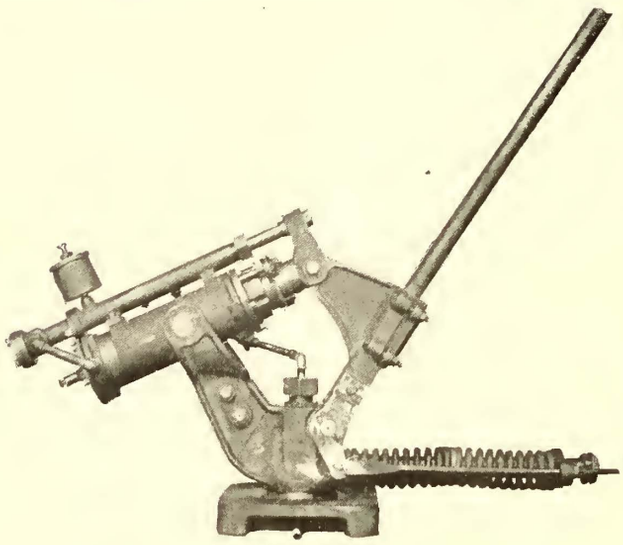


FIG. 24.—PNEUMATIC TROLLEY POLE CONTROLLER USED ON LONG BEACH CAR

business or wholesale districts of the two cities. As yet the Pacific Electric Railway Company has not gone into freight, baggage or express business.

Fig. 20 illustrates a short switch car, or yard motor, that was built to switch cars about the shops and yards of the company. It is 13 ft. 6 ins. long, and was designed so that it and a standard passenger car could be moved together on the transfer table. Its equipment comprises two 38-B motors and two K-10 controllers. It is provided with air brakes and has a vertical I-beam stand for use with a derrick.

For line repairs the company has built two tower cars of the type illustrated in Fig. 21. These cars are 18 ft. long, and are mounted on single trucks equipped with two Lorain motors and K-10 controllers. The tower is of the ordinary construction. Ladders are carried at the sides of the car as shown. Fig. 22 shows how this car is used in stringing live trolley wire, the reel being mounted on a flat car that is pushed ahead of the tower car.

Fig. 19 shows a 19-ft. narrow-gage motor car that was originally designed as a wrecker, but is now used in the yards for switching purposes. The company has also five maintenance of way or construction cars, 31 ft. 6 ins. long, with four No. 38-B motors and K-14 controllers. A small cab is placed in the center, and the rest of the car is used for carrying track and construction material, some rails always being left on the car to serve as ballast. Other rolling stock includes a pay car, a material car, an oil car and thirty-three flat cars of 10 tons, 15 tons and 30 tons capacity.

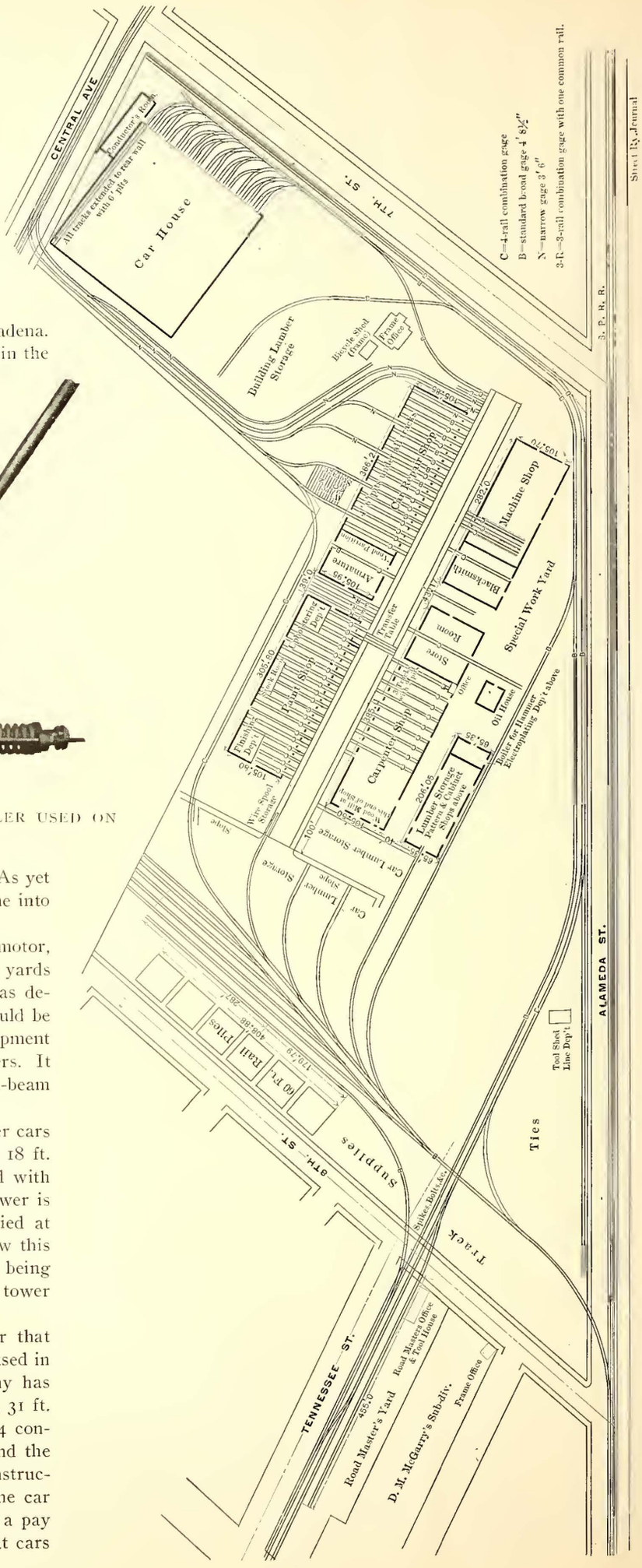


FIG. 25.—PLAN OF CAR HOUSE, YARDS AND SHOPS

TRUCKS

About 100 of the 150 or more cars owned by the railway are mounted on trucks designed and built by the company, and known as P. E. trucks. The other cars use St. Louis swing-bolster trucks. The P. E. truck, Fig. 23, has been gradually developed during the existence of the company, the chief features of the design sought being simplicity and durability. It has a rigid bolster and a flat-iron bolted truss frame with no ribs. The bolster is riveted to the top plate. For the bolster 1-in. x 6-in. forged iron is used, and for the side frame 1-in. x 4-in. iron. The details of construction may be noticed in Fig. 23. For a No. 76-motor equipment the truck has 33-in. wheels, mounted on 6-in. axles, and for No. 38-B motors 30-in. wheels on 4½-in. axles.

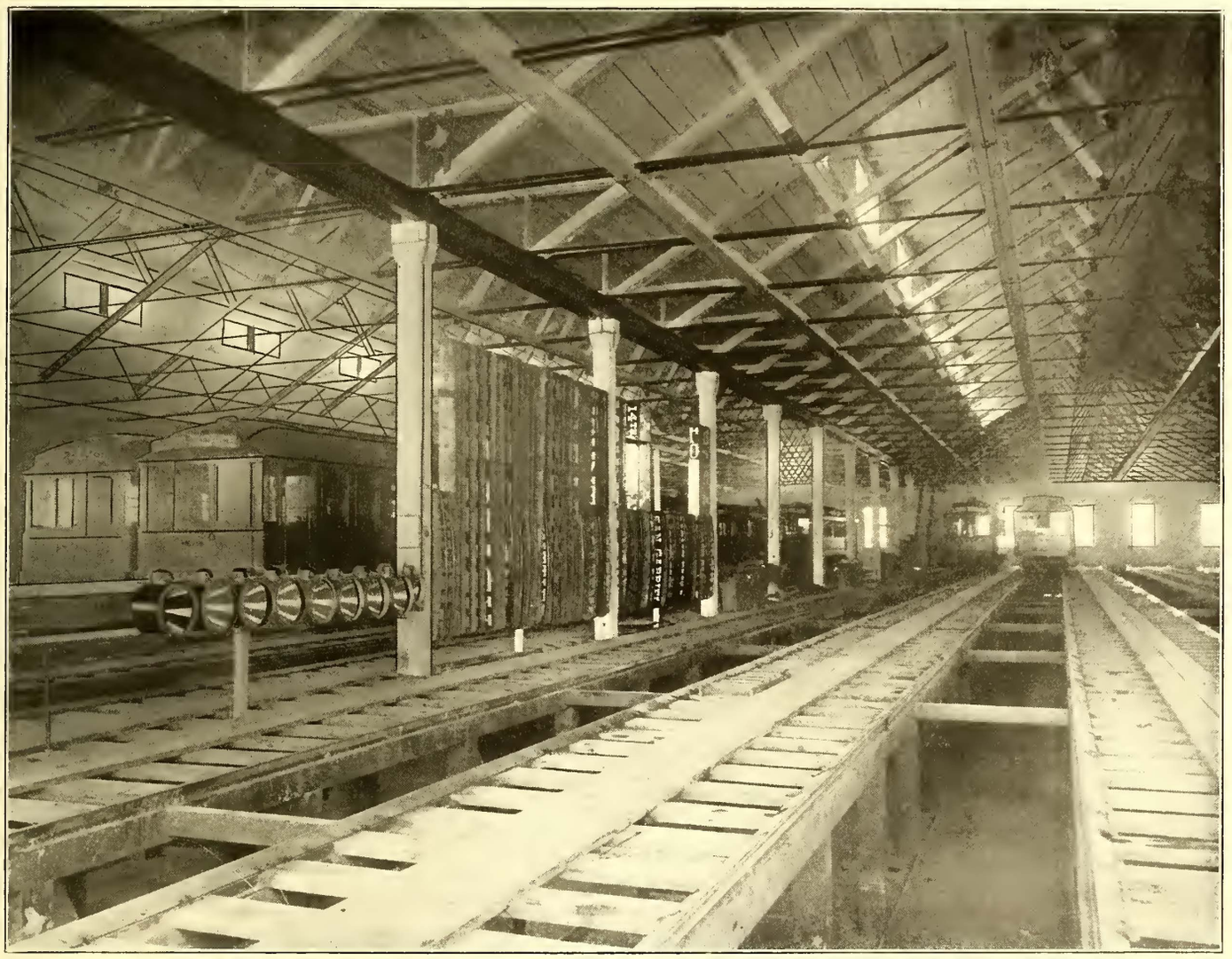


FIG. 26.—VIEW IN MAIN CAR HOUSE, SHOWING 6 FT. PIT AND HEADLIGHT AND SIGN RACKS

PNEUMATIC TROLLEY CONTROLLER

The cars on the Long Beach line are equipped with the Greenamyer pneumatic trolley-pole controller, Fig. 24, and its operation is said to be very successful. This device was described in the STREET RAILWAY JOURNAL of June 6, 1903, but a few facts concerning its operation will be of interest in this connection. The controller is operated by compressed air at any pressure above 60 lbs., supplied from the air-brake reservoir of the car, the consumption of air being very small. It holds the pole in firm contact with the trolley wire and keeps the same tension at all positions or altitudes, enabling cars to take curves at high speeds. It is stated that in actual tests and during several months' operation the trolley never runs off at any speed up to 60 m. p. h. on standard overhead construction unless there is a decided defect in overhead work. Even if it does come off it lowers itself instantly and automatically to a safe position below any spans. When it is desired to replace the trolley the conductor throws a three-way valve and the pole goes up with a very light pressure and assumes its normal pressure when the valve is thrown back. It has been demonstrated that the cost of operating the pneumatic trolley is practically nothing, as the damage resulting from burnt trolley wheels, broken or bent poles and broken overhead work and car roofs is almost entirely eliminated. The controller is very highly recommended by the officials of the Pacific Electric Railway Company, whose recommendations are backed up by the results of many tests. It is said to have repeatedly carried 350 amps. during a run of 7 miles at 60 m. p. h. with less than 5 volts drop and 27 lbs. pressure at the trolley wheel. During a twenty-days continuous service test, conducted under the direct observation of R. S. Masson, consulting electrical engineer of the company, without a moment's attention, on a car speeded at 50 m. p. h. on a level, straight track, carrying from 200 amps. to 300 amps. when running, and as high as 800 amps. on starting, traveling over 5000 miles, it left the wire but once, and this was due to a loose inverted bell hanger. Its wheel was not scored or burned, no spark was even visible at the contact of wheel and wire. At present the trolley controller is not on the market, but is being developed in the shops of the Pacific Electric Railway Company. It will probably be installed on all the cars of the company.

In view of the recent remarks of George Westinghouse on the trolley as against the third rail, it is interesting to observe that the management and engineers of the Pacific Electric

Railway Company are fully confident that the overhead trolley with some such controller as the pneumatic base just described, is the only safe and practical current-collecting method, and that it is not only feasible but the only practical device to use in high-speed operation. As already mentioned, this opinion has only been formed after long and practical tests with the Greenamyer trolley controller. It is stated that in about a year's operation with this controller, but two or three accidents have occurred, while with the ordinary spring trolley base they ran as high as six a day. The pneumatic trolley will be developed and changed as may seem desirable for high-speed tests, one idea being to make the end of the trolley weigh practically nothing, using aluminum in the construction, in order to come as near as possible to the theoretical condition, which is that the trolley should remain in contact merely with the current.

FIG. 27.—PASADENA CAR HOUSE WITH OFFICES ON SECOND FLOOR, SHOWING WEST END FROM WHICH CARS ARE DESPATCHED

HIGH-SPEED EXPERIMENTS

Under the supervision of Mr. Masson, speed tests were begun by the company about a year ago, and have been carried on intermittently since then. One of the "250" type of cars, with the standard equipment of four No. 76 motors and L-4 controllers, has been used in the experiments, the motor being geared to higher ratios than those normally used. The efforts of those in charge of the tests are now being directed toward overcoming as much as possible the air resistance. Wind shields, or "splitters," have been used for this purpose, and with the standard equipment speeds of from 68 m. p. h. to 69 m. p. h. have been attained. The Long Beach line, which, as has already been pointed out, has several long stretches of tangent track, with very slight grades, has been used for the trials. The wind shields consisted of pointed cabs, built on over the regular cabs of the car, and with windows in the sides so that the motorman could see ahead from his regular station. Different designs of these shields are now to be used to determine which offers the least resistance to the air, as the experiments thus far have shown that more is to be gained in lessening the air resistance than by increasing the motive power. It has been suggested that should these tests convince the management that it was practicable to operate at high speeds, the motorman and his appliances for handling the car could be stationed inside this additional cab, thus giving more seating capacity in the car itself. It is Mr. Masson's intention to carry on the tests as time and occasion permit until speeds up to 90 m. p. h. are reached.

CAR HOUSES

The Pacific Electric Railway Company operates its interurban cars from large car houses in Los Angeles and Pasadena, and its Los Angeles city lines from a car house in that city. A small barn is also provided at Long Beach. The main car house is located on one corner of a 30-acre tract that is used for the company's yards and shops at Seventh Street and Central Avenue, Los Angeles. Fig. 25 is a plan of the grounds and buildings. The shops will be described later. The car house is a brick building, 260 ft. x 260 ft. in size, and contains twenty tracks, with room for 100 of the largest cars used on the system. The building is divided into four bays, and the front is entirely open, as the mild weather of Southern California does not require doors. A pit floor of concrete, 6 ft. below the

tracks, extends under all the tracks. Fig. 26 is a view in the car house, showing the pit, and at the left the racks for signs and headlights.

At the northwest corner of the car house is a two-story addition, 40 ft. x 120 ft., designed for the use of the trainmen. At the north end of the second floor is the office of the superintendent of the Southern division and the despatcher's room,

FIG. 28.—DOUBLE TELEPHONE DESPATCHER'S BOARD IN MAIN CAR HOUSE, AND POWER BOARD

where is located the telephone despatching board shown in Fig. 28.

There has recently been completed the car house shown in Fig. 27. This building is 354 ft. long and 100 ft. wide, and has six tracks, with room for forty-eight cars, of the type used on the Pasadena lines. It extends from Fair Oaks Avenue to Raymond Avenue, and is open at both ends. It is located at one end of a loop, over which the Los Angeles-Pasadena cars have to pass, so the cars enter at the east and are despatched from

FIG. 29.—DESPATCHER'S DESK IN PASADENA CAR HOUSE

the west, or Fair Oaks Avenue, end, which is illustrated in Fig. 28. Over each end of the building is a second-story, 18 ft. wide. That at the east is to be fitted up for quarters for the conductors and motormen. The west end is devoted to the offices of the superintendent of the Northern division, his assistant, the trainmaster and despatcher. Fig. 29 shows the despatcher's desk and power switchboard for the central energy telephone system which is employed.

For the city narrow-gage lines an old car house on Temple Street is used, the superintendent of the Los Angeles division having his headquarters at that place.

DESPATCHING SYSTEM

The company is doing all its car despatching by telephone, but is seriously considering the use of the telegraph for a portion of the work in addition to the present telephone system. On account of the existing conditions the interurban cars have to be despatched from the Los Angeles and Pasadena car houses, and those operating on the Los Angeles division from the Temple Street car house; but, as soon as the new terminal station at Sixth and Main Streets, Los Angeles, is completed the despatching system will be concentrated at that point and all cars handled from one board.

The switchboard now used at the car house, illustrated in Fig. 28, is the largest in service, and was designed so that it could be used in the terminal station. Its distinguishing feature is the use of two turrets. All the lines terminate in both turrets, so that any desired division of the lines may be made between the two operators. Double-fused connections are made to the board, a valuable feature for repair work, as a line with damaged connections may be instantly thrown to the other side while repairs are made. The board can accommodate eighty lines, forty to a turret, and there is room for 500 lines.

There are eighty-five instruments on all the lines at present that are used for despatching purposes, forty-three of which are on the Long Beach road, where they are stationed a half-mile apart, so that a conductor will never have to walk farther than a quarter of a mile to get in communication with the despatcher.

This board also handles a private exchange system for the shops and offices of the mechanical superintendent with twenty-four instruments. These instruments are inter-communicating, so that conversations can be carried on among the shop men without disturbing the despatcher. Separate lines are also run to all the power houses and sub-stations.

While the telephone is generally regarded as the most suitable for electric railway despatching, it is quite significant that the Pacific Electric Railway Company has been experimenting with the telegraph, and the trials have been so satisfactory that the management feels warranted in adopting it. There has always been more or less trouble from induction on the interurban divisions, as telephone wires are carried on the same poles as the high-tension wires, and, of course, the induction would not affect the operation of the telegraph system. At the principal terminal points where the business warrants the employment of an agent, it is figured that this agent could serve as a despatcher or trainmaster, as it is easy to procure men who are telegraph operators. On occasions, such as frequently occur at Long Beach when large crowds have to be handled in a few minutes, it is necessary to despatch cars every 3 or 4 minutes. By the present method the conductors take considerable of their time in communicating with the despatcher, frequently delaying the starting of their cars. This would be avoided to a large extent, it is thought, by the aid of a trainmaster, who would report the times of the cars by telegraph. If the telegraph is adopted it will be used in conjunction with the telephone system for the smaller terminal stations as at present.

An extensive telephone and telegraph system is to be constructed by the Los Angeles-Pacific Railroad Company. It will cover 135 miles, and many stations will be established along the Santa Monica and Hollywood lines. It is officially stated that the contract will be awarded to the Postal Telegraph Company. The company already has a telephone system in operation.

ELECTRIC RAILWAYS OF OHIO

Ohio has made tremendous gains in electric railway mileage during the past three years. In the Street Railway Journal of Aug. 3, 1901, the writer presented an extended article detailing the development of electric railways in the State up to that time, and in connection with the article was a map showing the lines in operation, under construction and contemplated. At that time the writer estimated that there were in operation 898 miles of city lines and 868 miles of interurban lines. The roads under construction totaled 1435 miles, while it was estimated that rights of way and franchises for 4800 miles had been obtained.

Since 1901 a transition very similar to that which took place in the promotion of steam roads during the early 50's has been taking place. A large number of projects have fallen through, and there are grades in a number of portions of the State that will probably never carry cars. The map presented at that time showed a number of parallel routes, where rival promoters were actually building roads. These situations have been changed either by consolidation or the withdrawal of one of the contestants. Over one route at one time there were three companies actually at work on grades. The grades are still there, but the projects have all been abandoned—a case where stubbornness spoiled the game for all concerned.

The Everett-Moore embarrassment, which occurred early in 1902, had a most disquietening effect upon the electric railway situation all over the Central West. Not only were the building operations of this important syndicate wholly suspended and the immense system badly disrupted, but the crash was felt by all other operators in this district. Financiers became wary of all new electric railway propositions, while even syndicates that had capital and prestige decided it would be wiser to pause and develop the properties already built and under construction, before starting other projected roads. The situation was just clearing from this set back when there came another and worse —the financial depression which was accompanied by a decline of all stock values and the tightening of the purse strings by the Eastern bankers, who heretofore had furnished much of the capital for the new propositions.

But despite all these retarding influences the building of electrie railways in Ohio has progressed with surprising strength. Instead of 1766 miles of operating city and interurban roads, as in 1901, there are now in operation 2917 miles of road. Not as great a gain as the estimated mileage apparently under construction in 1901, but still a handsome one in view of conditions. The new mileage includes twenty-five new companies, some of which are engaged on extensions at the present time. It is safe to say that the close of this year will see 3500 miles of electric roads in operation, since fully the required increase is well under construction at the present time, making no allowance for a number of propositions which the promotors claim to have financed. The roads under construction include two third-rail lines, the first in Ohio; one of these will be placed in operation within ninety days. The other is being designed for handling heavy freight, and will open up extensive coal fields, marking an interesting departure in electric railroading.

Probably two-thirds of the projected roads of 1901 have not materialized, and the majority of them are dead issues. Within the past few weeks the promotion of new lines seems to have taken on new impetus, and a number of projects are now in the field that seem promising of success, for, despite the tight money market many financiers seem to be taking a new interest in the industry.

It was pointed out in the previous article that one of the chief aims of the promotors at that time seemed to be the building up of through lines connecting up the leading centers of population. Ohio is peculiarly well adapted for trans-State lines. Approximately square, it has a city of over 150,000 in three of the four corners, with a fourth large city, the capital, approximately in the center. The earlier propositions were designed to take business into these centers. Gradually the lines have been extended until in some cases they have been connected, and the possibilities of through traffic from center to center have lately become apparent. The majority of the propositions now under construction and projected aim to cover the untracked gaps, and the work is fast being carried out.

Reference to the map here presented indicates that it is now possible to travel practically across Northern Ohio, there being an unbroken string of lines from Westfield, N. Y., to within a few miles of the Indiana line. Limited cars, giving service equal to that of the parallel steam road, now operate between Cleveland and Toledo. Roads under construction will soon give through connection from Buffalo to Chicago, closely paralleling the Lake Shore & Michigan Southern Railway (steam). Lines under construction and projected give promise that there will soon be three distinct electric routes from Toledo to Cincinnati. Except for 40 miles, part of which is already graded, electric travel between these centers is already possible. Between Cleveland and Cincinnati about 50 miles remain untracked, while between Columbus, Cincinnati and Indianapolis people are traveling by electric car every day, and sleeping cars are soon to be operated between these points. A person desiring to travel from Indianapolis to Wheeling, W. Va., may cover three-fourths of the distance on electric cars, and the only break is covered by a steam road owned and operated by an electric railway syndicate, and this line is soon to be equipped with electricity. Across the north central portion of the State, touching Van Wert, Lima, Kenton, Bucyrus, Massillon, Canton and Salem, paralleling the main line of the Pennsylvania Railroad, is a chain of electric roads that is rapidly being connected up. Much work has been done in the Ohio Valley. Nine district roads are in operation, which if joined together would cover nearly one-half the distance from Cincinnati to Pittsburg. Nine-tenths of the distance from Cleveland to Pittsburg is tracked; in Ohio only 10 miles are lacking. Two-thirds of the route from Cleveland to Wheeling, W. Va., is in operation. Dayton and Fort Wayne, Ind., will be joined by two routes, the missing links in both routes being under construction.

In the previous article it was pointed out that several of the leading Ohio syndicates aimed to consolidate connecting properties and operate through trans-State lines. The financial conditions of the past two years have effected these plans to a considerable extent. At the time of its embarrassment, the Everett-Moore syndicate lost control of the Cleveland, Painesville & Ashtabula Railway (6), the Canton-Akron Railway and the Canton-Massillon Railway (24), the Eastern Ohio Traction Company (2), the Scioto Valley Traction Company (74), the Detroit & Toledo Shore Line, now a steam road, and the Cleveland Electric Railway, the Cleveland city system, thus destroying, for the time being at least, its aims for through systems. However, the Everett-Moore interests still control the largest mileage of any syndicate operating in the State. The lines are as follows: Northern Ohio Traction & Light Company (1), Lake Shore Electric Railway (4), Cleveland, Painesville & Eastern Railway (5), Maumee Valley Railway & Light Company (16), and the Toledo Railway & Light Company, in Toledo, also the immense system of the Detroit United Railway Company in Michigan.

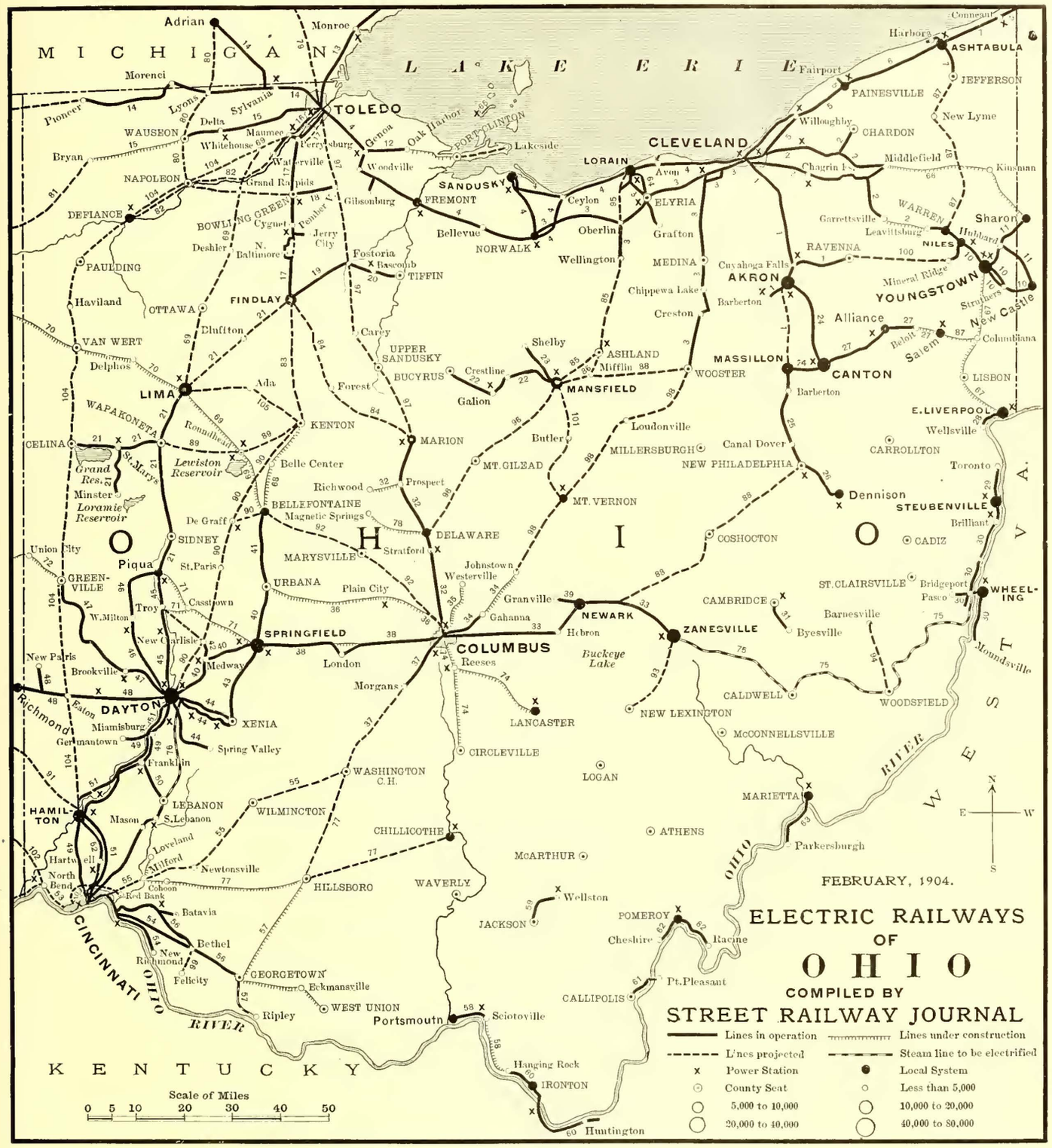
The plans of the Pomeroy-Mandelbaum syndicate for through lines have been blasted through the loss of control of the Cincinnati, Dayton & Toledo Traction Company (49), the keystone in its proposed line from Cincinnati to Toledo. This syndicate also appears to have lost control of the Miami & Erie Canal Transportation Company (51), which has a line on the canal bank, completed from Cincinnati to Toledo, but which

is now in the receiver's hands and its future shrouded in doubt. Control of the Springfield & Xenia Traction Company (43), and the Tuscarawas Traction Company (26), has also been sold by the Pomeroy-Mandelbaum interests; both of these lines figured in trans-State plans. The Ohio lines still in control of the Pomeroy-Mandelbaum people are: The Cleveland & Southwestern Traction Company (3), the Ohio Central Traction Company (22), and the Western Ohio Railway (21).

The Cincinnati Traction Company interests, generally supposed to be backed by the Elkins-Widener syndicate of Philadelphia, are now figuring strongly in Ohio properties. They now control the Cincinnati, Dayton & Toledo Traction Company (49), and appear to be planning to connect this with their Indiana properties. They operate under lease the Cincinnati Interurban Railway (52), and control the Miami & Erie Canal Transportation Company (51).

Tucker-Anthony & Company have a large mileage in operation, and by building 50 miles of road they will be enabled to operate through cars from Cleveland to Columbus, in connection with the Northern Ohio Traction & Light Company (1). Their lines are as follows: Canton-Akron Railway (24), Canton-New Philadelphia Railway (25), Columbus, Newark & Zanesville Traction Company (33), and the Newark & Granville Railway (39).

The Appleyard system in Ohio, which is about to be consolidated into the Ohio Union Traction Company, includes the following operating roads: Columbus, London & Springfield Railway (38), the Columbus, Grove City & Southwestern Rail-



way (37), the Dayton, Springfield & Urbana Railway (40), the Urbana, Bellefontaine & Northern Railway (41), the Springfield & Western Railway (42), and the Central Market Street Railway, in Columbus. The syndicate owns the Ohio River & Western Railway (75), and the Dayton, Lebanón & Cincinnati Railway (76), steam roads which are to be equipped with electricity, and is building the Kenton & Southern Railway (68). In connection with the Tucker-Anthony interests the Appleyard people, speaking generally, aim to operate through trains between Cincinnati, Columbus, Cleveland, Pittsburg and Toledo.

The Winters-Clegg syndicate holds a strong position in any through lines that would pass through Dayton. In addition to controlling the City Railway and the Oakwood Street Railway, commanding entrance to Dayton, it controls the Dayton & Troy Railway (45), operating north, and the Dayton & Western Railway (48), operating west from Dayton, the latter connecting with a line operating to Indianapolis.

The Allen-Stone syndicate, of Cleveland, is figuring largely in the chain of lines that is paralleling the Lake Shore & Michigan Southern Railway, between Buffalo and Chicago. It is operating the Cleveland, Painesville & Ashtabula Railway (6), and the Toledo & Western Railway (14), and is building roads along this route in New York and Indiana.

Although not represented in trans-State plans the Scrugham syndicate, operating the Interurban Railway & Terminal Company (54), has one of the largest interurban systems in the State.

The eight syndicates above mentioned, with the Andrews-Stanley syndicate controlling the Cleveland Electric Railway, of Cleveland, together with the interests controlling the Columbus Railway & Light Company, operate about 1700 miles of road in Ohio. A recapitulation of the mileage of these interests follows:

Name	Interurban	City	Total
Everett-Moore	272	195	414
Elkins-Widener	141	226	367
Pomeroy-Mandelbaum	250	...	250
Andrews-Stanley	...	220	220
Tucker-Anthony	163	20	183
Appleyard	142	16	158
Winters-Clegg	80	40	120
Allen-Stone	110	...	110
Columbus Railway & Light	8	98	106
Scrugham	101	...	101

The gross earnings of electric roads for the year ending April 30, 1903, according to reports filed with the Auditor of State, these being the latest figures obtainable, were $18,927,250. Of course, this is on a considerably smaller mileage than is in operation at the present, since a number of roads were placed in operation last year, and their earnings did not figure at all in this total. It should also be considered that several roads were placed in operation late in 1902, hence, did not figure for an entire year, neither were they up to their full earning power, on account of only partial operation in many cases. But it is safe to say that Ohio roads earned $20,000,000 in 1903.

It is manifestly impossible to separate the earnings of the city roads from those of the interurbans, because a number of companies operate and figure both together, but it is interesting to note that as, indicated by the following table, the city roads of the five leading cities of the State, with less than one-fourth the total mileage, earned over one-half the total gross receipts:

City	Earnings	Mileage
Cleveland	$4,500,000	220
Cincinnati	3,500,000	210
Toledo	1,500,000	102
Columbus	1,200,000	106
Dayton	785,000	63
Total	$10,985,000	701

The handling of freight and express is beginning to prove quite an important item in the earnings of some of the electric roads of Ohio, but as a general proposition it can only be considered as being in its infancy. Forty-one companies engaged in either one branch or the other during the year ending April 30, 1903, and the total receipts from both sources were $343,735. The largest earnings were made by those companies that handled freight at freight rates, rather than express, which tends to refute the growing impression that the earnings are larger where goods are handled as express at express rates. The showings of some of the best of the freight and express handling roads are shown in the accompanying table:

Name	Gross	Freight	Express	Both
Fairfield Tr. Co. (Lancaster)	$10,600	$5,200	.....	.....
Eastern Ohio Traction	197,000	44,000	.....	.....
Toledo & Western	122,000	23,000	.....	.....
Cincinnati, Dayton & Toledo	482,000	2,700	$11,000	.....
Clev., Painesville & East	231,000	.....	10,000	.....
Cinci., Georgetown & P'tsmouth	130,600	87,500	10,200	.....
Clev. & Southwestern Tr. Co	382,700	10,000	7,200	.....
Col., Buckeye Lake & Newark	130,500	.....	3,600	.....
Col., London & Springfield	119,900	.....	3,200	.....
Col., New Albany & Johnstown	21,600	1,900	.....	.....
Dayton, Covington & Piqua	54,200	2,300	.....	.....
Dayton & Northern	96,900	9,300	.....	.....
Dayton, Springfield & Urbana	195,600	.....	11,350	.....
Dayton & Troy	117,700	4,700	.....	.....
Dayton & Western	80,200	7,400	.....	.....
Dayton & Xenia	98,900	3,500	.....	.....
Lake Shore Electric	494,000	26,200	4,700	.....
Mahoning Valley Railway Co	411,000	12,200	.....	.....
Maumee Valley Ry. & Light Co	75,300	3,800	.....	.....
Newark & Granville Railway	63,500	1,300	.....	.....
Northern Ohio Tr. & Lt. Co	727,000	.....	.....	$15,800
Ohio Central Tr. Co	60,700	1,500	.....	.....
Ohio River El. Ry. & Power Co	45,400	.....	.....	2,900
Canton-Akron Railway	293,000	.....	2,900	.....
Pennsylvania & Ohio Railway	73,000	.....	2,200	.....
Tiffin, Fostoria & Eastern	47,400	.....	.....	3,100
Toledo, Fostoria & Findlay	59,000	2,064	.....	.....
Tuscarawas Tr. Co	56,800	2,500	.....	.....
Western Ohio Railway	121,000	.....	3,800	.....
Youngstown & Sharon	112,200	.....	.....	3,700

OPERATING ELECTRIC RAILWAYS

The following is a list of the electric railway companies of the State. The numbers which appear before the names of the companies refer to the index numbers on the map on page 407:

1 Northern Ohio Traction & Light Company.....Akron
2 Eastern Ohio Traction Company.....Cleveland
3 Cleveland & Southwestern Traction Company.....Cleveland
4 Lake Shore Electric Railway Company.....Cleveland
5 Cleveland, Painesville & Eastern Railway Company.....Willoughby
6 Cleveland, Painesville & Ashtabula Railway Company.....Painesville
7 Ohio & Pennsylvania Railway Company.....Ashtabula
8 Ashtabula Rapid Transit Company.....Ashtabula
9 Conneaut & Eastern Traction Company.....Conneaut
10 Pennsylvania & Mahoning Valley Railway Company.....Youngstown
11 Youngstown & Sharon Traction & Light Company.....Youngstown
12 Toledo, Port Clinton & Lakeside Railway Company.....Toledo
13 Detroit, Monroe & Toledo Short Line Railway.....Monroe
14 Toledo & Western Railway Company.....Toledo
15 Toledo & Indiana Railway Company.....Toledo
16 Maumee Valley Railway & Light Company.....Toledo
17 Toledo, Bowling Green & Southern Traction Company.....Findlay
18 Lake Erie, Bowling Green & Napoleon Railway Company..Bowling Green
19 Toledo, Fostoria & Findlay Railway Company.....Fostoria
20 Tiffin, Fostoria & Eastern Electric Railway Company.....Tiffin
21 Western Ohio Railway Company.....Lima
22 Ohio Central Traction Company.....Galion
23 Mansfield Railway, Light & Power Company.....Mansfield
24 Canton-Akron Railway Company.....Canton
25 Canton & New Philadelphia Railway Company.....Canton
26 Tuscarawas Traction Company.....New Philadelphia
27 Stark Electric Railway Company.....Canton
28 East Liverpool & Wellsville Street Railway Company.....East Liverpool
29 Steubenville Traction & Light Company.....Steubenville
30 Steubenville & Wheeling Traction Company.....Wheeling
31 Consolidated Company.....Cambridge
32 Columbus, Delaware & Marion Railway Company.....Columbus
33 Columbus, Newark & Zanesville Traction Company.....Newark
34 Columbus, New Albany & Johnstown Electric Railway Co.....Columbus
35 Columbus Railway & Light Company.....Columbus
36 Urbana, Mechanicsburg & Columbus Railway Company.....Columbus
37 Columbus, Grove City & Southwestern Railway Company.....Columbus
38 Columbus, London & Springfield Railway Company.....Columbus
39 Newark & Granville Street Railway Company.....Newark
40 Dayton, Springfield & Urbana Railway Company.....Springfield
41 Urbana, Bellefontaine & Northern Railway Company.....Springfield
42 Springfield & Western Railway Company.....Springfield
43 Springfield & Xenia Traction Company.....Springfield

44 Dayton & Xenia Transit Company.....Dayton
45 Dayton & Troy Railway Company.....Dayton
46 Dayton, Covington & Piqua Traction Company.....West Milton
47 Dayton & Northern Traction Company.....Dayton
48 Dayton & Western Traction Company.....Dayton
49 Cincinnati, Dayton & Toledo Traction Company.....Hamilton
50 Lebanon & Franklin Railway Company.....Franklin
51 Miami & Erie Canal Transportation Company.....Cincinnati
52 Cincinnati Interurban Railway Company.....Cincinnati
53 Cincinnati, Lawrenceburg & Aurora Street Railway Company...Cincinnati
54 Interurban Railway & Terminal Company.....Cincinnati
55 Cincinnati, Milford & Loveland Traction Company.....Cincinnati
56 Cincinnati, Georgetown & Portsmouth Railway Company.....Cincinnati
58 Ohio Valley Traction Company.....Portsmouth
59 Wellston & Jackson Railway Company.....Wellston
60 Camden Interstate Railway Company.....Huntington
62 Ohio River Electric Railway & Power Company.....Pomeroy
63 Parkersburg, Marietta & Interurban Railway Company.....Parkersburg
64 Lorain Street Railway Company.....Lorain
65 Victory Park Railway Company.....Put-in-Bay

ROADS UNDER CONSTRUCTION

66 Cleveland & Sharon Traction Company.....Cleveland
67 Youngstown & Southern Railway Company.....Youngstown
68 Kenton & Southern Railway Company.....Springfield
69 Toledo, Columbus, Springfield & Cincinnati Railway Company....Toledo
70 Fort Wayne, Van Wert & Lima Traction Company.....Lima
71 Springfield, Troy & Piqua Traction Company.....Springfield
72 Dayton & Muncie Traction Company.....Dayton
74 Scioto Valley Traction Company.....Columbus
77 Cincinnati & Columbus Traction Company.....Cincinnati
78 Delaware & Magnetic Springs Railway Company.....Delaware

STEAM ROADS TO BE ELECTRIFIED

57 Ohio River & Columbus Railway Company.....Cincinnati
75 Ohio River & Western Railway Company.....Woodsfield
76 Dayton, Lebanon & Cincinnati Railway Company.....Springfield

PROJECTED LINES

79 Ohio & Michigan Railway Company.....Toledo
80 Ohio Northern Railway Company.....Wauseon
81 Fort Wayne & Northeastern Traction Company.....Fort Wayne
82 Toledo & Fort Wayne Railway Company.....Toledo
83 Findlay & Kenton Railway Company.....Springfield
84 Findlay, Forest & Marion Railway Company.....Forest
85 Cleveland, Ashland & Mansfield Railway Company.....Cleveland
86 Mansfield & Eastern Railway Company.....Cleveland
87 Warren, Cortland & Jefferson Railway Company.....Cortland
88 New Philadelphia, Coshocton & Newark Railway Company.....Newark
89 Sandusky Southwestern Railway Company.....Wapakoneta
90 Dayton & Kenton Traction Company.....Dayton
91 Indianapolis & Cincinnati Traction Company.....Cincinnati
92 Columbus, Marysville & Bellefontaine Railway Company.....Columbus
93 Perry County Electric Railway Company.....New Lexington
94 Barnesville & Woodsfield Electric Railway Company.....Barnesville
95 Lorain & Southern Railway Company.....N. Amherst
96 Mansfield, Mt. Gilead & Delaware Railway Company.....Mansfield
97 Lake Erie & Southern Traction Company.....Toledo
98 Cleveland, Wooster, Mt. Vernon & Columbus Railway Co.....Mt. Vernon
99 Felicity & Bethel Railway Company.....Felicity
100 Mahoning Valley Western Railway Company.....Youngstown
101 Mansfield & Mt. Vernon Railway Company.....Mansfield
102 Indianapolis, Rushville & Cincinnati Traction Company.....Indianapolis
103 Cincinnati & Suburban Belt Line Company.....Cincinnati
104 Cincinnati, Toledo & Detroit Short Line Railway Company.....Toledo
105 Lima & Kenton Traction Company.....Akron

SCRANTON STREET RAILWAY COMPANY PURCHASES CULM BANK

The Scranton Railway Company has purchased the culm bank of the Richmond mine in Dickson City, and will carry the culm from this dump direct to the power house on Providence Road in big coal cars. The company owns a dump in the Notch, from which the culm is carried to the power house in wagons, but this proved an unsatisfactory arrangement.

It will not be necessary to erect a washery at the dump, as the boilers of the plant have been so constructed that they will burn unwashed culm. A chute, however, will be erected at the pile for the purpose of separating the rock from the culm, but further than that, it was stated at the company's offices that it will not be necessary to make any improvements.

East Lake, the summer resort of the Birmingham Railway, Light & Power Company, will be improved for the summer. An amusement company will furnish theatrical attractions. The railway company will build a new depot with different gates for embarking and discharging passengers.

TRANSFORMERS IN REPAIR SHOPS FOR TESTIMG ARMATURE AND FIELD COILS

Since the first article on the testing of motor armature and field coils, by means of an alternating-current transformer, appeared in the Street Railway Journal of Nov. 1, 1902, great progress has been made in the application of this simple method of shop testing. Although the plans used in several shops have been described in a general way recently, it may be in order here to go into fuller particulars as to some of the latest and most perfect methods that have been worked out for testing motor armature and field coils for defects.

The principle upon which such transformer tests are carried on is by no means complicated. If a short circuited coil is placed surrounding an iron core, the latter being excited by an alternating magnetic field, the short circuit coil will act like a short-circuited secondary coil on any alternating-current transformer. That is, a large amount of current will flow in it, due to the fact that the alternating magnetic field induces an alternating electromotive force in the coil, and this alternating electromotive force will cause a current to flow in the coil whenever the circuit through the coil is closed. The alternating magnetic field for testing armature and field coils is derived from a laminated iron core, around which is wound a coil through which alternating current is passed.

One of the simplest and most easily manipulated form of core for testing armatures is that employed in the armature shop of the St. Louis Transit Company. The general scheme of operation of this core is shown in Fig. 1, and the dimensions of one of the cores are given in detail in Fig. 2. In Fig. 1 the laminated iron core is shown resting on the surface of the armature to be tested. The core is wound with a coil of wire which is energized from an alternating-current circuit. If we assume that the alternating current has been turned into the coil on the transformer core in Fig. 1, it is evident that an alternating magnetic flux will pass through the transformer core and also through the armature core which completes the magnetic flux as indicated by the dotted lines in Fig. 1. As long as the coils in the armature slots are on open circuit, as is the case on a wave-wound armature, when they are not short-circuited through defective insulation of some part of the circuit, no current can flow in the armature coils, although it is evident that an alternating electromotive force is set up in those coils surrounding the alternating magnetic lines of force caused by the transformer. All coils included between the pole pieces of the testing transformer are, of course, subject to this alternating electromotive force. If, however, there is a short-circuited armature coil in any position which surrounds the alternating magnetic lines of force flowing through the armature core, a current will be set up in that coil. Such a short-circuited coil is indicated in Fig. 1. Its presence will become manifest if the transformer test is continued long enough to overheat the coil. Since the coil is short circuited a large current will flow in it. There is, however, a much quicker way to determine the location of a short-circuited coil than this. The current flowing in the coil will tend to produce a magnetic flux across the top of the armature slot in which the short-circuited coil is located, consequently, a piece of iron held just above the short-circuited coil, as indicated in Fig. 1, will be strongly attracted to the armature core, and the position of the coil is at once known.

So much for the theory upon which the test is made, as which is probably familiar to most readers of this paper. In practice in the St. Louis shops the transformer core is of the dimensions shown in Fig. 2. It is hung from a block and tackle so that it can be quickly lowered on to any armature placed beneath it. In the St. Louis shops two cores are used, one for the larger 15-in. and 16-in. armatures and one for the 11-in. The same core does service on armatures of approximately the same size, as it is not necessary that the pole piece of the core fit abso-

lutely the surface of the armature core. The coil on the transformer core consists of twenty-eight turns of No. 6 wire. Alternating current is supplied to it from an 8-kw alternating-current generator, giving 110-volt, 125-cycle single-phase alternating current. This generator is direct coupled to a 500-volt

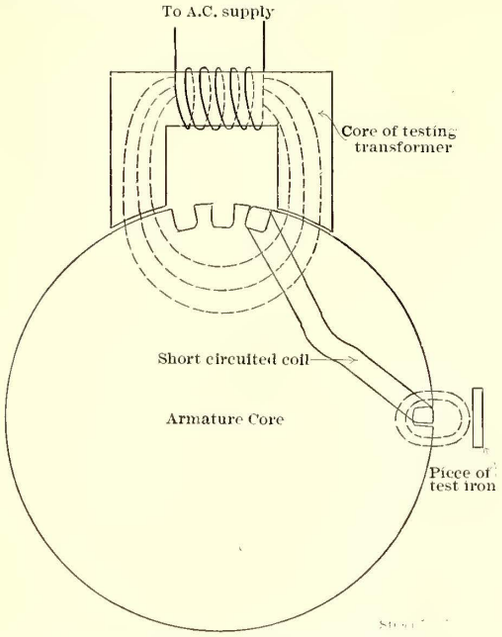


FIG. 1.—SCHEME OF TRANSFORMER TEST FOR SHORT-CIRCUITED ARMATURE COILS

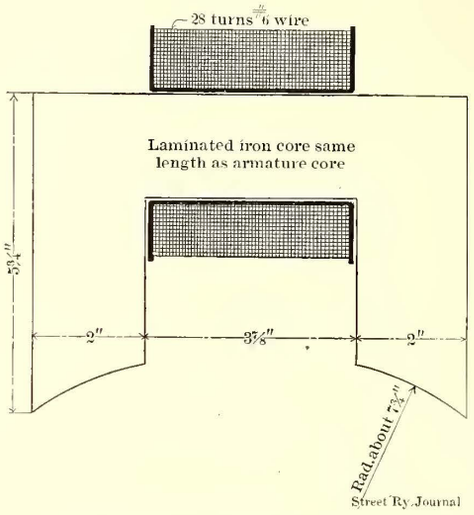


FIG. 2.—SECTION OF TRANSFORMER CORE FOR ARMATURE TESTS, AS USED IN ST. LOUIS

motor. The current is turned on and off the transformer coil by a switch within easy reach of the operator making the test on an armature. In making a test the armature is placed on a truck, which is run under the testing core, and the latter is lowered onto the surface of the armature. The alternating current is turned into the transformer coil. The attendant then passes a piece of soft iron around those parts of the armature core, 90 degs. from the part included between the poles of the testing core. The presence of a short-circuited coil makes itself at once felt by the attraction of the piece of iron to the core.

The test having been completed with the armature in one position, the attendant turns off current, and as a guide quickly marks with a piece of chalk the points of the armature core included between the pole pieces of the testing transformer. He then moves the armature core around to test another section of the armature, and so on until the entire armature has been tested, or, in other words, until every portion of the armature core has been brought between the pole pieces of the testing core. This test can be carried on very rapidly, and requires no special skill or delicate apparatus. In fact, it is the absence of delicate apparatus that recommends the transformer tests so strongly to practical electric railway shop men.

The testing of field coils for short circuits is carried on at St. Louis by the apparatus shown in Figs. 3 and 4. In this apparatus the transformer core has a hinged yoke across the top, which is counterbalanced by the cylindrical weight shown on the ends of the levers at the right. This top yoke is hinged and provided with a handle so that it can be raised, as in Fig. 3, to admit of placing the field coil to be tested on the core. After the coil has been put in position this top yoke is lowered as in Fig. 4. The coil of this transformer has seventy-eight turns of No. 5 wire. It is connected to the 8-kw, 110-volt alternating-current generator, from which the armature testing is done. Just above the transformer is a panel containing the switch which controls the circuit to this transformer coil and also an ammeter, which indicates the current flowing to the transformer. If there is no short circuit in the field coil which is being tested, the current flowing to the transformer coil will be so small as to be scarcely noticeable on the ammeter. If, however, there is a short circuit in the coil, even if it is but one turn, an appreciable current will flow, as indicated by the ammeter, and that one coil will shortly become red-hot. The counterbalance weight on the top yoke is arranged so that the yoke will remain either up or down, according to the way it is placed.

For testing armatures for open circuits, a plan used in the shops of the Metropolitan West Side Elevated Railway, in Chicago, gives quick and certain results. The armature is placed in a rack where it can be revolved by hand, and brush holders are mounted on this rack so that the brushes bear on the commutator, 90 degs. apart, just as on the ordinary railway motor. Alternating current is then passed from one brush to another and the armature is revolved by hand. If there is an open circuit in any of the coils it will be made manifest by flashing at the commutator between the bars where the open circuit is located. When the bars pass a brush in the Metropolitan

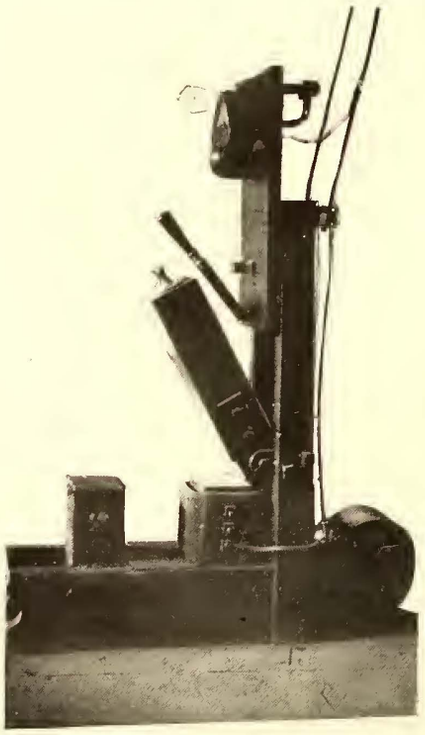


FIG. 3.—FIELD COIL TEST, TRANSFORMER CORE OPEN

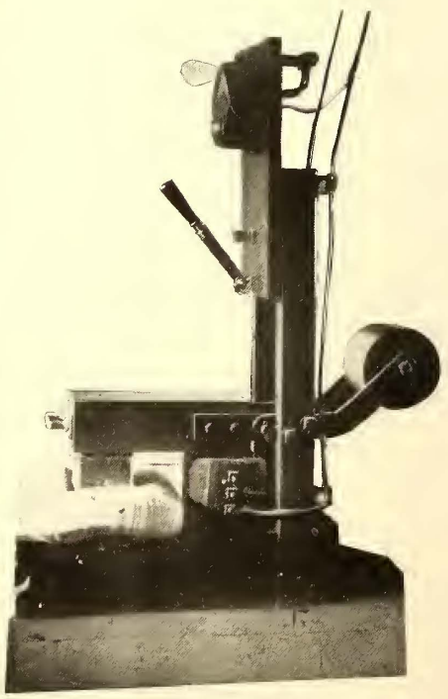


FIG. 4.—FIELD COIL TEST, TRANSFORMER CORE CLOSED

Elevated shops an alternating current of 250 amps. at 80 volts is passed through the armatures of G. E. 2000 motors. This current also serves to burn out any short circuits, due to pieces of copper or solder between commutator bars or short circuits

in armature coils. Either this test or the transformer test, before described, serves to burn out short circuits between commutator bars caused by small pieces of metal. Such short circuits will be burned out with a pop as soon as the current is applied, leaving the armature clear of such faults. The Metropolitan test is only useful when a large volume of current is passed through the armature.

A SUGGESTED NEW PLAN OF WORK FOR THE STREET RAILWAY ASSOCIATIONS

THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY
Milwaukee, Wis., Feb. 29, 1904.

EDITORS STREET RAILWAY JOURNAL:

Most of your readers are probably aware that a movement is now on foot looking to the organization of an association of electric railroad "way" engineers and superintendents.

The numerous communications received to date indicate a general appreciation of the necessity for some such society, and tender a generous support for the association when formed.

It has been urged, however, that the isolation of this branch of the electric railroad business in another distinct organization is probably not the most effective method of handling the matter, and two other schemes have been proposed. The intention of this letter is to lay these propositions before the street railroad presidents, managers and other officials throughout the United States and Canada for their consideration and advice, and with the hope that definite opinions may be arrived at and sufficient interest aroused to guarantee the formation of some plan of action before the next meeting of the American Street Railway Association, and the due furtherance of such plan at that meeting.

The least radical and least comprehensive of the plans mentioned suggests a reorganization of the American Railway Mechanical and Electrical Association, under the name "American Society of Electric Railway Engineers," that society to include all the mechanical divisions of street railway work. Sub-divisions could then be effected, probably, as follows: "Rolling Stock and Shops," "Way and Structures" and "Power Houses," sub-committees being appointed to conduct each phase of the work. This plan would save the expense necessary to the formation of another distinct organization, and would serve to give the present organization much wider support.

However, it has been justly urged that the formation of these various distinct societies is gradually tending to strip the parent body (the American Street Railway Association) of all the functions for which it was organized. This is, of course, due in great measure to the fact that there has not been room, time or method in the meetings of that body to permit a satisfactory or thorough discussion of enough subjects in any one branch of the work. It may not be possible or advisable to extend the length of time of these meetings (that is a moot question), but it certainly does seem both possible and advisable to so change the method of these meetings as to make them thoroughly effective along all the lines embraced in electric railroading. It is, therefore, respectfully suggested that a reorganization of the American Street Railway Association, by the presidents and general managers representing companies therein, or who may wish to affiliate with such reorganized association, is possibly advisable.

The plan indicated and outlined in numerous letters received to date is approximately thus:

The association's active members to consist of owning or operating companies as represented by their presidents, general managers or other duly accredited representatives.

These active members to have full control of all executive matters and a general direction of the sub-divisions covering all the phases of the work.

The sub-divisions could be determined only after more thorough discussion, but would be approximately "Accounting," "Legal and Claims," "Transportation," "Way and Structures," "Rolling Stock and Shops," "Power Houses."

Each of the sub-divisions to constitute a sub-society represented in the main body by a vice-president, elected by the members of each sub-society. The active members to pay a small fee, and consist, as may be afterwards determined, of the persons having charge of that particular class of work on the electric railways affiliated with the main association.

This vice-president to appoint his committees, and the sub-association to carry on its work exactly as though it were a distinct organization, except that it will be under the general direction of the presidents and general managers constituting the parent body, at whose will all of the present organizations exist. The present accountants' association need not lose its individuality in any manner inconsistent with causes permitting its existence at this time. Sub-association meetings could be made to lap one another so that no one representing different departments need suffer. Thus the accountants and the way men might meet at the same time, as also the transportation and the power house men. The publication of the discussions would be information enough for those not directly interested, and methods could be devised within each sub-society that would tend to the maximum benefit within the minimum time. Papers should be published and distributed sixty days in advance of the meetings, discussions prepared, boiled down and methodically handled, sub-committee meetings held when necessary during the year, business handled by the various vice-presidents and sub-secretaries, so that each meeting of the reorganized association would be of such value to street railway work that no company could afford to remain unattached thereto.

An expression of opinion as to the above is earnestly solicited, in order that a plan of some kind may be decided upon. The necessity for some action which will give the "Way" men, the "Transportation" men and others whose work up to the present time has been neglected a chance to progress along lines similar to the two independent societies now in existence, is being widely recognized.

The scheme to reorganize the American Street Railway Association, as outlined above, has been suggested through letters received and opinions expressed by the following gentlemen, who are absolutely favorable thereto: John I. Beggs, president and general manager of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.; S. L. Tone, vice-president Pittsburg Railways Company, Pittsburg, Pa.; C. D. Wyman, representing Stone & Webster, Boston, Mass.; R. B. Baer, president and general manager Galveston City Railway Company, Galveston, Tex.; J. F. Vail, general manager Pueblo & Suburban Traction Company, Pueblo, Col.; G. S. Kimball, chief engineer Boston Elevated Railway Company, Boston, Mass.; C. D. Emmons, general superintendent, Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.

FRED. S. SIMMONS,
Superintendent Construction and Maintenance of Way the Milwaukee Electric Railway & Light Company.

A bill has been introduced in the Ohio Legislature providing that in case of damage suits for personal injuries caused by electric cars, the company must turn over to the plaintiff the names of witnesses taken at the time by the crew of the car. Failure to comply shall be taken as evidence of negligence on their part. Another bill confers upon conductors and motormen of interurban cars the same police powers now enjoyed by conductors of steam railroad trains.

A COMPARISON BETWEEN DIRECT-CURRENT AND SINGLE-PHASE RAILROADS

At the meeting of the Cincinnati branch of the American Institute of Electrical Engineers, Feb. 16, W. A. Blanck, of the Arnold Electric Power Station Company, of Chicago, read a paper on "Single-Phase Railroads," which was also presented at the Chicago branch March 8.

By way of introduction Mr. Blanck says that in some sections of the country most of the best interurban railway propositions have been already taken up. There are, nevertheless, still a great many which would be profitable in case a system could be developed which would materially reduce the cost per mile. For some time the perfection of a single-phase motor has been suggested as the solution of this problem, since it allows great reduction in the cost of the transmission system.

In order to consider more in detail the relative merits of the alternating-current and direct-current systems of distribution from sub-stations, parallel computations and diagrams may be made for the case of a 60-mile single-track interurban road. The power house is assumed to be located at the center of the line, and to contain one sub-station, and that the four remaining sub-stations are located at equal intervals on the line. Although the alternating-current system would not require sub-stations at so frequent intervals, they are retained, as in the direct-current system, on account of the advantage to be derived from the sectionalizing of the line and the more advantageous distribution of power due to the larger number of feeding points. The schedule proposed consists of five local cars, having 1-hour headway, one express car, making the round-trip in 3 hours, and one freight and baggage car, making the trip between the two terminals in about 8 hours.

The average power required by the various cars in kilowatts will be as follows:

	Weight in tons	Schedule speed in m. p. h.	Watt-hours per ton mile	Kilowatt-hours per trip	Average power in kilowatts
Local car	30	25	80	144	60
Express car ..	35	42.8	110	231	165
Freight car ..	30	12.5	70	126	25

With the schedule outlined above, the average load on all five sub-stations will be about 500 kw, or 100 kw per sub-station, while the maximum load per sub-station, under certain conditions, is 450 kw, as when, for instance, the case arises that the express car is starting and two locals are running in one section. With a proper momentary overload allowance this assumed condition will require one 300-kw rotary converter per sub-station to be installed in the direct-current system. In the alternating-current system, however, a static transformer of 200-kw capacity per sub-station will be ample. The maximum load at the power house will be 800 kw, and two 400-kw units will suffice, if for the purpose of this comparative study no reserve capacity be provided either in power house or sub-stations. In both cases step-up transformers raise the total generator output to the high transmission voltage, and a step-down transformer set is placed in the power house. Although the power house sub-station could take its supply directly from the generators it was preferred to use one general form for all sub-stations, and thus avoid special switch arrangements.

For the three-phase transmission lines of the d. c. railroad system three No. 6 wires are assumed, and for the single-phase transmission line two No. 4 wires, costing, respectively, $10,000 and $11,500.

The proportions of the distributing system have been worked out along the following lines: For the direct-current system it was assumed the maximum drop of a car starting at its maximum distance from sub-stations should be approximately 200 volts, or about 30 per cent. This will be accomplished by installing two No. 000 trolleys and No. 0000 feeder capacity between sub-stations, and 500,000 circ. mils feeder for the stub ends. The cost of the copper under these conditions will be about $95,000.

For the alternating-current system the size of the trolley has been determined rather from mechanical than from electrical considerations. A No. 00 grooved trolley has been assumed installed throughout the length of the line, since for this class of service it is not practical to use a smaller size. The cost of the copper in this case will be $21,500.

In determining the drop for this system 80 per cent power factor has been assumed, and it will be noted that the maximum drop under the same conditions as above mentioned will be 190 volts between sub-stations, or 6.25 per cent, and 380 volts on stub ends, or 12.5 per cent, showing a very considerable advantage in favor of this system.

As to the motor equipment in the two systems, at present the alternating-current motor weighs somewhat more than the direct-current motor, and operates at a slightly lower efficiency. However, the smaller efficiency of the alternating-current motor is more than counterbalanced by the small percentage loss in the alternating-current distributing system. And, furthermore, with the rapid development now taking place in the alternating-current motor, it is safe to assume that in the very near future its characteristics as to weight and efficiency will soon equal those of the direct-current motor, thus making the advantage of the alternating-current railroad system still more evident.

An idea of the relative investments for the two systems may be best obtained by arranging in parallel columns the cost of the various items, as is done in the table below:

ESTIMATED COST OF THE ELECTRICAL EQUIPMENT OF A 60-MILE SINGLE TRACK INTERURBAN RAILROAD

Power House:—	D. C. System	A. C. System
Building	$10,000	$10,000
Foundations	2,500	2,500
Boilers and settings	12,000	12,000
Steam piping and covering	7,500	7,500
Engines	22,000	22,000
Generators: 2 400-kw	18,000	23,000
Exciters	1,000	1,000
Step-up transformers 800 kw.	8,000	7,500
Switchboard	3,500	3,000
Wiring	3,000	2,500
Feed-water heater	800	800
Pumps	800	800
Coal storage	1,000	1,000
Smoke-stacks and flues	2,000	2,000
Fuel economizers	3,000	3,000
Stokers	3,500	3,500
Incidentals	4,400	4,400
Total	$103,000	$106,500
Sub-Station in Power House:—		
Building extension	1,000	600
Rotary converter, 300-kw	4,800	....
Transformer 300-kw; 200-kw A. C.	3,200	2,000
Switchboard	2,000	1,300
Wiring	1,000	500
Incidentals	600	200
Total	$12,600	$4,600
Forty-eight Miles Transmission Line:—		
Poles charged to trolley line	....	....
Copper	$10,000	$11,500
Insulators, pins and cross-arms	7,500	5,000
Erection	4,000	3,000
Incidentals	1,000	1,000
Total	$22,500	$20,500
Sub-Station Along the Road:—		
Building	$2,000	$1,000
Rotary converter	4,800	....
Step-down transformers	3,200	2,000
Switchboard	2,000	1,300
Wiring	1,000	500
Incidentals	500	200
Total	$13,500	$5,000

Four sub-stations	$54,000	$20,000
Trolley Line and Feeder:—		
Poles, 3,500	$17,500	$17,500
Poles distributed and set	4,000	4,000
Guys and anchors	2,000	2,000
Brackets with hangers	18,000	25,000
Copper, D. C., Feeder, 12 miles, 500,000 cm; feeder, 48 miles, No. 0000; trolley, 120 miles, No. 000	95,000	....
Copper, A. C., Trolley, 60 miles, No. 00	....	21,500
Feeder insulators	2,000	....
Erection	10,000	4,000
Incidentals	7,500	4,000
Total	$156,000	$78,000
Bonding of Rails:—		
Both rails bonded	$30,000	....
One rail bonded	....	$15,000
Cross bonds	2,000	1,000
Total	$32,000	$16,000
Rolling Stock:—		
Ten vestibule passenger cars each equipped with four motors and weighing about thirty tons	$75,000	$85,000
Two express passenger cars, equipped with four motors and weighing about thirty-five tons	18,000	20,500
Two baggage cars, each equipped with four motors and weighing about thirty tons.	10,000	12,000
Snow-plow and construction car	7,000	8,500
Total	$110,000	$126,000
RECAPITULATION		
Power house	$103,000	$106,500
Sub-station in power house	12,600	4,600
Transmission line	22,500	20,500
Sub-stations	54,000	20,000
Trolley line and feeder	156,000	78,000
Bonding	32,000	16,000
Rolling stock	110,000	126,000
Total	$490,100	$371,600
Cost per mile D. C. system	$490,100 ÷ 60 =	$8,168
Cost per mile A. C. system	371,600 ÷ 60 =	6,193
		$1,955

The decrease of A. C. cost in terms of D. C. investment, 25 per cent.

The increase of D. C. cost in terms of A. C. investment, 32 per cent.

It is not necessary to take up in detail all the items, as they speak for themselves, but it may be of interest to note some items in which the costs vary more widely.

The single-phase generators, as would be expected, cost nearly 30 per cent more than three-phase generators, amounting to $5,000. Small savings on switchboard and wiring reduce the total for the power house $3,500 in favor of the direct-current system.

For the sub-station in the power house, principally on account of saving in converter and transformer capacity, the balance is $8,000 in favor of the alternating-current system.

The transmission systems are approximately the same, there being $2,000 in favor of the alternating-current system.

In the alternating-current distributing system, while the suspension of the trolley is noticeably more expensive than in the direct-current system, on account of special insulators, the immense saving in copper gives a balance of $78,000 in favor of the alternating-current system.

The necessity of bonding but one rail effects a saving of $16,000 in favor of the alternating-current system.

A very liberal allowance has been made by placing the cost of the alternating-current motor equipments one-third in excess of that of the direct-current motor equipment; this, as above noted, is the present cost of alternating-current equipment, and without doubt in the near future this difference will be greatly reduced.

Mr. Blanck also takes up the practical details of construction of a single-phase alternating-current railway system, beginning with the type of motor to be used. He describes briefly the use of a single-phase synchronous motor on a locomotive, to drive a direct-current generator, which in turn operates direct-current motors to drive the car axles, as proposed by H. Ward Leonard and as worked out by the Oerlikon Machine Works. He also sums up the status of the other motors as follows:

The alternating-current series motor, as proposed by Lamme and Finzi, and manufactured by the Westinghouse Company, possesses all the characteristics of a direct-current series motor, and is, therefore, directly applicable to railroad work. The current passes in series through the field and armature, which latter is similar to the ordinary direct-current drum type armature with commutator. Since the series commutator motor cannot be operated at high voltage, it is necessary to use a step-down transformer in connection with a high-tension trolley, thus increasing the weight of the car equipment.

The repulsion induction motor, developed by Steinmetz and Schuler, and manufactured by the General Electric Company, shows in general the same performance as the straight-series motor, and can be fed directly from the high-tension trolley, since the armature is independent of the field. The current is induced in the armature by transformer action, and can be of any desired voltage. The brushes are short-circuited and placed at such angle as will give best running conditions.

Repulsion Series Motor.—The repulsion series motor, developed by by Winter and Eichberg, and built by the Union Electric Company, Berlin, Germany, is similar to the repulsion induction motor with the addition of a second set of brushes, displaced 90 degs. from the short-circuited brushes. Through these brushes current is supplied by a series transformer, for the purpose of decreasing the sparking at less than synchronous speed, and at the same time securing the important additional advantage of raising the power factor nearly to unity.

Controllers.—In general, the operation of the last three motor systems is effected by master controllers operating suitable contactors to get the desired combinations. Induction regulators are used in all three cases to secure the voltage variation necessary for speed control, thus avoiding the losses consequent to the rheostatic control of the direct-current system.

Car Wiring.—In order to protect passengers and crew from the high potential used in this system, it is necessary that the wiring should be done in metallic conduit; this should be connected to the trucks so that any defect in the insulation of the circuit will result in the tripping of the automatic circuit breaker in the car. Moreover, it will be necessary to insulate the steps and hand-rails to guard the passengers from shocks, which might result from wet weather or car standing on a dirty rail.

Trolley Bow.—With the high-tension working conductor it is necessary to provide against any possible short-circuiting of the trolley and its suspensions. On account of the serious results which would follow the slipping of the trolley pole, so common in the present system, a suitable bow must be used instead. It should be of such length that no manipulation will be necessary in reversing the car. This trolley bow is mounted on a well-insulated platform on the roof of the car, which also supports the springs necessary to maintain the requisite pressure between the bow and the trolley wire. A small air cylinder, mounted on the same platform, operated by compressed air from the brake system, should be so connected as to lay the bow flat on the roof of the car, in case the necessity arises to temporarily disconnect the bow from the trolley.

The contact part of the bow can be made either of soft copper or aluminum, and the necessary lubrication is accomplished by

grease, applied in a slot extending the length of the bow.

The bow trolley in use on the Valtelina road, in Northern Italy, with a working pressure of 3000 volts, consists of copper cylinders rolling in insulated ball bearings. Brushes take the current from these revolving cylinders to the steel tubes carrying the contact piece.

Trolley Line Construction.—Great care must be given to the construction of the high-tension trolley line in order to avoid damage to life and property. Notwithstanding the prevalent idea that the danger of these high-tension trolleys will handicap the development of alternating-current railroads operated over public property, there is no reason why they should not be made as safe as the high-tension distributing systems of lighting companies, now so common on public property. It is of first importance to provide such a hanger as shall readily withstand the working pressure of the system, and can be easily replaced in case of mechanical or electrical defect.

The trolley construction on the Lansing, St. Johns & St. Louis, equipped for the Arnold experiments, was then described (see Street Railway Journal, Jan. 2, 1904), and also a trolley line construction similar to that used on the Valtelina Railroad. If the road passes along a public highway special precautions should be taken to avoid accident. One solution is to suspend the working conductor at intervals of about 10 ft. from two steel wires. In case of mechanical break in the trolley wire the end cannot reach the ground or injure passers-by. This construction increases the carrying capacity of the trolley with but slightly greater investment. A construction somewhat similar to this is in use on the single-phase railroad near Berlin.

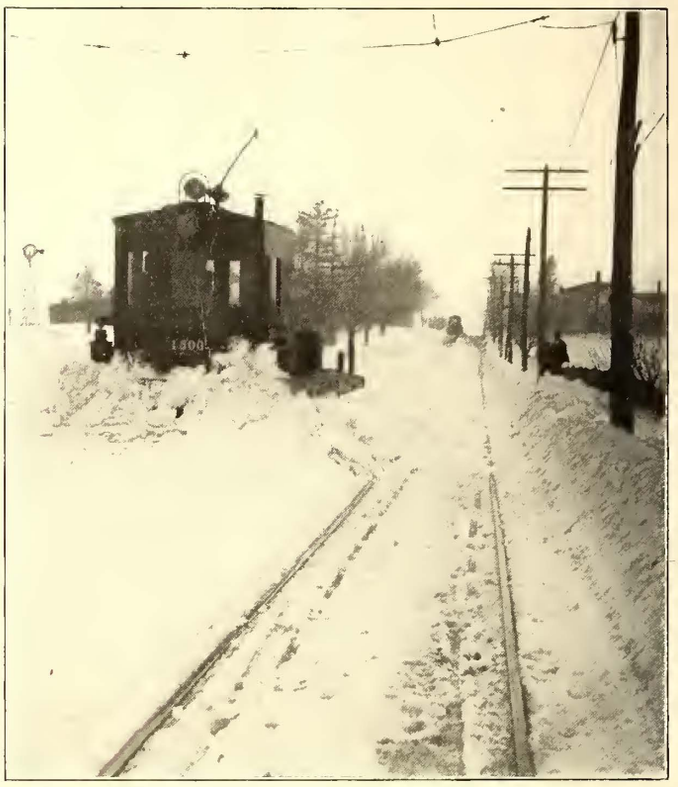
In regard to rail return, with the proposed frequency of 25 cycles per second, and the small current required with the higher voltage, this portion of loss will be even smaller than in direct-current work, so that for normal interurban service it will be sufficient to bond only one rail. This has the advantage (greatly to be desired in many cases) of leaving the other rail free for the purpose of block signals. Furthermore, the evils of electrolysis are completely avoided with the alternating-current system.

APPLEYARD SYNDICATE WINS IN TAX SUIT INSTITUTED BY COUNTY COMMISSIONERS

The Appleyard syndicate, owners of the Ohio River & Western Railway, a steam road operating from Zanesville to Wheeling, have been successful in the suit brought by the County Commissioners against the company to collect rental and back taxes of $70,000, claimed to be due on 7 miles of roadbed in Muskingum County. This civil suit has held up the plans of the syndicate for electrifying the road as planned. C. A. Alderman, chief engineer of the Great Northern Construction Company, which will rebuild the road, states that work is to start as soon as possible.

LARGE SNOW PLOWS IN DETROIT

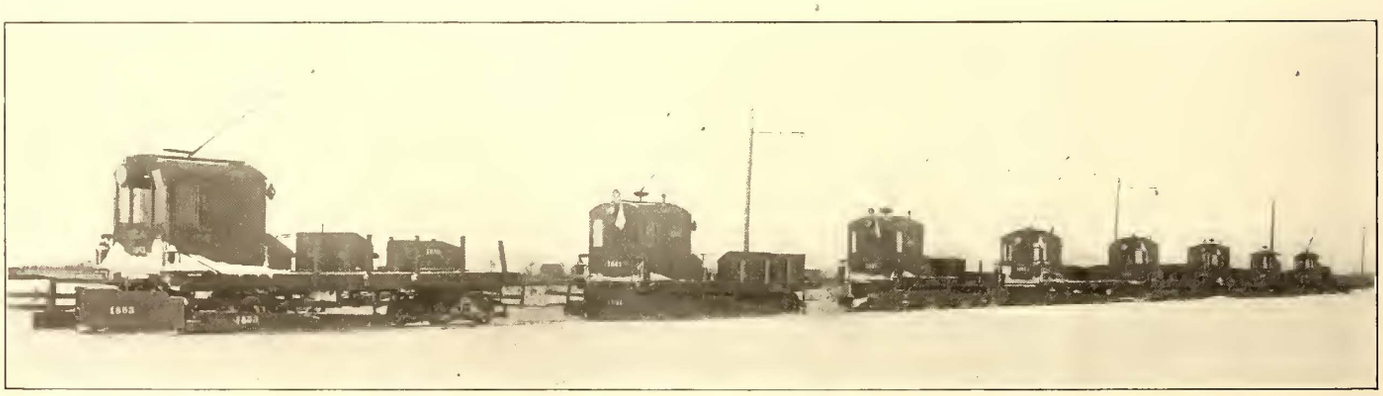
The city and interurban system of the Detroit United Railway Company is so extensive that the provisions made for clearing snow necessarily have to be most complete. For the interurban lines, namely, the Rapid Railway, Flint, Pontiac, Orchard Lake and Wyandotte divisions, reliance is chiefly placed upon a number of large nose snow plows, which are of particular interest owing to the fact that the nose is operated pneumatically. The air cylinders are located directly over the plow, and can be seen in the engraving.



DETROIT SNOW PLOW AT WORK

The plow is set to the proper height by a turn-buckle in the bar connecting the plow with the horizontal bar joining the pistons of the two air cylinders. When in use the turn-buckle is so adjusted that about half the weight of the plow rests upon the track. When lifted up with air the plow is about 6 ins. from the track. The back ends of the large side bars, which are part of the frame of the plow, are pivoted at about the middle of the car. Each car and plow combined weigh about 24 tons. They are equipped with four G. E. 57 motors and an air compressor, and are also used as locomotives for handling heavy freight.

The side wings are about 18 ft. long, and are pressed out-



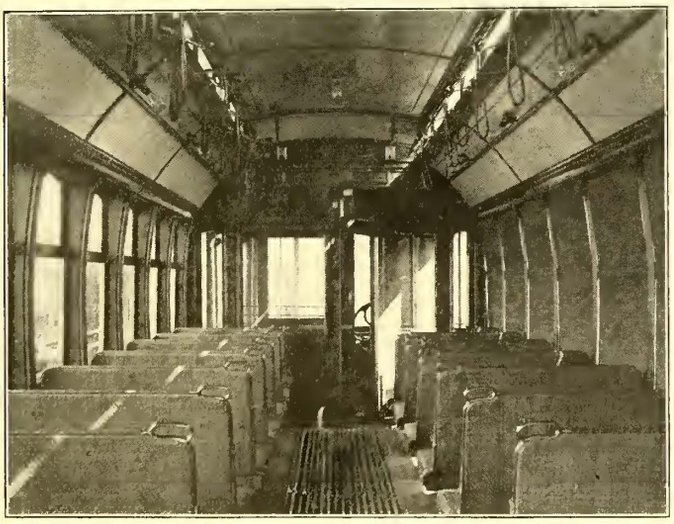
ROW OF ELECTRIC SNOW PLOWS

ward by a wheel at the rear of the vestibule. They have a movement outward of about 8 ft. The nose of the plow is fitted with a kind of rubber for taking the snow from the devil strip between two tracks, and which can be set to the right or left by a lever on top of plow. The company has erected a number of posts along the line to mark all gate and highway crossings in the track. When the operator notices one of these markers he raises his plow about 2 ins., until he is sure he is on the crossing, then he drops it immediately down on the rail. The boxes shown at the back of the car are for sand and salt.

One of the engravings shows car No. 1800 clearing a track on the Pontiac division of about 3 ft. of snow, and is from a photograph taken last month. The plows were designed by J. Kerwin, superintendent of tracks of the Detroit United Railway Company, and were built in the shops of the company.

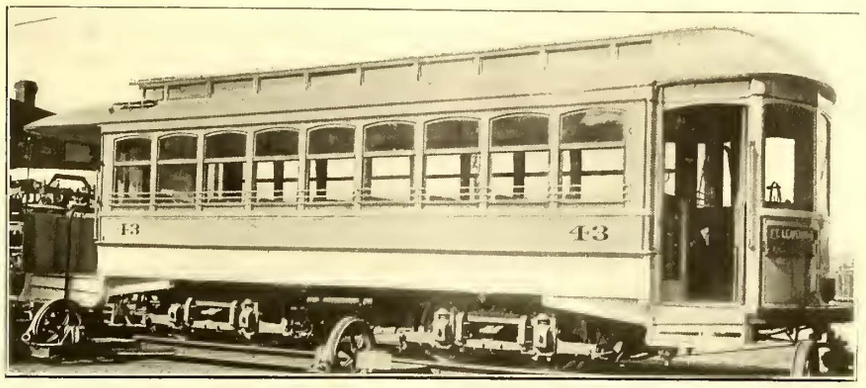
SEMI-CONVERTIBLE CARS FOR KANSAS CITY-LEAVENWORTH RAILROAD

The Kansas City-Leavenworth Railroad Company has recently received four semi-convertible cars of the Brill patented type from the American Car Company, of St. Louis. As shown in the accompanying cut the cars have a combination of features making them suitable for both city and interurban service. The "Detroit" platform at the rear is distinctly a city car feature, while the enclosed vestibule, with motorman's cab at the forward end, gives the car an interurban character. The Brill 27-F trucks, on which the cars are mounted, carry the cars low and at the same time are capable of running 30 m. p. h. to 35 m. p. h. The platform steps are 17⅞ ins. from the railhead, and from step to platform is 15 ins. The cars are furnished with transversely placed walk-over cane seats, seating thirty-five passengers. The interior view of the car gives an idea of the width of the aisle, maximum width being obtained by not having wall window pockets. The cars are 8 ft. 6 ins. over the posts at belt, which, allowing 2 ins. on each side for the walls and 36 ins. for the seats, leaves the aisle 26 ins. wide. The window sills being extra low in this type of car, three-bar window guards, extending from corner post to corner post on either side, afford protection to passengers' arms when the sashes are raised into the roof pockets.



INTERIOR OF KANSAS CITY-LEAVENWORTH CAR

The motorman's cab in the vestibule is arranged similar to that of the cars of the Rapid Railway, of Detroit, recently built by this company. A partition extends at an angle from the vestibule corner post and is met with a swinging door hinged to the door post of the car. In the corner of the cab thus made a vertical brake wheel is situated.

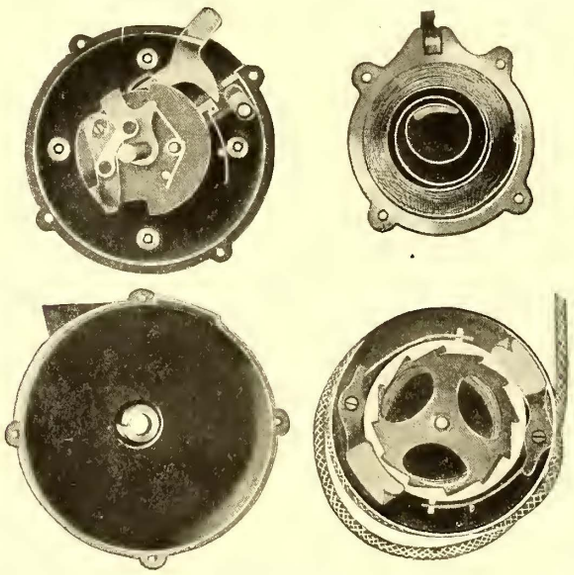


CAR FOR KANSAS CITY-LEAVENWORTH RAILROAD

The length of the cars over end panels is 25 ft. 4 ins.; over crown pieces, 37 ft.; from panel over crown piece at the forward end, 4 ft. 8 ins., and at rear end, 7 ft.; width over sills, 8 ft. 2½ ins., and over posts at belt, 8 ft. 6 ins.; from center to center of side posts, 2 ft. 8 ins.; thickness of corner posts, 3¾ ins., and side posts, 3¼ ins.; sweep of posts, 1¾ ins. The side sills are 4 ins. x 7¾ ins., plated with 12-in. x ⅜-in. steel, to which the posts are firmly secured, besides being strongly tenoned and strap-bolted. The end sills are 5¼ ins. x 6⅞ ins. The platform timbers are reinforced with angle-iron. Extra angle-iron knees at the center extend along the center body sills to a point well inside the body bolster. The floors are double, with mineral wool between. The trucks have a 4-ft. wheel base, 33-in. wheels, and are equipped with four 38-hp motors per car.

TROLLEY RETRIEVER FOR CITY AND SUBURBAN SERVICE

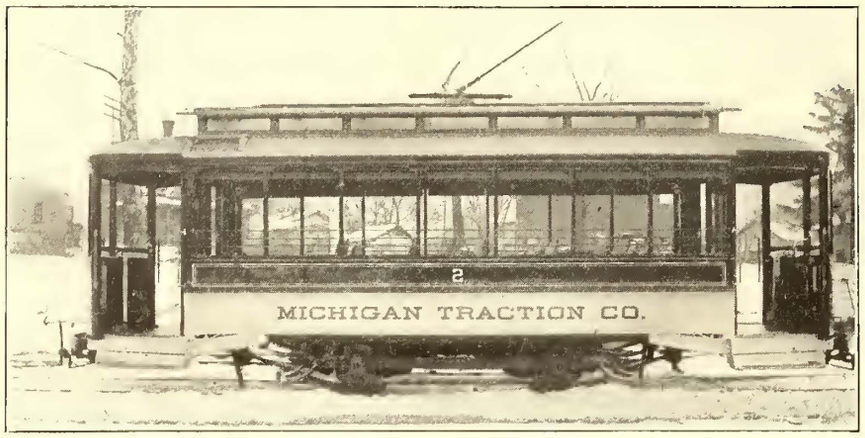
The Trolley Supply Company, of Canton, Ohio, has just completed its new Knutson retriever No. 3, the details of which are shown in the accompanying cuts, and claims that it is the best retriever it has ever put upon the market. Its retriever No. 2, which has been in general use for a long time, has been the medium through which the company has successfully established, in a practical way, the economic value of the retrieving principle in trolley catchers. Realizing the need for a smaller



DETAILS OF TROLLEY RETRIEVER

and less costly retriever for city and suburban service, the No. 3 was built, and carefully experimented with for nearly half a year, until every chance of defective mechanism was eliminated.

Style No. 3 is 6 ins. in diameter, 7 ins. deep, weighs 18 lbs., and can be easily carried from end to end of car if desired. It is built upon the same mechanical principle as the No. 2, and



CAR READY FOR WARM WEATHER, WINDOWS DOWN AND VESTIBULES OPEN

the valuable feature of a retrieving mechanism that is set automatically without touching the machine has been preserved, a feature no other retriever is said to possess. The advantage of this is that when the retrieving mechanism is once set it cannot fail to act accurately, and there is no chance of its being rendered inefficient because of carelessness on the part of the operator. The mechanism is reset, after the trolley has jumped the wire and been retrieved, by allowing the trolley pole, slightly aided by the hand, to pull out rope till the wheel has been guided upon the wire, when the operator, by pulling out a few inches more of rope, brings the mechanism to a point where it locks itself automatically.

It is claimed in regard to devices that have to be set by pressing a button on the machine, that if the operator, in his hurry, puts the trolley back upon the wire without setting the retriever, it will, of course, not act; or, if he does not set it just right, it will retrieve too far, or not far enough, inefficient service being the result.

SEMI-CONVERTIBLE CARS USED BY THE MICHIGAN TRACTION COMPANY

The accompanying cuts illustrate several semi-convertible cars that were built for city service in Battle Creek and Kalamazoo, by the John Stephenson Car Company, for the Michigan Traction Company. Fig. 1 shows the exterior of the car closed. Fig. 2 shows the car open for summer service, and Fig. 3 is a view of the interior.

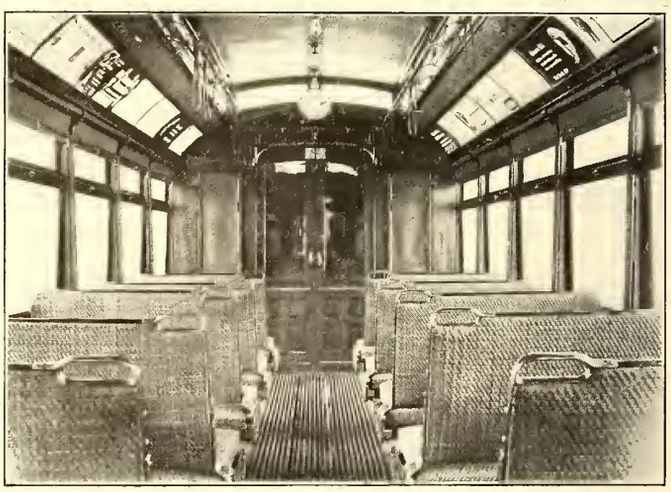
The lines of both Kalamazoo and Battle Creek have been fully equipped with this type, and the old equipment formerly used has been discarded. The cars are 20 ft. 6 ins. over body, with 5-ft. platforms.

These cars are equipped with Brill 21-E trucks furnished with extension braces, Westinghouse 12-A-30 double motor equipments with platform circuit breakers, Consolidated Car Heating Company cross-seat heaters, Syracuse changeable incandescent headlights, Parmenter fenders, International registers and illuminated destination signs.

CONVERTIBLE CARS OPERATED IN TORONTO

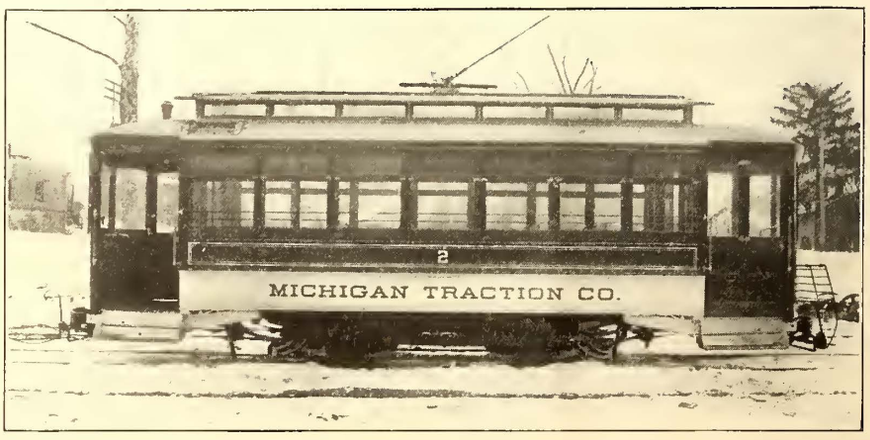
The accompanying illustrations show one of twenty-nine convertible cars built and operated by the Toronto Railway Company. The first car was constructed about a year ago, and in view of its satisfactory service during that time the railway company determined to build more. This type was designed by Michael Power, the company's master mechanic, and is controlled by the Convertible Car Company, of Toronto, Can.

The appearance of the car is in conformity with the general pattern adopted by the Toronto Railway Company. The car body is straight, all below the sashes being of 5/8-in. narrow-tongued and grooved hardwood, bevel-edged, stained and varnished a dark, rich natural color, ornamented with a gold striping. These strips can be kept in stock already stained and varnished, so when a car side is broken in collision with vehicles, the injured piece can be taken out easily and replaced. This method is claimed to be far superior and more economical than any other paneled or beveled construction. All the sashes are stationary and fixed in the movable side sections, and do not permit any possibility of drafts coming in underneath or around the sashes. This car, when closed, is unlike other convertible cars, in that there is nothing in the interior or exterior



INTERIOR OF CAR USED BY THE MICHIGAN TRACTION COMPANY

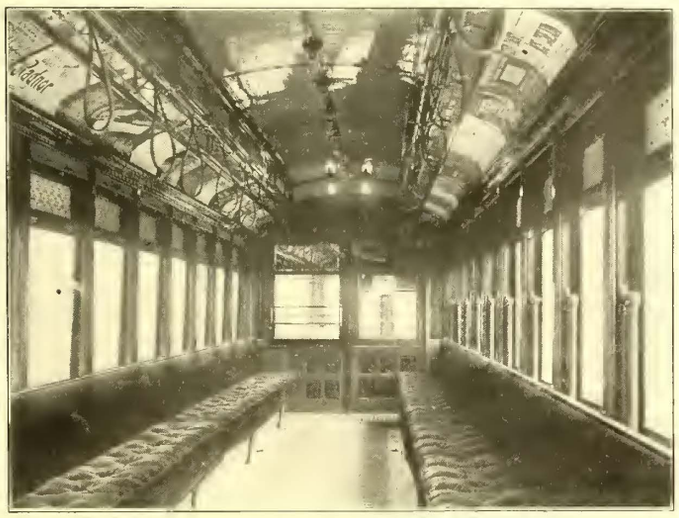
lines to affect the appearance, since no provision is necessary in the walls or roof for storage of the side sections. The only difference to attract attention is the stationary summer hand rails,



CAR READY FOR COLD WEATHER, VESTIBULES CLOSED

which remain permanent on the side posts behind the seat-back of the closed car. These rails, however, are so constructed as only to take up space which is occupied by the sash frame on the inside of the car. They do not interfere with the light of the car nor are they visible from the outside. The shades may be pulled down in a groove inside of the hand rails, and the winter sections placed in position without any interference. By using this construction the side of the car, when in the closed form, is not defaced by the removal of the hand rails.

As an open car this construction is said to possess all the features of the very best cars of that type. The seats, when converted, can always be used to ride facing the front. One small section of sash remains intact at each corner, so that proper anchorage may be obtained to prevent the wrack or straining which might possibly take place under certain conditions. The panel is, however, very low, and the narrow sash in each corner may be dropped to the car sill for summer purposes. The doors remain in position at the car ends, and in warm weather may be opened to allow freer ventilation. The removable side sections are made of ordinary seasoned wood, and are held in position by rounded iron buttons, made to conform or clip the iron band at the belt rail or sash



INTERIOR OF TORONTO CONVERTIBLE CAR

bottom. These buttons are held in position by a sink bolt, the nut of which is imbedded in the car post. Above and adjacent to the car transom or sash top is fixed another type of button, in which rubber cushions are inserted in both ends, each of these ends bearing on the removable sections. The rubber is provided to keep a tension on the sections in the event of their becoming loose by reason of shinkage or from any other cause. These buttons are secured in the same manner as the other buttons.

These buttons present a very effective means of holding the sections in position and permit quick removal of the side sections at any time. It is not necessary to remove them from position at any time, it being only necessary to slack them for the removal of the side sections. While the car is in summer use the buttons are turned in an upright position on the posts.

The seats are of the cane or slatted type, so made as to be adapted for use longitudinally when the car is closed. Plush cushions, or any other covering, if desired, may be placed in

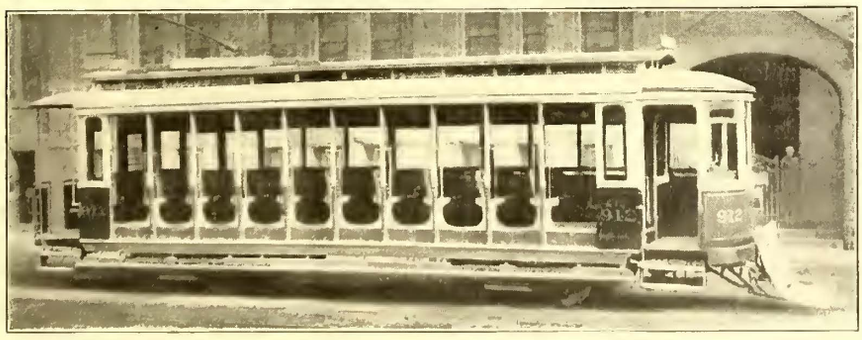
TORONTO CONVERTIBLE CAR, CLOSED

these seats. The seats are made with solid metallic ends, strengthened by truss rods, which, when the car is open, are placed crosswise in the car, entirely dispensing with legs. This arrangement permits easy access to the motor trap-doors. The metallic ends prevent the seat ends from being damaged during conversion, and also permit bolting together whether the seats are placed longitudinally or crosswise. The short seats at each end of the open car and backing against the car have hinged backs, and are fitted with rubber buffers, so that they will not deface the woodwork of the car end when folded back.

The floor of the car is slatted crosswise. The slats are fixed solidly to the floor and are easily swept. Provision for disposing of the sweepings is made by a small trap under the seat through which refuse can be discharged. The ends of the slats are reduced gradually flush to the floor, and offer no obstruction when the car is used as an open car.

Steel plates are used on the face of the car sills, to which are securely fitted malleable cast-iron panels, bolted through the car sills. On the face of these panels is a rim, which forms a slot into which the car posts pass. These, being bolted to the upright panel, pass down to the bottom of the car sill, and are securely bolted through the face of same, being also notched into the running board or top step, making the base extremely rigid. On the top of the posts are plates of unusual depth, which make a very stiff construction, being halved into the car posts and forming the top or outside panel.

In attaching the bottom step, "T" or angle-iron is used. It is securely bolted through beneath the car sill, projecting and supporting the top step and affording the attachment for the bottom or removable step, which is removed to convert the car to a closed car. The second step is interchangeable. The steps on back and front platforms are stationary, and are not removed to convert from closed to open car. The second step is necessary in double-truck cars, but where single, or maximum traction trucks, are used, one step is sufficient.



TORONTO CONVERTIBLE CAR, OPEN

In Toronto, owing to close trackage, cars must be built with narrow body and wide track edge, consequently, double trucks have to radiate underneath the car sill, the wheels being of the highest diameter used on motor cars, namely, 33 ins. It is usually the case on ordinary standard gage roads that the trucks radiate between the sills, thus allowing the car body to run much closer to the ground than in

Toronto under the foregoing conditions. The running board, when used on the closed car, acts as a guard to prevent the car-sides from being damaged by coming in contact with vehicles. It forms also a permanent rest for the removable sections.

The vestibule of this car is of special design and capable of standing great hardship from collisions. It is in the circular form, all the mouldings and belt rails being bent before ironing off.

The room required for storing the removable parts is very small, the space occupied by a single car being sufficient to store the side sections, seat backs, etc., of thirty cars.

NEW EQUIPMENTS FOR THE MILAN GALLARATE LINE

The train service of the Milan-Gallarate-Porto Ceresio Electric Railway, the third-rail Italian road which has been mentioned frequently in these columns, consisted initially of a motor car hauling a trailer, the motor car being equipped with four G. E. 55 160-hp motors, geared for a maximum speed of about 60 m. p. h. These equipments have been in service for about three years, but with the increase in traffic the company found it necessary to increase its rolling stock, and has added sixteen equipments with type-M control. They were supplied by the Cie d' Electricité Thomson-Houston de la Mediterranee, the Italian representatives of the General Electric Company, and the same type of motor is used as before, i. e., G. E. 55. Each motor car, however, now carries two motors, which enables the cars to be run either singly or in multiple, according with the demands of traffic.

Contrary to American practice the two motors of each car are not mounted on the same truck, but on separate trucks and on the outside axles, this arrangement being considered desirable by the railway authorities on account of the high speed, as it insures that the leading axle of the car shall always be heavily loaded.

The standard train consists, as formerly, of two cars, each capable of accommodating eighty passengers. The length of the new car bodies is 61 ft. over all, the distance between truck centers being 42 ft. 6 ins. The trucks are of specially heavy build, and follow the European design, having wheel base of 6 ft. 3 ins. An exceptional thickness of axle is used, being 6¼ ins. in the axle linings of the motor. The weight of each car, including electrical equipment, is 45 tons.

ONE RESULT OF OVERHAULING ACCORDING TO MILEAGE

On a large city system the practice was recently begun of overhauling motor cars according to the mileage they have run. Formerly they had been overhauled without regard to mileage. The change resulted in some revelations, which caused the mechanical department to decidedly change its policy as regards bearing metal. Formerly a cheap grade of bearing metal had been used, on the theory that it was more economical than genuine babbitt containing a high percentage of tin. As soon as it became necessary to determine just how many miles the cars were making before it was necessary to take them to the shops for armature bearing renewals, it became evident that high-grade babbitt metal was the thing to use.

Property owners along the route of the proposed Youngstown & Ohio River Railway, which was promoted by Max Goodman, of Cleveland, have brought action to have the conveyances set aside, because work on the line did not start at the time agreed upon. Construction of the line is being held up.

CONVERTIBLE CARS FOR SOUTH AFRICA

The J. G. Brill Company has lately shipped two of its convertible cars to Port Elizabeth, which is situated on Algoa Bay, on the southern coast of Africa, 425 miles due east from Cape Town. The city has a fine harbor, and is connected by steam lines with important cities of Cape Colony. A short distance back from the coast are high mountain ranges with foot hills extending to the water's edge. The lines of the tramway system are a series of grades, more or less steep. The cars are mounted on Brill "Eureka" maximum traction trucks, which it is claimed are particularly adapted to hill climbing. They are equipped with 35-hp motors, and have 33-in. driving wheels and 20-in. pony wheels. The climate is sub-tropical, with heavy rainfall in winter, so that by using cars of this type provision is made for every season of the year.

The cars include the solid paneling with cross bracing between the double corner posts and first side posts described in the Street Railway Journal of Feb. 6, in an article on convertible cars for Spokane, Wash. This arrangement permits the use of longitudinal seats at the corners, accommodating three passengers each, and provides sufficient space near the doors to prevent crowding when the cars are closed. A somewhat novel feature is the use of folding seats hinged to the panels at the ends of the car body. Including the folding seats, each car has a seating capacity of forty-four. When the cars are open the entrances at one side may be closed by chain guards. The interiors are finished in dull cherry with bird's-eye maple ceilings. Spring cane upholstered seats are of the walk-over back type.

CAR FOR PORT ELIZABETH, SOUTH AFRICA

The cars measure 25 ft. 9 ins. over the end panels, and 34 ft. 3 ins. over the crown pieces; from end panels over crown pieces, 4 ft. 3 ins.; width over sills, including sill plates, 6 ft. 8¾ ins.; width over posts at belt, 7 ft. 3 ins.; from center to center of posts, 2 ft. 7 ins.; sweep of posts, 3½ ins.; size of side and end sills, 4¾ ins. x 7 ins.; sill plates, 8 ins. x ⅜ in. The corner posts are 3¾ ins. thick, and the side posts, 3⅜ ins. The cars are furnished with angle-iron bumpers, sand-boxes, platform and conductor gongs, folding gates, brake handles, radial draw-bars and other specialties of the builder's make.

A uniform has been decided upon for the special policemen who will be appointed by Police Commissioner McAdoo to guard the platforms at the points of congestion on the New York elevated roads. These men will be appointed from a list furnished by the Interborough Rapid Transit Company as soon as the Commissioner has finished his investigation into their character. They are to be paid by the Interborough Company. The uniform will be practically the same as that worn by the regular city policemen, except that instead of the city coat of arms on the helmets there will be a wreath, and the buttons on the coat, although of the same size, shape and color, will be plain instead of bearing the city coat of arms.

FINANCIAL INTELLIGENCE

WALL STREET, March 9, 1904.

The Money Market

The money position continues entirely satisfactory from the standpoint of the immediate future. Surplus reserve on Saturday, a week ago, reached the high level of the season—$32,000,000. It fell a little below $30,000,000 in the statement issued last Saturday. A year ago the surplus stood at the meagre total of $660,000, and two years ago it had sunk to $4,000,000. This comparison illustrates broadly the strength of the present situation as against that of the preceding years. The high state of the reserve has been brought about by several causes working in unison; first, the great increase in our credits in the foreign trade which has brought in a large quantity of gold, both from Europe direct, and from Australia and Japan; second, the decline in merchandise imports, which, by comparison with former seasons, has greatly reduced the current payments of the market to the government; third, the falling off in interior trade, which has acted both on the Treasury and the inland exchanges in such a way as to augment very largely the flow of currency to New York. In consequence of these several influences cash holdings of the local banks have been expanding steadily, until they have arrived now at a record total, and this movement has more than counterbalanced the record-breaking increase in bank loans. The loan account, after keeping relatively stationary during the latter half of February, rose again last week by $8,000,000. This was entirely due to the renewal of borrowing by the railroad companies, some of which, like the New York Central and the Missouri Pacific, have announced their intention of gradually providing funds for necessary expenditures by offering from time to time their notes for discount. Under the circumstances the bank surplus may be expected to fall during the next six weeks, and it is conceivable that the shrinkage may go far enough to cause some hardening of money rates. But the money market is exceptionally well-assured against any of the strain which is often witnessed in the early spring, by the unusually strong position of the bank reserve. The failure of sterling exchange to advance more than it has during the last week, must be taken to increase the probability that the Panama Canal payments will be handled without the export of gold.

The Stock Market

The stock market has changed very little in the fortnight since our last review was written. The Eastern war has developed nothing to indicate any more clearly when the end of the conflict may be expected. No decision has yet been handed down in the Northern Securities case. No new light has been thrown on the future tendency of trade throughout the country. In a word, the causes which have been paralyzing Wall Street's energies for so long, are present now with undiminished force. The market, on the whole, has behaved very well; that is to say, prices have not gone down in the face of the prevailing apathy and uncertainty, but on the contrary have in some cases improved. Liquidation has, to all appearance, pretty well ceased, and while there is no buying of any account outside the professional coterie, it has become evident to all practised traders that short selling at the present level is not a profitable operation. The market may be said to have reached a deadlock where substantial interests are equally unwilling to buy or sell, and where professional operators, living on one another's losses, afford the only diversion. Trading has been at the lowest ebb since the summer of 1900. Nobody expects that business will get out of the rut until some of the uncertainties just mentioned are cleared away. The Northern Securities verdict, because it promises to be decided ahead of the other questions of the day, is naturally attracting the greatest amount of attention. Nine-tenths of Wall Street believes the case will go against the company; still there is a strong feeling that, after the first shock of bad tidings is over, the market may shake off its lethargy and the larger interests take a more active part in the proceedings.

The declaration of an extra 1 per cent on Manhattan Elevated, while expected in well-informed quarters, nevertheless affords lively satisfaction. The only doubt now felt is lest the tunnel will take away enough traffic during the next year and a half to prevent anything more than a 6 per cent distribution, until the 7 per cent guarantee goes into effect in 1906. This, however, is the ultra-cautious. Nobody can be surprised, under present circumstances, that the stock holds as well in the market as it does. Metropolitan has felt the effects of scattered liquidation ever since the recent unfavorable statement for the December quarter. Brooklyn Rapid Transit has followed actively the fluctuations in the general share list, but it is said by people who should know that the recent buying has, on the whole, been better than the selling.

Philadelphia

Philadelphia has had a fairly good business in the traction stocks during the last two weeks, but prices have changed very little. Whatever speculative schemes might have been afoot have, of necessity, been postponed, owing to the unfavorable state of the general market. On the other hand, there have been no evidences of fresh selling in any quarter. Philadelphia Company common rose from 38¼ to 39, and fell back slowly to 38, the preferred fluctuated between 44 and 44½. Philadelphia Rapid Transit advanced from 14 to 14½ on unusually heavy trading. Ten thousand shares were traded in many of the orders coming from New York. In the late dealings, however, the stock lost all its gain on the sale of a few hundred shares. Philadelphia Electric was moderately active between 5¾ and 5⅞, Union Traction between 47½ and 47¾, and Philadelphia Traction between 97 and 97¼. American Railways fell from 44¾ to 44½ under scattering selling. Other transactions included a hundred Passenger preferred at 95, and odd lots of Pittsburg Traction preferred at 49¼, Fairmount Park Transportation at 24, and Consolidated of New Jersey at 62¼.

Chicago

Further liquidation has occurred in nearly all the traction stocks during the last fortnight, but as a rule prices have recovered from their lowest. On the sale of 300 shares North Chicago dropped from 67½ to 65, a new low record. Later the stock rallied to 70 on the purchase of a hundred shares. Two hundred shares of West Chicago sold at 40, also a new low price, but later 42 was paid for fifty shares. On the sale of a few odd lots, City Railway broke five points from 160 to 155. The feature among the elevated issues was Metropolitan preferred, which dropped from 47½ to 45 under heavy liquidation. This is the lowest figure at which the stock has ever sold. Dissatisfaction with the present management of the company is assigned as the cause of weakness, and it is expected that at the meeting in April a vigorous effort will be made to depose the directors. Of the other elevated stocks Lake Street has been traded in freely at 2, several hundred shares of South Side have sold at 92, and a few transactions have been reported in Northwestern common at 16¼, and the preferred at 47. Union Traction has held comparatively steady. There seems to be a better feeling all around regarding the outlook for the company, in the first place because of the belief that a favorable decision will soon be rendered in the franchise extension case, and in the second place because of the prevailing idea that the reorganization plan has now been fully worked out, and is only awaiting a more favorable occasion to be announced. It is said that the name of the company will be changed and placed under the control of the Chicago Railway Company, the concern incorporated in Springfield some months ago. The deal will be financed by Eastern capitalists. The entire debt of the underlying companies will be paid off at once, and the new securities of these companies will probably be placed on the guaranteed dividend basis.

Other Traction Securities

The Massachusetts Electric issues have been the active features in the Boston market of the last two weeks. The common stock was offered freely at one time, and broke from 18¾ to 16¾, but at the low level received good support and rallied to 18¼. The preferred fell from 74¾ to 72½, rallied to 74 and eased again to 73¼. The movement in both cases was accompanied by unusually large transactions. Boston Elevated was strong, advancing from 137¼ to 138½, relapsing later to 138¼. West End common held steady at 91, and the preferred at 109. Considerable interest was manifested in the opening of the Baltimore Exchange two weeks ago after its prolonged suspension following the fire. It was feared that the damage done to the property of the local street railway companies might cause considerable liquidation in the securities. These expectations were partially realized. On the first day of the new session United Railways income bonds fell to 49¾, a drop of 6 points from the last previous sale, and the lowest price of the

year. The stock lost a point and a half to 6¾, and the general mortgage 4s lost two points to 90. Sharp recoveries set in almost immediately. The incomes went back to 52½, the stock to 7⅞, and the generals to 91¼. From this level fresh declines set in, extending from 1 per cent in the stock to 1½ in both classes of bonds. Other transactions for the period comprise Baltimore City Passenger 4½s at 102½, North Baltimore 5s at 114, Anacostia & Potomac 5s at 90, Atlanta Street Railway 5s at 104¼, City & Suburban (Washington) 5s at 90¼, and Charleston Street Railway 5s at 103⅛. Scarcely any business has been doing lately in the traction specialties on the New York curb. Only twenty-eight shares of Interborough Rapid Transit changed hands all last week, this lot selling at 103. One hundred New Orleans common went at 8¾, and 150 preferred at 29¼. Brooklyn Rapid Transit 4s sold at 74 and Washington Railway and Electric 4s at 76 to 75¾. Five hundred St. Louis Transit sold yesterday at 9.

Detroit United featured in the selling at Cincinnati last week; about 425 shares sold during the week, opening at 62 and advancing to 63¾. Cincinnati Street Railway sold at an advance touching 136½; sales were small. Cincinnati, Newport & Covington preferred sold at 82 to 82½ on several lots, aggregating 300 shares. Two small lots of Miami & Erie canal sold at 8 to 9⅞. The future of this proposition is still very much in doubt. Cleveland Electric featured at Cleveland and gained two points, advancing from 72¼ to 74¼. The political outlook for this property seems to be improving, and offerings are few. Transfers were 400 shares; one sale being made for future delivery at 75½. Cincinnati, Dayton & Toledo is in demand, the inquiries seemingly coming from Cincinnati. It seems evident that some step will soon be made whereby the Cincinnati Traction interests will acquire this property, either by purchase or lease. Sales were 518 shares at 20 to 20½. Northern Ohio Traction was in some demand, 311 shares selling on an advance from 15⅝ to 15¾. Northern Texas Traction sold to the extent of 110 shares at 31. A block of the bonds sold at 81½. Monday another lot of these bonds sold at the same price. Cincinnati, Dayton & Toledo dropped to 19½.

Security Quotations

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

	Closing Bid	
	Feb. 23	March 8
American Railways	44	43
Aurora, Elgin & Chicago (preferred)	a55	a54
Boston Elevated	137¾	138
Brooklyn Rapid Transit	38⅞	40¼
Chicago City	160	156
Chicago Union Traction (common)	4¼	5
Chicago Union Traction (preferred)	29½	30½
Cleveland Electric	71½	73
Consolidated Traction of New Jersey	62	62
Consolidated Traction of New Jersey 5s	105½	105½
Detroit United	60¼	61¾
Elgin, Aurora & Southern	—	—
Interborough Rapid Transit	101	102½
Lake Shore Electric (preferred)	—	—
Lake Street Elevated	2	1¾
Manhattan Railway	141	143¾
Massachusetts Electric Cos. (common)	18⅝	18½
Massachusetts Electric Cos. (preferred)	74½	73
Metropolitan Elevated, Chicago (common)	17	15¼
Metropolitan Elevated, Chicago (preferred)	47	44
Metropolitan Street	114⅝	113½
Metropolitan Securities	86½	82
New Orleans Railways (common)	8	8
New Orleans Railways (preferred)	29½	29
New Orleans Railways 4½s	79½	79
North American	82½	80
Northern Ohio Traction & Light	14¾	15
Philadelphia Company (common)	38	38
Philadelphia Rapid Transit	14	14
Philadelphia Traction	97	97
St. Louis Transit (common)	7	9
South Side Elevated (Chicago)	92	91
Third Avenue	119	120
Twin City, Minneapolis (common)	87½	87½
Union Traction (Philadelphia)	47¼	47⅛
United Railways, St. Louis (preferred)	52	51
West End (common)	90½	91
West End (preferred)	108	109

a Asked.

Iron and Steel

The principal incident in the iron market of the last two weeks was the meeting of iron ore producers, at which no agreement was reached regarding the schedule of prices for the ensuing year. Some interests contended for a reduction, others held out for no change, and the result now threatened is an "open" market, which will necessarily involve considerable disorganization for the trade in general. Next to this in point of interest was the purchase of 100,000 tons of pig iron by the United States Steel Corporation at an advance over the prevailing market quotations. This action has aroused a great deal of comment of one sort or another, but the impression in well-informed quarters is that this was done in order to steady the market, and in order to provide a more stable future for the manufacturing trade, a good part of which is arranged on the sliding scale system, and is therefore adversely affected by price changes in the basic material. Quotations are as follows: Bessemer pig iron $13.50, Bessemer steel $23, and steel rails $28.

Metals

Quotations for the leading metals are as follows: Copper 12⅜ cents, tin 27⅞ cents, lead 4⅝ cents, and spelter 4⅞ cents.

THE HEARING OF THE NINETY-NINE YEAR ACT CASE IN CHICAGO

The trial of the case to determine the rights of the Chicago Union Traction Company under the ninety-nine year act, which involves the authority of the company to occupy some of the most important streets, took place before Judge Grosscup, of the United States Circuit Court, and Judge Jenkins, of the United States Court of Appeals, at Chicago, March, 1, 2 and 3. The trial, however, failed to bring out any arguments which have not before been presented. The traction interests were represented by Attorneys J. S. Auerbach and Brainerd Towles, of New York, and W. W. Gurley, Henry C. Crawford and John S. Miller, of Chicago. The city was represented by David T. Watson, of Pittsburg, special counsel; John C. Mathis and Edwin Burritt Smith, attorneys for the local transportation committee of the City Council, and Corporation Counsel Tolman.

Briefly stated, the points in controversy are these: In 1865 the State Legislature passed what is called the ninety-nine year act. This act was for the avowed purpose of extending the charters and legal life of several of the street railway companies then operating and enjoying franchises on the streets of the city of Chicago. These companies were created originally under a special act of the Legislature in 1859 at the time they were incorporated. This act of the Legislature gave them charters for twenty-five years. These charters were extended ninety-nine years by the ninety-nine year act of 1865. The controversy has arisen because the city of Chicago maintains that the ninety-nine year act extended only the charters and corporate life of the companies named in the act and not the franchises. The companies have maintained that the act was intended to extend both the charters and the franchises enjoyed by the companies at the time the act was passed. The case, therefore, is a question of the interpretation of the act. The exact language of the ninety-nine year act is as follows: "All contracts, stipulations, licenses and undertakings made, entered into or given, and as made or amended, by and between the said Common Council and any one or more of said corporations, respecting the location, use or exclusion of railways in or upon the streets, or any of them, of said city, shall be deemed and held and continued in force during the life hereof as valid and effectual to all intents and purposes as if made a part, and the same are hereby made a part, of the said several acts."

The position taken by the attorney for the city in the trial of the case was that if it was intended that the franchises, as well as the charters of the companies, were to be extended ninety-nine years, it would have been expressly stated in the act and not left to be implied. They argued that, since the original act of 1859 creating these companies left the granting of franchises to the city of Chicago, it is therefore to be implied that the amendment of the act extending the corporate life of the companies, also left the granting of franchises to the city. David T. Watson, for the city, also called attention to the fact that the North Chicago City Railway Company is not mentioned in any way in the act, that its charter therefore expired in 1884, twenty-five years from its date of issue.

The attorneys for the company maintained that it was the intention of the act to extend the franchises. There were at the

time the act of 1865 was passed no restrictions on the Legislature which would prevent that body from making a perpetual franchise grant. This is a point which was denied by the city in its original argument. The traction attorneys further called attention to the investment which had been made on the strength of the action of the Legislature in 1865 and to the great injustice which would be done to investors if the rights to its property were now wiped out by an adverse decision.

It is expected that a decision will be handed down early in April. As the case will be appealed to the United States Supreme Court, it is unlikely that it will be settled before early in 1905.

RAILWAY OFFICIALS TAKE TRIP ON ELECTRIC SLEEPING CAR

A party of railway officials and bankers enjoyed a trip on one of the beautiful Holland palace sleeping cars Friday, Feb. 26. It was the initial trip into the city of Richmond of the car "Francis," named after the son of the general manager of the Holland Palace Car Company, Joseph W. Selvage.

This car is of the type described in the STREET RAILWAY JOURNAL of Aug. 15, 1903. It is furnished with ten compartments of twenty berths, or twenty chairs when the berths are not in use. The finish is in green, with chairs and carpet to match, contrasted with unique and brilliant brass trimmings and grille work, which, together with the mahogany inlaid panels, give a rich effect, especially when the electric lights are turned on. The car, which weighs about 50 tons, ran as smoothly as a Pullman, although this road is not as finely ballasted as a well-regulated steam road.

Notwithstanding that it was the first trip a speed of 50 miles was obtained. It was thought unwise to attempt a higher speed, though that was possible. The car was run over the Indianapolis & Eastern Railway Company, through the courtesy of the officials of that road, by a crew furnished by them, and over the Richmond Interurban Street Railway, whose officials gave personal attention to the comfort and convenience of the visiting delegation.

The Indianapolis party consisted of the following gentlemen: M. B. Wilson, president of the Columbia National Bank, and treasurer of the Indianapolis & Eastern Traction Company, H. F. Holland, president of the Holland Palace Car Company, A. K. Hollowell, vice-president; J. W. Selvage, general manager; Judge McCullough, general counsel; Charles N. Wilson, general manager of the Columbus, Greensberg & Richmond Traction Company, August M. Kuhn, director of the same company, together with several newspaper representatives, who were joined at Cambridge City by a delegation from Richmond. Dinner was served at Cambridge City, after which the car made the run to Richmond and was open for inspection to the public. Leaving Richmond at 4 o'clock, supper was taken at Knightstown, and the party returned to Indianapolis at 9 o'clock. Congratulations were extended to the officers of the Holland Palace Car Company, and the car pronounced a magnificent success.

THE EFFECTS OF THE BALTIMORE FIRE

A postscript to the annual report of the United Railways and Electric Company, of Baltimore, recites facts of interest in connection with the recent fire, such as the renewal of arrangements with the Baltimore & Ohio for current from its power house, pending repairs to the Pratt Street power house; also the resumption of operations by the Preston Street house, which, together with the Light Street and Falls Road houses and the alternating machinery in the new Pratt Street house, working through the sub-stations, are now furnishing current to the system. While the original Pratt Street house was seriously damaged, the three large engines and generators escaped with but little injury, and will soon be in condition for service. Owing to the fact that the company's transmission lines throughout the burned district are in subways, the damage was almost entirely confined to the destruction of poles and trolley wires, which are being rapidly restored.

The company has 32 of its lines in full or partial operation. The revenue results are surprising for the amount of service operated. The expenses, other than those chargeable to the insurance companies, have been greatly reduced, so that the net results are well maintained. Owing to the great activity in building operations which must ensue, it is believed that the year will yet, from a revenue point of view, prove the greatest in the history of the company.

THE BOSTON & WORCESTER FINE WINTER SHOWING

The Boston & Worcester Street Railway, operating between Boston and Worcester, Mass., has made a fine record this winter. When fall came, the company arranged to cut the service between the cities from a half-hourly to an hourly schedule. It was soon found, however, that the demands of traffic would allow of no such reduction, and the schedule of a car every half hour adopted when the road was placed in operation last summer, has been maintained throughout the entire winter. Despite the severe weather there were no serious interruptions of traffic, and on several occasions when the schedule of the steam railroad lines between Boston and Worcester was smashed because of the snow and ice, the electrics operated on time. The results are best shown by the earnings. The gross receipts for the six months ending Dec. 31, 1903, amounted to $166,547, the operating expenses were $80,715, leaving a net profit of $85,832. From the net profit the sum of $28,125 interest was deducted, leaving a surplus of $57,707, equivalent to 4½ per cent on the stock for the year, after charging against net earnings six months' interest on the bonds.

NEW OHIO ASSOCIATION

At a meeting of interurban railway managers held at the Phillips House, Dayton, Ohio, Feb. 29, preliminary plans were laid for the formation of an association to be known as the Ohio Interurban Railway Association. The meeting was called by F. D. Carpenter and J. H. Merrill, of the Western Ohio Railway, primarily for the purpose of effecting arrangements between the various roads centering at Dayton for interchangeable mileage. The various roads and the representatives present were as follows: Dayton & Troy Electric Railway, H. P. Clegg, general manager, E. R. Larter, superintendent, and C. M. Paxter, auditor; Dayton & Western Traction Company, Howard Fravel, superintendent; Dayton & Xenia Transit Company, C. J. Ferneding, president, and A. W. Anderson, superintendent; Dayton & Northern Traction Company, R. E. DeWesse, superintendent; Dayton, Springfield & Urbana Railway, E. B. Gunn, general superintendent; Dayton, Covington & Piqua Traction Company, E. W. Spring, general superintendent; Western Ohio Railway, F. D. Carpenter, general manager, J. H. Merrill, assistant general manager, R. H. Carpenter, general ticket agent; Cincinnati, Dayton & Toledo Traction Company, J. A. Boyer, auditor.

The situation was thoroughly discussed and the advantages of uniform cash fare and mileage rates were generally acknowledged. A canvass of the situation showed that cash fares ranged from 1¼ cents to 2 cents per mile with mileage rates from 1⅛ cents to 1½ cents per mile. One road had no mileage, while no two roads appeared to have the same rates of fare. The opinion seemed to prevail that an interchangeable mileage based on 1½ cents per mile should be adopted, but objection to this was made by a representative of the Dayton, Springfield & Urbana Railway on the grounds that his company is affiliated with the systems centering at Columbus, which have an interchangeable mileage based on 1¼ cents per mile. The question of permitting the use of mileage by several persons in one party was discussed, and it was voted to make the books good only for the parties in whose name they are drawn.

A committee composed of J. H. Merrill, E. B. Gunn, E. W. Spring, Howard Fravel and J. A. Boyer was appointed to prepare samples of interchangeable mileage. It was understood that any action taken at the meeting or by the committee was subject to the approval of the board of directors of the various companies.

The question of a permanent organization was then discussed, and the advantages of an organization similar to the New England Street Railway Club were pointed out. It was voted to call the organization the Ohio Interurban Railway Association.

Officers were elected as follows: H. P. Clegg, president; E. W. Spring, vice-president; J. H. Merrill, secretary-treasurer; E. B. Gunn, J. A. Boyer, R. E. DeWeese, H. Fravel and A. W. Anderson, executive committee.

It was the opinion of those present that the organization should be open to managers, superintendents, master mechanics, electricians and heads of departments of electric railways in Indiana, as well as Ohio. At a meeting of the executive committee to be held in the near future, a number of vice-presidents will be chosen, covering the various districts in Ohio and Indiana, and in this way a membership for the organization will be worked up. A general meeting of the organization is expected to be called soon.

MORE ADIRONDACK TROLLEY RUMORS

Following the announcement that the New York & Ottawa Railway, extending from Tupper Lake to Cornwall Bridge, was to be converted into an electric road, mention of which was made in the STREET RAILWAY JOURNAL of Feb. 27, comes the statement from Charles S. Taylor, proprietor of Taylor's-on-Schroon Hotel, that interests associated with the Delaware & Hudson Railroad Company are back of a project to build an electric railway from Warrensburg to Elizabethtown, N. Y.

In fact, surveys have been made for part of the distance, and Mr. Taylor's statement has been confirmed from another source equally trustworthy.

This line would be an extension of the Hudson Valley Electric Railway, running from Albany to Warrensburg, and would pass through the most picturesque part of the Adirondacks. The road would touch at Schroon Lake, North Hudson and other well known summer resorts, run east to Mount Marcy, and thence to Elizabethtown, according to present plans. The route is about 70 miles or 80 miles long.

An abundance of power could be secured from the Hudson River Water Power Company, which has within a year completed a big dam across the Hudson at Spier Falls, and is already supplying power for the Hudson Valley, Schenectady, Troy and Albany Railway lines, as well as for numerous manufacturing plants.

MEMORIAL TO JAMES WATT

The movement to erect a memorial statue to James Watt, the father of the modern steam engine, in Greenock, Scotland, on the site of the humble cottage where the inventor was born, is progressing very favorably. An American committee has been formed to receive contributions. Andrew Carnegie is chairman of this body, which is made up of the presidents of the four leading engineering societies, representatives from the different labor brotherhoods, and others. Theodore Dwight, of 99 John Street, New York, is secretary and treasurer.

It is the purpose of the committee to solicit and receive subscriptions in small amounts only and from many countries, as it is felt that the memorial should represent the contributions of the thousands who know and appreciate what the invention of the steam engine has meant to the material progress of the world. Those who desire to contribute, therefore, are requested to send any amount not exceeding $5 to the treasurer and accompany the contribution with an autograph. The latter is desired for transmission to Greenock, to show the number of the American contributions.

The United States has, probably, been the greatest beneficiary of Watt's labors, and the committee hopes that the response from this country will exceed that of any other country in point of numbers, as the number of subscribers is a greater tribute than the amount subscribed.

PORT CHESTER AND WESTCHESTER COMPANIES RENEW APPLICATIONS TO CITY COUNCIL OF NEW YORK

The New York & Port Chester Railway Company and the New York, Westchester & Boston Railway have renewed their applications to the Aldermen of New York for permits to cross streets in Bronx Borough in the construction of an electric railway.

Each company has tried to meet the conditions imposed by Mayor McClellan in his memorandum which accompanies the veto of the former grant to the New York, Westchester & Boston Road, although the methods of that company on its renewal and of the New York & Port Chester Company differ in details.

Both companies in the applications agree to pay the city for the permit, and both agree to construct all crossings over, or under, streets entirely at their own expense. The New York & Port Chester Company does not offer to pay any specific price for the franchise, but agrees to leave the matter to the board of estimate to fix the compensation. The New York, Westchester & Boston Company offers to pay the city annually 75 cents per lineal foot for crossing up to 60 ft. wide, and a proportionately larger sum for wider crossings.

In connection with the application of the New York, Westchester & Boston Company is a statement from Dick & Robinson, bankers, saying that $13,125,000 is ready for the work as soon as the grant is approved, and the assertion also is made that the road has no connection with the New York, New Haven & Hartford Road. The company agrees to construct its road so that traffic on the highways shall not be disturbed, to fence the road within the city limits, and to light it by electricity, and to charge 5-cent fares within the city limits, and to use electricity as a motive power.

The New York & Port Chester Company in its application agrees to build all structures at its own cost, such structures to be of a character to meet the approval of the Mayor and the President of the Borough of the Bronx. The company also agrees to stand all the expense of replacing water and sewer pipes and to restore disturbed streets to their original condition.

Both applications have been referred to the railroad committee.

FURTHER ALLIS-CHALMERS DEVELOPMENTS

Further developments with regard to the entrance into the field of heavy electrical machinery, as well as the development of steam turbines, hydraulic turbines, gas engines, etc., by the Allis-Chalmers Company, announced as the STREET RAILWAY JOURNAL goes to press, seem to indicate that the management is not yet at the end of the radical and decisive moves which are to be made under the new régime just entered upon.

One of the most important events within the past few days has been the conclusion of an alliance between the Allis-Chalmers Company and the Bullock Electric Manufacturing Company. It now appears that the Bullock Electric Manufacturing Company, of Cincinnati, which is a New Jersey corporation, has been leased by a new Bullock Company organized under the laws of Ohio. This new corporation is one in which the Allis-Chalmers Company is financially interested as principal owner, and it takes over the business of its predecessor as a going concern. In this manner the Allis-Chalmers Company is at once able to fill orders ranging throughout the entire field of direct-current and alternating-current generating apparatus. It is understood that the Bullock output now includes street railway motors, and that some of these have already been supplied to a road in Indiana. In this connection it is interesting to record that the new company has made a personal contract with President George Bullock, under whom the old company was vigorously and successfully built up, so that the administration of the company will remain unchanged, a contract having also been made with Mr. Neave for the retention of his services as vice-president.

In connection with the affairs of the Allis-Chalmers Company, itself, and its own internal management, it would appear that some vital and important changes are being made. The first and most noteworthy of these is the resignation of Charles Allis, whose wife has been ill, and is now proceeding to the Mediterranean under medical advice for an indefinite stay. Mr. Allis felt that under these private conditions he could not possibly give all the attention to the business of the company that its affairs demanded at this juncture, and preferred, therefore, to take this step. His place in the management is to be filled by B. H. Warren, formerly vice-president of the Westinghouse Electric & Manufacturing Company. It is also understood that Edward D. Adams, the banker, who has been identified with the company since its organization a few years ago, has consented to take the chairmanship of the executive committee. Mr. Adams will make his offices at the New York headquarters in the Empire Building and give a large amount of his time to Allis-Chalmers affairs.

It has already been stated in these columns that John F. Kelly, formerly of the Stanley Company, has been made head of the electrical engineering department of the company, with William Stanley, Jr., as consulting electrical engineer; and to this may now be added the fact that Mr. Kelly has begun his work and taken up affairs at Allis-Chalmers offices.

As a result of this deal with the Allis-Chalmers Company, the present capacity of the Bullock electrical works is to be enlarged. The first thing that will be done will be to erect another large shop, with an area of 40,000 sq. ft., where motors for street cars will be manufactured. This will mean the employment of about 400 more hands. It is the intention of the new leasing company to enter actively into the street car equipment field. The lease is for twenty-five years with the privilege of renewal for another twenty-five years on the same terms. It is expected that when the plants that are now under way have been completed the Bullock electrical works will give employment to from 2000 to 3000 hands.

While the papers in the deal have all been signed, the deal will not go legally into effect until after the stockholders of the present Bullock Electric Company have had their special meeting at Jersey City on Wednesday, March 16.

TEMPORARY TERMINAL FOR NEW BRIDGE IN NEW YORK

In a sincere effort to do his best to relieve congestion of traffic at the Brooklyn Bridge, and to provide a ready means of traffic over the new Williamsburg Bridge, Mayor McClellan, of New York, has ordered Bridge Commissioner Best to prepare plans for a temporary terminal station for the Williamsburg Bridge, in Manhattan, to be ready when the operation of cars over that structure is begun in July. The station will also be used temporarily as a terminal for the elevated lines that will cross the structure from Brooklyn, which are expected to be ready for service about Oct. 1. Nothing like a definite plan for a suitable permanent terminal has been agreed upon, as the plans for connecting the two bridges by underground, surface or overhead car lines are still in an embryonic state. At present there seems to be no end to these plans, but the temporary measures of relief that the Mayor has adopted give promise of materially increasing the efficiency of the new structure, and of lessening the congestion on the old structure by inducing some of its regular users to abandon it in favor of the new bridge. The dissatisfaction with the present facilities for traffic over the new bridge are in a large measure chargeable to the administration which went out of office Dec. 31. Under the guise of consideration for the public, the members of that administration really opened the new bridge months in advance of its completion, in order that the names of certain public officials might go down in the public records as having participated in the opening.

STEAM LINE ABSORBS CONNECTICUT TROLLEYS

The purchase by the New York, New Haven & Hartford Railroad of the Fair Haven & Westville Railroad, of New Haven, to which reference was made in the issue of March 5, has been consummated. From New Haven comes the statement that the terms have actually been arranged, and that their submission to the directors of the two companies is the only thing now standing between the actual transfer of the securities. It is stated that the basis of the merger is the exchange of New York, New Haven & Hartford fifty-year 3½ per cent debentures for the Fair Haven & Westville stock, the latter being taken at a valuation of $50 for each share of par value of $25. The shareholders of the Fair Haven & Westville thus get 7 per cent on the debentures in place of the present 5 per cent dividend on stock. As the stock of the Fair Haven & Westville amounts to $5,000,000, it will be necessary for the New York, New Haven & Hartford Railroad to issue $10,000,000 of bonds.

The purchase by the New Haven Company is of special interest, in that it seems to indicate a policy of the new president of the company, Mr. Mellen, toward the electric railways directly opposite to that of Mr. Clark, his predecessor. Under the old management any electric railway enterprise that threatened the New York, New Haven & Hartford was fought from its very inception and pursued relentlessly if carried to completion. The policy seemed to be one of millions for defense, but not one cent for purchase. Just at this time, however, it seems that the most significant thing about the deal is the heading off by the New York, New Haven & Hartford Company of its most formidable competitor, the Connecticut Railway & Lighting Company, which now operates 170 miles of line in the State. Not so long ago rumor had it that the Connecticut Railway & Lighting interests were seeking to purchase the Fair Haven & Westville. The latter company operates 104 miles of track in New Haven and nearby towns.

IMPORTANT FRANCHISES GRANTED IN PITTSBURG

Ordinances providing for an elaborate street railway system of 22 miles have been passed by the City Council of Pittsburg in favor of Murry A. Verner, Thomas S. Bigelow and E. M. Bigelow. The system provided for will extend from the downtown section to the east end and may be described as using the Grand Boulevard for the trunk line with ramifications downtown by Liberty and minor streets, and throughout the east end by various branches. One of the lines in the east end will be carried by a high bridge over the Pennsylvania Railroad and Junction tracks from the boulevard to Bloomfield. Mr. Verner and his associates have secured the franchise in the interests of companies chartered at Harrisburg Jan. 26, 1902. It is said that the new companies are in no way connected with the Philadelphia Company, which now controls all the lines operating in Pittsburg, and that the latter will very likely oppose the construction of the new lines. The grants are in perpetuity. They have been signed by the Mayor.

IMPORTANT DEAL PENDING AT SYRACUSE?

Rumor has it that the Andrews-Stanley syndicate, of Cleveland, is negotiating for the purchase of the stock of the Syracuse Rapid Transit Street Railway, of Syracuse, N. Y., held by J. W. McClymonds, of Massilon, Ohio, brother of the late L. K. McClymonds. It is said that Mr. McClymonds has not the real interest in street railway securities and work that his brother had, and that he stands ready to dispose of his holdings at a reasonable figure. A few years ago the Stanley-Andrews syndicate acquired its first interest in New York electric railways by the purchase of one of the systems in the Mohawk Valley. Since then other roads have been purchased by the syndicate, and extensions have been built, until now it controls a formidable number of roads, including the Fonda, Johnstown & Gloversville Railway, the Herkimer lines, the Utica & Mohawk Valley Railway, the city system of Utica, and the Oneida Railway, all east of Syracuse.

THE NEW BONDS OF THE ST. LOUIS COMPANY

The announcement is made that the directors of the St. Louis Transit Company have arranged with the Mercantile Trust Company, of St. Louis, to form and manage a syndicate to purchase $8,000,000 of the 5 per cent refunding and improvement bonds of 1903. These bonds are part of an issue of $20,000,000, due April 1, 1923 (but subject to call at par on and after April 1, 1905), and guaranteed by the United Railways of St. Louis as to principal and interest, as well as secured by collateral.

None of these bonds has heretofore been issued. The $8,000,000 included in the present arrangement will provide for the floating debt, and for construction and equipment for the year 1904. A further amount is reserved to refund $5,776,000 outstanding 5 per cent collateral trust notes due Nov. 1, 1904, and the remainder is issuable only for future acquisitions, construction and equipment at not exceeding $500,000 yearly after Jan. 1, 1905.

The life of the syndicate is for six months, with the privilege of extending it for another similar period.

THE HARTFORD-SPRINGFIELD AND HARTFORD-WORCESTER PROJECTS

The prospects for the successful termination of the projects to connect Hartford, Conn., and Springfield, Mass., and Hartford and Worcester, Mass., by electric railways have recently been brightened by two important deals. One of these is the announcement that Tucker, Anthony & Company, of Boston, have become interested in the Windsor Locks & Rainbow Street Railway, and the other is the announcement that the Worcester & Hartford Street Railway Company has secured the last franchise needed for its line.

The purchase by Tucker, Anthony & Company of the Windsor Locks & Rainbow Street Railway means the early completion of a through electric railway between Hartford and Springfield on the west side of the Connecticut River. The same interests already own the Hartford & Springfield Street Railway, which operates on the east side of the river. The new line will be about 10 miles long, running from the tracks of the Suffield Street Railway Company through the town of Windsor Locks and to the center of the town of Windsor, where connections will be made with the Hartford Street Railway. The distance from Hartford to Springfield over the new route, however, is about 32 miles. Traffic arrangements have been negotiated with the Hartford Street Railway Company and with the Springfield Street Railway Company, which controls the Suffield Company. The present plan is to run the cars from Hartford to Springfield on one side of the river, and then to run them back to Hartford on the other side, making a circuit of more than 60 miles.

Immediately after the purchase of the new property officers were elected as follows: William A. Tucker, president; Arthur Perkins, secretary; S. Reed Anthony, treasurer; William A. Tucker and S. Reed Anthony, of Boston; Authur Perkins, of Hartford; Frank E. Healy, of Windsor Locks, and Henry A. Huntington, of Windsor, directors.

The franchise to the Worcester & Hartford Street Railway Company was granted by the town of Leicester, and completes the rights of the company to build between Hartford and Worcester. In Leicester the road will cross private land almost wholly. The tracks, it is said, will be laid as soon as the frost is out of the ground. The line will run from Worcester to the Connecticut State line at Stafford, and from Stafford it will come to Rockville, Conn., where connections will be made with the tracks of the Hartford, Manchester & Rockville Tramway Company.

DUPED THE MOTORMEN OF NEW YORK

A man who recently inserted in the New York daily newspapers an advertisement for street car motormen and conductors has disappeared from the city after having obtained $2.35 apiece from some 200 men whom he had promised jobs. The advertisement was for 300 motormen and conductors to go out of town at $2.50 per day, and the address was given of the man authorized to contract for the help. At the headquarters of the advertiser the applicants were met by a very suave person, who explained that there was trouble on an electric railway within a short distance of New York, perhaps in Connecticut, and that he wanted from two to three hundred men. He guaranteed each man a month's contract at $2.50 a day, and possibly a permanent position, but demanded $2.35 for transportation to the point in question. It is said that most of the men who called gave the required amount without question, receiving an ordinary receipt. They were told when to report for "work," and when they did report they found that the advertiser had left the city.

MORE STRIKE TALK AT PITTSBURG

Again is Pittsburg threatened with a street car strike. Demands were recently made on the company for the reinstatement of several employees who had been discharged, and on the refusal of the company to comply with the request the question of a strike was discussed. Last Friday a meeting of the employees was held at which the vote was in favor of a strike.

ANOTHER RECORD RUN

This time it is the Pacific Coast that offers a candidate for high-speed electric railway honors. The record was made over the new line recently placed in operation between Los Gatos, San Jose and Saratoga, Cal., and is for a distance of 5 miles made in 4 minutes and 45 seconds, or a trifle better than a mile a minute. That the figures are correct is attested by the fact that the run was made over a straight stretch of track for 5 miles, and that the time was recorded by stop watches. When it is considered that the roadway of this line has not had time to become seasoned, and that the equipment has not yet properly limbered up, even better figures may be expected in the future.

CYPRUS BRONZE BEARINGS

The use of cyprus bronze for journal bearings on street railway cars is increasing. This material is manufactured by the Brady Brass Company, which was a pioneer in the matter of bronze bearings for steam railroad cars, having been engaged in the manufacture of copper, tin and lead compositions for such purpose for many years past. Cyprus bronze is a preparation of copper, tin and lead, treated by a process especially devised by the company. so that the tendency to segregation of lead is eliminated.

This material has given great satisfaction when used for bearings and wearing parts on locomotives and railroad cars. It shows a great resistance to wear, as it has a low coefficient of friction, it requires a very small amount of oil to lubricate. This material is not claimed to be a frictionless or self-lubricating alloy, but requires oil like any other bronze, though in very much diminished quantity.

The success of cyprus bronze for steam railroad work suggested to the Brady Brass Company its employment in electrical railway service, and the many thousands of street railway cars equipped with bronze motor bearings made from cyprus bronze testify to its value for this purpose. It has a high strength in compression, equal to 50,000 lbs. per square inch, under a compression of 10 per cent, and a tensile strength of 25,000 lbs. per square inch, combining, therefore, in all its properties, the essence of a first-class engineering material.

Although cyprus bronze is the only product of the Brady Brass Company which has been discussed in this article, it is only one of many to which the company has given a great deal of attention during its period of existence, and with which it is meeting with great success. A great deal of babbitt is manufactured at its works on Tenth Street, Jersey City. The company recommends cast-iron shell babbitt bearings for armature and solid bronze for main motor axle bearings, according to the preference of the consumers. The bronze used is of special composition, which has given excellent service in steam railroad work, and which has also been found to be very well adapted to this particular service. In addition, the company manufactures a large number of other metals for different purposes, including phosphor and manganese bronze, brass, solder, battery zincs, etc.

ANNUAL MEETING OF THE INDIANA UNION TRACTION COMPANY

The annual meeting of the stockholders of the Indiana Union Traction Company and its allied companies, the Union Traction Company, of Indiana, and the Indianapolis Northern Traction Company, was held in Anderson, March 1.

The financial report of the Indiana Union Traction Company shows that the gross earnings for the last year are $1,118,951.54; operating expenses, $620,136.64; total net earnings, $498,814.90; fixed charges, interest accounts, taxes, licenses and dividends on preferred stock, $358,511.19; net income for the year, applicable to rental payments, $140,303.71.

For the Union Traction Company, of Indiana, the following directors were elected: Philip Matter, of Marion; J. Levering Jones, of Philadelphia; James A. Van Osdol, of Anderson; William C. Sampson, of Muncie; Ellis C. Carpenter, of Anderson; Hugh J. McGowan, of Indianapolis; Arthur W. Brady, of Muncie. The board organized by electing Mr. Matter president, Mr. Carpenter vice-president, Mr. Van Osdol secretary, and Mr. Sampson treasurer.

For the Indianapolis Northern Traction Company directors were elected as follows: George F. McCulloch, of Indianapolis; Randall Morgan, J. Levering Jones, Henry H. Kingston and John A. Harris, Jr., of Philadelphia; W. Kesley Schoepf, of Cincinnati; Arthur Brady, of Muncie.

The same board was elected for the Indiana Union Traction Company. There was not a quorum of directors present for the Indianapolis Northern or the Indiana Union Traction.

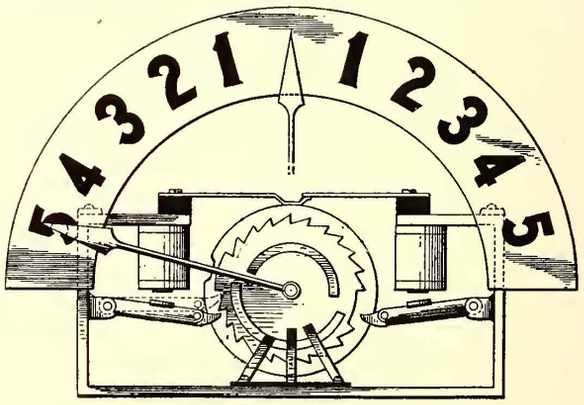
STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED FEB. 23, 1904.

752,718. Railway Switch; Wilber K. Smith, Denver, Col. App. filed April 1, 1903. The switch tongue is connected with a lever pivotally secured in position between the railway tracks and adapted to be operated by means secured to the car.

752,719. Automatic Signaling System for Electric Railways; Harry B. Snell, Cement City, Mich. App. filed July 17, 1903. A dial-plate and index at the ends of each block indicate the number of cars upon the block, and in which direction they are running.



PAT. NO. 752,719

752,824. Electric Railway Switch; Harry H. Chandler, Waltham, Mass. App. filed Oct. 24, 1903. Details of a magnet, by means of which the switch tongue is actuated.

752,828. Clamp Handle; William P. Devine, Dorchester, Mass. App. filed March 27, 1903. Details of a clamp handle adapted to be attached to the rods connected with the fare registers in street cars.

752,861. Vestibule for Cars; Michael Power, Toronto, Canada. App. filed June 17, 1903. A vestibule for the motorman which is adapted when not in use to be folded and stored under the hood of the platform.

752,892. Tongue Switch; George M. Ervin, Johnstown, Pa. App. filed June 17, 1903. A continuous main rail, a casting secured to the inner side thereof and forming a part of a turnout or branch track, the casting having an under-cut and recessed guard portion, and a switch-tongue pivoted to the casting, and having a base-flange which engages the recessed guard portion.

752,984. Vehicle Brake; Jake Knuth and Charles Read, Oswego, Ill. App. filed Oct. 25, 1902. A shaft deriving rotation from a ground-wheel, a clutch member having a flange, a co-operating

clutch member mounted to slide longitudinally upon the shaft, and having radially presented friction-blocks adapted to engage the inner surface of the flange, radial stems carrying said blocks, radial bearings in which the stems are adjustable, and bolts for securing the stems in place.

UNITED STATES PATENTS ISSUED MARCH 1, 1904

753,341. Safety Guard on Electric Cars; Charles A. Willard, St. Louis, Mo. App. filed Jan. 29, 1902. Details of construction of a guard rail adapted to be projected from the rear of the car by the motorman to prevent persons, upon alighting from the car, passing around the same in front of a car passing on the adjacent track.

753,345. Automatic Releasing Device for Safety Trolleys; Andrew C. Wolfe, Pittsburg, Pa. App. filed July 6, 1903. Details of construction.

753,418. Register; John O. Morris, Richmond, Va. App. filed May 23, 1903. Details of construction.

753,436. Safety Apparatus for Motor Cars of All Kinds; Karl Schmidt, Cothen, Germany. App. filed Oct. 12, 1903. Rotary brushes mounted in front of the car on a spring-mounted sliding frame, are adapted when an obstruction is encountered, to be pushed back and engage gears which rotate the brushes to thereby roll the obstruction off the track.

753,535. Register; Francis R. Beal, Northville, Mich. App. filed May 6, 1903. A register particularly adapted for use on lines where the amount of the fares is liable to differ considerably.

753,526. Contact Device for Electrically Propelled Railways; Henri Berthoud, Neuchatel, Switzerland. App. filed July 10, 1902. A contact strip is provided on the roof of each car, running the full length thereof and overlapping the strip on the adjacent cars, the electrical terminals being suspended above the track and bearing upon these conductors to deliver current to the vehicle.

753,542. Trolley; Alexander C. Calderwood, Gloversville, N. Y. App. filed Aug. 6, 1903. When the wheel leaves the wire, a trolley replacer is tripped and allowed to move into operative position.

753,545. Car Seat; Eugene Chamberlin, Brooklyn, N. Y. App. filed June 1, 1901. A seat structure, a pivotal support therefor eccentrically arranged with regard to the ends of the seat structure, whereby the structure may be directed transversely or longitudinally of the car and may at the same time be moved relatively to the car floor, and means for locking the seat structure in different positions.

753,552. Trolley for Electric Cars; William A. Daggett, Vineland, N. J. App. filed Sept. 3, 1903. A yielding connection between the trolley harp and pole to prevent pounding or jumping of the trolley.

753,554. Trolley; Arthur S. Deem, Reading, Pa. App. filed Aug. 8, 1903. Two trolley wheels, one arranged in advance of each other, one wheel being pivoted on a horizontal axis, while the other is pivoted on a vertical axis.

753,617. Trolley Replacer; Francis A. Nolan, St. Paul, Minn. App. filed Jan. 16, 1902. Tension on the trolley cord throws guide arms to operative position.

753,759. Electrical Connection; Edward G. Thomas, Cambridge, Mass. App. filed July 15, 1902. For soldering terminals of the rail bonds to the under face of the rail, said terminals have spout-shaped extensions into which the melted solder is poured and by which it is conveyed to the abutting surfaces of the bond and rail.

753,794. Track-Sanding Device; John H. Hanlon, Somerville, Mass. App. filed Nov. 4, 1903. Vibrators placed in the blast nozzle and movable by the discharge of compressed air, to keep the blast nozzle free from foreign substances.

753,802. Combined Third and Traction Rail for Electric Railways and Switching Systems Embodying Same; Edmund C. Morgan, Chicago, Ill. App. filed Aug. 27, 1902. The third rail is slotted to accommodate gearing carried by the truck and operated by the motor thereon for causing the truck to move along the track.

753,803. Combined Third and Traction Rail for Electric Railways; Edmund C. Morgan, Chicago, Ill. App. filed Dec. 3, 1903. Details of construction of the rail used in the system described in the preceding patent.

PERSONAL MENTION

MR. F. L. FULLER, general manager of the New York & Queens County Railway Company, has also been elected to the office of vice-president of the company.

MR. CHARLES T. CHAPIN, formerly president of the Rochester Car Wheel Works, and recently vice-president of the National Car Wheel Company, has been elected president of the company, in place of Mr. C. V. Slocum, who has resigned.

MR. GEORGE B. DOVEY, superintendent of the Broadway division of the St. Louis Transit Company, has resigned from the company to become connected with the St. Louis Car Company.

MR. T. W. SHELTON, chief engineer of the Northern Ohio Traction & Light Company, of Akron, has resigned. He has been succeeded by Mr. Robert J. Turnbull. Mr. William Roberts has been appointed chief electrician of the same property.

MR. EDWARD J. BALDWIN has resigned as secretary of the Evansville & Princeton Traction Company, of Evansville, Ind. Mr. Baldwin has not announced his plans for the future, but is understood to have several offers under consideration. One of these is said to be from a company in California.

MR. GEORGE H. CAHILL, formerly superintendent of the Bayonne division of the Public Service Company's electric railway lines, in New Jersey, has accepted the position of superintendent of the New Paltz, Highland & Poughkeepsie Electric Railway, of Poughkeepsie, N. Y.

MR. L. C. HANNA has been elected a member of the directorate of the Cleveland Electric Railway Company, succeeding his late brother, Senator M. A. Hanna. In accordance with the wishes of the late Senator, Mr. L. C. Hanna has also succeeded to nearly all official positions held by the Senator.

MR. LAWRENCE A. YOUNG was elected first vice-president of the Chicago City Railway, to succeed Mr. Joseph Leiter, and Mr. A. W. Goodrich was elected second vice-president, to succeed Mr. George T. Smith, at the meeting of the directors of the company on Feb. 29. The other officers were all re-elected.

MR. FRANK VAN VRANKEN has been appointed superintendent of the Los Angeles division of the Pacific Electric Railway Company to succeed Mr. J. B. Rowray, who will now devote his entire time to the northern division. Mr. Van Vranken is also superintendent of the southern division, operating the Long Beach and Whittier branches, and the two positions will be combined. The change took place March 1.

MR. F. E. FISHER, superintendent of the Chicago & Joliet Electric Railway, of Joliet, Ill., was recently presented with a gold watch, a chain and a charm by the employees of the company as a token of esteem. As previously stated in the STREET RAILWAY JOURNAL, Mr. Fisher will, on April 1, become connected with the Fisher Construction Company. Mr. Fisher has been at Joliet six years.

MR. WILLIAM LINTERN has resigned as master mechanic of the Cleveland & Southwestern Traction Company, of Cleveland, to devote his time to the interests of the Nichols-Lintern Company, of Cleveland, manufacturers of track-sanders, with which he has long been identified. His shop associates tendered him a reception a few evenings ago and presented him with several valuable presents. Mr. Lintern has been succeeded by Mr. Fred Strail, who for thirteen years has been shop foreman with the Rochester Railway Company, of Rochester, N. Y.

MR. E. N. HIBBS has resigned as general auditor of the Public Service Corporation, of New Jersey, his resignation to take effect March 15. Mr. Hibbs came to Jersey City about nine years ago, when the late Mr. B. M. Shanley was connected with the Consolidated Traction Company. He served in the auditors' department, and when the North Jersey Street Railway Company leased the property of the Consolidated Traction Company his ability was recognized and his services rewarded with a continuance in the same capacity. Last year, when the Public Service Corporation came into being, Mr. Hibbs was retained and advanced to the position of general auditor. Mr. Hibbs resigned so as to become connected with the United Railways, of San Francisco.

MR. WALTER B. JACOBS, president of the Shreveport Traction Company, of Shreveport, La., died at his home in Shreveport at 2:00 a. m. Thursday, March 3. Mr. Jacobs succeeded his father eight year ago as president of the street railway lines in Shreveport, and during his incumbency rebuilt the entire system, putting it in first-class physical condition, beginning with new power station, then cars, heavy steel in paved streets, etc. The very day before his death Mr. Jacobs concluded negotiations for the erection of a magnificent park for amusement purposes. Besides being president of the Traction Company, he was also interested in a number of important industrial and other companies, and was a prominent clubman. He was very popular with the employees of the street railway company, with whom he came in daily contact, and was a man liked and respected by all classes. His successor in the Traction Company will probably be one of the vice-presidents.

NEWS OF THE WEEK

CONSTRUCTION NOTES

WALNUT RIDGE, ARK.—Construction of the Walnut Ridge & Hoxie Electric Railway is reported begun. S. C. Dowell and Mayor H. L. Ponder and others are interested.

NAPA, CAL.—The Vallejo, Benicia & Napa Valley Electric Railway has purchased a site here for its terminal station.

OAKLAND, CAL.—The San Francisco, Oakland & San Jose Railway has filed with the Council a franchise application for the construction of the tunnel along Fortieth Street, from Broadway to Howe Street, according to plans. Another franchise application, made on behalf of the company is for crosstown tracks on Fifty-fifth Street from the present ferry tracks on Adeline and Linden Streets to Telegraph Avenue.

PUEBLO, COL.—Leading citizens of Bessemer are the promoters of a plan to establish an electric railway here. It is proposed to run a line from Carlile Park, in the west end of the city, to the zinc smelter and Riverview Cemetery on the east, the line to run through the principal streets of Bessemer.

SAN FRANCISCO, CAL.—The United Railroad has petitioned the Board of Public Works for the necessary permission to reconstruct its steam line on California Street. The double tracks will be retained, but the road will be changed into standard gage, and equipped for operation by electricity.

BRIDGEPORT, CONN.—The Connecticut Railway & Lighting Company is enlarging the capacity of the power station for the Bridgeport division of its system. The plant has been extended and an 800-kw generator, directly connected with a 1200-hp engine, is now being installed. It will be at least two months before the new generator will be ready for use. The plant will then have a capacity of 3600 hp, and will supply power, not only for the local lines, but for the Milford and Westport branches.

HARTFORD, CONN.—The Hartford Street Railway Company has applied to the municipal authorities for approval of its plans to extend its lines within the city limits. The company has also under contemplation the extension of its suburban lines.

WATERBURY, CONN.—The local municipal authorities have granted to the Cheshire Street Railway Company the necessary rights to construct the Waterbury end of the proposed line between this city and Cheshire. The Cheshire Company is an underlying corporation of the Connecticut Railway & Lighting Company. The work of construction will be commenced this spring. The road will complete a through line between Waterbury and New Haven.

GAINESVILLE, GA.—The North Georgia Electric Company expects soon to purchase electric launches, a merry-go-round, and perhaps an electric fountain, for the company's Chattahoochee Park.

PARIS, IDAHO.—The Bear Lake Valley & Electric Company has been incorporated, with a capital stock of $100,000, to build an electric railway to connect several small towns in Bear Lake County. The directors are: C. R. Slusser, H. E. Slusser and others. Milton Smith will act as attorney for the corporation. C. R. Slusser and H. E. Slusser already own and operate an electric lighting plant at Paris.

CHICAGO, ILL.—The City Council has extended the permit of the Chicago City Railway Company to operate until March 15.

CHICAGO, ILL.—A proposition has been made that, pending the settlement of the terms of a franchise extension ordinance for the Chicago City Railway Company, the company be allowed a temporary permit to put an overhead trolley on Wabash Avenue, north of Eighteenth Street, to make it possible to run cars downtown electrically over the cable tracks. The Council, at present writing, has taken no action.

HILLSBORO, ILL.—The Hillsboro Electric Railroad Company has been organized, with a capital stock of $15,000, to build an electric railway here. The incorporators are: Isaac Hill, T. M. Jett and L. V. Hill.

MOLINE, ILL.—Work on the last of the forty cars ordered by the directors of the Tri-City Railway Company is under way in the car shops in Rock Island. Twelve of the cars are on the floor for completion. None of these will be used on the Elm Street or Prospect Park lines, because they are too large to be serviceable. The company has plans for constructing new smaller cars for these lines, and there is work in sight to keep the shops busy on the company's equipment for a year to come. The cars now being completed are 42 ft. long.

ROCK ISLAND, ILL.—The Tri-City Railway Company, serving Rock Island and Moline, Ill., and Daveport, Ia., is perfecting plans for concentrating all its power-generating plant into one large station on the site of the present plant in First Avenue, Rock Island, from which it will be able to furnish current for the operation of all its lines in the three cities. At the present time the Rock Island plant only furnishes sufficient power for the operation of the cars on the Illinois side of the river, and it has been found necessary to obtain power from the People's Power Company for the operation of the lines in Davenport. The improvements will involve a large investment of capital, and will be made gradually so as not to interfere at all with the traffic of the company.

SPRINGFIELD, ILL.—Yeager & Son, of Danville, Ill., have been awarded the contract for building the sub-stations along the line of the Illinois Central Traction Company's road. The Illinois Central Traction Company is the name under which the McKinley syndicate is building its Decatur-St. Louis line.

WAUKEGAN, ILL.—The Chicago & Milwaukee Electric Railroad Company is asking for a long-term franchise over certain business streets.

FT. WAYNE, IND.—The Ft. Wayne, Logansport, Lafayette & Lima Traction Company has filed amended articles of association with the Secretary of State, changing its name to the Ft. Wayne & Wabash Valley Traction Company. The articles also provide for the extension of the system to Goshen, Elkhart, Mishawaka, South Bend, Ligonier, Millersburg, Kewana, Culver, Hibbard, Plymouth, Lapaz, Lakeville, North Manchester, Claypool, Warsaw, Leesburg, Milford, New Paris, Rochester and Argus, in the counties of Elkhart, St. Joseph, Fulton, Marshall and Kosciusko. The directors of the newly-formed company are: H. C. Paul, J. L. Jones, Randall Morgan, Bayard Henry, S. B. Fleming, James Murdock, and G. F. McCulloch.

INDIANAPOLIS, IND.—Four of the seven members of the County Council have voted not to appropriate money to build new and much-needed bridges over White River in this city, on the ground that the Indianapolis Traction & Terminal Company uses the bridges. The sentiment expressed by the negative members is that "the city doesn't want to build bridges for the electric railways." Under the Traction & Terminal Comapny's franchise, it has a right to use the bridges. The action of the County Council leaves the city in an embarrassing position.

LAPORTE, IND.—The Buchanan Power Company has submitted a proposition to the directors of the Chicago & South Shore Railway Company to furnish power from its plant at Buchanan sufficient to operate cars on the interurban system. It is proposed to run a power transmission line a distance of 26 miles, and to establish stations at Laporte and Michigan City. There is a well defined report that in the event of such a contract being made capitalists will organize a company to build an electric railway from Michigan City to Buchanan and other Michigan points.

RICHMOND, IND.—The Richmond & Northwestern Electric Railway Company has been incorporated to build an electric railway from Richmond to Anderson. The capital is $50,000, and the directors are: George M. Hodges, G. G. Bambach, W. D. Riddel and L. I. Lowman, of Dayton.

SHELBYVILLE, IND.—Application has been made of the City Council by the Indianapolis & Cincinnati Traction Company for privileges to extend its lines to the southern corporation line of the city, that it may continue to Greensburg. It is provided that work on the extension shall begin not later than January, 1906.

WABASH, IND.—The contract for all the material to be used in the completion of the Wabash & Rochester Electric Railway has been awarded to a New York firm. The contract includes rails and overhead work, power-house machinery and cars. The work of grading for the road began March 1.

WARSAW, IND.—The City Council has granted a franchise to the Goshen, Warsaw & Winona Electric Railway. This system, when completed, will be in the form of a cross. The main line will be built from Goshen to Winona, and the cross section will center at Milford, running east to Wawasee Lake, and west to Nappanee, Cleveland capitalists, headed by J. B. Hanna, are behind the project, and there seems to be no doubt about the building of the road.

DES MOINES, IA.—General Manager G. B. Hippee, of the Des Moines City Railway Company, says that it will be sixty days before the company will have finally decided upon extensions and improvements to be made this year. The company has under consideration the extension of the Sixth Avenue line north across the new Melan Bridge to Highland Park, and the diverting of passenger traffic to and from that portion of the city from the Belt Line. If this is done, the Belt Line will be used almost entirely for freight purposes in connection with the Interurban and the Fourth Street line extended from Fourth and School Streets north past Mercy hospital, and thence across the north bottoms to take care of the passenger traffic now carried over the Belt Line. Another contemplated improvement is the building of a crosstown line from the vicinity of Union Park west to Sixth Avenue, thence south to Washington and west on Washington Street to Thirteenth, south on Thirteenth to Clark and west on Clark Street line to about Thirtieth, and south from Thirtieth to an intersection with the Ingersoll Avenue line. This line is planned to relieve park traffic and shorten the distance to be traveled between the parks by nearly a mile. Some changes in the lines south of the Coon River are also under contemplation.

EDDYVILLE, IA.—Rumor has it that plans are under way for the construction of an electric railway between Council Bluffs and Ottumwa, passing through Buxton, Bridgeport and South Ottumwa.

MARSHALLTOWN, IA.—It is reported that a contract has been closed with J. G. White & Company, of New York, for the construction of the Marshalltown Electric Street & Interurban Railway. The road will be built from Marshalltown to Grundy Center, 30 miles, and then, if feasible, will be extended to Parkersburg and ultimately to Charles City, on the north, and to Ferguson, south of Marshalltown, in order to connect with the Milwaukee there. The power house will be built at Marshalltown.

OSAGE, IA.—A mass meeting of business men and farmers from Winnebago, Worth, Howard, Mitchell and Winneshiek Counties was held here a few days for the purpose of considering the feasibility of constructing and operating an interurban electric railway from Decorah, Winneshiek County, west through Winneshiek, and the other counties to Forest City, Winnebago County. The towns of Northwood, Fertile, New Haven, Rice-