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EDITORIAL NOTICE

Street railway news, and all information regarding changes of officers, new equipments, extensions, financial changes and new enterprises will be greatly appreciated for use in these columns.

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Electric Traction on the Elevated

It is now about six months since the Second and Third Avenue Divisions of the Manhattan Railway Company were changed over to electric operation, and about four months since a partial electric service was commenced on the Sixth Avenue line. Sufficient experience has therefore been had with the electric equipment to justify a judicial and dispassionate view of the net results. For many reasons a consideration of this subject is extremely appropriate at the present time. In the first place, the Manhattan installation is by far the most extensive of the kind which has yet been made, so that the practical adaptability of the electric apparatus, and particularly of the multiple-unit system to semi-heavy railroad conditions, has to a certain extent been on public trial in the Manhattan equipment. In the second place, the traffic conditions to be met, while probably the most severe of any in the world when all attendant circumstances are considered, had previously been fulfilled remarkably well with steam locomotives which were built especially for the service, and which were undoubtedly both economical and efficient. It is not surprising, therefore, that the attention of the engineers and managers of steam railroads all over the world has been focused during the last six months on the elevated equipment in New York, to see whether the results secured in that city would be such as to warrant the conclusion that electricity is able to cope with the

broader subject of heavy electric railroading, which is logically its ultimate goal.

Electric railway engineers and all others acquainted with the achievements of electricity in street railway and power work, never felt any trepidation as to the outcome of the demonstration in New York, but with steam railroad managers it was different. They drew a distinction between what had been done in the past, and what was being attempted on the Manhattan, and perhaps only naturally took the ground that the burden of proof of the success of the enterprise was with the electrical engineers who recommended and installed the Manhattan system.

The result of the trial has proved the electric system on the Manhattan a conspicuous and brilliant success, and that the company made no mistake either in the transformation of the system to electricity as a whole, or in the selection of the multiple-unit system instead of either locomotives or the two-motor car system, both of which were at one time considered. The ability of the equipment properly to fulfil the conditions required, or modified if necessary, to suit other like conditions, has been demonstrated beyond the shadow of a doubt. There have been, it must be admitted, certain delays to the service, which, however, were only incidental to the starting of a large system of this kind. These troubles have received more attention by far in the daily press and in New York than their importance deserves, but as they have undoubtedly caused some feeling of anxiety and mistrust in the minds of those steam railroad owners who are contemplating the installation of electrical equipment, and who are not fully posted as to the facts, it is only proper that they should be fairly discussed in these columns.

An analysis of all the complaints against the Manhattan equipment shows that they may be roughly divided into three classes: first, those caused by minor mechanical defects entirely apart from the electrical equipment; second, those caused by the popular impression that electricity would accomplish impossibilities in the way of reducing noise and in other ways, and third, those which have no foundation in fact, but which have arisen during a period of popular clamor against the transportation systems of this city, which are being forced to transport nearly two and a half million people daily while tied down to facilities suitable for half that number.

The first class of complaints are, of course, the only ones worth considering, and a brief review of them may, perhaps, be very pertinent at the present time.

The most serious delays which have occurred on the Manhattan Railway up to the present time have been practically confined to one week in December, when the company was caught unprepared by an early sleet storm of unusual severity. We have already fully considered editorially the sleet trouble on this line, and it is necessary only to reiterate that the company has now completed preparations which should render the cars immune from troubles of this kind in the future. As other third-rail roads, like the Boston Elevated, have come through at least as serious conditions undisturbed it is safe to say that the third-rail system is per se perfectly reliable, and the engi-

neers of the Manhattan Company can be safely relied upon to make such changes, if any are necessary, to render its third-rail system workable at all times.

The second charge brought against the Manhattan system, and particularly against the method of control employed, is that should the motorman be suddenly stricken at his post, or should he abandon it in the excitement of an impending tail-end collision, the train would continue with full power on and dash into the train ahead. This charge, which has been brought by some of the labor leaders, is of course untrue, because the master controller is held in position by the motorman against a spring, which returns it to the zero point automatically with a release of pressure. A prominent official of the Manhattan Railway Company positively assures us that in no case has the handle failed to return automatically and absolutely to the "off" position when so released, and characterizes any statements in the daily papers and elsewhere to the contrary as absolutely untrue. Moreover, the current for the entire train can be cut off at other points by means of circuit breakers, and the emergency brakes, which are capable of stopping the train even with the circuit on, can be applied from any platform. As the setting of these brakes would immediately blow the fuses and stop the train, it will be seen that the control over the train is much more complete than if steam power were used.

Still another alleged failure of the Manhattan system is that under certain circumstances there has been a tendency of the contactors under the car to fuse, or in very cold weather to freeze, and thus not complete or break the circuits at the proper times as required by the movements of the controller handle. It might be said in passing that with the system of wiring used the fusing or sticking of one or even of two sets of contactors would not render the train unmanageable, but that three sets would have to stick simultaneously. Nevertheless, during the entire experience of the Manhattan Company, and in spite of the most careful inspection, we can affirm that no instance has been found of a single contactor sticking during commercial operation. In other words the multiple-unit control system has never failed to work, and it has operated with complete success under all conditions and at all times.

Still another criticism directed against the trains has been as to abruptness in starting and stopping. The latter is due partly to imperfect adjustment of the brakes and partly to the extremely difficult braking conditions required on the Manhattan Railway. Owing to the limitations of the stations, the trains are obliged to stop exactly at predetermined points in order not to overlap the platform limits or gates. The result is that instead of releasing his brake just before stopping, and thus securing a cushioned effect, the elevated railway motorman, unless an expert, has to make the final stop by a quick brake-shoe application, which may sometimes give the train a disagreeable jar. There is also a difference in the rate of acceleration due to the training of the men. The normal Manhattan acceleration to full speed is based on an interval of about twelve seconds, but as with surface lines a record of the time actually taken would undoubtedly show that some of the motormen accelerate half that time, while others might take twice as long. Of course uniform acceleration could be secured by means of an automatic throttle, but the managers of the Manhattan Company believed that the advantages possible with the hand control system, as employed by them, outweigh the advantages of the automatic and there seems no reason why the motormen, with training, should not be able to get perfectly satisfactory results. In fact the operation of the Second Avenue trains,

where the motormen have had the longest training, shows how satisfactory and successful acceleration with the hand control operation can be.

The points of complaint which have been discussed here, and which comprise practically all that have so far been brought against the road, seem so insignificant when analyzed that we feel that we must apologize, in a sense, to our readers for mentioning them, and it is only because of the fact that they have been advanced as serious defects in the Manhattan road that editorial notice of them is warranted.

Another factor in the operation of the Manhattan road should be considered in a discussion of its change of motive power. One of the greatest difficulties its engineers has had to contend with is that the change to electricity had to be effected without interruption of service, making it practically impossible for the employees to gain familiarity with the new operating conditions, save in actual service. This difficulty is not encountered in most installations of this kind. The Boston system, for instance, was in experimental operation on a large scale before it was opened to the public. The trainmen were thoroughly drilled in their duties, the track was plainly marked to guide the motormen in starting and stopping, and the result was that, after the abnormal crowds of the first few days, the operating department went on like well-oiled clockwork. With the Manhattan system, on the other hand, commercial operation was commenced almost at once. The fact that the trains can accelerate and make their runs much more quickly than the steam trains also implies radical changes in the speed-time curves all along the line from the former steam practice, and until these changes have been learned intuitively by all the motormen, and until the latter have become familiar with the peculiarities of the control in relation to every grade and curve along the route, a full and effective service cannot be expected. But these difficulties have grown less as time has gone on, and will before long disappear entirely.

In conclusion, the electric train, particularly if equipped with the multiple-unit system, is far more manageable under elevated or any other conditions than a train drawn by a steam locomotive possibly can be. It can be started and stopped more promptly and smoothly if the control and brakes are skillfully applied; it is capable of giving better time between stations, and consequently better service; and a long experience in several cities has proved it both safer and more reliable than a steam train. The multiple-unit feature enables every car on the train to come to the aid of the others, so that no accident to a single motor can cripple the system. Power is automatically shut off if the motorman loses his grip. The third-rail feature of the electric system, which has been particularly attacked, has demonstrated its effectiveness in elevated service in Boston and Chicago, as well as in suburban railway conditions in the woods of Michigan, across the plains of Illinois, and on inter-urban lines in Pennsylvania and Connecticut, and there should be and will be no future difficulty with the third rail on the New York Elevated. Although the metropolis is the toughest place in the world for a rapid transit system, and serves probably the most critical populace on earth, so far as slight interruptions of service are concerned, we are satisfied that the Manhattan Railway can, and undoubtedly will, give us the best possible service under the existing conditions. In fact, the records during December show that even with a three-fourths electric, and one-fourth steam service, the traffic carried on some days was 50 per cent in excess of that which was considered a "record-breaker" with steam four years ago.

The New York Franchise Decision

The decision of the Appellate Division of the Supreme Court of New York State last week in declaring the Ford franchise tax law unconstitutional, is on the whole satisfactory, although the practical results of the decision have yet to be determined. The ground taken by the majority of the court was that the unconstitutional feature of the bill lay in the provision that the assessments were to be made by a State board, while the constitution declares that local real estate, which the franchise involved are declared to be in the statute, shall be assessed by local authorities. The claim is already being made by the cities that outside of the State assessment provision the law is constitutional, consequently the local assessors can immediately place the properties on the assessment books in the different cities, like other real estate. In the meantime Governor Odell has come out strongly in advocacy of substituting a tax of 2 per cent on gross earnings in place of the franchise tax.

In our opinion neither of these proposals is satisfactory or just. As we have many times stated, the franchise of a railway company is simply the right to operate cars, and its value depends almost entirely on the ability of the managers of the road to give a service which will attract traffic. It is easy to imagine a property which in one set of hands would show a deficit, but which if controlled by others more experienced in railway operation might earn a handsome surplus. We do not mean that the franchise in either case is absolutely worthless, but that until the human element in its value is separated from that possessed by the franchise per se, the tax is not laid on property, but on brains. It would be just as equitable to place two taxes on a merchant or a professional man, one for the property which he owns, and the other for his professional reputation for ability and honesty. Both of the latter qualifications may be very important adjuncts in the success achieved by him in his business, but neither has heretofore been considered a proper object of taxation. The railway companies are perfectly willing to bear their proportion of the public expenses, and, we believe, do not object to paying taxes on the real value of their franchises, if that can be determined. What they have vigorously objected to throughout their long contest on the franchise tax bill is the fact that the assessors have consistently refused to disclose their methods of appraisal. This has prevented, and would prevent, any company from determining whether such appraisal was just.

The suggestion of the governor for a tax on gross receipts is in one sense more logical, for there can be, of course, no question as to the gross receipts of a property, but there are equally serious, if not greater, objections to this method. To mention two only, it would bear equally on the roads which are profitable and those which are not so, even under the most economical administration, and the history of special measures of this kind proves that an arbitrary tax of this kind is generally followed within a year or two with an advance to a higher per cent and other increases later, as the rapacity of the governing authorities increases.

It might further be stated that the decision rendered is by no means final, as either side to the controversy has the right of appeal to the Court of Appeals, which is the court of highest resort in the State. Announcement has already been made that the Attorney-General, acting for the State, will carry the case to the Court of Appeals, though with what correctness we cannot say, as the Governor may bring influence to bear on the legislative body of the State to substitute his plan of taxation of gross receipts for the present franchise law.

Securing Franchises in Massachusetts

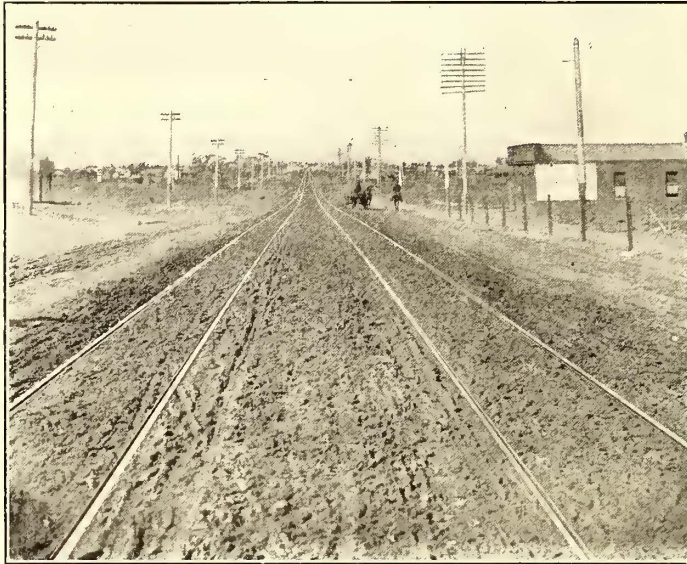
Proceedings before the Massachusetts Railroad Commission are a source of vexation and disappointment to ambitious promoters, and likewise to many substantial business men, who regard that august body as a veritable circumlocution office. Those who are not familiar with the routine are liable to meet with many unexpected set-backs and surprises when they make application for the first time for approval of proposed enterprises, unless they are fortunate enough to have sought advice from those who have already passed through the ordeal, and even then they must proceed warily. The present regulations governing applications before the Commission have been in force some time, and they have been widely published, but it is evident from the number of petitions received that do not comply with these rules, that not only the general public but investors, promoters and even the legal fraternity are still unfamiliar with the first requirements. Frequently the Commissioners are obliged to reject petitions, and refuse to consider plans that are submitted for their approval simply because the promoters have failed to meet the preliminaries that are considered essential to give them a standing before the Board. The proceedings on the petition of the Holbrook, Weymouth & Nantasket Street Railway Company, reported in last week's issue, form an excellent illustration of this class of applications.

Those who are familiar with the work of the Commission insist that the precautions which have been taken to prevent irresponsible promoters from receiving recognition and approval have exerted a salutary influence upon street railway enterprises in Massachusetts, and have given these securities a very high standing among the most desirable of investment properties. Moreover, the restrictions and exactions of the Massachusetts law have proved their wisdom in so far as they relate to conditions of operation, and companies already established find that they afford protection against unwarranted competition and similar annoyances. But it must also be admitted that the means employed are not always the simplest, and it is questionable whether they are any more effective because of the difficulties imposed. They are discouraging, it is true, and this very fact may defeat the purposes of the measure, for the average promoter has more time than anything else, whereas conservative business men, whose time is valuable, may be dissuaded from entering the field and supporting new projects merely because they cannot be bothered attending the numerous hearings before the Commission. Of course, in the case of important enterprises these objections will not hold, as such projects are usually looked after by legal representatives of the company, and they are of sufficient moment even to warrant men of large interests devoting personal attention to them. To illustrate this point, it is only necessary to mention that under present regulations applicants for street railway privileges in Massachusetts are required by law to go before the Railroad Commission three times after they secure their franchises from the local authorities and before they can begin operating cars. It is necessary, first, to secure the Board's approval of the locations granted by towns; second, to have the Board certify that the company has complied with the requirements of the railway law, in regard to its locations, before it goes to the Secretary of State for its charter, and third, to have the Board certify that its constructed road is safe and proper for public service. This is in addition to the many details which must be complied with in securing the necessary rights to establish an electric road. Verily, the promoter who survives the ordeal is entitled to immunity from competition during the life of his franchise.

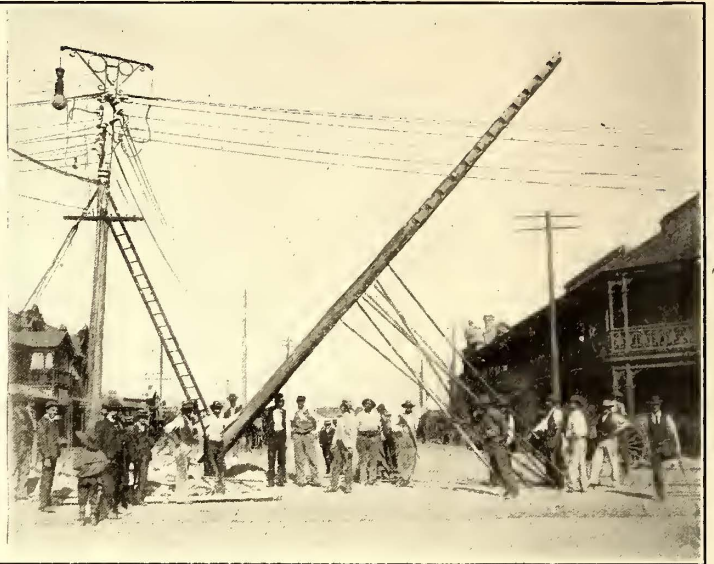
ELECTRIC RAILWAY CONSTRUCTION IN KALGOORLIE

Kalgoorlie is one of the most prosperous mining cities in Western Australia, and shows the wonderful growth and development which are characteristic of towns of that kind, and which has distinguished many places in the mining regions of America. Only a few years ago the name was unknown to the publishers of atlases, and it could not be found on their

kind the Kalgoorlie Electric Tramways Company, Ltd., having a capital of £250,000 ordinary shares, and an authorized debenture stock issue of £200,000, was organized in March, 1902. This company took over the concession which had previously been granted to the Tramways Syndicate, Ltd., of London, and has carried the construction of a trolley line to a successful issue. The engineering work and furnishing of material has been in the hands of J. G. White & Co., Ltd., London, the work



VIEW SHOWING COMPLETED TRACK ON BOULDER ROAD



"KING" POLE IN COURSE OF ERECTION AT CORNER OF HANNAN AND MARITANA STREETS

maps. But with the discoveries of rich gold fields in the neighborhood its development has been rapid, and it now possesses, with its suburbs, a population of approximately 40,000 inhabitants, handsome buildings and a regularly organized municipal system. The city itself is inland, and is connected by rail with Fremantle, its chief water port, 400 miles to the south.

It is needless to say that one of the first necessities of an enterprising place of this kind was a well-equipped and up-to-date electric railway system. To carry out an enterprise of this

locally being carried out by the Tramway Company's engineer, S. W. Childs. Of Mr. Childs it might be said that he built the Perth (Australia) electric railway system in connection with the same contractors, and has also had charge of important electric railway construction in this country, including that of the Toledo & Monroe Electric Railway.

The tramways in Kalgoorlie traverse the chief streets of the city, and extend to Boulder, the principal mining district and suburb. The cars are at the present time operated on an eight-minute headway. The fares charged are 3 pence to any point within the Kalgoorlie limits, and an additional 3 pence to Boulder, with which place the chief traffic exists.

The construction has presented no unusual difficulties except those due to the carrying out of any extensive work at an extreme distance from the base of supply.

The track construction is made up of 90-lb. 30-ft. 6-in. girder rails, dog spiked to 8-in. Jarrah ties, having 2-ft. centers. The road surface is made up with fine screened mining slag, which, when consolidated, makes a cement formation that is extremely hard and durable. In excavating for the line it was found necessary to blast out long sections of the roadway, due to the extreme hardness of this material. The tracks are double bonded throughout with protected rail-bonds.

The overhead wires are supported on Jarrah poles, with both span and bracket type of construction. Double trolley wire of No. 00 B. & S. gage copper wire extends over the entire route, and is fed by some 10 miles of



OPENING DAY, CAR ON POINT OF LEAVING FOR BOULDER

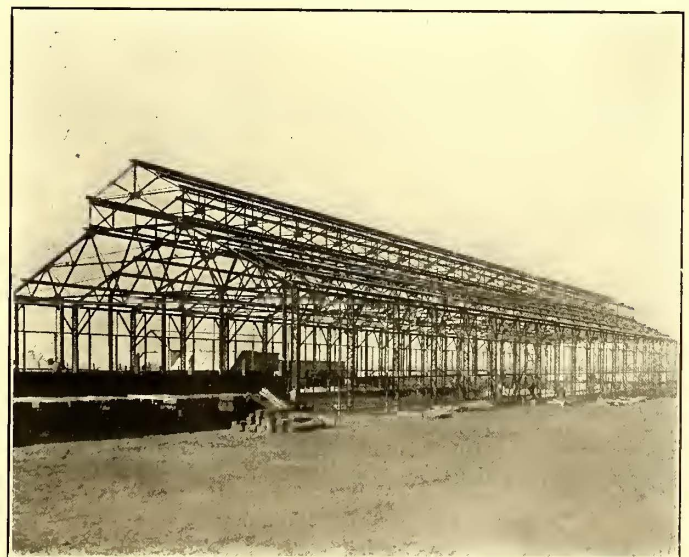


VIEWS SHOWING PORTIONS OF THE ROAD IN COURSE OF CONSTRUCTION

No. 0000 weatherproof wire. The rolling stock consists of fifteen single and ten double truck cross-seated closed cars, and one 2600-gallon sprinkling car. The single-truck cars are equipped with two 35-hp General Electric Company motors, and the double-truck cars with four motors of the same capacity. Christensen independent motor-driven air brakes are employed on the larger cars. The car bodies and trucks were furnished by the J. G. Brill Company, of Philadelphia, the single cars being 19 ft. long, with capacity of twenty-eight passengers, and the double cars 33 ft. long with a seating capacity of fifty-two passengers. The double cars are furnished with two trolley poles.

The car house is of steel, 300 ft. x 60 ft., covered with corrugated iron, all supplied by the American Bridge Company.

The power is supplied to the Tramways Company by the Kalgoorlie Electric Power & Lighting Corporation, Ltd., whose plant is located about 2 miles from Kalgoorlie, upon the outskirts of Boulder. This company has a plant of 2400 hp, equipped with three units, consisting of vertical cross-compound engines of 800 hp. each, manufactured by D. Stewart & Company, Ltd., Glasgow, each directly-connected to a 500-kw three-phase alternator of the revolving field type, and with 40 cycles, by the General Electric Company, of New York. This plant furnishes power to the surrounding mining district as well as to the Tramways Company. Two 250-kw 550-volt, 40-cycle General Electric rotary converters are used for the tramway supply.



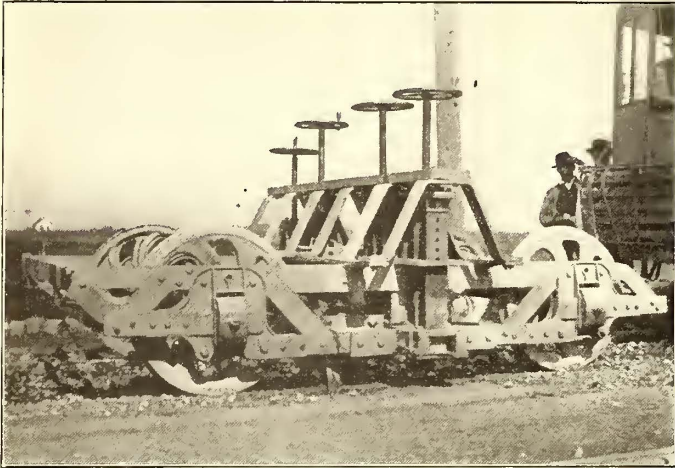
STEEL FRAME WORK OF LARGE CAR HOUSE

CALCUTTA ELECTRIC RAILWAYS

The Calcutta Tramways Company, Ltd., has opened the Chitpur sections of its system. With the opening of these sections the complete conversion of the tramways to electricity has been carried out within the time specified in the agreement.

PAVEMENT PLOW CAR ON THE CALUMET IN CHICAGO

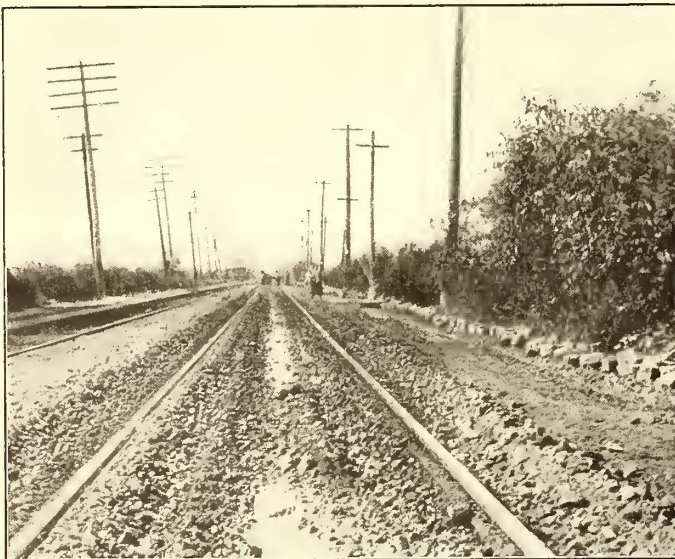
H. M. Sloan, general manager of the Calumet Electric Street Railway Company, of Chicago, has devised and built a



SIDE VIEW, SHOWING PLOWS RAISED

plow car for digging up macadam pavement on suburban highways where track repair is to be undertaken. The Calumet road has many miles of track in outlying districts on streets paved with macadam, and because of its large mileage labor-saving means for effecting extensive track repairs are extremely desirable. This car will easily supplant a gang of twenty track laborers with picks in loosening up pavement preparatory to track repairs.

The plow car is simply a four-wheeled truck, as seen in the accompanying engravings, upon which ten plow bars, or diggers, are mounted between the wheels. There are two of these bars outside of each rail and three inside of each rail. These are raised and lowered by screws worked by hand wheels. When necessary, additional dead weight in the shape of pig-iron can be loaded on the truck to hold it down. In front of the rear wheels are scrapers to take the loose dirt and gravel



TRACK AFTER PASSING OF PLOW CAR

off the rail and prevent derailing the rear wheels. The digging bars are made of tool steel. The appearance of the track after the plow car has passed along is shown in one of the engravings. The car is pulled by one or two motor cars, according to the necessities of the case. The outfit is simple in construction and saves the company much money in the course of the season. Mr. Sloan would be very unwilling to part with its services.

The accompanying views were taken during work last season on Cottage Grove Avenue, where it was necessary to renew ties in order to keep the track in surface. Joints on this



END VIEW, SHOWING PLOWS DOWN

track are cast-welded, and the rails themselves are good for much more service.

IMPROVEMENTS IN SALT LAKE CITY

The Consolidated Railway & Power Company, of Salt Lake City, has made a number of important improvements and additions during the past year in all departments of its service, and the road is now well equipped for operation.

The rolling stock has been increased during the past year by the addition of eleven closed double-truck cars, built by the Laclede Car Company. These cars will seat fifty people, and are equipped with air brakes, trolley catchers and fenders. The company has also purchased six fifteen double-bench open cars, and expects early this coming year to secure six others of the same type. The company has added to its rolling stock during



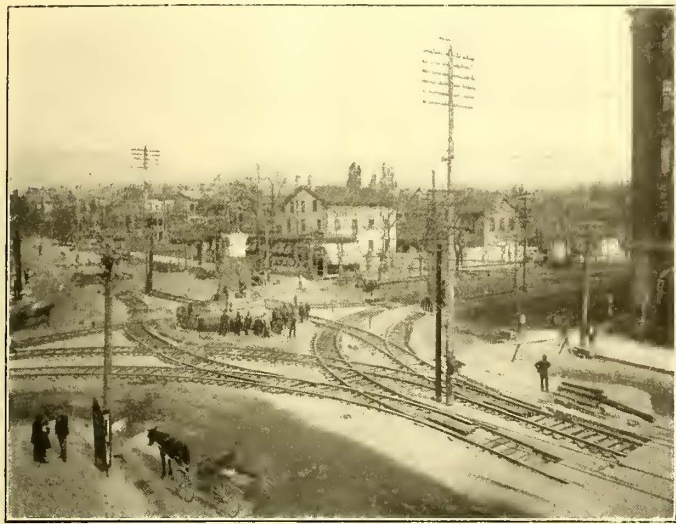
SPECIAL WORK NEAR PIONEER MONUMENT

the past year twelve long double-truck cars, made by splicing together two single-truck cars, and has found the longer cars so popular that all of the present single-truck cars will be so converted. The new cars are equipped with Hunter fenders.

The company has also built new car houses on the site of the old Salt Lake Rapid Transit Company car houses, which were destroyed by fire in the summer of 1901.

A considerable amount of new track has also been built, and

several complicated pieces of special work have been laid. The new rails are all 72 lbs. to the yard. One of the largest pieces of track construction installed is shown in the accompanying

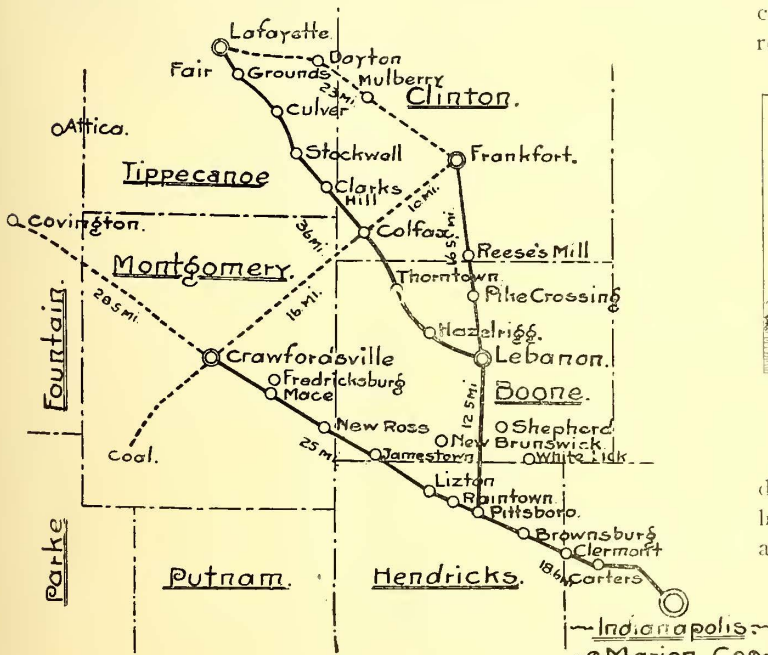


DOUBLE-TRACK THROUGH Y IN SALT LAKE CITY

engravings. It consists of a double track through Y built at the intersection of East Street and Temple Street, around the Pioneer Monument. The company has also increased its feeder distribution system to a considerable extent.

CONSOLIDATED TRACTION COMPANY'S INTERURBAN LINES

The accompanying map shows the principal lines of the interurban system, comprising 106 miles of track, which the Consolidated Traction Company is organizing and building in the



INTERURBAN LINES NEAR INDIANAPOLIS

vicinity of Indianapolis. This concern is a merger of the Crawfordsville Traction Company, the Lafayette & Indianapolis Rapid Railway Company, and the Indianapolis & Lebanon Traction Company. The right of way for most of the lines shown on the map has already been secured, and it is proposed to begin active operations at once. The line from Indianapolis to Crawfordsville will be the first to be completed, and the coal line, which will be a branch from Crawfordsville, and will be run into the mining district, will be the next to be finished.

This line will be especially devoted to the development of the

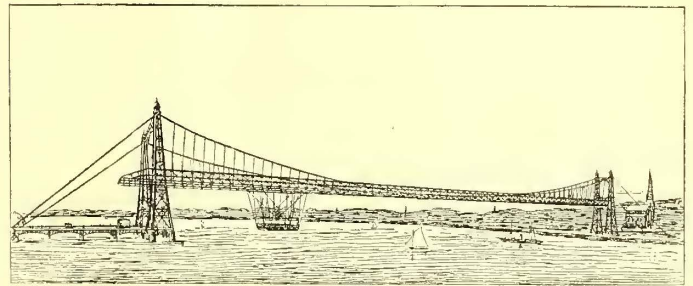
coal mines, which were the property of the Crawfordsville Traction Company, and have been acquired by the Consolidated Company. They are located in Montgomery County, 20 miles south of Crawfordsville and about 64 miles from Indianapolis.

Between Indianapolis and Crawfordsville the route will be practically an air line, and will be built on private right of way over the entire distance, paralleling the Peoria & Eastern Railroad. From Lafayette to Lebanon the line will be over a private right of way, and will parallel the Big Four Railway. The line between Lebanon and Frankfort will likewise be over a private right of way along the Frankfort & Lebanon Gravel Road, which is almost a straight line, and a spur will be built from Lebanon south to a point on the Crawfordsville Division, thus effecting a complete connection of all points of the system with Indianapolis. The country through which this road will be built is generally level, and the routes selected will not require the construction of many bridges. The cities and towns all along the line have shown an interest in the project, and there has been general co-operation with the new concern in its efforts to secure an effective organization.

The directors and stockholders of the Consolidated Traction Company are A. F. Ramsey, P. C. Somerville, C. N. Van Cleave, A. E. Reynolds, Crawfordsville; George P. Heywood, J. F. Marks, William C. Mitchell, Lafayette; Ely P. Baker, Lebanon; A. M. Glossbrenner, R. W. McBride, Edward Hawkins, Indianapolis. Edward Hawkins has been elected president; A. F. Rausey, vice-president; A. M. Glossbrenner, treasurer; Guy E. Hawkins, secretary. The capital stock of the company is \$300,000. The general offices are in Indianapolis.

A SUSPENDED ELECTRIC CAR

A novel type of bridge is being built across the Mersey River in England, at Runcorn, not far from Liverpool. From a recent article in the "Liverpool Mercury" the following facts in regard to the installation have been gathered:



ELECTRIC CAR SUSPENDED FROM BRIDGE

"The proposed bridge is of the 'transporter' type, and is in design precisely similar to an ordinary stiffened suspension bridge, with the exception that the approaches to the bridge are at a low level—thus dispensing with the very costly high level approaches—and the traffic, both foot and wheel, is carried over in a car suspended to the underside of the bridge. Several bridges of this type have been built on the Continent, and one is proposed at Duluth, Minn.

The towers are of steel, rise 190 ft. above high-water level, and rest on caissons. The tower legs are spaced 30 ft. apart at the base and 6 ft. 9 ins. apart at the top landing, which is 10 ft. 6 ins. wide. Each pair of towers are 70 ft. apart, and are braced together with strong horizontal and diagonal frames. Upon the top of the towers are fixed the saddles, on steel rollers, for carrying the steel cables. Each of the latter is made up of nineteen steel ropes, each in turn built up of 127 wires, 0.16 ins. diameter. The outside diameter of the cable is about 12 ins.

From the main cables are suspended two longitudinal stiffen-

ing girders, 18 ft. deep, and placed 35 ft. apart horizontally, the underside of the girders being 82 ft. above the level of high water. The two girders are to be firmly braced together horizontally to withstand a wind pressure of 56 lbs. per square foot. The stiffening girders are hinged at the center, so as to minimize the stresses, due to deflection from temperature, the girders rising and falling as much as 2 ft. 9 ins. for a range of temperature from zero to 120 degs. F.

Upon the lower flange of the stiffening girders are fixed the rails, upon which runs the trolley, from which is suspended the car. The trolley is about 77 ft. long, and is carried by sixteen wheels on each rail. It is propelled by four electric motors coupled to the wheels, which receives the current from the generating station placed at the foot of one of the towers.

The transporter car consists of a platform 55 ft. long by 24 ft. wide, and is suspended from the trolley by steel ropes. It is capable of holding at one time four two-horse wagons, loaded, and 300 passengers. The operator's cabin is on top of the car. The time occupied in crossing will be about two and one-quarter minutes, so allowing for loading and unloading; the car will be capable of making about nine or ten trips per hour. The bottom of the car will be about 12 ft. above high-water level.

The engineers are J. J. Webster, J. T. Wood and L. H. Chase. The towers, approach girders and cylinder foundation are being supplied by the Widnes Foundry Company. The construction of the steel cables has been let to the St. Helens Cable Company.

This bridge, when erected, will have the longest span of any bridge in the United Kingdom designed for carrying road traffic, the clear space over the Mersey and the Ship Canal being 1000 ft. The Clifton Suspension Bridge is 702 ft. span, the Menai Suspension Bridge 570 ft., and the Conway Suspension Bridge 327 ft.

CAST-IRON WHEELS TO MEET THE REQUIREMENTS OF THE PRESENT DAY*

BY F. W. SARGENT

Considering the subject from the standpoint of the relation between the brake-shoe and the cast-iron wheel, the question naturally arises, "What is the effect of the brake-shoe acting upon the cast-iron wheel?" The brake-shoe has very little direct effect upon the hard chill of the cast-iron wheel tread so far as actually cutting or wearing into the wheel tread or flange is concerned. There have been occasionally instances where cast-iron wheels have been cut into and grooved by the brake-shoe, but such cases occur generally with wheels that are nearly worn out or that are very lightly chilled. In either case the slipping on the rail or the flange thrust in combination with the heat produced at the shoe face softens the chill in the wheel, permitting the harder, or tougher, material in the shoe to cut. Cases occur where the chill does not extend clear across the wheel tread, and then a chilled-face brake-shoe bearing all across the wheel tread may cut into the softer portion. Some cast-iron wheels have in this way been grooved along the outer tread. Investigation generally discloses the absence of chill in those parts of the wheel cut into by the shoe. Figures 1 and 2 show the section of a cast-iron car wheel which has been cut into by a chilled-end brake-shoe. The reason why the shoe cut the wheel (Fig. 1) is clearly indicated in the fracture which shows that the chill did not extend entirely across the wheel tread. Fig. 2. shows the same brake-shoe on a narrower wheel which has been chilled heavily; it would seem evident, from a comparison of these two illustrations, that the same width of chill-ring had been used in the manufacture of both wheels. Figs. 3 to 6, which show sections of wheels and

shoes used by the Brooklyn Rapid Transit Company, illustrate the same conditions in a little different manner.

I have noticed cast-iron wheels grooved by the wrought-iron shoes at one time in use on a Western road. The hard metal flowed and burned fins on the side of the shoe, and these cut deep furrows in the wheel tread. Examination of these damaged wheels showed them to be practically worn through the chill by continued service and sliding on the rail where the shoe had cut inside the limits of rail wear, and outside of these limits there had been but very little chill at the start. These observations of cut cast-iron wheels were made over ten years ago, and the road has long since discarded the practice of riveting a strip of wrought-iron on the brake-head, this to take the place of a brake-shoe.



FIG. 1.—WHEEL WITH NARROW CHILL AND CUT BY BRAKE-SHOE

Some years ago the Southern Pacific Railroad made an exhaustive test of cast-iron wheels in their mountain service for the purpose of determining the best design of wheel for their use, and in the course of the trials used cast-iron and wrought-iron brake-shoes. As I remember the results, which were published, many more wheels of all designs were cracked under the wrought-iron shoes than under those of cast-iron. The braking loads were the same in all cases. The only reason that can be given for the apparent severer action of the wrought-iron shoe is that the greater retarding power of this kind of shoe heated the wheel more highly than the softer cast-iron shoe. Under the conditions of freight service there is about 15 per cent greater retarding effect with wrought-iron than unchilled cast-iron, which will account for the greater heat. I refer to this test now because I have heard the results quoted as a reason why wrought-iron is unsatisfactory for use in a brake-shoe to be used on the chilled wheel.

My observation, extending over a number of years in the manufacture of brake-shoes and close study of their action on both cast-iron and steel-tired wheels, has convinced me that the most desirable metal to use in the brake-shoe is unchilled cast-iron, and our efforts as manufacturers have always been directed toward maintaining, as much as possible, the grinding effect and rolling action between the shoe face and the wheel,

* Paper read before the New York Railroad Club January 16, 1903.

which is only possible with a large proportion of unchilled cast-iron in the shoe face. I think it is reasonable to assume that the final temperatures of the wheel and of the shoe are much less when a portion of the work changed into heat has been dissipated by the particles thrown off in an incandescent condition by grinding from the shoe face. I think it is impossible that a hard spot on the face of an ordinary brake-shoe should cut into the tread of a well-made cast-iron wheel. By "well made" I mean with a good, strong chill where the brake-shoe acts. The brake-shoe is continually against the wheel when the brakes are applied, while any point on the wheel is but intermittently in contact with the shoe; the smaller body of the brake-shoe must in consequence become more highly heated than the larger volume of the wheel, and hence any hard spot or point on the shoe would be destroyed by heat before the cooler chilled metal in the wheel tread is cut. Of course, fluted steel or wrought-iron, as before noted, will cut into the unchilled metal of the wheel body regardless of the temperature, but it will have no effect on the chilled iron. During all my experience I have found no records of cast-iron wheels being directly injured by the brake-shoe, so long as the wheels were in good condition otherwise.

Indirectly, the brake-shoe may affect a cast-iron wheel to such an extent as to make it necessary to remove the wheel from service. The brake-shoe is the medium through which the energy stored in the wheel, due to rotation and load carried, is transformed into heat. The rate at which this change takes place is the most important factor in determining the final temperature of the shoe and wheel. The rise in temperature of the wheel due to the action of the brake-shoe upon it depends upon the amount of work done by the shoe upon the wheel and the time in which the work is done. Hard cast-iron is a metal which appears to have a lower rate of heat conductivity than soft cast-iron. The chilled iron does not absorb or conduct heat readily, and this condition produces the tendency for the wheel to crack; the wheel does not expand freely when heated rapidly. The cracks in the wheel are very small and fine at first, but in hard cast-iron, as in steel, these cracks, once started, continue to enlarge under the repeated heatings, coolings and poundings which the wheel receives, especially in winter, until finally fracture of the wheel occurs. Any person who has examined the face of a worn, chilled brake-shoe must have observed the many cracks on the chilled face and the absence of cracks on the adjacent unchilled parts. Cracks in the chilled or hard iron brake-shoes result in total fracture unless precaution is taken to hold the parts together regardless of the cracks. Brake-shoe makers have resorted to the steel-plate reinforcement at the back of the shoe, which is so designed as to anchor the cast-iron body firmly to the back. The cast-iron may crack; it is sure to do so sooner or later, but the parts cannot get away from the back, which is made of other metal and the back cannot be broken. The brake-shoe to meet to-day's requirements has a steel back and is a success regardless of the fact that the extra durability for wear in the brake-shoe which is required by many railroad officials necessitates the use of a grade of iron which is sure to be cracked under the conditions of modern service.

Cracks are produced in the tread of cast-iron wheels by the same conditions which produce cracks in the wheel face, but not so readily, because more heat must be produced in the wheel on account of its greater volume and surface to take care of the heat and also on account of shape; the shape affording greater strength to resist destructive action of the heat. Very few, if any, cast-iron wheels which are acted upon by only the brake-shoes are found to be cracked or shelled out on the outer tread. The trouble always appears within the limits of rail action. Heat is very destructive to cast-iron wheels, and it is the heat generated in the wheel tread by the brake-shoe, or at the point of rail contact, by reason of the brake-shoe retarding effect, that, sooner or later, causes the wheel to fail.

The thermal test, adopted by wheel makers and railroads generally, subjects the wheel to rapidly heating it to a high temperature, and this rapid rise in temperature develops weak points in the design or material which might cause failure in service. Each application of the brake-shoes to bring the car to a stop or to control its motion on a grade subjects the wheels to a practical thermal test varying in intensity as the period and rate of application, and after each application of the shoes the wheel is subjected to a rapid rate of cooling.

It would be interesting to note the effect upon a cast-iron wheel of repeated thermal tests alternated with quick cooling. A better indication of the possibility of the wheel meeting to-day's requirements might be obtained by this experiment. The continued application of the brake-shoe may so heat the wheel tread as to cause circumferential fracture. I have been told that in a shop test a wheel flange has been broken off by the continuous action of the brake-shoe upon the outer tread, while the flange may be comparatively cool. Should the truck

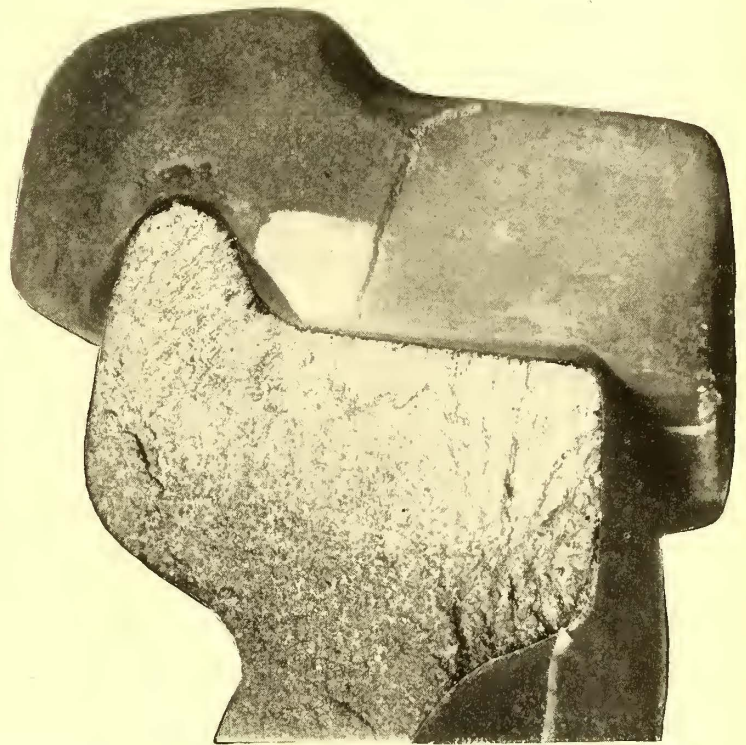


FIG. 2.—WHEEL WITH DEEP CHILL ENTIRELY ACROSS TREAD

be out of square and a wheel be forced against the rail on one side the flange of the wheel may become highly heated while the outer tread of the wheel is comparatively cool. It is this continued change of conditions, first on one side of the wheel tread and then on the other, aggravated by the blows on top and against the side of the rail, that causes the circumferential cracks and causes the flanges to be broken off; these adverse conditions are greatly aggravated by the higher speeds and loads of to-day. Again, too hard application of the brake-shoe checks the wheel's motion and causes it to slide upon the rail, generating intense heat at the point of rail contact, destroying the hardness and life of the chill at that point and cracking the surrounding metal. The slid-flat wheel is permanently injured.

When the brake-shoe retards the motion of wheel to the extent that the distance traversed by the car exceeds the distance rolled by the wheel a high rate of heating occurs, due to the imperceptible slip (so to speak) of the wheel along the rail. This will crack the chill along the limits of rail contact, but will not burn it, as in the case of the slid-flat spot. Pounding on the rail causes the cracked metal to fall off. This effect is the result of the combined action of the shoe and rail and always occurs within the limits of contact of the wheel with the rail. These evil effects are directly due to the brake-shoe, as

nothing of the kind would occur on the surface of a cast-iron wheel, which is simply rolled along on the rail under the heaviest loads. These effects are unavoidable so long as the wheel is controlled by the tread-bearing brake-shoe. Slid-flat and shelled-out treads were of common occurrence in cast-iron wheels under the lighter and slower service of the past, and must of necessity increase under the more severe service of to-day. Something can be done, doubtless, in the way of more careful handling of brakes, but the demands of modern service call for

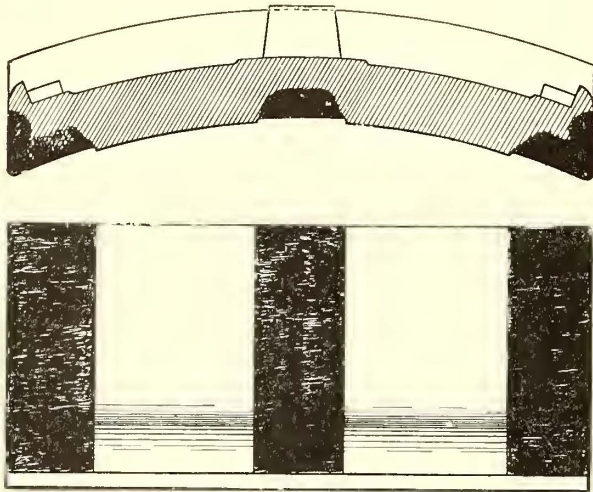


FIG. 4.—CHILLED SHOE FOR BROOKLYN RAPID TRANSIT CO.

heavier and stronger wheels, and the wheel makers are well aware of this fact.

Wonderful progress has been made in the improvement of the cast-iron wheel to meet the changed condition, makers being all the time seriously handicapped by the limitations of track conditions and car design. Putting two brake-shoes on a wheel has been suggested as one means of reducing the evil effect of shoe action on the cast-iron wheel, but beyond the fact that a little more heat would be taken care of by the additional shoe there can be no advantage in so doing. Also,



FIG. 5.—SECTION OF NORMALLY CHILLED WHEEL

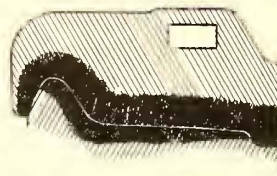


FIG. 6.—SECTION OF TIRE CUT BY SHOE



FIG. 7.—SECTION OF ABNORMALLY CHILLED WHEEL

there can be obtained only little advantage by increasing the size of the brake-shoe. The use of a flanged brake-shoe would help matters somewhat, because such a shoe would tend to heat more uniformly the wheel tread and the flange. The brake-beam would then distribute the side thrust equally between both wheels on the same axle. To use a flanged shoe successfully it will be necessary to have the cast-iron wheel ground to a true circle and the flange ground to a uniform section. The particular advantage of this style of brake-shoe is that it occupies the same position on the wheel tread and avoids the excessive side thrust against the flange, which side thrust may be a factor in flange breakage.

To-day's requirements of higher speeds and heavier loads call for the strongest cast-iron wheel that can possibly be made to withstand the great amount of heat and the rate at which the wheel must take this heat in the satisfactory control of the fast and heavy traffic. Freight trains are run frequently on passenger train schedule, and the same necessity exists for their brakes being adjusted on the basis of the total wheel load as exists with the passenger trains on the same tracks with

which the freight trains are run. If cast-iron wheels are burned when the brakes are applied on the basis of the light weight of the car, what will be the result if the braking load is increased to the loaded car basis? As time is the factor in stopping a train, which affects the wheel and shoe (and the shorter this time the greater the trouble), it may be argued that, as freight trains carried on cast-iron wheels are seldom stopped in a very short interval of time and by the emergency application, there is little danger to be apprehended. This is all very true if the speeds are slow, but to-day's requirements call for increased speed, and the difficulties are magnified as the square of the speed. The control of a freight train on a grade is gradual, though constant, and the comparatively long time of application permits a great deal of heat to be radiated. Increase of load means increase of heat at the brake-shoe, even though the braking load is based on the light weight of the car. Loads are ever increasing, while the light weight of car varies very little. Therefore the heavy cars will call for more brake application throughout the whole train and the wheels will suffer. Since the advent of the 100,000-lb. loads transverse cracks have appeared in the cast-iron wheel, which seem to be due to the higher rate of heating than that which occasions their shelling out along the limits of rail wear, the excessive heating of the wheel literally causing it to burst by reason of circumferential expansion—all of which appears to be due to the increased effort in braking the increased load.

Keep down the braking load and the necessity of much braking effort and you will help the cast-iron wheel; increase either the speed or load, or both, and the wheels will suffer if they are not proportionately strengthened. For the same amount of braking in the same period of time I believe that a shoe of soft cast-iron will heat the cast-iron wheel to a less extent than any other shoe in common use, for the reason that considerable heat must be dissipated in the particles which are thrown off the shoe in an incandescent state. Apparently the softer cast-iron allows the passage of heat through the body of the shoe, whereas the more ductile, flowing metals, as wrought-iron and mild steel, as well as the harder and more dense chilled and hard cast-iron, apparently hold back the heat

and maintain a higher temperature at the face of the shoe and consequently a higher temperature at the wheel face. As brake-shoe makers, our efforts have been directed towards retaining, as much as possible, the soft cast-iron effect in the brake-shoe, toughening it by inserts to resist rapid wear as well as to increase the grip on the wheel; we have been compelled, however, in order to meet to-day's requirements, to reinforce the cast-iron body by the addition of a steel back as a safeguard against failure in the shoe by cracking. The cast-iron car wheel cannot, unfortunately, be reinforced in the same manner as the brake-shoe, and the wheel makers can only add more weight in the rim and plate and improve the quality of the metal. The records of test on cast-iron wheels under the 80,000 lb. and 100,000 lb. capacity freight cars indicate that the cast-iron wheel of to-day is equal to the increased demand when the braking load is based on the light weight of the car. What will happen to the cast-iron wheel from the brake-shoe acting with a load based on the total weight of the loaded car is a question yet to be decided.

In conclusion, and returning to the consideration of the cast-

iron wheel to meet to-day's requirements from the standpoint of the relation between the brake-shoe and the wheel, the use of a flanged brake-shoe—bearing on the wheel tread and flange, the shoe supported against failure by a steel back—will materially assist the successful operation of the best cast-iron wheel that can be made.

ENGINEERING AND OPERATING FEATURES OF THE CHICAGO TRANSPORTATION PROBLEM—III

The abstract of the report by B. J. Arnold to the local transportation committee of the Chicago City Council is continued in this issue. Parts I and II were taken up in the issue of Jan. 10, and Parts III, IV and V in that of Jan. 17. In this issue the first six chapters of Part VI are considered. This part is devoted to a discussion of the technical problems, and Chapter I of Part VI to the subway plans.

The problem of subways for the business center submitted for report called for the preparation of preliminary plans for a system of subways, which, together with the surface terminals or independently of them, will adequately accommodate traffic for years to come and relieve the congested condition, while at the same time creating a larger area available for use by all lines of business. The plans should show a feasible disposition of all existing underground improvements, so as to permit of easy access for future repairs, renewals and reinforcements without disturbing the street surface.

As before stated it is impractical to devise a system of underground lines for downtown terminals that will be adequate for all future needs without having them supplemented by surface tracks.

In the plans submitted the possible consolidation of the street railway systems was kept in mind. The subways were so arranged as to provide for (1) operating between one division and another through the business district, or (2) operation from each division over downtown loops and return, or (3) a combination of the two plans.

The railways designed were kept as close to the surface as possible, both on grounds of convenience for passengers and cost of construction. It was assumed that the entire width of

the streets between building lines is legally available, and that the space under the sidewalk is to be used for the purpose originally set aside, viz.: the disposition of public utilities. Pipes and conduits should be placed in galleries.

SUBWAY ROUTES, PLAN NO. 1

The location of subways, according to Plan No. 1 (Map No. 11), is suggested as the most feasible method if present low-level improvements are not to be interfered with. The surface terminals in connection with this plan are shown in Map 10. This plan presents the greatest possible elasticity with regard to operation of cars. The routes are then discussed in detail. (Both of these maps, Nos. 10 and 11, were presented on page 121, in the last issue.)

This plan calls for 20,825 lineal feet of double-track subway, and 20,000 ft. of single track, not including tunnels under the river. Plate 1 shows a typical cross section of a subway in an 80-ft. street. The cross section of the subways provides for the operation of the largest cars now used in Chicago, with clearance to insure safety of employees working in the subways. The dimensions are, therefore, clear height above rail 14 ft. 6 ins., clear width between side walls 25 ft., clearance between wall or center columns and car 1 ft. 8½ ins. The central space between center columns is ample for a man to stand in between passing cars. When detailed plans of the subway are made they should provide for the longest and heaviest cars the curvature conditions will permit.

METHOD OF CONSTRUCTION

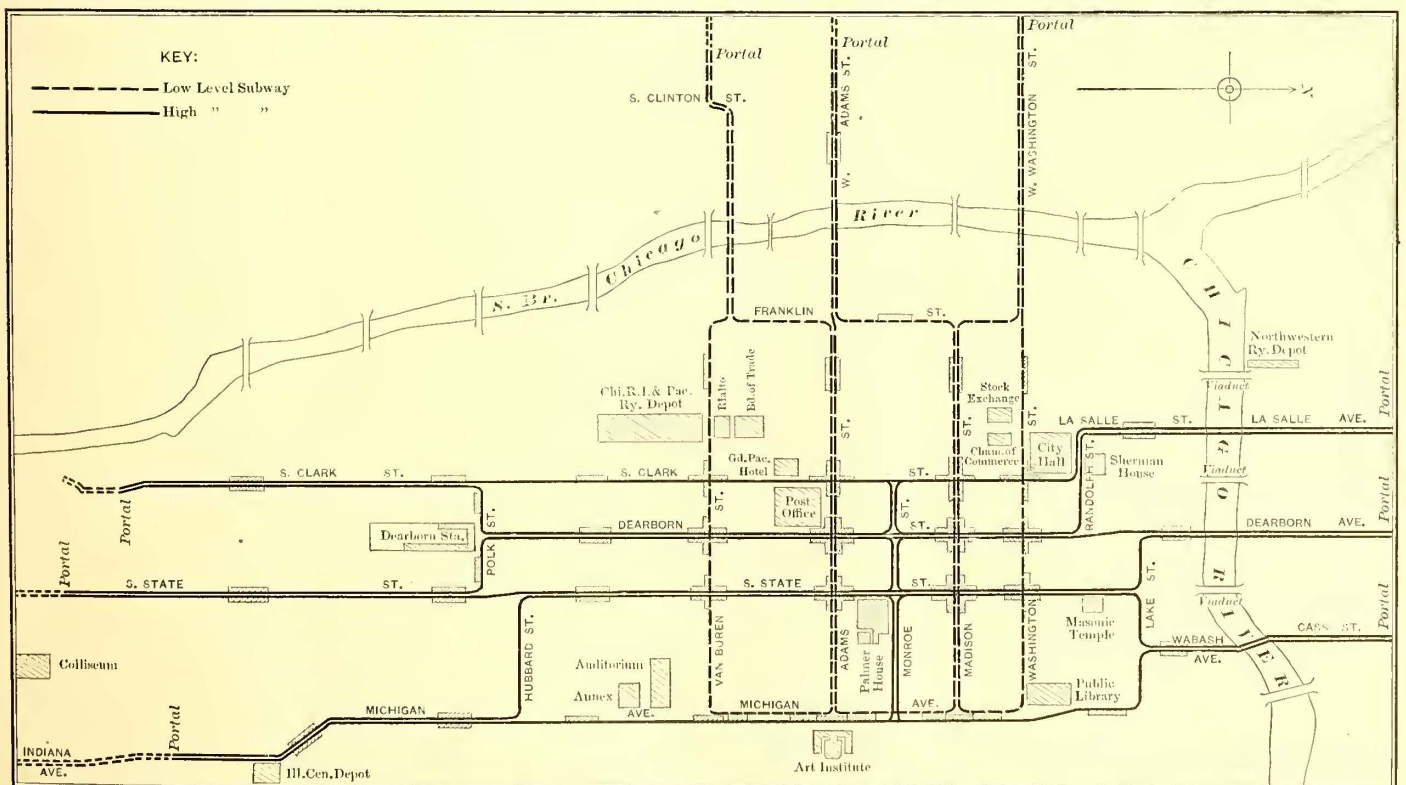
Most of the subway construction would necessarily be by excavating from the surface except where tunneling under the river. During part of the construction the street surface could be planked over so that some traffic could pass.

TEMPERATURES

The temperatures of the Boston subway for two years are given to show that water pipes would be safe from freezing within the galleries.

DRAINAGE

Within the subway district it is proposed to provide a high-level gravity system of sewers for surface and house drainage from above the level of the first floors. A low-level sewer would take care of basements of buildings, the subways and



MAP NO. 5.—SHOWING SUBWAY PLAN NO. 2.

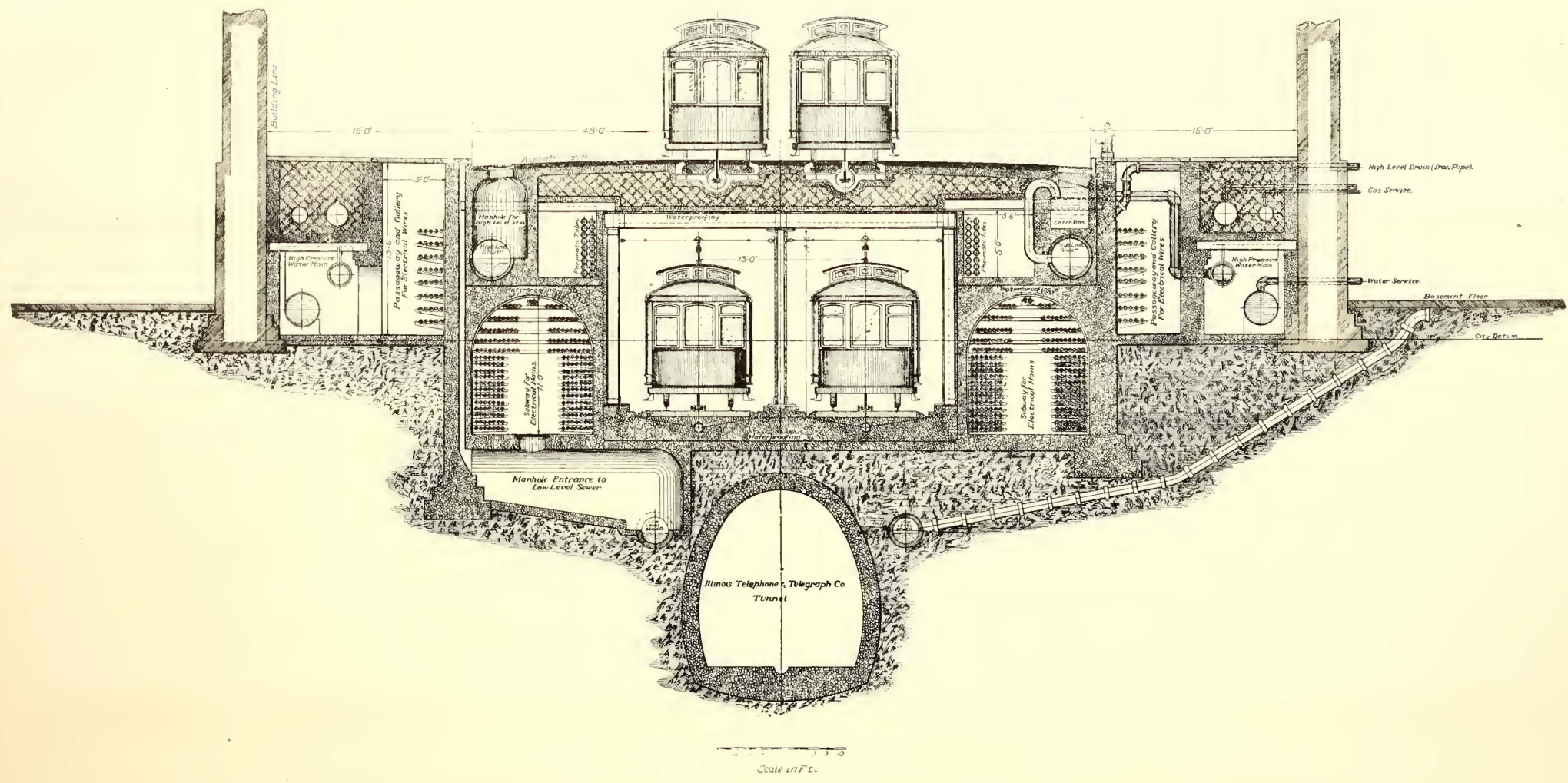


PLATE NO. 1.—TYPICAL CROSS-SECTION BETWEEN STATIONS FOR PROPOSED STREET RAILWAY SUBWAY OVER LARGE TUNNEL OF ILLINOIS TELEPHONE & TELEGRAPH COMPANY ON STREET 80 FEET WIDE

pipe conduits. The low-level sewers would empty into receiving wells, and from these wells the sewage would be pumped.

WATER SYSTEM

It is proposed to install a belt of feeder pipes in the subway district, this feeder to be connected to the present feeder system in such a manner as to provide for a complete circulation of water. (The exact arrangement proposed is given in the full report.)

GAS PIPES

The general arrangement of gas pipes would be similar to that of the water pipes.

DISPOSITION OF ELECTRIC WIRES AND CABLES

The galleries for electric wires are located at practically the same level as the railway tracks within the subway. They are about 9½ ft. wide and 11 ft. high in the clear. The wires and cables would pass the station points in tile conduits beneath the station platform.

The cost of subway plan No. 1 is estimated later.

This plan No. 1, it is believed, will best fulfil the conditions for the successful operation of a combined surface and subway system without interfering with existing low-level improvements. Its chief advantage from an operating standpoint is that it keeps through north and south, west to south and west to north traffic off the surface of the streets, and will permit rapid running time for such traffic through the business district.

This plan, No. 1, does not meet all the conditions of a complete solution of the transportation problem. If used in connection with the surface terminals on Map 10 most of the north and south cars would run in the subways, and most of the West Side cars would come in on the surface. If some cars from all divisions are to be brought in on the surface, as some think should be done, this plan is not satisfactory. This could be partly overcome by slight modification of the plans. The transferring of passengers from subway to surface cars and vice versa as necessary by this plan, would create the best possible condition for the abuse of transfer privileges.

SUBWAY PLAN NO. 2

In order to overcome the objections previously mentioned to Subway Plan No. 1, Subway Plan No. 2 has been devised, which is shown in Map 5. All of the advantages in Plan 1 are retained and the objections overcome. By it a universal transfer system can be demanded without injustice to the companies. It is submitted as an ideal solution, with a full understanding of the difficulties in its construction and recognition of its increased cost over Plan 1. This plan retains the same north and south trunk line system of terminals as shown in Plan 1, except that the line on Wabash Avenue is moved over to Michigan Avenue, and run underneath the edge of Lake Front Park, in order to get the West Side lines through to Michigan Avenue and ultimately farther east in Lake Front Park. Should future extensions of the park make this desirable, or if it should be thought best to connect the several passenger and freight depots of the steam railroads a series of low-level loops could be provided. Where they intersect the streets occupied by the north and south lines, double-deck stations could be used, as shown in Plate 9. By this plan the business center of the city would be underlaid with a system of subways intersecting each other at right angles and at a sufficient number of points to enable passengers to travel from almost any point in the business district to almost any other point at the least possible inconvenience, and at the same time make it impossible for passengers to use transfers improperly for the reason that in order to get on a car the passenger must pay cash fare and pass through a subway entrance, and one transferring from any high-level subway car to any other high or low-level subway car, cannot go to the surface to dispose

of his transfer, but must take some car and use his transfer himself, for if he goes to the surface to dispose of it the transfer loses its value, as no one can enter the subway on a transfer. He could not dispose of his transfer to any one already in the subway because persons entering the subway must first pay cash fare. By the construction of three or more north and south subways and three or more low-level east and west loops, the entire street car traffic of the business district could be kept below the surface for some years to come, except that of the local line around the business center, and if this could be operated by some independent motive power, conduit track construction on the street surface could be avoided until such time as it became necessary to put surface tracks on the street; at that time it would be necessary to construct surface tracks in accordance with plans shown on Maps 2 and 3, given in the earlier part of this report and suggested for the immediate relief of downtown terminal congestion.

The objections to this plan are its greater cost as compared with No. 1, the depth of the low-level subways, since the passengers would be about 40 ft. below the surface of the street, necessitating the use of elevators, and the engineering difficulties and risks in its construction. It would further interfere with, and to a large extent destroy, existing and contemplated low-level improvements. All the objections but the last can be overcome and are small when compared with the advantages to be gained by the adoption of the plan.

As to the last the Illinois Telephone & Telegraph Company has under construction low-level subways for telephone and telegraph wires and also for the delivery of freight and packages from the railroad freight houses and terminals to business houses in the city. The relative importance of the two undertakings to the business interests of the city should be considered. If some amicable arrangement could be made with the telephone company whereby the low-level subways could be combined with the telephone company's underground work and the two constructed jointly and at the same time, it would, to a large extent, relieve the difficulties to be encountered. The cost estimate on the Subway Plan No. 2 is given later.

WORKING CONDUCTORS IN SUBWAYS

The working conductor should be in sections, whether overhead or underneath the car, and provided with suitable circuit breakers for each section, so that the section will be automatically cut out in case of a short circuit on that particular section. It would probably be best to construct the subways so that the cars equipped with overhead trolleys and operating in sparsely settled districts of the outlying territory and not equipped with the conduit plow, could be allowed to run through the subways. By providing the subway with both overhead and surface conduit construction all cars of the operating company could be made completely interchangeable so far as operating through the subway is concerned.

UNDERGROUND ELECTRIC CONDUIT SYSTEM

One of the purposes of the report was to give an opinion as to the feasibility and desirability of an underground conduit system of railways in the downtown district of Chicago. The statement has already been made in Part II that the underground conduit construction in Chicago is feasible, and that it should be required in the business center. Thorough drainage of the conduit is of utmost importance in the operation of such a type of railway.

The subject of inadequate drainage in Chicago has been the one most frequently brought forward and vigorously urged as the reason why underground electric railways are not feasible in that city, and the flooding of the cable railway conduits during storms has been held up as positive proof that it is impracticable to install and operate underground conduit electric railways in Chicago without frequent interruptions to traffic on account of the flooding and freezing in conduits,

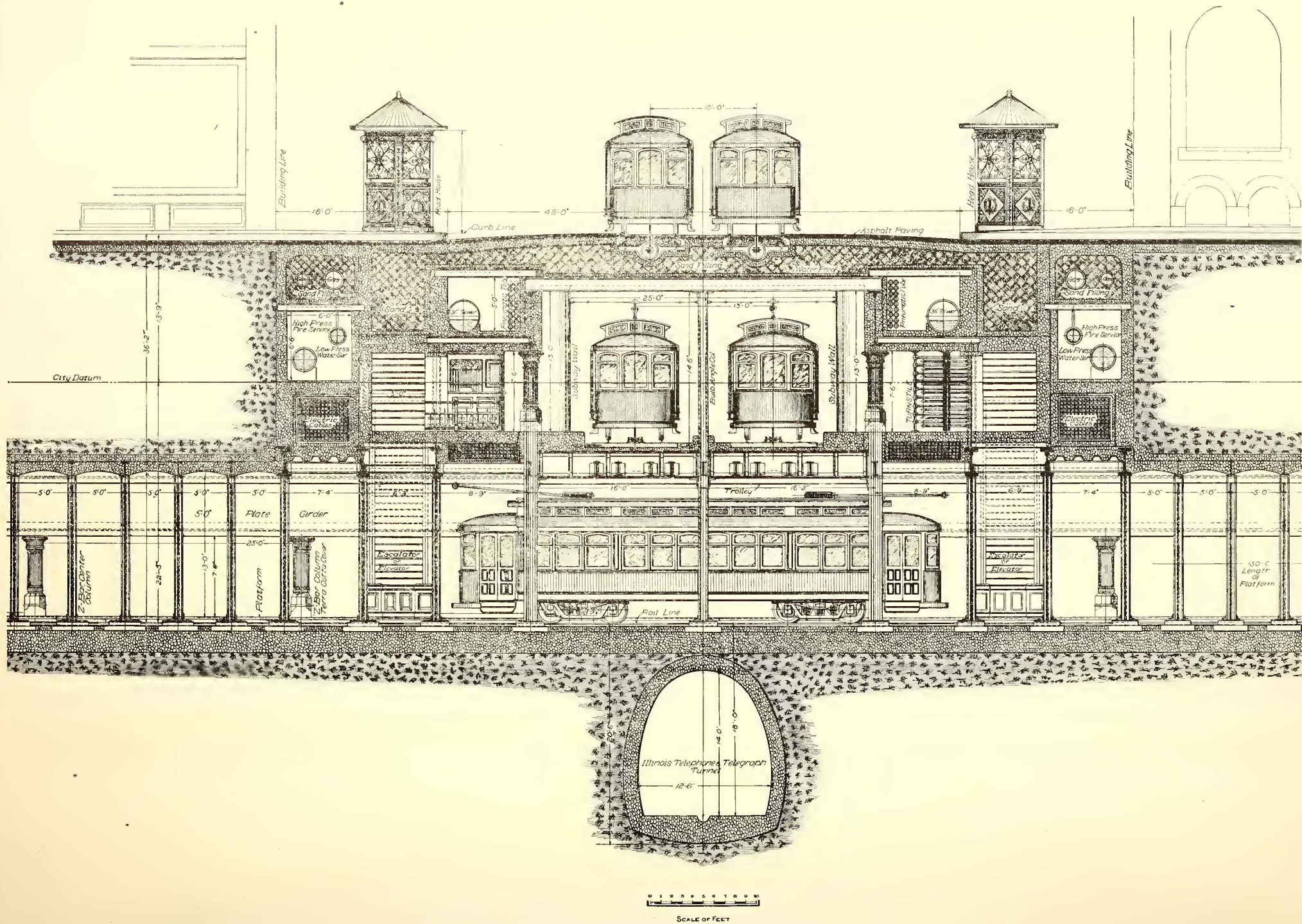


PLATE NO. 9.—TYPICAL SECTION SHOWING STATIONS AT INTERSECTIONS OF HIGH AND LOW LEVEL SUBWAYS

unless the entire drainage system of the city were remodeled in some way to insure the speedy removal of all storm water. The flooding of the existing cable railway conduits during storms is not entirely due to the inadequacy of the city drainage system; on the contrary, it is largely attributable to the insufficiency and improper construction of the cable railway drainage system which connects with the city system of drainage. The connections between the cable railway drainage pipes and the city sewer system are infrequent, and those that have been provided are seldom clear and in working order. Even with all the openings to the sewers in proper working condition the capacities of the railway drains are not sufficient to enable them to carry away promptly the volume of storm water which enters the cable conduits.

The gradients of the cable conduits are parallel with the street gradients, which for long distances in some of the Chicago streets are practically horizontal, and if the openings from the cable conduit to the sewers are not frequent enough, or are allowed to become filled with dirt, the water cannot leave the cable conduit and the tube is soon filled and overflows through the slot at the surface of the street. It is entirely practicable to build underground conduits for railway purposes in the streets of Chicago, especially within the business district, and provide a drainage system connecting with the city sewers which will keep the electrical conduits sufficiently free of water at all times to prevent any serious interference with the operation of the railway.

Under Chicago conditions the installation of underground conduit electrical railway would naturally be confined to limited districts, and to avoid the necessity of having two distinct sets of rolling stock, it would be necessary to devise a mechanism on the cars and within the track conduit which would permit any car to operate on either underground conduit or overhead trolley lines. Such a system of operation is entirely practicable. Mechanism can be applied which will permit of the change being made, at designated points, from underground conduit to overhead trolley contact and vice versa with practically no delay to the car.

The drawings on Plates Nos. 10 and 11, submitted herewith, are typical illustrations of a system of underground conduit electric railway which will be applicable to Chicago conditions. An estimate of the cost to produce 1 mile of single-track electric conduit railway according to the typical designs submitted herewith, is given in Unit Price Estimate J. This estimate is made to cover the construction of an underground conduit line in streets not previously occupied by railway tracks. If this type of construction were placed in streets which are now occupied by cable railways the cost per mile of track would be reduced by the amount of salvage which could be derived from the sale of old cable material taken out of the street. This sum would be variable and would probably, under favorable conditions, not exceed \$3,000 per mile of single track.

TRANSFORMATION OF CABLE LINES INTO ELECTRIC LINES

A "report on the cost of transforming the present cable lines into an underground electric system" is called for in the specifications.

This question has been mentioned in Part II of this report, wherein the statement is made that the yokes which were used in the construction of the cable railways in Chicago were not designed to carry heavy rolling stock such as is now in daily operation on the electric railway lines in this city, and the Milwaukee Avenue line is cited as an instance, which verifies the correctness of the statement.

The conditions which obtain in respect to the Milwaukee Avenue cable line may be said to apply to a large proportion of the cable railway tracks in Chicago, and where they do apply, it is impracticable to convert the cable lines into underground electric railway and produce a satisfactory and durable con-

struction. There are, however, some portions of the cable system which could be converted for the electrical propulsion of cars, especially within the district where overhead trolley construction would be permissible, but it is doubtful if it would prove economical to attempt to convert any of the existing cable track into underground electric conduit railway. The construction of a durable track to carry the heavy rolling stock of modern electrical railways involves the use of rails having sufficient depth and section to resist bending under the loads put upon them. The depth of the rail in first-class construction is also regulated in some degree by the character of the pavement and its foundations. The rail which seems to be most suitable to meet all requirements has a depth of 9 ins. The yokes used in the construction of nearly all of the cable tracks in Chicago were designed for shallow lower rails. The track rails supported by these yokes range from 7 ins. to 4 ins. in depth. The manholes in cable railway tracks are located about 30 ft. apart at points where pulley wheel supports occur. The insulated supports for the contact bars in an underground electric conduit railway are usually spaced not more than 15 ft. apart, and a manhole is required at each of these insulated supports.

The drainage of electrical conduits must be practically perfect; if it is not, serious interruptions to traffic are certain to ensue. The drainage system of the cable railways in Chicago, as constructed, is utterly inadequate for the purposes of electrical operation, and any attempt to convert the cable lines into underground electric conduit railway involves the redesigning and entire reconstruction of the cable drainage system.

From the foregoing statements it will be seen that with the remodeling of the yokes to receive deeper rails, doubling the number of manholes, reconstructing the drainage system, and attempting to fit new work to old, the conversion of the existing cable lines into an underground electric system will probably involve an expenditure of money equal to the amount required to create an entirely new system of underground electric conduit, and the property created would not be as durable as new construction throughout.

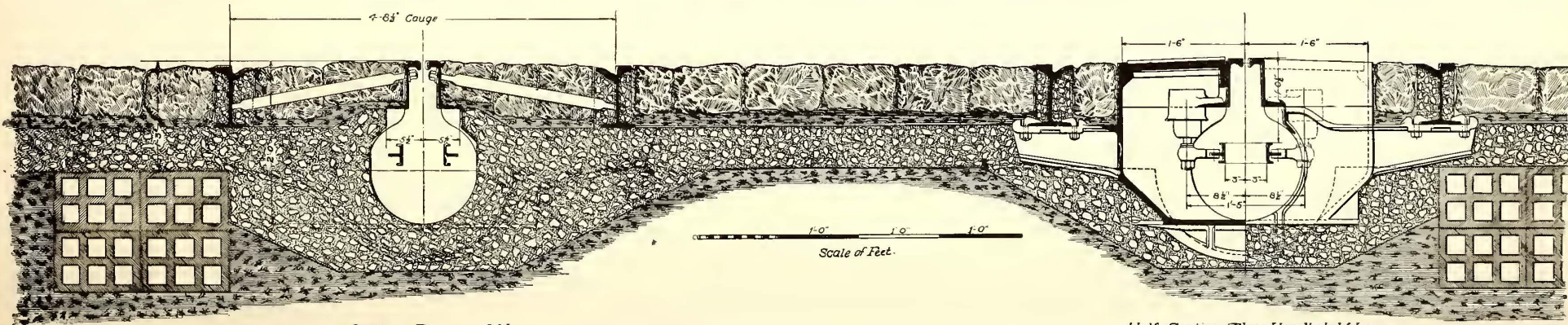
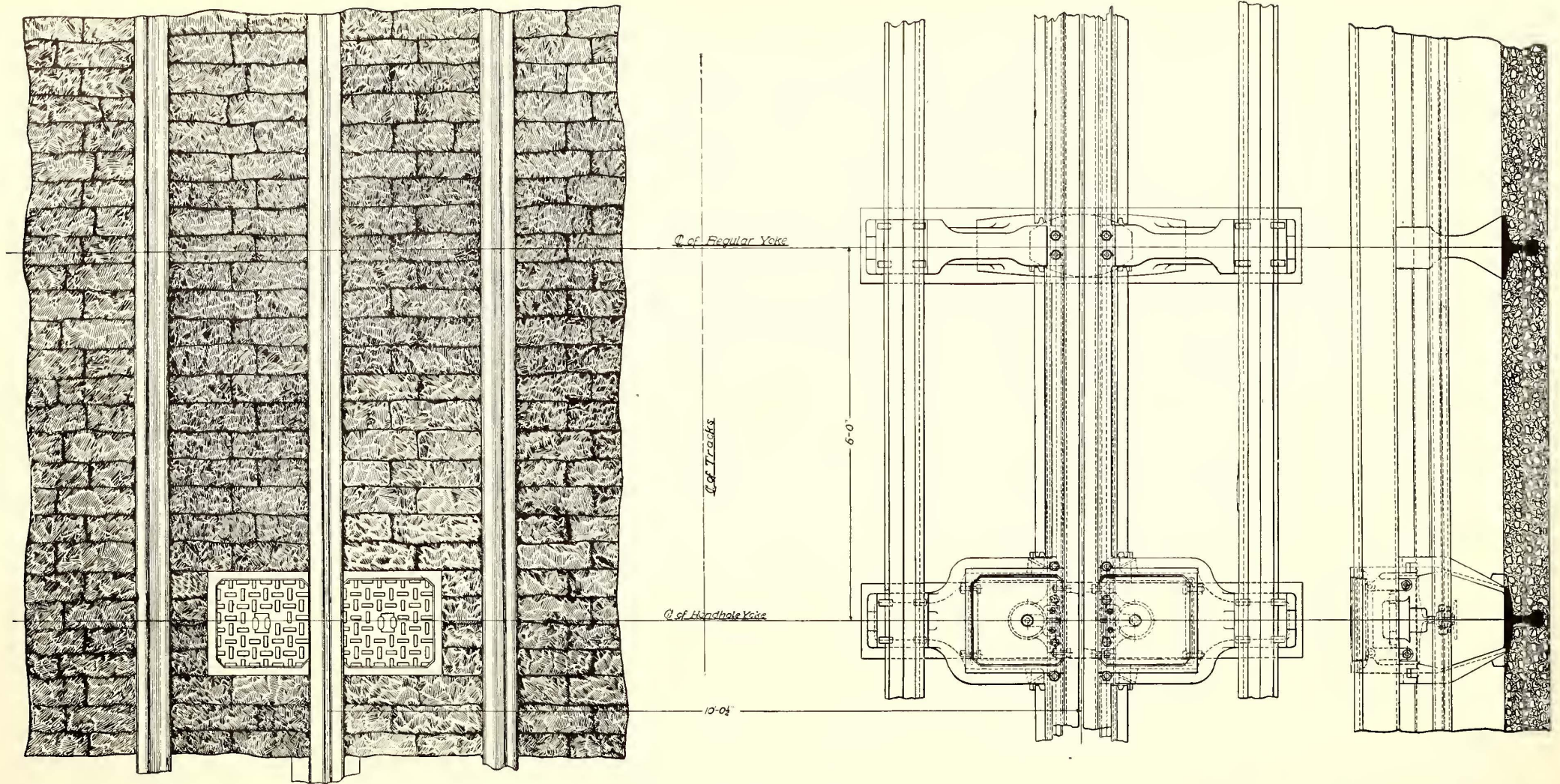
Under conditions as here set forth it seems that little saving would be made in attempting to transform the existing cable conduit into electric conduit. The estimate (see Unit Price Estimate J) of the cost of constructing new underground electric conduit railway will apply to the cost of converting the existing cable lines into underground electric systems.

ELECTROLYSIS

The destructive effect of the electric current on water pipes and other underground improvements in districts where the overhead trolley and ground return system of electric railway has been installed has been quite marked in places, but with the improved methods of bonding in vogue at the present time the difficulties have been largely overcome, so that the general question is not so serious as it was ten years ago.

In Chicago a careful test for electrolysis has been made under the direction of the city electrician over almost the entire city, and while disturbances were found means of prevention have been formulated by the Electrical Department and embodied in an ordinance known as the "Electrolysis Ordinance," passed July 16, 1900, which, in recent construction and reconstruction, have been put into effect by the several companies operating in the city, resulting in the elimination of the difficulty in a large degree.

The ordinance reads in part as follows: "Every person, firm or corporation operating, owning, or controlling any surface or elevated railroad or any street railway within the city of Chicago, upon which cars are now or hereafter operated by electricity as a motive power, with a grounded return circuit for conveying the electricity, shall install and maintain a metallic return circuit of such cross section and conductivity



Section Between Yokes

Half-Section Thru Handhole Yoke

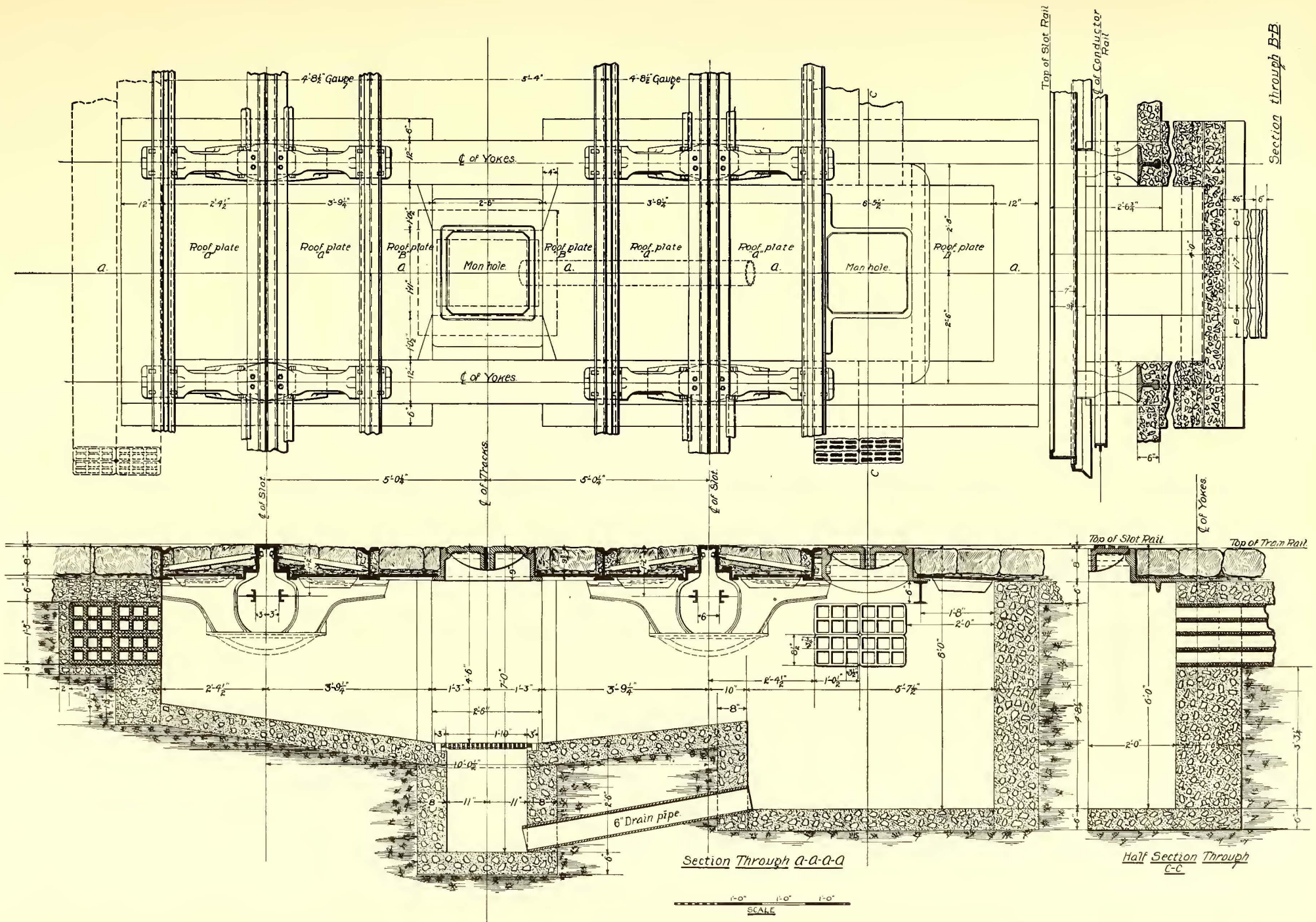
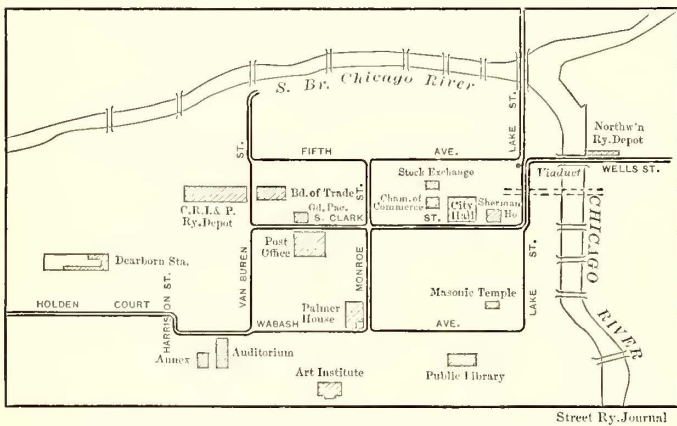


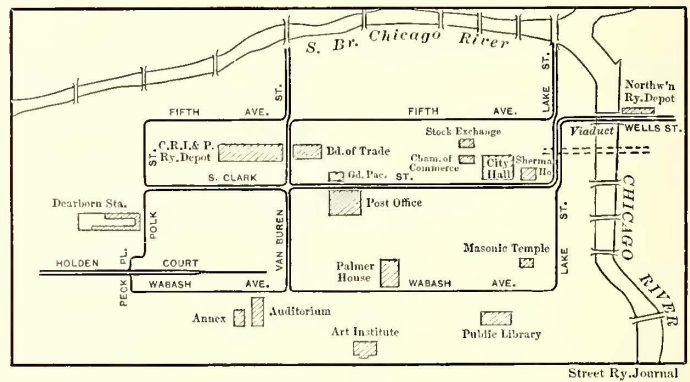
PLATE NO. 11.—PROPOSED ELECTRIC CONDUIT RAILWAY; DETAIL OF MANHOLES

for conveying the electricity so used as a motive power that the maximum difference of potential will not at any time exceed one (1) volt between any part of such metallic return circuit and any water pipes, gas pipes, or other metals not installed for the purpose of forming a part of such metallic return circuit, and that there will not be a variation in difference of potential exceeding one-half ($\frac{1}{2}$) volt between any two measurements made at the same time at points along and upon said metallic return circuit within a distance of three hundred (300) ft. or less from each other. Such metallic return circuit shall be installed and maintained in accordance with the provisions of the general ordinances of the city of Chicago, now or hereafter in force."

The best electric railway practice at the present time involves the bonding or joining together of the ends of the rails with a copper or other bond which has an electric conductivity equal, or approximately equal, to the conductivity of the rail. With this accomplished the return current follows the rails of the track, and has but little tendency to leave its regular path and pass into the earth or to water pipes or other underground improvements, provided the conductivity of the rail is



MAP NO. 13.—SUGGESTED CHANGE IN ELEVATED LOOP
PLAN NO. 1



MAP NO. 14.—SUGGESTED CHANGE IN ELEVATED LOOP
PLAN NO. 2

sufficient. If the conductivity of the rail is not sufficient, through lack of sectional area or conductivity of material, it should be supplemented by an additional metallic return circuit securely bonded to both rails of the track at distances about 100 ft. apart, in districts where the quantity of current liable to flow is large, which is often the case in the business district where cars become bunched. In outlying districts these connections need not be so close.

In Chicago, and elsewhere, one of the most effective ways to insure a perfect bond between the ends of the rails, and at the same time secure a rigid and permanent joint, has been to electrically weld or cast-weld the ends of the rails together. The greatest conductivity is secured when the rails are welded, as the cross section at the joint is then made equal to or considerably greater than the cross section of the rail itself, and as this is the method which has been adopted almost exclusively in Chicago, it will be seen that where track has been laid in recent years the difficulties from electrolysis are overcome to as great an extent as modern practice demands. There are, however, many pieces of track which are not as well bonded as they might be, and it is from such sources that damage from electrolysis naturally ensues.

As the overhead trolley construction, and consequently the grounded rail circuit, is eliminated from the city by the introduction of the electric conduit, the electrolysis, due from the street railways, will disappear, for the reason that the conduit construction is built with a complete metallic circuit and without any ground connection, thus removing entirely the conditions so far as street railways are concerned, which makes electrolysis possible.

THE UNION ELEVATED LOOP

The Union Elevated Loop, which encircles the business district of Chicago, is a two-track railroad 2 miles in length, and serves as a terminal for the traffic from seven different elevated railroad lines, the South Side Elevated, the Lake Street Elevated, the Northwestern Elevated and the four lines of the Metropolitan West Side Elevated. No less than 1600 trains of from two to five cars in length are delivered to the loop daily. The number of cars operated on the loop per day is 5000. The period of maximum congestion on the loop extends over approximately thirty minutes mornings, and thirty minutes evenings. At these times the average headway between trains of the outer loop is 19.8 seconds, and on the inner 19.5. The ultimate capacity of the loop tracks is fixed by the number of in-bound and out-bound trains which it is possible to pass through the junctions where the several lines enter the loop. It has been demonstrated that a train of five cars can be successfully and successively passed through one of the junctions from a state of rest to clearance and the interlocking combinations operated to open another route for the passage of a train in forty-five seconds. If it were necessary to operate the interlocking mechanism for each in-bound or out-bound train the capacity of these junctions would long ago have been

exceeded, but it is the usual practice to pass simultaneously an in-bound and an out-bound train from the main line to the loop and vice versa.

PRESENT CAPACITY LIMITED BY STATION PLATFORMS

Under the existing conditions it is the station platforms on the loop and not the junctions which limit the number of trains which can be operated over its tracks. The platforms should be lengthened sufficiently to permit two trains of five cars or six cars each to simultaneously occupy a platform. If the junctions were operated to their maximum capacity a train could make the circuit of the loop in not exceeding fifteen minutes. Under the existing conditions the average time is twenty minutes. The reason for the loss of time in rounding the loop is apparent. The movement of every train is much retarded at every station because it is prevented from approaching the platform until the preceding train has taken on its load of passengers and is under way. There are eleven stations on the loop, and under existing conditions each train must be retarded and accelerated twenty-two times instead of eleven times, as would be the case if the train could approach the station platform without having to wait for the train preceding it to move out of the way. The extension of these platforms sufficiently to provide for the accommodation of two full trains at the same time is the only way that the present capacity of the two-track loop structure can be increased. The enlargement of the loop to take in more territory would simply add to the loop mileage and the running time and increase the operating expenses of the several companies without in any way relieving the congestion of trains on the loop. The time con-

sumed in rounding the present loop is a serious objection. From both the construction and operating points of view it is practicable to double the capacity of the elevated loop terminals by providing a separate loop for each of the four operating companies, eliminating at the same time the crossing of junctions which are the limiting factors. Map 13 shows a rearrangement of the loop tracks which will furnish a complete solution of the problem. The same results in increasing capacity could be obtained by another plan, as shown on Map 14. Unless some such plan for separate loops is adopted the only remaining means by which terminal facilities can be provided after the full capacity of the present junctions has been reached is by establishing auxiliary stub terminals outside of the loop and adjacent to the business district. Should the time come when all the elevated roads were consolidated and passengers were transported within the district served by all the companies for one fare, the tracks now forming the loop could be made simply sections of through lines, and the problem of increasing the loop capacity would vanish.

TRACK RAIL AND TRACK CONSTRUCTION

The design of rail is of vital importance to a street railway company and of equal importance to the taxpayer and municipality. Every driver and vehicle owner using the streets is interested and affected by the design that may be selected, as well as the street railway companies. Very careful consideration should be given the matter from all standpoints, that no injustice may be done to any interests. What has been done in other cities has little bearing on what is practicable in Chicago, because entirely new situations exist. Chicago has had an unprecedented growth, necessitating the extension of street car lines into territory where property values will not warrant heavy assessments for expensive street paving. The revenue to the municipality derived from the tax levy on this cheap property is inadequate to properly maintain the pavement that does exist. A rail suitable for a well-maintained street would not be practicable in outlying streets cheaply paved and poorly maintained. The same is true as to a large number of streets in the older portion of the city, where the paving has deteriorated and property owners will not bear the expense of repaving with their property daily depreciating, because of the outgoing of population to newly annexed territories.

USE OF RAILS BY VEHICLES

In the absence of well-paved streets it would be a hardship to the whole of the vehicular traffic of the city to adopt a rail that would deprive vehicles of the roadway now furnished by the tram of the girder rail now in use. The free movement of vehicles throughout the larger portion of the city would be materially retarded by the adoption of the grooved rail. The design of rail affects the individual who patronizes street cars operating on poorly paved streets, because of the inability of the car to operate as well on a grooved rail that is clogged with mud from the adjacent roadway, as is possible on the present girder tram-type of rail. In the outlying districts, where the time between cars is infrequent, the grooved rail would frequently become clogged with ice. This would not occur in streets where cars run frequently enough to clear the groove. From the standpoint of a street railway company the style of rail is generally a compromise between the demands of the several department heads of the company, the team owners and the ordinances of the city. The superintendent of motive power wishes a rail that will offer the least resistance to the movement of the cars and will keep clean under all conditions. He favors the T-rail. The superintendent of transportation is satisfied with this rail until the pavement parallel with and immediately adjoining the rail becomes so badly rutted that his cars are delayed by the slow passage of teams. Then he demands that a place be created on the rail for the accommodation of such vehicles as will insist on keeping the tracks, so

that their movement will be accelerated, and so cease to delay his cars. The superintendent of maintenance of way wants rails of the girder type, not less than 7 ins. high, to provide for paving above the top of the tie and also to provide a place on the rail for wagon wheels so they will not wear out the pavement. The owners of vehicles are pleased at the provision made for their accommodation, and vigorously oppose any change until some pavement equally as good is provided. There has grown up among the drivers of teams the habit of running the wheels on one side in the outside car track, while the other wheels are on the paving. A depression is soon worn in the surface of the paving. Because of this wear on the pavement and from a desire to have car tracks that can be crossed at any point on the street without a jolt to the vehicle, there has arisen a demand for the full grooved rail. The full grooved rail has the groove brought flush with the head, and is the ideal rail from the viewpoint of having the surface of the street unbroken, but such a rail cannot be cleaned by the passage of the wheel flange. The dirt will pack down in the groove until cars run off the track. The compromise is to lower the flange on the rail and grade the incline from the bottom of the groove to the top of the flange on such an angle that the dirt can be forced up the incline and out over the edge of the flange. If the flange is lowered too much, a guiding shoulder for wagon wheels is provided by the head of the rail, and vehicles will follow the rail as they do the present tram rail, but the wagon wheels can leave the track more easily without wrenching. Figures accompanying the report show the evolution of the street-car rail and the effect of the design of the rail on the paving. The 135-lb. grooved rail adopted by the Philadelphia Rapid Transit Company is especially mentioned, the principal objection to which is made that the $\frac{3}{8}$ -in. difference in height between the head and flange tends to hold wagon wheels in the track. Although these flanges are so designed that it is not difficult for vehicles to leave the track, the portion of the head above the flange is sufficient to invite teams to follow the tracks. It is reasonable to suppose that where the company is responsible for the condition of pavement outside their tracks, as it is in Philadelphia, this rail must have been

considered to be superior in reference to paving maintenance, which is by far the greatest item in cost in reference to maintenance of way.

RAIL RECOMMENDED FOR CHICAGO

The foregoing considerations led Mr. Arnold to submit the design of rail shown in Fig. 7, which is similar to the Philadelphia rail, to meet the Chicago conditions or streets that are paved with asphalt, brick or dressed granite, when such pavement is kept clean. The flange is only $5\frac{3}{32}$ of an inch below the head of the rail, while the Philadelphia rail is $5\frac{6}{16}$ of an inch. This reduces the invitation to teams to follow the

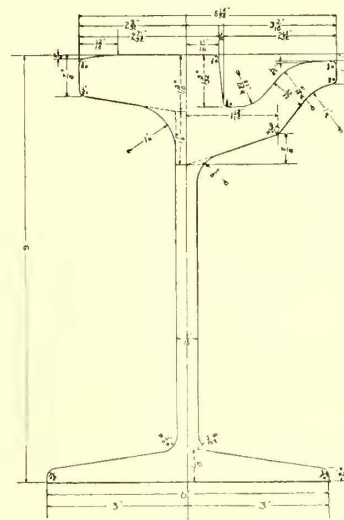


FIG. 7.—RAIL PROPOSED FOR CHICAGO

track. It would not be advisable on poorly paved or unpaved streets. The report declares that a well-dressed ribbon of granite between the rails and the asphalt surface of the pavement is the practice to be preferred, because in warm weather the steel rail absorbs heat and softens the asphalt next to the rail.

A PRACTICE TO BE AVOIDED

Drawings are shown in the report to illustrate the condition where paving blocks rest on a bed of concrete with a fine

bed of sand between, giving a practically unyielding bed, and where the blocks were originally laid projecting above the rail in accordance with the old practice where the foundation was yielding enough to allow the pavement to sink after the rails were laid. Where the concrete base was used the pavement remained just where it was put, and the rails are in the bottom of a rut.

T-RAIL IN MINNEAPOLIS

Fig. 8 represent a very excellent type of street railway track construction, where T-rails are laid on concrete beams. Ribbons of dressed granite are laid on each side and flush with the upper surface of the rails. The granite blocks next to the gage side of the rails are dressed to form a groove for the passage of the car wheel flanges. This type of construction has been developed to the highest degree of perfection in the cities of Minneapolis and St. Paul, where it has been adopted as a standard of street railway construction. Where the granite blocks are of good quality, well dressed to uniform dimensions and properly laid on concrete foundations of sufficient strength, this type of track will give excellent service under moderately heavy vehicular traffic, and there are many streets in Chicago where track construction of this type could be installed with

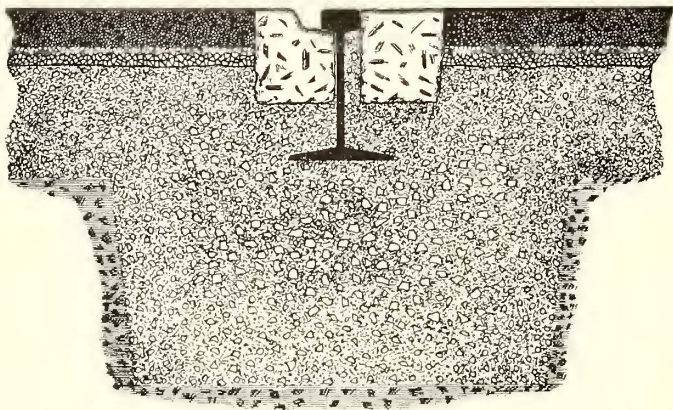


FIG. 8.—T-RAIL CONSTRUCTION USED IN MINNEAPOLIS

the assurance that it would give satisfactory results to all parties concerned. In a discussion with the officials of the leading asphaltic paving company of this country on the maintenance of pavement in streets occupied by street railway tracks, it was admitted by these gentlemen that in their extended experience in maintaining under guarantee the pavements in such streets, the most satisfactory results have been obtained in streets where the Minneapolis type of construction has been installed.

CONCLUSIONS REGARDING RAILS

For streets paved with asphalt, brick or dressed granite, and where the pavements are kept clean, the rail shown in Fig. 7, laid on a concrete beam without ties, as in Fig. 9, is recommended. On unpaved and poorly maintained streets or on those indifferently cleaned, the present general tram section should be retained, to be replaced with the grooved rail only as it wears out or as streets are improved.

CONCRETE ROADBED

Under the present operation of 25-ton electric motor cars on soil of the nature of that in Chicago, it is necessary to lay cement concrete roadbeds to maintain an unyielding foundation. While the first cost of track construction is increased thereby, it is economy in the end for street railway companies to adopt such practice. The cost of maintenance is reduced to a minimum, and the street retains its even contour indefinitely, securing the greatest life possible. A further advance in the use of concrete in track construction has been made in dispensing with wood cross ties altogether, and supporting the rails on concrete foundations, burying the rails in concrete to the under

side of the paving material. The rails are kept in gage by tie-rods placed in the track at frequent intervals. The most improved practice in the use of concrete foundations is to lay the rails on longitudinal beams of Portland cement concrete, these beams being a part of the foundation supporting the pavement. This method of construction is shown in Figs. 8 and 9, and if carried out with good material produces a substantial track, which can be maintained under heavy traffic at a minimum cost, and it is most favorable for laying and maintaining street pavements. Estimates on cost of track construction are given later.

UNIT PRICE ESTIMATES

In order to comply with the conditions of the commission regarding the valuation of the present properties and the probable cost of the future properties, analyzed in this report, it has been necessary to formulate a series of unit price estimates arranged in such a manner that they could be applied to any one of the various valuation questions involved.

In making valuation estimates it has been found advisable, in order to enable one to make an intelligent analysis of the valuation of the different properties, to make the estimates on two different bases, the object in view of determining the physical value of the properties as they exist to-day, which is understood to be what is meant by the commission, "to make a valuation of present plants." The estimates have, therefore, in Chapter VII, been made in two columns, headed as follows:

A—The cost to reproduce the properties to-day.

The figures in this column are based upon what it would cost to furnish and install the materials entering into the construction of the properties to-day, and in considering these prices it should be borne in mind that the state of the art is now such

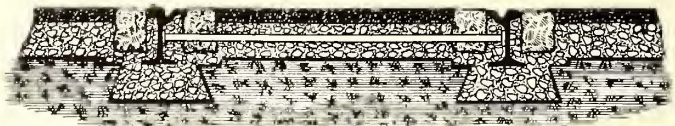


FIG. 9.—GIRDER RAIL, ON CONCRETE GIRDER CONSTRUCTION

that a large amount of the physical part of the properties, as they exist, could be built now much cheaper than was possible at the time they were built. This applies especially to the cable systems which, at the time they were installed, were largely built under patented systems, and from special designs, and at a time when engineers were not familiar enough with the requirements of cable railway work to definitely determine what should be done at the time an installation was made. The result was that some of the systems were built in a much more expensive manner than subsequent experience proved necessary. Another result was that some of the plants were built too light for the service, and had to be completely torn out and reinstalled at a largely increased expense. Such, for example, is the Washington Street power house of the West Side system, which was installed and started in operation and found to be so small that it could not operate the cars. A new plant, adjacent to it, was constructed, and the machinery originally designed completely discarded and new and heavier machinery installed. These conditions also govern, to a certain extent, the introduction of the electric plants, some of which were built with belted machinery, in order to utilize the class of machinery available at the time, with the result that the power stations cover so large a ground area that the cost of the buildings and foundations and transmission apparatus, even though now almost obsolete, made the complete plants cost almost as much per electrical unit as the more modern plants now cost.

B—Present value of the physical property for electric railway purposes.

This column gives the present values of the physical properties for electrical railway purposes so far as it was possible

to estimate them. In deducing this column it was necessary to take into consideration the fact that the cable systems complete, exclusive of track, real estate and buildings, must be considered as practically obsolete, and that, therefore, the only amounts that they can be credited with is what salvage can be obtained from their disposition. I have, however, considered that some portions of the cable tracks, outside of the business center, where underground conduit construction would not be required, could be used to operate electric cars over, provided the tracks were surfaced up and brought into good physical condition. For these reasons I have credited the cable systems, in each case, with the estimated value that it would cost to reproduce these cable tracks as new electric car tracks, taking into consideration the weight of the rail in each case, and allowing a suitable depreciation from the figure thus obtained, depending upon the condition in which the track and paving have been maintained by the respective companies. I have endeavored to estimate this depreciation as fairly as possible, and while it may seem difficult to understand how it can have been so great, it should be accepted as one of the conditions due to the advancement of the art in street railways, and is illustrative of the conditions which must be faced by any corporation or municipality which engages in the transportation business. The same statements are largely true regarding a large part of the electrical equipment of some of the present companies, for the reason that the electrical art has so far advanced, since some of the present properties were built, that a part of their electrical and steam equipment is, from the standpoint of economical operation, obsolete to-day. In considering this valuation column it must be understood that it does not in any sense purport to be the actual value, from a business standpoint, of the properties estimated, for the reason that ordinarily from a business and financial standpoint the value of all properties having franchise rights would be based largely upon their earning capacity, and not upon the mere physical value of the tangible property.

UNIT PRICE ESTIMATE A

Estimate of cost to produce 1 mile of single-track cable construction of the type now installed in the North Division and South Division, and on the Madison Street and Milwaukee Avenue systems in the West Division:

5,095 lineal feet of straight track at \$10.70 per foot.....	\$54,516.50
185 lineal feet of curved track at \$35.00 per foot.....	6,475.00
<hr/>	<hr/>
5,280	\$60,991.50
Includes rails, yokes, joints, tie rods, manhole covers and frames, curve wheels, frames and covers, tubing, excavating, concreting, paving and labor.	
Pulley wheels and supports, 170 per mile, at \$5.....	\$ 850.00
Proportion of special track work per mile.....	5,000.00
Proportion of cost for vault construction.....	4,500.00
Moving and reconstructing underground obstructions.....	7,134.00
<hr/>	<hr/>
	\$78,475.50
Engineering, supervision and administration 10 per cent	7,847.55
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Total, including paving.....	\$86,323.05

UNIT PRICE ESTIMATE B

Estimate of cost to produce 1 mile of single-track cable construction of the type now installed on the Blue Island Avenue and Halstead Street system in the West Division:

5,095 lineal feet of straight track at \$9.35 per foot.....	\$47,638.25
185 lineal feet of curved track at \$25 per foot.....	4,625.00
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5,280	\$52,263.25
Includes rails, yokes, joints, tie rods, manhole covers and frames, curve wheels, frames and covers, excavating, concreting, paving and labor.	
Pulley wheels and supports, 170 per mile, at \$5.....	\$ 850.00
Proportion of special track work per mile.....	5,000.00
Proportion of cost for vault construction.....	3,726.00
Moving and reconstructing underground obstructions.....	6,000.00
<hr/>	<hr/>
	\$67,839.25

Engineering, supervision and administration 10 per cent	6,783.92
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Total, including paving.....	\$74,623.17

UNIT PRICE ESTIMATE C

Estimate of cost to produce 1 mile of single track 4½-in. girder rail, on chair supports, ties on earth foundations:

Steel rails, 65 lbs. per lineal yard, 102.14 gross tons, at \$41 per ton.....	\$ 4,187.74
Ties, 2,640, at 55 cents, delivered on street.....	1,452.00
Tie rods, 700 at 25 cents.....	175.00
Chairs, 5,280, at 50 cents.....	2,640.00
Spikes	150.00
Hauling rails to street, at \$1 per ton.....	102.14
Joints, 352, cast-welded, at \$3.....	1,056.00
Cross bonding.....	10.00
Excavation, including bedding of ties, 1,549 cu. yds., at 60 cents.....	929.40
Track laying and cleaning street, at 25 cents per foot..	1,320.00
<hr/>	<hr/>
	\$12,022.28
Special work at intersections and cross overs, average..	4,000.00
<hr/>	<hr/>
	\$16,022.28
Engineering, supervision and administration, 10 per cent	1,602.22
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Total cost of track exclusive of paving.....	\$17,624.50

UNIT PRICE ESTIMATE D

Estimate of cost to produce 1 mile of single track, 6-in. girder rail, earth foundation:

Steel rails, 78 lbs. per lineal yard, 122.57 gross tons, at \$41 (see foot note to Estimate C).....	\$ 5,025.37
Ties, 2,640, at 55 cents, delivered on street.....	1,452.00
Tie rods, 700, at 25 cents.....	175.00
Spikes	150.00
Hauling rails to street, at \$1 per ton.....	122.57
Joints, 352, cast-welded, at \$3.50.....	1,232.00
Cross bonding.....	10.00
Excavation, including bedding of ties, 1,158 cu. yds., at 60 cents.....	694.80
Track laying and cleaning street per foot, at 25 cents..	1,320.00
<hr/>	<hr/>
	\$10,181.74
Special work at intersections and cross-overs, average.	4,000.00
<hr/>	<hr/>
	\$14,181.74
Engineering, supervision and administration 10 per cent	1,418.17
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Total cost of track exclusive of paving.....	\$15,599.91

UNIT PRICE ESTIMATE E

Estimate of cost to produce 1 mile of single track, 7-in. girder rail, earth foundation:

Steel rails, 85 lbs. per lineal yard, 133.57 gross tons, at \$41 (see foot note to Estimate C).....	\$ 5,476.37
Ties, 2,640, at 55 cents, delivered on street.....	1,452.00
Tie rods, 700, at 25 cents.....	175.00
Spikes	150.00
Hauling rails to street, at \$1 per ton.....	133.57
Joints, 352, cast-welded, at \$3.50.....	1,232.00
Cross bonding.....	10.00
Excavation, including bedding of ties, 1,374 cu. yds., at 60 cents.....	824.40
Track laying and cleaning street, per foot at 25 cents..	1,320.00
<hr/>	<hr/>
	\$10,773.34
Special work at intersections and cross-overs, average.	4,000.00
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	\$14,773.34
Engineering, supervision and administration 10 per cent	1,477.33
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Total cost of track exclusive of paving.....	\$16,250.67

* The price of \$41 per gross ton for steel rails includes the cost of the rails f. o. b. cars Chicago at \$40 per gross ton, and \$1 additional to cover switching charges and other costs of handling prior to hauling the rails to the work.

UNIT PRICE ESTIMATE F

Estimate of cost to produce 1 mile of single track, 9-in. girder rail, earth foundation:	
Steel rails, 94 lbs. per lineal yard, 147.71 gross tons, at \$41 (see foot note to Estimate C).....	\$ 6,056.11
Ties, 2,640, at 55 cents, delivered on street.....	1,452.00
Tie rods, 700, at 25 cents.....	175.00
Spikes.....	150.00
Hauling rails to street, at \$1.....	147.71
Joints, 352, cast-welded, at \$5.....	1,760.00
Cross bonding.....	10.00
Excavation, including bedding of ties, 1,549 cu. yds., at 60 cents.....	929.40
Track laying and cleaning street, at 25 cents per foot..	1,320.00
	<hr/>
	\$12,000.22
Special work at intersections and cross-overs, average.	4,000.00
	<hr/>
	\$16,000.22
Engineering, supervision and administration at 10 per cent	1,600.02
	<hr/>
Total cost of track exclusive of paving.....	\$17,600.24

UNIT PRICE ESTIMATE G

Estimate of cost to produce 1 mile of double-track overhead trolley construction:	
100 Iron poles, set in concrete, at \$28.....	\$ 2,800.00
50 Four-pin iron cross arms, with pins and insulators, at \$3.95.....	197.50
100 Small Brooklyn insulators for spans, at 50 cents.....	50.00
100 Globe strain insulators for spans, at 22 cents....	22.00
90 Straight line hangers, at 32½ cents.....	29.25
10 Feed-in hangers, at 50 cents.....	5.00
140 Soldered 9-in. ears, at 16 cents.....	22.40
12 Live cross-overs (estimated), at \$3.....	36.00
8 Insulated cross-overs (estimated), at \$6.....	48.00
8 Two-way frogs (estimated), at \$3.....	24.00
3,000 Ft. 5-16-in. galvanized strand wire for spans, at \$10 per thousand.....	30.00
6 Strain plates (strain layout), at 32 cents.....	1.92
12 Small Brooklyn (strain layout), at 50 cents.....	6.00
12 Globe insulators (strain layout), at 22 cents....	2.64
1,500 Ft. ¼-in. galvanized strand wire (strain layout), at \$7.25 per thousand.....	10.88
20 Double hangers (two double-curve layout), at 44 cents.....	8.80
20 Single hangers (two double-curve layouts), at 35 cents.....	7.00
1,000 Ft. ¼-in. strand wire (two double-curve layouts), at \$7.25 per thousand.....	7.25
4 Heavy Brooklyn (two double-curve layouts), at 70 cents.....	2.80
10,560 Ft. 2-0 trolley wire, 4,246 lbs., at 13¾ cents....	562.59
2 2-0 splicing ears, at 50 cents.....	1.00
Labor, placing spans, trolleys, etc.....	225.00
	<hr/>
Total cost exclusive of feeder wire.....	\$ 4,100.03
Cost of feeder wire estimated average per mile..	4,000.00
	<hr/>
	\$ 8,100.03

UNIT PRICE ESTIMATE H

Estimate of cost to pave 1 mile of single track, 8 ft. in width:	
1. Dressed granite, city specifications: On 6-in. concrete base, 4,600 sq. yds., at \$4 per yard.....	\$18,500.00
2. Asphalt: On 6-in. concrete base, 4,600 sq. yds., at \$2.80 per yard.....	12,880.00
3. Vitrified brick: On 6-in. concrete base, 4,600 sq. yds., at \$2.75 per yard.....	12,650.00
4. Cedar blocks: On plank and sand, 4,600 sq. yds., at \$1.48 per yard.....	6,808.00
5. Rough granite: On sand bedding, 4,600 sq. yds., at \$2.50 per yard.....	11,500.00
6. Cobble stone: Bedded in gravel, 4,600 sq. yds., at \$1.65 per yard.....	7,590.00
7. Macadam: 4,600 sq. yds., at 75 cents per yard.....	3,450.00
8. Oak blocks: On plank and sand, 4,600 sq. yds., at \$1.70 per yard.....	7,820.00

UNIT PRICE ESTIMATE I

Estimate of cost to produce 1 mile of single-track, grooved girder rail of design Fig. 7, submitted and recommended, laid on concrete beams, Fig. 9:	
Excavation and hauling, 2,000 cu. yds., at \$1.....	\$ 2,000.00

*Concrete beams, 800 cu. yds., at \$6.....	4,800.00
Steel rails, 120 lbs. per yard, 188.57 tons, at \$41 (see foot note to Estimate C).....	7,731.37
Hauling rails to street at \$1.....	188.57
Tie rods, 700, at 25 cents.....	175.00
Cast-welded joints, 176, at \$5.....	880.00
Cross bonding.....	10.00
Track laying, cleaning street, etc.....	1,501.44
Special track work per mile of single track.....	4,500.00
Engineering, supervision and administration, 10 per cent	2,178.63

Total cost of track exclusive of paving.....	\$23,965.01
If paved with asphalt.....	36,845.01
If paved with dressed granite.....	42,365.01
If paved with brick.....	36,615.01
Cost of Paving—	
Asphalt on 6-in. concrete base.....	12,880.00
Dressed granite on 6-in. concrete base.....	18,400.00
Vitrified brick, on 6-in. concrete base.....	12,650.00

* These estimates fix the price of concrete in place at \$6 per cubic yard. The price of concrete varies with the variations in the market price of cement and other materials, and with the varying conditions under which the work must be executed. The price of \$6 per cubic yard is considered to be a safe average price for the purposes of these estimates.

UNIT PRICE ESTIMATE J

Estimate of cost to produce 1 mile of single-track, underground electric conduit type, grooved girder rail of design Fig. 7:	
Steel track rails, 120 lbs. per yard, 188.57 tons at \$41 (see foot note to Estimate C).....	\$ 7,731.37
Steel slot rails, 66 lbs. per yard, 103.71 tons, at \$43....	4,459.53
Conductor bars, 21.3 lbs. per yard, 33.47 tons, at \$43....	1,439.21
352 cast-weld joints, at \$5.....	1,760.00
352 slot rail splices with bolts.....	82.00
Bolts (tram rail, slot rail, hand-hole, insulator, hatch, washers and keys).....	492.00
Tie bars, 4,200, at 25 cents.....	1,050.00
Insulators and clips.....	1,200.00
Cast iron yokes, pit covers and frames, conduit plates, 310 tons, at \$50.....	15,500.00
Hauling iron work.....	600.00
Special track work per mile single track.....	6,000.00
Conductor bonds.....	500.00
Track laying and placing iron work, per mile.....	7,260.00
Excavation 2,700 cu. yds., at \$1.....	2,700.00
Concrete, 1,500 cu. yds., at \$6.....	9,000.00
Sewer connections from manholes, etc.....	2,000.00
Removing and rearranging underground obstructions..	7,000.00
Cable ducts in place.....	1,500.00
Plus for engineering, supervision, administration, 10 per cent.....	7,027.41

Total estimated cost per mile of single track, exclusive of paving.....	\$77,301.52
Cost of feeder wire, estimated average per mile.....	4,000.00
	<hr/>
	\$81,301.52

If paved with asphalt, single-track road would cost per mile	\$94,181.52
If paved with dressed granite, single-track road would cost per mile.....	99,701.52
If paved with brick, single-track road would cost per mile	93,951.52
Cost of Paving—	
Asphalt on 6-in. concrete base.....	\$12,880
Dressed granite on 6-in. concrete base.....	18,400
Vitrified brick on 6-in. concrete base.....	12,650

The unit price per mile given for underground conduit work is a safe average figure for a system covering the city at large, for in outlying districts the price should not exceed \$70,000 per mile, and for all work located in the business district the price should be raised to about \$100,000 per mile, both exclusive of paving, owing to the increased amount of underground obstructions, the extra cost of labor due to congestion of traffic, and the large amount of curves and special work which will be required within this terminal district.

On streets now occupied by cable construction the cost, in either case, would be reduced by about \$3,000 per mile, derived from sale of old material.

ANNUAL REPORT OF THE NEW YORK STATE RAILROAD COMMISSIONERS

The annual report of the Board of Railroad Commissioners of New York State was submitted to the Legislature Jan 12, and, as usual, contained some very interesting information in regard to the electric railway interests of the State. A financial summary for the year of the different operating companies was published in the STREET RAILWAY JOURNAL for Jan. 3, but the following figures are also contained in the report:

Percentages of subdivisions of operating expenses to total operating expenses, for the years ending June 30, 1901 and 1902:

	1901	1902
Maintenance of way and structures.....	7.30	7.09
Maintenance of equipment	11.16	11.51
Operation of power plant	13.52	13.67
Operation of cars	48.26	46.72
General expenses	19.76	21.01

Percentages of subdivisions of operating expenses to gross earnings from operation for the years ending June 30, 1901 and 1902:

	1901	1902
Maintenance of way and structures.....	4.15	4.19
Maintenance of equipment	6.35	6.78
Operation of power plant	7.70	8.04
Operation of cars	27.45	27.52
General expenses	11.24	12.38
	56.89	58.91

manner with proper weight of rails, good ties and broken stone or gravel ballast. Concrete culverts and openings on these lines have been put in. A large portion of the new construction has been on private right of way; in these cases the track has been properly ditched and right of way fenced in most instances. A large amount of new rail has been added to existing roads, replacing lighter rail. The improvements in the physical conditions of existing roads has been quite general throughout the State during the past year. At present there is very little 6-in. girder or 45-lb. "T"-rails remaining in the different city system, and most of the companies owning these roads have made arrangements to replace this class of rail with heavier ones in the near future.

The improvement in cars and equipment has kept pace with those made in track and roadbed construction. These improvements have been on the lines of larger cars, more comfortable inside furnishings; most of the cars which are now being added to the different systems are double truck, which adds greatly to the comfort of passengers, doing away with the end oscillation which is so disagreeable to passengers in the single-truck cars. Nearly all of the new double-truck cars placed in service during the past year have been equipped with power brakes, and in a large number of cases this class of brakes has been placed on cars which were in service previous to this year. More attention has been given to the matter of cleaning cars; they are at present kept in a better condition on the inside and present a better appearance on the outside than formerly. There has been a marked improvement in the electrical equipment of cars, motors of a greater horse-power capacity have been placed on them, which has resulted in avoiding the numerous delays caused by the breaking down of overloaded motor equipments.

Nearly all of the leading railroad systems and a number of the smaller ones have recently reconstructed their power plants; the equipment of several plants in one. There has been a change

Street Surface Railway (principal companies) Receipts and Expenditures per Passenger and Cost of Operation per Car Mile for Year Ending June 30, 1902 OPERATED WHOLLY OR IN PART BY MECHANICAL TRACTION

NAME OF ROAD	Number of Passengers Carried, Including Transfers	Total Car Mileage	BASED UPON GROSS EARNINGS FROM OPERATION AND OPERATING EXPENSES		BASED UPON RECEIPTS FROM ALL SOURCES AND TOTAL EXPENDITURES, INCLUDING FIXED CHARGES		PER CAR MILE		
			Average Earnings per Passenger	Average Cost of Operation per Passenger	Average Receipts per Passenger	Average Expenses per Passenger	Gross Earnings	Operating Expenses	Total Expenses Including Fixed Charges
			Cents	Cents	Cents	Cents	Cents	Cents	Cents
Albany and Hudson.....	1,055,175	637,902	14.64	11.46	17.80	25.35	24.21	18.96	41.93
Auburn.....	2,112,599	496,627	3.99	3.29	4.19	4.55	16.99	13.85	19.37
Brooklyn Heights*.....	285,406,828	54,549,774	4.03	2.70	4.15	4.19	21.13	14.14	21.97
Buffalo and Lockport†.....	903,756	742,868	13.51	10.78	13.69	15.66	16.43	13.12	19.05
Buffalo Railway†.....	53,920,590	7,172,700	3.53	1.72	3.57	2.48	26.57	12.89	18.68
Buffalo and Niagara Falls †.....	2,292,843	1,009,657	13.48	4.52	13.54	6.12	30.61	10.27	13.91
Coney Island and Brooklyn.....	36,324,531	6,164,575	4.13	2.54	4.15	3.23	24.31	14.75	19.04
Crosstown Street (Buffalo).....	15,663,288	2,694,868	3.37	2.23	3.39	3.38	19.63	12.97	19.75
Geneva, Waterloo, Seneca Falls and Cayuga Lake.....	1,421,391	411,251	4.64	2.79	4.71	4.23	16.66	9.63	14.63
Forty-second St., Manhattanville & St. Nicholas Av., (N.Y.).....	20,671,950	2,996,526	3.94	2.26	4.06	4.08	27.20	15.51	28.12
Hudson Valley.....	4,408,761	1,655,461	7.21	5.14	8.10	8.03	19.20	13.70	21.37
International (Buffalo)‡.....	23,928,838	4,439,560	3.92	2.18	3.98	3.56	21.13	11.75	19.19
Interurban (New York)§¶.....	103,350,322	11,132,531	3.63	1.75	3.79	3.77	33.73	16.31	34.99
Jamestown.....	3,143,655	662,911	3.64	2.44	3.69	3.46	17.29	11.57	16.42
Metropolitan Street (New York)§**.....	300,182,080	33,100,797	3.58	1.64	3.72	2.80	32.47	14.88	25.36
Niagara Falls and Suspension Bridge†.....	1,546,237	301,503	4.33	2.75	4.60	4.63	44.08	14.08	23.76
New York and Queens County.....	12,759,449	2,649,115	4.26	2.44	4.30	3.87	20.49	11.76	18.63
Rochester.....	28,103,971	5,249,617	3.71	2.04	3.80	3.16	19.90	10.91	16.88
Schenectady.....	4,036,919	1,129,041	6.44	4.89	7.73	6.17	25.87	19.68	24.80
Syracuse and Suburban.....	1,433,475	399,410	4.87	2.81	4.89	4.83	17.49	10.50	17.33
Syva use Rapid Transit.....	17,351,247	3,704,105	3.96	2.21	3.99	3.53	18.55	10.37	16.54
Third Avenue (New York).....	52,709,413	6,707,446	4.29	2.69	5.59	6.02	33.68	21.12	47.38
Union (New York).....	38,981,728	6,070,768	2.62	1.79	2.63	2.36	16.83	11.49	15.18
United Traction (Albany and Troy).....	38,796,923	7,707,050	3.77	2.59	3.81	3.20	18.79	13.03	16.57
Utica and Mohawk Valley††.....	5,551,630	1,305,066	4.32	2.74	4.36	3.99	18.39	11.67	16.95
Yonkers.....	7,136,635	1,499,662	3.09	2.63	3.17	3.49	14.72	12.50	16.62
<i>Operated wholly by animal power</i>									
Central Crosstown (New York).....	17,678,173	1,577,158	2.80	1.93	2.83	2.53	31.39	21.62	23.37
Dry Dock, East Broadway and Battery.....	17,428,582	2,047,193	3.33	2.68	3.36	3.45	28.31	22.81	29.34

* Includes all lines controlled by Brooklyn Heights not making separate reports. † To February 20, 1902. ‡ From February 21, 1902. § Includes all lines controlled by Interurban and Metropolitan not making separate reports. ¶ For three months ending June 30, 1902. ** For nine months ending March 31, 1902. †† For seven months ending June 30, 1902.

REPORT OF EXPERT

The board has continued, through its electrical expert, the inspection of street surface railroads. The companies generally comply with the recommendations of the board willingly, and the board has not yet been called upon to enforce them through the courts. Many improvements, both for the safety and comfort of passengers, have grown out of this system of inspection, and it will be continued by the board in the same manner as the steam railroad inspection. The electrical expert of the board reports generally on this subject as follows:

The several new electric railroads which have been built and the extensions of existing roads which have been constructed in this State during the past year have been constructed in a first-class

in the method of transmission of power, several of the larger systems are at present transmitting power from a central station to transformer stations, located at different points on the systems; this transmission from the power house to the transformer station is made at voltages varying from 6000 to 23,000 volts. A number of the suburban lines in the State are supplied with power which is transmitted from water plants located some distance from the lines. This transmission of power is in most cases made over lines which are located on the highways. The transmission of power at the high voltages used over line on the highways adds an element of danger to the operation of electric railroads. The safety of the public requires that lines carrying currents of this character should be properly constructed and maintained, and, where possible in a number of cases the power has been centralized by combining, should be located on private right of way.

The methods of operation on the different electric railroads have been greatly improved during the past year. This is especially true of all of the city systems. There has also been an improvement in the methods of operation on the suburban roads. Cars on five of the larger suburban systems are now operated under the authority of train-despatching systems. Train orders on one of these roads are issued by means of a telegraph system, on the other roads by telephone. These improvements in safety appliances and methods of operation should be continued.

RECOMMENDATIONS FOR OPERATION

The board renews to railroad managers its general recommendations heretofore made as to the operation of street surface railroads, especially in the following particulars:

First.—Every street car which crosses a steam railroad at grade shall be equipped with a red flag for use during the day and a red lantern for use at night. When approaching such crossings the car shall come to a full stop at least 30 ft. from the crossing, and shall not proceed until the conductor has gone upon the steam railroad, carrying the flag or lantern, and, after ascertaining that the way is clear, given the proper signal for the car to proceed. The board also recommends that at all grade crossings by overhead-trolley railroads of steam railroads, a V-shaped trough of metal be constructed over the trolley wire or wires to insure the motor retaining the current while the crossing is being made.

Second.—That where two or more street car lines cross, or where they merge, an agreement shall be made as to which line shall have the right of way. The car that has not the right of way shall come to a full stop before crossing the tracks of the other line, or entering on the joint track, and the car which has the right of way shall slow down before crossing the tracks of the other line, or entering on the joint track.

Third.—That cars passing in opposite directions shall not meet on street crossings.

Fourth.—That the speed of cars be reduced to the minimum on all curves where the view is obstructed.

Fifth.—That passengers be prohibited from riding on the running boards or side steps of open cars.

Sixth.—That passengers be not permitted to stand on the front platforms of open cars, and that only as many passengers be permitted on such platforms as can be conveniently seated. In the case of open cars that have no seats on the front platforms, passengers shall not be permitted to ride on the platform, and the side gates shall at all times be kept closed. Under no circumstances should passengers be permitted to ride on the front platforms of closed cars.

TAIL LIGHTS ON SUBURBAN CARS

The board urges upon the companies and recommends that oil tail lights be provided on all cars operating on suburban lines. It has been the experience of the board that many rear collisions would have been avoided were the cars equipped with these lights, and in a great number of instances the board has recommended directly to a company that the lights be provided, which recommendation has been complied with. Not alone on suburban lines should the lights be provided, but in all cases where the streets are not well lighted, and if the current should be cut off from an electrical car it would be difficult to be seen from an approaching car, these lights should be provided.

TRANSMISSION LINES

The board again refers to the subject of transmission lines for electric railroads which carry a high voltage of power. There are several of these in this State, and in one instance in the last year the board has recommended in detail that improvements be made in the transmission line. The supporting poles and transmission lines carrying these currents should be located upon private property and be of substantial construction. As stated last year, it is the board's belief that local authorities in granting franchises for electric railroads where such currents are proposed to be transmitted should insist that this be done. The matter receives the attention of the board and its electrical expert in his reports.

STATISTICS

The average number of persons, including officials, employed during the year ending June 30, 1902, on all the street surface railroads of the State (including horse railroads) was 30,529; for the year ending June 30, 1901, it was 27,914. The aggregate

amount of salaries and wages paid them for the year ending June 30, 1902, was \$17,857,825.83; for the year ending June 30, 1901, \$16,434,083.30. The companies owned and operated on June 30, 1902, 446 electric combination cars, 23 air motor box cars, 4,976 electric box cars, 10 cable box cars, 3,834 electric open cars, 7 cable open cars, 11 electric mail cars, 624 electric freight, express and service cars, the total being 9,931; for the year ending June 30, 1901, the total was 9389. Fifteen thousand and seventy-five fenders were reported in 1902 as used on these cars, some forms of fenders being transferred from one end of the car to the other at terminals, and some of the devices reported as fenders are what are known as wheel-guards, being close to the wheel. Two thousand and seven hundred other cars (being cars operated by horses and box, open, freight, express and service cars not equipped with motors) were also owned and operated on June 30, 1902.

The number of tons of freight carried on street surface railroads of the State during the year ending June 30, 1902, was 394,641; during the year ending June 30, 1901, it was 287,311.

On June 30, 1892, the length of street surface railroads in this State was 739.291 miles; on June 30, 1902, it was 1746.015 miles. The capital stock of the companies on the same date in 1892 was \$71,684,449.32; bonded debt, \$65,822,452.88; on the same date in 1902 the capital stock was \$204,591,357.50, and bonded debt \$218,508,474.10. The cost of road and equipment on the same date in 1892 was \$135,506,415.74; on the same date in 1902 it was \$420,888,704.51. The gross earnings of the companies for the year ending June 30, 1892, were \$24,238,172.94; for the year ending June 30, 1902, they were \$46,905,187.87. For the year ending June 30, 1892, 487,611,009 passengers were carried; for the year ending June 30, 1902, 1,209,510,539 were carried. These figures include the elevated railroads in Brooklyn in 1892 and 1902, and also include "transfers."

ACCOUNTS

The standard system of street railway accounting as devised by the American Street Railway Accountants' Association, and in accordance with which the annual reports of the companies are made to this board, has worked satisfactorily.

FRANCHISE TAX LAW INVALID

The special franchise tax law, known as the Ford bill, was declared unconstitutional by the Appellate Division of the Supreme Court of the Third Department of New York, on Jan. 20. The decision was handed down at Albany by Chief Justice Parker, who wrote the opinion, and was concurred in by Justices Chase and Kellogg, the latter, however, filing a supplementary opinion. Justices Smith and Chester dissent from the majority of the court.

The right of the State to tax franchises as provided for by the act in question is not denied or assailed by the court; the decision declares unconstitutional that part of the law which was added by amendment to the original Ford bill, and which takes away from local assessors the power to assess the franchises and confers the power on the State Board of Tax Commissioners.

The decision is in the case of the Metropolitan Street Railway Company against the valuation put upon its special franchises by the State Tax Commission, and the Appellate Division now hands down its decision reversing the order of Justice Herrick, which approved Referee Earl's report, and vacating the assessment.

The test case especially affects the Metropolitan Street Railway Company, but the litigation involves the proceedings of forty-seven distinct companies and embraces all the street railway, gas and electric companies of the city of New York. The total assessments on their properties amount to about \$137,000,000.

REPORT OF THE MASSACHUSETTS RAILROAD COMMISSIONERS—II

In the last issue of this paper an abstract was published of the first part of the report of the Railroad Commissioners of Massachusetts for the last year to the Legislature, and presented to that body Jan. 14. The Commission has paid especial attention to the street railways of the State in its report this year, and in addition to the recommendations published last month takes up extensively the subject of accidents.

In the opinion of the Board no prudence in management or wisdom in laws can wholly eliminate the dangers which attend the introduction of improved facilities for rapid transit, and additional risks will always find people ready to take them. Accidents are quite generally charged to excessive speed; and this has been one of the sins of street railway management, particularly in places where the street railway has entered the field as a competitor of the steam railroad. High speed, it is admitted, is not necessarily dangerous at all times and at all places, as where the railway is operated over private lands, with suitable equipment, proper roadbed and track, an adequate system of signals and proper instruction of employees. Cars may be run at a considerable speed, too, over a railway constructed in a reserved space apart from the traveled road, if suitable conditions and safeguards are provided. But high speed upon a railway which occupies a part of the traveled road is out of the question. The common right of all travelers to use the space covered by the railway tracks, and the consequent liability to collision, here make it necessary that the car be at all times under such control that it can be immediately stopped. Control over rates of speed upon the public streets, it is pointed out, has been expressly left by the Legislature to boards of aldermen and of selectmen. While they have been properly jealous of retaining local control over the highways, they have too often neglected to use it in regulating the speed of cars. The Commission therefore suggests the enactment of a law which, while leaving original jurisdiction over rates of speed with the local boards, will give to a company on the one hand or to citizens upon the other a right of appeal to some other tribunal for final decision of this question.

SAFETY APPLIANCES

The Board then refers to the importance of equipping all double-truck cars equipped for high speed upon interurban railways with power brakes. For light cars operated at a slow speed, however, particularly those which pass through crowded streets under circumstances which require the motormen to constantly stop and start them in order to avoid collision with other traffic, the hand brake may have advantages. Authority is requested from the Legislature to require companies to follow the recommendations of the Board in this particular. The passage of a law is also asked requiring street railway companies to carry upon their cars such tools and appliances for use in cases of accident as the Board may from time to time require.

The subject of fenders is then discussed. In 1895 the Board undertook a thorough investigation of the merits of different kinds of fenders. Public hearings were held and very many tests made, but, as a result of its inquiry, the Board declined to recommend any particular device. In conformity with the direction of the Legislature of last winter the Board again took up the inquiry. A public hearing has been held, after extended notice, and later full opportunity was afforded those interested in different devices to explain the merits of their respective designs. Fenders in use upon railways in other States and other countries have also been inspected. The subject was also taken up in St. Louis, where the Board of Public Improvements, early in 1902, made an investigation of street railway fenders. One hundred and four different designs were presented, and explained by the inventors or their representatives;

fifteen of these were selected for practical test. In closing its report, the Commission stated that it could not refrain from expressing its belief, based upon experience gained with different fenders, that "the importance of equipping an electric street car with a fender, viewed as a life-saving device, sinks into insignificance when compared with the importance of equipping such a car with an efficient power brake in order to stop or check the speed of a car before striking the unfortunate individual, instead of trying to scoop him up after he has been struck."

In response to the request of the Board the several companies operating railways in this State furnished data showing their experience with fenders. As the result of information secured and personal observation made, the Board reaffirms its former opinion, that there is no fender which it ought at this time to recommend above others.

The total miles of main track operated Sept. 30, 1902, is 2,465.608—an increase of 250,149 miles over the previous year. The gross assets of the companies were \$123,200,557.20, and the gross liabilities at the same date, including capital stock, were \$119,441,791.31. The average cost of the street railways of the State per mile of main track (including the cost but not the length of side track), as it stood on the books of the companies Sept. 30, 1902, was \$24,494.86 for construction, \$9,025.98 for equipment, and \$11,888.68 for lands, buildings (including power plants) and other permanent property—making a total average cost of \$45,409.52 per mile of main track.

INCOME AND EXPENDITURES

The total income from all sources was \$24,918,160.94, and the total expenditures (including dividends) were \$24,668,021.29, leaving a net balance of \$250,139.65 to be deducted from the surplus of previous years.

The items of total expenditure, with the increase in each item over the previous year, are shown in the following table:

TOTAL EXPENDITURES, 1901 AND 1902

EXPENDITURES	1901	1902	Increase
Expenses of operation	\$14,565,141	\$15,912,852	\$1,347,711
Interest on debt and loans . . .	1,893,668	2,161,160	267,492
Taxes	1,555,787	1,611,851	56,064
Rentals of leased railways . . .	1,304,433	1,403,225	99,192
Other charges on income	462,492	440,222	22,270*
Dividends paid	3,417,117	3,138,711	278,406*
Total expenditures	\$23,198,238	\$24,668,021	\$1,469,783
Surplus for the year	18,934d	250,140	269,074

d Deficit

* Decrease

The gross earnings and expenses of operation the last year are classified and compared with those of the previous year, in the following table:

GROSS EARNINGS AND EXPENSES OF OPERATION, 1901 AND 1902.

EARNINGS AND EXPENSES.	1901	1902	Increase.
Revenue from passengers	\$21,339,480	\$22,989,002	\$1,649,522
“ from mails and merchandise	51,897	65,658	13,801
Revenue from tolls, rents, advertising, etc.	374,963	431,774	56,811
Gross earnings from operation	\$21,766,340	\$23,486,474	\$1,720,134
Operating expenses	14,565,141	15,912,852	1,347,711
Net earnings from operation	\$7,201,199	\$7,573,622	\$372,423

The total number of passengers carried during the last year on the railways of the 105 companies making returns to the Board was 465,474,382—an increase of 31,947,447 passengers over the previous year.

The total number of car miles run was 100,280,687—an increase of 7,275,462 over the previous year. The percentage of

operating expenses to gross earnings of all the roads was 67.75 per cent.

The following table gives for each of the last ten years the average gross earnings, operating expenses and net earnings from operation, per total mile of main track owned, per car mile run and per passenger carried, thus showing more in detail the changes from year to year in the earnings, cost and net results of operation:

GROSS AND NET EARNINGS FROM OPERATION PER CAR MILE RUN, PER PASSENGER CARRIED, AND PER MILE OF MAIN TRACK, 1893-1902

YEARS	AVERAGE PER CAR MILE			AVERAGE PER PASSENGER.			AVERAGE PER MILE OF TRACK		
	Gross Earnings	Expenses of Operation	Net Earnings	Gross Earnings	Expenses of Operation	Net Earnings	Gross Earnings	Expenses of Operation	Net Earnings
1893.	31.39	21.74	9.65	5.07	3.51	1.56	12,392	8,582	3,810
1894.	30.28	21.05	9.23	5.04	3.50	1.54	11,972	8,321	3,651
1895.	30.20	20.82	9.38	5.07	3.50	1.57	12,127	8,359	3,768
1896.	27.69	19.70	7.99	5.08	3.61	1.47	11,627	8,274	3,353
1897.	25.68	17.71	7.97	5.12	3.53	1.59	11,187	7,713	3,474
1898.	24.80	17.11	7.69	5.11	3.52	1.59	10,998	7,589	3,409
1899.	24.74	16.87	7.87	5.09	3.47	1.62	10,459	7,132	3,327
1900.	24.46	16.10	8.36	5.06	3.33	1.73	10,452	6,878	3,574
1901.	23.40	15.66	7.74	5.02	3.36	1.66	9,908	6,690	3,218
1902.	23.42	15.87	7.55	5.05	3.42	1.63	9,609	6,510	3,099

STREET RAILWAY ACCIDENTS

The whole number of persons injured in connection with street railway operations, as reported by the companies for the year ending Sept. 30, 1902, was 4253, of whom eighty-five received fatal injuries, and 4168 injuries not fatal. The number of passengers injured was 2879, of whom eighteen were injured fatally. The injuries to employees were 247 in all, ten of which were fatal. The number of injuries to travelers and others on the streets was 1127, of which fifty-seven were fatal.

RAILWAY TERMINAL AT LOS ANGELES

Henry E. Huntington, president of the Pacific Electric Railway Company, with extensive interurban interests in and about Los Angeles, has given his official approval to plans for a magnificent depot block now under construction at the corner of Main and Sixth Streets, Los Angeles, Cal. About \$600,000 is the estimated cost of construction, and it is hoped that the building will be completed by the end of the year. There will be nine stories and a basement, each story containing over an acre of floor space. The dimensions are 211.10 ft. front on Main Street, and the same on Los Angeles Street, while the frontage on Sixth Street is 285 ft. The basement and ground floor will have 60,000 sq. ft. of space; the remaining floors 50,000 sq. ft. each. The basement will be 16 ft. high, the ground floor 22 ft., the first office floor 13 ft., the second 12 ft., and the remaining floors 11 ft. There will be eight elevators in the building—six of them for passengers and two for carrying freight, and for the janitors and other employees in charge of the building. The ground floor will be the passenger station for the interurban cars of the Pacific Electric Railway Company. All of the cars will enter through the 60-ft. arch on the Main Street side, switch within the building and return from the same arch. Waiting-rooms and public offices of the company will occupy the remaining space on this floor, excepting the northwest corner, where there will be three ground floor office or store-rooms. General offices of the Pacific Electric Railway Company and the Los Angeles Railway Company, together with other Huntington interests, will be in the building, but, of course, not occupying nearly all of it.

The foundation work is already in place, and work on the great superstructure will begin as soon as the cement and concrete masonry has fully seasoned. The building will be steel frame and absolutely fireproof, with every new contrivance for the safety, comfort and convenience of occupants.

ACTIVITY IN CHICAGO

Since the publication of the report by B. J. Arnold, on the Chicago transportation problem, there has been much activity both on the part of the council committees having franchise matters in charge and financial interests controlling the companies. Representatives of New York stockholders of the Chicago Union Traction Company have been in Chicago the past two weeks to become posted on the situation and the probable financial requirements incidental to new grants. R. R. Govin, Brainerd Tollies and H. B. Hollins, of New York, have been recent Chicago visitors in this connection. Just at present all matters are in an extremely uncertain state. The terms upon which the existing franchises will be renewed are not by any means settled, though there is no doubt a better idea as to what these will probably be in the minds of both the directors of the companies and the council committees than there has been.

The financial situation is a complicated one. The two companies involved are in about as widely different financial condition as can be imagined. They represent the two extremes in financial policy. The Chicago City Railway Company has in past years retired all of its bonds and now has \$18,000,000 capital stock, this being its only outstanding obligation. On this 9 per cent is being paid in dividends and in 1901 \$180,000 was set aside for depreciation, with a surplus of \$127,159. The Chicago Union Traction Company, on the other hand, which leases the property of several underlying companies, has assumed fixed charges on \$43,097,100 of underlying securities, has \$12,000,000 issued in 5 per cent cumulative preferred stock, and \$20,000,000 in common stock. For the year ended June 30, 1902, it had a deficit of \$120,368 after paying interest on underlying bonds and stock rentals on underlying companies. The income from all sources for the Chicago City Railway Company was \$2,268,116, and for the Chicago Union Traction Company \$3,371,750. The earnings of the Chicago City Railway are therefore about two-thirds those of the Chicago Union Traction Company, and the liabilities in the ratio of 18 to 75. The management of a consolidation between these two companies would naturally be a very difficult matter to arrange to the satisfaction of the stockholders of both companies.

In any event, whether there is a consolidation or not, it is assumed by all concerned that a large amount of money must be expended by both companies as soon as franchise matters are definitely settled. The estimate in the Arnold report gives \$69,800,000 as the cost for a complete new system of surface lines for the city of Chicago. This system as outlined would comprise 745 miles of single track, and is 220 miles in excess of the present mileage, which is 525 miles.

It would involve the reconstruction of all the cable lines into trolley and conduit electric lines, new rolling stock and a great increase in electric power station capacity. These latter improvements must be made whether there is an immediate increase in track mileage or not. It is not possible to estimate from the Arnold report what the probable immediate expenditure of either of the present companies would need to be to bring their systems up to date. The system proposed in the Arnold report would hardly be built immediately in its entirety, as it is intended to provide for future needs, and some of it would not be built at once. Even assuming this, however, the expenditure called for is large, and will call for a considerable increase in earning power if the value of the present securities is to be maintained.

The earning power of the reconstructed systems would undoubtedly be considerably in excess of the present. Much money is now being lost by the companies because of the great crowding of the cars during the rush hours, so that fares are not collected, and also by the fact that the crowded condition of the cars prevents riding, except in cases of necessity, or drives traffic to the elevated roads. Upon the strength of this

possible increase in earnings, together with the increase in the growth of population, must the new securities be floated. The Arnold report estimates the value for electric railway purposes of the physical property of the Chicago City Railway Company at about \$12,000,000, and that of the Chicago Union Traction Company (not including the Chicago Consolidated Traction Company) at about \$15,000,000. That is, these amounts could be deducted from the amount a company would have to spend if it were starting in to-day to build an entirely new street railway system on the modern lines which will doubtless be laid down in the franchise renewal.

According to this estimate, there is in the city of Chicago \$27,000,000 worth of physical street railway property which can be applied on the reconstruction and building of new lines. The amount of material which will be thrown at one time into the scrap heap will be something enormous and unprecedented in the history of street railway operations. Chicago companies have been awaiting the outcome of this franchise matter for several years, and consequently have not yet made many improvements which otherwise would have been made. Indeed many improvements have been blocked by the city because of the prospective general adjustment of affairs in 1903. For this reason obsolete apparatus has to a certain extent been utilized, where, under ordinary circumstances, it would have been thrown out little by little from year to year. When once franchise matters are settled Chicago will be the field of the greatest activity in street railway matters that has been seen for many a day.

The companies are willing to meet the city half way in the matter, and ask only that the investment made in street railway property in Chicago be properly safeguarded.

R. R. Govin, representing the Union Traction stockholders in interviews in the Chicago papers has assured the public that Chicago will be given the most up-to-date street railway service in the world with all the proposed betterments, if only the assurance can be had that the money so spent will be protected by the city. The company will spend all the money necessary to get the best, if the investment is safeguarded by the franchise terms.

President D. G. Hamilton, of the Chicago City Railway Company, has, on several occasions recently, uttered a similar sentiment as regards the attitude of his company. Indeed, the Chicago City Railway Company has been anxious for some time to proceed at once to a settlement, since its excellent financial condition has put it in a position to deal promptly and liberally with the question. That the settlement has not come sooner with this property is not the fault of the company.

MEETING OF CHICAGO COMMITTEE ON LOCAL TRANSPORTATION

A meeting of the Chicago Council committee on local transportation was held Jan. 21 to consider the Arnold report on the proposed readjustment of the street railway affairs of the city. When the committee met, Attorney E. R. Bliss, for the Chicago City Railway Company, stated that that company was ready to present a proposition to the city on the franchise renewal question and to discuss terms. Although he did not so state, it is understood that the company is willing to take a twenty-year extension from the City Council and to pay for the privilege.

The Union Traction Company's counsel, W. W. Gourley, told the committee that his company had not been able to get a majority of the stock of the component companies—the North and West Chicago Street Railways—and was, therefore, not ready to talk business or discuss the Jackson bill or any other measure. It would, he declared, take two weeks to get such majorities, and in the meantime it was impossible to state what position the company would assume in the matter.

Several of the South Side aldermen were in favor of taking

up the Chicago City Railway matter at once, but in view of the universal transfer and other questions it was decided to put the entire matter over for two weeks.

Mayor Harrison said: "I am convinced from the attitude of the traction people that they will not appear at the meeting two weeks hence, but will go to the Legislature and ask for an extension for a long term of years. They will have many ornate explanations of why they take the matter out of the City Council, and the fight in the Legislature will be a determined one. I shall go to Springfield and oppose them if they appear there."

PRIZE FOR AN ELECTRIC RAILWAY TRADE-MARK

The Detroit United Railway Company in the current issue of its "Weekly," which it issues for its patrons, makes an offer of a prize of \$25 for the best trade-mark design suited to the company's use. The offer and its object are best explained by the following extract from the Detroit United Weekly:

Realizing the desirability of having some distinctive emblem to characterize the property, stationery and general literature of this company, the Detroit United Railway has decided to adopt an appropriate trade-mark. The company hereby invites the public to assist in the selection of this trade-mark. For the suggestion that is accepted the Detroit United Railway will pay the sum of twenty-five dollars (\$25.00).

To give some idea of what is desired in the way of a trade-mark we call attention to the emblems and designs used by the railroad companies—such as the maple leaf, an artistic arrangement of names and initials and colored designs of animal heads or allegorical subjects. All suggestions must, of course, be in the form of drawings or sketches. The mediums shall be ink, wash or even oil. Pencil drawings will not be considered. Too much emphasis cannot be laid upon the necessity of simplicity of design. Complex groups, lengthy mottoes or inscriptions, drawings with deep perspective and many colors will not be considered. The suggestion is to be used on all the company's property and must be sharply defined and comprehensive. Of what is practical suggestion can also be found in the trade-marks of some of the largest manufacturing concerns, the letter heads of clubs and a few hotels. This is not a coat-of-arms, but a trade-mark. The drawing may be of any size, suitable for reproduction.

All suggestion designs must be submitted by 6 p. m. Monday, Feb. 16, 1903. They must be mailed, "Care of Mr. John H. Fry, trade-mark competition, Detroit United Railway." No personal interviews will be granted. Name and address must be enclosed. The decision and award of this competition will be made by the staff officers of the Detroit United Railway.

GASOLINE ROAD FOR HARVEY, ILL.

Harvey, Ill., a manufacturing suburb of Chicago, of about 6000 inhabitants, scattered over considerable territory, has granted a franchise for a forty-ride-for-a-dollar, or a 2½-cent fare street railway, to gentlemen interested in the Chicago Motor Vehicle Company, which has its factory in that town. The cars are to be supplied with gasoline motors similar to those used on the Chicago Motor Vehicle Company's heavy automobiles. The road will be an interesting experiment in gasoline motor cars for street railway purposes.

MUNICIPAL OWNERSHIP ENABLING ACT PASSED IN CHICAGO

The Chicago Council on Monday approved the act known as the Jackson bill for presentation to the Legislature. This bill provides for municipal ownership by purchase or condemnation of street railways in any city in Illinois, and the city must reserve the right to purchase in all franchises hereafter granted. In case ownership is acquired the City Council can license cars or else lease the tracks for a period not exceeding twenty years to private corporations. Bonds issued in such cases are to be payable solely out of the railway earnings by means of sinking funds. Foreclosing bondholders can operate the road for twenty years, but the bonds are not a lien

on city's general fund. The earnings of the road after the bond interest and retirement fund is paid can go to the city treasury for general municipal purposes. To become valid the municipal purchase ordinance must be submitted to the voters, and must have 60 per cent of the votes. For municipal operation two-thirds of the votes must be recorded in favor of the proposed action.

The passage of the act is not taken in Chicago by any means as an indication that such a step will be followed in that city, as most of the Council have expressed themselves as opposed to municipal ownership. But it is understood as giving the city more freedom in the coming settlement of the street railway question in that city.

FARE INVESTIGATION IN CLEVELAND

The special committee which was appointed some months ago by the Allied Trade and Labor Council of Cleveland to investigate the street railway situation with reference to the renewal of franchises and the obtaining of a lower rate of fare, submitted its report before a meeting of the Council held last week. The report, which embodies over fifty typewritten pages, contains an unqualified recommendation in favor of municipal ownership. The matters of low fare and universal transfers were left as subjects for future discussion, the report making absolutely no recommendation on these two points.

According to the report the average cost of carrying passengers on the lines of the Cleveland City Railway for the last six years has been 2.85 cents for each passenger, and for the Cleveland Electric Railway during the last seven years the average cost of carrying passengers was 2.92 cents a passenger. Some of the figures for the Cleveland City Railway follow :

No. of Passengers	Operating Expenses	Actual Cost
1895—25,099,705	\$778,573.77	.03101
1896—30,533,722	828,012.25	.02711
1900—30,773,304	899,829.98	.02924
1901—34,136,065	925,961.84	.02712

The figures for the same years for the Cleveland Electric Railway, as presented in the report, are as follows :

No. of Passengers	Operating Expenses	Actual Cost
1898—35,906,697	\$1,046,592.77	.02914
1899—31,146,437	967,945.19	.03107
1900—42,460,437	1,121,037.49	.02640
1901—34,136,056	925,961.84	.02712

The part of the report that refers to the future policy of the city reads as follows :

"It ought to be the policy of the city in the future, therefore, to make provision to have all of the grants expire at the same time. The question of municipal ownership of the street railways or the granting of any further franchises at the time should be submitted to a vote of the people."

This part of the report was bitterly attacked by some of those present, on the ground that in effect it "meant the passing up of the question, as far as the people are concerned, for another eleven years and a consequent strengthening of the position of the street railway owners."

In an interview with a STREET RAILWAY JOURNAL representative, Horace E. Andrews, president of the Cleveland Electric Railway Company, stated that the report was correct and impartial as far as it went, and clearly demonstrated the fallacy of the 3-cent fare proposition, but he thought the company should make some allowance for depreciation on property due to operating expenses, and an allowance for interest on bonds. He said that he appreciated that many of the labor leaders maintained that the bonded indebtedness of the company, \$16,000,000, represented a large amount of water, and for the sake

of harmony he was willing that they should make what they considered a fair reduction for what they classed as water, and allow the interest on the balance as a part of the cost of operating. He said that should the interest and depreciation be considered, the cost per passenger would be brought up to about 3.75 cents.

Robert Bandlow, a member of the committee which made the report, was asked for his reason for not including these items in the cost of operating. He replied that whatever depreciation there had been was taken care of and repaired from time to time out of the operating expenses, hence the property did not depreciate in value. His argument against allowing for interest on bonds was that if the parties who built the road had used their own money they would not have been forced to pay interest on the money borrowed, and that this interest did not enter into the expense of carrying the passenger. He also maintained that about half the bonded indebtedness represented the franchises of the company, which had cost the company nothing. He admitted that the entire aim of the investigation had in view the municipal ownership of the street railways at such time as all the franchises expire, and the efforts of the members of the several unions will be along this line, and not in favor of 3-cent fares, which could not fail to have a tendency to lower the wages of the men employed.

MORE MOVING STAIRWAYS FOR THE NEW YORK ELEVATED

The Manhattan Railway Company expects soon to install more moving stairways, similar to that on Sixth Avenue, at the Twenty-Third station. It is reported that plans have been drawn up to install escalators at the Thirty-Third Street and Forty-Second Street stations on that line for both the uptown and downtown tracks.

PROVIDENCE & DANIELSON RAILWAY OFFICERS

The annual meeting of the Providence & Danielson Street Railway Company was held at Providence, Jan. 15, and resulted in the election of the following officers: President, James H. Morris, of Philadelphia; vice-president, D. F. Sherman; treasurer, George W. Prentice; secretary, Franklin A. Smith, Jr. The board of directors was increased by the addition of four names, making a total of nine, and it is made up at present as follows: James H. Morris and Julius Christensen, of the banking house of Morris Brothers & Christensen, of Philadelphia, representing Philadelphia interests; D. F. Sherman, of Portland, Ore.; James S. Kenyon, of Burrows & Kenyon; Edwin A. Smith, treasurer of the Mechanics' Savings Bank; Franklin P. Owen, Franklin A. Smith, Jr., George W. Prentice and John W. Potter, of Providence.

HIGH-POTENTIAL RAILWAY WORK OF THE STANLEY COMPANY

The Stanley Electric & Manufacturing Company, of Pittsfield, Mass., will soon put on the market a high-potential railway system employing electric locomotives, which will use the current directly without the intermediary of rotary converters or transformers. The potential and phase to be employed has not yet been announced, but it is stated that the power stations will not have to be located closer together than 50 or 75 miles. The system to be used is not that of the Ganz Company, but the result of the work done by the engineers of the Stanley Company on patents on which rights have been secured from engineers in this country and abroad. It is stated that they involve the use of an entirely new form of generator with a new form of motor, which permits the use of high voltages directly on the car and absorbs no energy in resistances on starting.

FINANCIAL INTELLIGENCE

The Money Market

WALL STREET, JAN. 21, 1903.

The money market during the week has made further progress toward a lower level. Loans for sixty days to four months are now obtainable at $4\frac{3}{4}$ per cent, and a good deal of competition is apparent even at this reduced figure. Meanwhile call funds are supplied in abundance at 4 per cent. These further concessions on the part of lending institutions are the natural result of continued gain in bank reserves which has proceeded with great rapidity even for this season of year. The Treasury's payments on account of pensions and other extraordinary disbursements are still running very far ahead of the revenue collections, producing thereby a large credit in favor of the local banks. But the principal source of gain is the currency movement from the interior, which, in the last two weeks, is estimated to have netted no less than \$19,000,000. Last Saturday's increase in cash, as reported, of \$12,000,000, was unusually heavy, notwithstanding the fact that large increases are normal at this time. In spite of a \$14,000,000 loan expansion, which is attributable to one or another of the various syndicate enterprises, \$5,400,000 more was added to the surplus reserve last week, bringing the total up about \$20,000,000. The present position is certainly very much stronger than many financial critics and bankers had anticipated it would be a month ago. The common expectation then was that even were currency to flow back in the usual volume from interior centers, it would be quickly drained by exports of gold to Europe. This anticipation has happily been deceived, because the rapid increase in agricultural exports and foreign buying of our securities have held down rates of exchange in face of the opposing influence of easier money conditions. It is true that sterling is very close to the specie shipping point, and that gold exports are fully expected in the near future. But now that New York bank reserves are back to the normal again, this contingency is no longer to be dreaded, as it was a month or six weeks ago. The outlook seems to be for a continuance of the present easy market for another month at least, or until the usual demands of the spring trade begin to be felt. A surprise was sprung upon the community by the Treasury order Monday that the State and municipal bonds allowed, under a special ruling last fall, as security for government deposits, must be replaced by government bonds before August 1 next. The motives for this action are not understood, but the belief is that in order to comply with the order the banks will have to retire their note circulation very fast during the next few months.

The Stock Market

The tendency toward reaction in the general stock market became more pronounced during the past week, with general, and, in some cases, rather sharp declines in prices. Weakness has been most apparent among the stocks in which pool speculation had previously been most active, such, for example, as Rock Island, Southern and Union Pacific, St. Paul, Erie and Reading. The local traction group held rather steadier than the rest, although profit-taking sales and liquidation have been heavy in these stocks also. There are no causes of a general nature which can properly explain the decline. As already indicated, money conditions have grown easier, so much so that even the prospect of gold exports need no longer excite apprehension. Railway traffic continues, meanwhile, surpassingly large, and although there is some doubt as to whether the net earnings statements for last month and this will compare favorably with the gross, it is expected that net revenues will have begun to show some good effects from the recent advances in traffic rates. That earnings results have nothing to do with the lower prices on the Stock Exchange, is demonstrated most conclusively by the fact that while the anthracite coal stocks have been the weakest members of the trading list, it is precisely those roads which are now doing the largest and most remunerative business. The simple truth of the situation seems to be that speculation for the rise in the early part of the month went ahead too fast, and that the market is having one of the setbacks which usually follow after such a rise.

The comparative firmness of the traction shares was no doubt anticipative of yesterday's decision of the Appellate Court at Albany declaring the State franchise tax unconstitutional. On the announcement of this news, the shares of the local companies rose for a time very sharply, getting back pretty close to the high prices of the previous advance. The movement was short-lived, however,

occasion being taken by the cliques in the stocks to lighten their loads. On the appearance of this selling prices fell again quickly. It is still reported that Manhattan Elevated shares are steadily passing into the hands of investors. The main speculative incentive in the stock is the prospect of an early issue of rights to subscribe to the new capital, which rights will have considerable value. The inside party in Brooklyn Rapid Transit seems disposed for the present at least to let the stock simply drift with the tide in the general market.

Philadelphia

Nothing of importance has happened in the Philadelphia street railway issues during the week. Prices have moved within unusually narrow limits, and trading has been light. Some liquidation was reported in Philadelphia Rapid Transit, but not enough to break the price, transactions occurring mostly at 17 and 16 $\frac{7}{8}$. Union Traction changed hands for the most part at 47, and Philadelphia Traction at 98 $\frac{1}{2}$. There were only a few scattering sales of American Railways, at 52 $\frac{1}{4}$ and 52. The same was true of Railways General, which sold at 4 $\frac{7}{8}$ and 5, and of Consolidated of New Jersey, which went at 66 $\frac{1}{2}$ and 66. Two hundred Indianapolis Street Railway sold at 84, a decline of 6 points from the figures of a month ago. Other minor trades included Easton Consolidated Electric at 20 $\frac{1}{4}$, 200 Rochester Passenger preferred at 100, Union Traction of Indiana at 51, and Reading Traction at 30.

Chicago

Denials of the recent rumors of surface line consolidation have caused some reaction in prices during the past week in Chicago. Union Traction common dropped from 17 to 15, and the preferred from 50 to 47. North Chicago, after reaching at one time 173, broke to 170 $\frac{1}{2}$, and West Chicago dropped from 91 $\frac{1}{2}$ to 88. On the other hand, as a noteworthy exception, City Railway shares continued their advance, scattering odd lot purchases forcing them up as high as 231. Notwithstanding the reactionary tendency in the market, there is good authority for the statement that plans for unifying the surface system of Chicago have not been abandoned, but, on the contrary, are making steady progress. Moreover, unless efforts unexpectedly fail, the franchise controversy will soon be settled and immense sums spent on the improvement of the various properties. The elevated shares have been comparatively inactive during the week. Metropolitan preferred is off a point and a half from 90 to 88 $\frac{1}{2}$, and South Side is weaker at 108. Lake Street holds steady around 8, Northwestern preferred advanced two points to 78 $\frac{1}{4}$. The South Side management is still hesitating between two routes in extending its line to Englewood and the stock yards. There are rumors that the protracted negotiations between the Northwestern Elevated and the St. Paul Railroad regarding the Evanston branch of the latter, are nearing a settlement.

Other Traction Securities

Boston traction issues have moved with considerable irregularity during the past week. Elevated stock has fluctuated rapidly with 152 $\frac{1}{2}$ as the low point and 154 the high, and trading has been more active than usual. Massachusetts Electric on light dealings fell from 37 to 36, the preferred meanwhile losing ground from 94 $\frac{1}{2}$ to 94. Unimportant transactions are reported in West End, the common between 94 and 94 $\frac{1}{2}$, and the preferred at 112. An exceptionally dull week on the Baltimore exchange has brought little change in the quotations of the leading specialties. United Railway incomes merely kept steady at 67 and 67 $\frac{1}{8}$, and the 4 per cents the same at 94 $\frac{7}{8}$ and 95. Other sales comprise Charleston Consolidated Railway 5s at 110, Norfolk Street Railway 5s at 110 $\frac{1}{2}$, Raleigh & Augusta 5s at 122 $\frac{1}{2}$, Atlanta Consolidated 5s at 105 $\frac{1}{4}$, Baltimore City Passenger 5s at 108, and City & Suburban (Washington) 5s at 100. Following is as near a complete record as is possible of the week's traction sales on the New York curb: American Light & Traction common at 43 to 44 $\frac{1}{2}$, the preferred at 94 to 95, Interborough Rapid Transit (50 per cent paid in) at 116 to 116 $\frac{1}{2}$, Washington Traction at 15, Interborough (full paid) 116, New Orleans common at 15 $\frac{1}{4}$, San Francisco 4s from 86 $\frac{3}{4}$ down to 80, the subscription privileges at 47 $\frac{1}{2}$ to 48 $\frac{1}{2}$, New Orleans 4 $\frac{1}{2}$ s at 82 $\frac{3}{4}$ to 82 $\frac{1}{2}$, United Railways of St. Louis 4s at 84 $\frac{1}{2}$ and 84 $\frac{5}{8}$, and Brooklyn Rapid Transit 4s at 83 $\frac{1}{4}$. Activity in traction stocks was the feature of the week on the Cleveland exchange. Traction sales numbered 2470 shares, more than half the total sales. Prices improved all along the list. The new Northern Ohio Trac-

tion & Light was responsible for much of the activity, as it is attracting considerable attention. Over 800 of this issue sold at between 20 and 20½. Northern Ohio Traction receipts, probably the last of this issue, sold at 70 for 290 shares, and one 100-share lot of the preferred receipts went at 93½. Sales in Lake Shore Electric preferred numbered 530 shares at 50½ to 51. The common, which sold last week at 14, advanced to 15½ on sales of 325 shares. Miami & Erie Canal was in strong demand and sales numbered 110 shares at 32½ to 33½. Aurora, Elgin & Chicago common sold off two points, 50 shares going at 35. The preferred advanced from 91 to 91½ on 80 shares. Western Ohio receipts advanced 2½ points over the previous week, sales were 160 shares at 27 and 28. Cleveland Electric was stronger, selling up from 85½ to 87. Springfield & Xenia was also stronger, a small lot bringing 18. Monday there was a sharp advance in Aurora, Elgin & Chicago preferred, the price advancing to 93¼ and then dropping back to 92¾. Springfield & Xenia advanced to 20 on repeated rumors that the road is to be sold to the Bushnell syndicate. There was strong bidding on Western Ohio receipts, but none sold. M. J. Mandelbaum is represented to be working on a plan for the immediate consolidation of the Western Ohio, Cincinnati, Dayton & Toledo, and other lines between Cincinnati and Toledo.

Security Quotations

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

	Closing Bid	
	Jan. 13	Jan. 20
American Railways Company.....	51½	51½
Aurora, Elgin & Chicago.....	a38	a37
Boston Elevated.....	152½	152½
Brooklyn R. T.....	68¾	67¼
Chicago City.....	215	215
Chicago Union Tr. (common).....	16¼	15
Chicago Union Tr. (preferred).....	50	45
Cleveland Electric.....	85	86½
Columbus (common).....	63	61
Columbus (preferred).....	104	104
Consolidated Traction of N. J.....	66	66
Consolidated Traction of N. J. 5s.....	106¾	106¾
Detroit United.....	87	87½
Electric People's Traction (Philadelphia) 4s.....	98¾	98
Elgin, Aurora & Southern.....	51½	51
Lake Shore Electric.....	14¾	14¾
Lake Street Elevated.....	8¼	7¾
Manhattan Railway.....	154	153
Massachusetts Electric Cos. (common).....	36½	35½
Massachusetts Electric Cos. (preferred).....	94½	94
Metropolitan Elevated, Chicago (common).....	37	36
Metropolitan Elevated, Chicago (preferred).....	88	87
Metropolitan Street.....	141¾	140½
New Orleans Railways (common).....	15¼	15¼
New Orleans Railways (preferred).....	49½	—
North American.....	117	116
Northern Ohio Traction (common).....	66	—
Northern Ohio Traction (preferred).....	—	—
Northwestern Elevated, Chicago (common).....	33	32
Philadelphia Rapid Transit.....	17½	16¾
Philadelphia Traction.....	98¾	98½
St. Louis Transit (common).....	28¾	28½
South Side Elevated (Chicago).....	108½	107
Syracuse Rapid Transit.....	a31	28¾
Syracuse Rapid Transit (preferred).....	a80	a80
Third Avenue.....	a128	124
Toledo Railway & Light.....	36¾	a38
Twin City, Minneapolis (common).....	118½	119½
United Railways, St. Louis (preferred).....	80¼	80¼
United Railways, St. Louis, 4s.....	84¼	84¼
Union Traction (Philadelphia).....	46¾	46¾
Western Ohio Receipts.....	27	27¾

a Asked.

Iron and Steel

The usual monthly compilation of pig iron production by the Iron Age shows that the output at the first of the month was ahead of all previous records. The weekly capacity of the furnaces was estimated at 354,684 tons, as compared with 352,064, the previous high point on May 1 last. In spite of this enormous production the iron trade is quiet so far as the taking of new orders is concerned. There is little doing also in imports of pig iron. The steel market is dull, but a good tonnage is reported in structural material, in cast iron pipe, and in plates. Quotations are unchanged as follows: Bessemer pig iron \$21.75 and \$22, Bessemer steel \$29 and \$30, steel rails \$28.

Metals

Quotations for the leading metals are as follows: Copper, lake, 1¼ cts, tin 28 cents, lead 4¾ cents, and spelter 4.90 cents.

NEW MANHATTAN STOCK—LEASE APPROVED

The Manhattan Railway Company, of New York, has approved the proposed lease of its property and franchises to the Interborough Rapid Transit Company. The vote for the proposition was a heavy one, over 430,000 shares being cast in its favor. The stockholders of the Interborough Rapid Transit Company have also approved the lease.

The stockholders of the Manhattan Railway Company have also passed the following resolutions, recommended by the directors:

"No. 1. That the capital of the company be increased from \$48,000,000 to \$60,000,000.

"No. 2. That 72,000 shares of the new stock be issued forthwith.

"No. 3. That the remaining 48,000 shares be issued as required by the company, but not prior to Jan. 1, 1906, provided the approval of the Railroad Commissioners be obtained for such issue.

"No. 4. That the proceeds from the sale of the new stock be used for the completion of the improvements, now in progress, including the change of motive power."

The 72,000 shares of additional stock of the Manhattan Railway Company, authorized by the stockholders, is to be issued forthwith, and will be offered for subscription to stockholders of record of Jan. 27 at par at the rate of 15 per cent of their holdings on that date.

PARLIAMENTARY ELECTRIC RAILWAY COMMISSION FOR UNITED KINGDOM

The announcement is made in London that plans are making for establishing a royal commission to deal with the whole subject of electric transit in the United Kingdom. The commission would be similar to the existing railway commission, and would entirely supersede the Parliamentary committee to which the rival propositions were referred during the last session. Its duty would be to recommend the best projects without concerning itself as to whether they are American or English.

One important scheme now before Parliament will probably be referred to the new commission. This is the Hammersmith-Piccadilly-Bank of England route, for which various groups have been competing. The prominent rivals now are the Central London Railway Company, which owns the "tuppenny tube," and includes Sir Ernest Cassell and Sir Henry Oakley, and the Yerkes-Speyer interests. The latter have just offered at par two millions sterling of shares of their Great Northern, Piccadilly & Brompton Railway, which are to be allotted from 200,000 £10 ordinary shares, a dividend of 4 per cent on which is guaranteed by the Yerkes Underground Electric Railway Company, of London.

Mr. Yerkes' control of the old Underground District Railway, which for a long time sought to amalgamate with the Metropolitan Railway, is said to be showing signs of having practical effect. The scheme was futile two years ago, owing to the fact that the directors of the various companies could not agree on a system of electric equipment. At that time Mr. Yerkes was not sufficiently strong to effect his purpose, but is now in a position to dictate terms.

THE UNDERGROUND ROAD IN PHILADELPHIA

Detailed plans for the building of the first section of the underground railway in Market Street, Philadelphia, were approved by the directors of the Philadelphia Rapid Transit Company, Jan. 17. The specifications are for a four-track road from Fifteenth Street to Twenty-Second Street. They have been ordered printed, and will be sent to contractors in a few days, accompanied by a letter inviting bids. The plans for the West Philadelphia Elevated, the two-track underground east of the City Hall, and the loop will be announced later.

The next step will be the drafting of specifications for a great terminal loop encircling the City Hall. This will not only be designed to accommodate the Market Street traffic and the Walnut and Arch Street loop traffic, but will be so constructed as to provide for lines that may develop from other parts of the city.

Plans for crossing the Schuylkill have been submitted to the United States Engineer for the district, and to the Baltimore & Ohio Railroad, but official approval has not yet been received.

CHICAGO TRACTION COMPROMISE

It was announced in New York on Wednesday that a committee of well-known New York and Chicago men had been formed with the object of aiding the traction companies and the city authorities of Chicago to settle the franchise question. The committee represents the Chicago Union Traction, North Chicago Street Railroad and West Chicago Street Railroad Companies. There is also included in its membership a number of prominent citizens of Chicago, who are interested in the question only as citizens, and who, representing the community at large, are anxious to see the question settled as soon as possible in order that the development of the transit facilities may begin at once.

The members of the committee are Walter G. Oakman, of New York, chairman; John J. Mitchell, Marshall Field, H. N. Higginbotham, John H. Wrenn and Norman B. Ream, of Chicago; P. A. B. Widener, of Philadelphia; Rafael R. Govin, George E. Adams, H. B. Hollins, Charles Steele and Oakleigh Thorne, of New York. The counsel of the committee are Davies, Stone & Auerbach, of New York; Wilson, Moore & McIlvaine, of Chicago, and John G. Johnson, of Philadelphia, and William H. Henkle, secretary. The committee calls for a deposit of the shares of the three companies named before Feb. 15 with the Illinois Trust & Savings Bank, of Chicago; the Guaranty Trust Company, of New York, and the Equitable Trust Company, of Philadelphia. As soon as a sufficient amount of the stock of these corporations has been deposited the committee will undertake to prepare a plan to carry out the purposes for which it has been formed. The Chicago City Railway Company is not a party to the plan, but is said to be thoroughly in accord with the policy of the committee, and doubtless will cooperate with it as far as possible.

PENSION SYSTEM ESTABLISHED BY THE BOSTON ELEVATED RAILWAY

On Jan. 19 the Boston Elevated Railway Company issued an order to its employes granting an increase in wages amounting to nearly \$250,000 annually. The order provides for an increase according to the length of time a man has served the company, and in addition provides for a system of pensions after a certain term of years. Learners who, previously, have been paid nothing while under instruction, are to receive pay, and extra men will be paid while on waiting orders. The official circular of the company to the men follows:

"The board of directors have authorized the announcement of certain additions to the rates of pay of car service employes, to take effect on pay roll week beginning Saturday, Jan. 24, 1903, and to continue until further notice, as follows:

"1. Learners—Learners, while breaking in as conductors or motormen, will be allowed \$1 per day for each day of not less than ten hours. This is also applicable to men learning to be brakemen or motormen of the elevated division.

"2. Minimum pay—Extra conductors and motormen of surface lines will be guaranteed a minimum amount of \$1.50 per day for each ten-hour day during which they have reported and are on hand awaiting work for the required full day, whether work falls to them or not.

"Extra brakemen, guards and motormen of elevated lines will be guaranteed a minimum amount of pay for each full ten-hour day during which they have reported and are on hand awaiting work for the required full day, whether work falls to them or not, as follows: Motormen, 15 cents per hour for ten-hour day; guards, 13.7 cents per hour for ten-hour day; brakemen, 12 cents per hour for ten-hour day.

"3. Three classes of starters—Starters will be divided into three classes, to be paid respectively \$2.25, \$2.35 and \$2.50 per day.

"4. Regular rate of pay of guards and brakemen of elevated lines—The regular rate of pay of guards is fixed at 21 cents an hour, in place of 20. The regular rate of pay of brakemen is fixed at 18½ cents an hour, in place of 17½.

"5. Extra compensation to blue uniformed men wearing service stripes—One service stripe will hereafter be awarded to blue uniformed men only for each five years of continuous service in the surface or elevated service of this company. Blue uniformed men now wearing, or hereafter becoming entitled to wear service stripes, will be paid an increase of wages as follows: For one stripe, 5 cents per ten-hour day, or ½ cent per hour; for two stripes, 10 cents per ten-hour day, or 1 cent per hour; for three or more stripes, 15 cents per ten-hour day, or 1½ cents per hour. This will be added to the regular rates of pay governing employment in the car service, which includes inspectors, starters, station masters, collectors, and all other blue uniformed men in both surface and elevated service.

"6. Reward—At the end of the calendar year a payment of \$15 will be made to each blue uniformed employee of either surface or elevated lines, including station masters, who has rendered continuous and satisfactory service throughout such calendar year. This will apply to first-year men who have been six months or more in such continuous employment prior to the end of the calendar year. It is intended as a reward for meritorious service only.

"7. Support of aged blue uniformed employes—It is also the intention of the company, in the case of a blue uniformed employee who, in the judgment of the management, is unfit to perform any duty in the service of the company, and who has been continuously employed by the company for a period of 25 years, or who has reached the age of 60 years and has been continuously employed by the company for a period of 15 years, to contribute to the support of such employee a sum not exceeding \$25 per month during the rest of his lifetime.

"C. S. SERGEANT, Vice-President,
101 Milk Street, Boston, Jan. 19, 1903."

ANNUAL MEETING OF THE COLUMBUS RAILWAY

At the recent annual meeting of the Columbus Railway Company, of Columbus, Ohio, the stockholders authorized a number of important improvements to the property. The power facilities will be largely increased, a new barn will be built, new cars purchased, extensions to several of the lines will be built and the system will be brought up to the highest standard of efficiency. To secure funds for this work the directors were authorized to issue 5000 shares of preferred stock now held in the treasury.

A year ago the company reduced its fares from six tickets for 25 cents without transfers, to seven tickets for 25 cents, with universal transfers, with the result that the company carried 5,000,000 more passengers than in the year previous. The city is growing rapidly, and the indications are that the increase in traffic will be maintained, hence the necessity for more equipment. Officers elected were: Robert E. Sheldon, president; E. K. Stewart, first vice-president, treasurer and general manager; Clarence M. Clarke, second vice-president; P. V. Burington, secretary and auditor; M. S. Hopkins, general superintendent.

THE PROPOSED INTERURBAN LINES AT LOUISVILLE

For the purpose of carrying out the plans of the Louisville Railway Company, of Louisville, Ky., for building an extensive system of interurban lines to traverse Jefferson, Oldham, Shelby, Spencer, Nelson and Bullitt Counties, in Kentucky, the Louisville & Interurban Railroad Company has been organized as a separate company, but will be managed by the Louisville Railway. The authorized capital stock of the company is \$500,000, divided into 5000 shares of a par value of \$100. The incorporators of the company are: T. J. Minary, J. B. Speed, J. W. Gaulbert, Attila Cox, John Stites, Harry Bishop, Clarence Dallam. The exact extent to which operations will be carried out is mere speculation at this time, although the plan in general has received very serious consideration at the hands of the officials of the company. It is known that some plan for a suitable terminus within the city for the interurban lines is proposed, and that an important power development project is in contemplation; but Mr. Minary, president and manager of the Louisville Railway, brands as premature the announcement of plans for building a gigantic central power station.

A CONVENIENT UNDERGROUND CABLE CHART

D. E. Rundle, of the Interborough Rapid Transit Company, has recently drawn up for the National Conduit & Cable Company an ingenious form of chart for one of the extensive London installations which this company is making. The chart shows graphically, by sections, each and every cable throughout a city or town; which duct each particular cable is in; a key map of the section of city shown and number of cables from power house to manholes; cable ordered but not forwarded; cable in town, but not laid; cable drawn into duct, with reel number, month, day and year, also foreman drawing in cable into duct; two cables in one duct; numbers of manholes or street names; diameters of manholes; distances between manholes; cable jointed, with month, day, year and name of man making joint; switch pillars, with terminal head, giving date put on and by whom, and without terminal head; also duct length or cable drawn into switch pillars. This chart, by use of two colors, shows exact status of the work as it progresses from day to day, to the joiner, to the superintendent of construction and for office reference.

UNITED STATES PATENTS

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

UNITED STATES PATENTS ISSUED JAN. 13, 1902

718,068. Electric Railway; F. M. Ashley, Brooklyn, N. Y. App. filed Feb. 26, 1898. The branch circuits from the main to the sectional conductors, which include the actuating coils of the cut-outs, are completed in shunt to the car motors successively by the passing car, said shunt relationship being maintained while the motors are receiving current through the switches controlled by the coils in said circuits.

718,069. Electric Railway; F. M. Ashley, Brooklyn, N. Y. App. filed Feb. 26, 1898. The switch coils located in the branches connecting the mains with the corresponding sections of the working conductor are connected in series.

718,183. Electric Railway System; G. T. Woods, New York, N. Y. App. filed Oct. 30, 1896. In an electric railway having electromagnetic-track switches as controlling the flow of current from the track system to the car-motor system, a shunt from the motor system for energizing the magnets of the track switches, and a motor generator on the car having the armature of its motor side in said shunt, and having its generator side so connected to the car-motor system that the work and, therefore, the counter electromotive force of the motor generator armature is regulated.

718,220. Conductor, Conduit and Collector for Electricity on Railways; R. C. Sayer, Bristol, England. App. filed Oct. 7, 1901. Valves are regularly spaced along a conduit and adapted to be opened successively by plungers in the rim of a wheel, to thereby give access to a conductor therein.

718,259. Fare Indicator; O. Kuntzen and A. Kahle, Berlin, Germany. App. filed April 25, 1902. A fare indicator adapted to indicate and totalize a primary rate a given basic distance, and secondary rates for secondary distances, said indicator having an indicator disc, with numerals thereon, to indicate the basic rate, repeated as many times as the basic distance is a multiple of said secondary distance, and higher numerals increasing with the secondary units traversed, and means for advancing said disc intermittently as the distance is covered.

718,292. Car Fender; J. F. Verner, New York, N. Y. App. filed Oct. 18, 1902. Details.

718,510. Street Railway Switch; G. T. Osborn, Atlanta, Ga. App. filed Sept. 6, 1902. An open casing secured on the outer side of the rail in advance of the switch, a pivoted bar adapted to swing horizontally in said case, said bar having an outer beveled face at its forward end, and a rigid connection between the free end of the bar and the switch point.

718,551. Truck for Tram Cars or Other Rolling Stock; J. W. Wainwright, Hale, England. App. filed April 3, 1902. Details of construction.

718,570. Traction Railroad; W. O. Cunckel, Terre Haute, Ind. App. filed April 25, 1902. A cable-operated railway provided with automatic means for disengaging the grip member from the cable when shunting the car on to a branch track. Other features are claimed.

PERSONAL MENTION

MR. J. C. FRANKLIN, of Brooklyn, N. Y., has been appointed superintendent of the Tacoma Railway & Power Company, of Tacoma, Wash., and has entered upon his new duties, taking charge of the city lines. Mr. Franklin has had extensive experience in the electric railway field in the East.

MR. TORRENCE SCULLEN, for a number of years road foreman of the Cleveland Electric Railway Company, of Cleveland, Ohio, has been promoted to master mechanic of that company, succeeding Mr. D. F. Moffatt, who resigned to become connected with an electric railway company in the East.

MR. FRANK W. LATIMER, who has been general manager of the People's Traction Company, of Galesburg, Ill., since the company was organized, has resigned from the company, and announces that he will engage in another line of work. Mr. Thomas W. Peterson, one of the present officials of the company, will succeed Mr. Latimer.

MR. CHARLES H. BIGELOW, formerly inspecting engineer of the Boston Elevated Railway Company, has been appointed chief mechanical draftsman of the company, to succeed Mr. Howard P. Quick, who went to Kansas City some months ago to become connected with the Metropolitan Street Railway Company, of that city. Mr. Bigelow has been with the Boston Elevated since 1894, and has been connected with Mr. C. J. Baker,

superintendent of motive power and machinery, for a large part of the time. He is an active member of the New England Street Railway Club, and of the New England Railroad Club.

MR. JILSON J. COLEMAN, who was recently manager of the Johnson railway system centering in Trenton, N. J., has resigned from that position and opened an office at 35 Nassau Street, New York city, where he will act as financial council and expert in making reports on properties, in reorganizations and on all matters connected with street traffic matters. Mr. Coleman has had a long experience in street railway operation. In 1876, when seventeen years of age, he commenced his railway experience as office boy with the Louisville Railway. From Louisville he removed to Cleveland at the request of the Johnsons, and for fourteen years was identified with the Johnson enterprises, in re-equipping the roads for them in Cleveland, Allentown, Yonkers and Brooklyn. After the sale to the Brooklyn Rapid Transit Company of the Nassau system in Brooklyn, of which Mr. Coleman was then general manager, he acted as Eastern representative of the St. Louis Car Company for two years, and while connected with that company commenced the expert advising work in which he has been largely engaged since. This business called him to St. Louis, where, after making reports to the banking interests on the proposed consolidation of the St. Louis properties, he remained in charge of the Consolidated Company in that city for one year. He resigned this position several months before the great strike in that city, and went to Washington as general manager of the Washington Traction & Electric Company at the request of Mr. Stevens, who was then president of the company. He remained at Washington until the election of Mr. McDermott as president of that property, and then resigned to take charge of the interests in Eastern Pennsylvania and New Jersey of the late Mr. A. L. Johnson, who had recently died. Mr. Coleman, in his street railway career, has had charge of practically every class of street railway property, including city and suburban roads and lines operated by horses, cable, trolley and underground electric systems; and during his twenty-six years' experience has filled every position from office boy to president. During his experience as manager he has never had a strike of the employees in his charge. In addition to his consulting work Mr. Coleman will act as Eastern representative of a few Western manufacturers of street railway apparatus.

MR. HOWARD F. GRANT, secretary to the vice-president of the Boston Elevated Railway Company, resigned his position on Jan. 10 to become general manager of the Seattle Electric Company, of Seattle, Wash. His service with the Boston Elevated and its predecessor, the West End Street Railway Company, covers a period of ten years, during which time his duties have been such as are usually assigned to an assistant general manager. The property which he is to manage at Seattle consists of upwards of a hundred miles of trolley and cable railway, an electric lighting and power plant and a coal mine. Mr. Grant began railroading as a watchman at Portsmouth, N. H., for the Eastern Railroad. His first promotion came in three years, when he was placed in charge of the company's kyanizing plant at that point. A year later he was appointed to a clerkship in the maintenance of way department, and a little later rose to the position of chief clerk of the department. When the Eastern Railroad and the Boston & Maine were consolidated he was made chief clerk of the department of engineering and maintenance of way of the combined system, in which capacity he served for ten years, when he left the Boston & Maine to become secretary to the general manager of the West End Street Railway Company. It was not long before the clerical duties of secretary gave way to the executive function of an assistant, although there was no change in title, and he was given a large amount of administrative responsibility and was acting vice-president in the absence of that official. In the afternoon of the day upon which his resignation took effect (Jan. 10) he was ushered into the president's office, where he found some forty officials of the company assembled, to say farewell to him. The vice-president, with whom he had served for ten years, acted as spokesman for the assembly, and expressed the regret of the management and the members of the various departments that he was about to sever relations that had been so agreeable and satisfactory to those concerned in the welfare of the company. He dwelt particularly upon the loyalty and ability Mr. Grant had shown while serving as his head assistant in operating the system, and of the strong friendships that had been created. At the conclusion of his remarks he presented Mr. Grant with a letter signed by the president and about fifty other officers congratulating him upon his well-merited success, and expressing regret that he was about to leave them. A purse of gold was presented to him, with the suggestion that it be used to supply in his new home some reminder of the friendship and good will that extended across the continent to him.

WORK ON PROPOSED LINES

A canvass has been made by the STREET RAILWAY JOURNAL of the companies that have in contemplation the construction of new electric railway lines, and below is given an outline of some of the work proposed, together with the date at which the companies plan to begin work. This information covers only roads not yet under construction, and does not aim to be a complete list of companies about to build new lines.

THE BALTIMORE & CHESTERTOWN RAILROAD, of Wilmington, Del., will probably be built during 1903.

DOVER & ELIOT STREET RAILWAY, of Dover, N. H., will begin the construction of its line in spring of 1903.

DELAWARE SUBURBAN RAILWAY, of Wilmington, Del., has purchased charters for two roads, and will build at once.

MIDDLESEX & ELGIN INTERURBAN RAILWAY COMPANY, of London, Can., will build 35 miles of track. Construction work will be commenced in spring.

CONCORD, DOVER & ROCHESTER STREET RAILWAY, of Dover, N. H., early in spring of 1903 will build 27 miles of line. The president of the company is Elisha R. Broua, of Dover.

DES MOINES, MOUNT AYR & SOUTHERN ELECTRIC RAILWAY COMPANY, of Mount Ayr, Ia., will connect Des Moines, Creston, Tingley, Mount Ayr, etc. Work is to be begun in March.

WARREN & JAMESTOWN ELECTRIC RAILWAY, of Warren, Pa., is soon to begin the construction of 22 miles of line. The officers of the company are: D. H. Siggins, president; John M. Siegfried, treasurer.

THE CANTON & DOVER ELECTRIC RAILWAY, of Canton, Ohio, will build 24 miles of standard-gage overhead trolley line. Construction will be commenced in early spring. John E. Mounot is president of the company.

ATLANTIC, VILLITCA & GRANT RAILWAY, of Omaha, Neb., will build 38 miles of line, and will furnish power for lighting. Construction is to commence in the spring. E. C. Pitney is president of the company.

WATERTOWN & CARTHAGE TRACTION COMPANY, of Watertown, N. Y., will build 20 miles of line. Construction work is to begin in the spring. The officers of the company are: J. U. Carlisle, president; F. M. Hugo, secretary.

SYRACUSE & ONEIDA LAKE ELECTRIC RAILWAY, of Syracuse, N. Y., will build 30 miles of standard-gage line. The officers of the company are: Frank L. Barnes, president; Thomas Merriam, vice-president; James G. Tracy, secretary.

DECATUR & SHELBYVILLE SOUTHERN RAILWAY, of Decatur, Ill., will build 27 miles of track and furnish power for lighting. Two amusement parks will be laid out. The third-rail system is to be used. Construction may not be commenced until August.

SOMERSET COUNTY STREET RAILWAY, of Somerset, Pa., in the spring is to begin the construction of a line to connect Rockwood, Somerset and Johnstown. The president of the company is W. A. Ruppel, and the general manager is George J. Kirbs.

PAXTON, DANVILLE & WILMINGTON RAILWAY, of Paxton, Ill., is to connect Danville, Petomac, Paxton, Piper City, Wilmington, etc.. Construction is to commence in the spring. The president of the company is J. P. Middlecoff, and the secretary is S. Ludlow.

DELAWARE VALLEY TRACTION COMPANY, of Trenton, N. J., in the spring will begin the construction of 16 miles of 5-ft. 2½-in. gage line. Eight cars will be operated. The president of the company is George Buckman, and the secretary-treasurer is W. F. Sadler, Jr.

FORT WAYNE & GOSHEN RAILWAY, of Goshen, Ind., early in the spring will begin the construction of a 60-mile road. An amusement park is to be provided. James F. Rathwell, of St. Louis, is president of the company, and Arthur S. Partridge, of St. Louis, is vice-president.

FARGO & MOOREHEAD ST. RAILWAY COMPANY, of Fargo, N. D., is to begin at once the construction of 10 miles of standard-gage line. The officers of the company are: F. C. Von Storch, of Scranton, Pa., president; George E. Moffat, of Fargo, N. D., general manager.

ST. LOUIS, KIRKWOOD & MANCHESTER RAILROAD, of Manchester, Mo., about April 1 will begin the construction of 18 miles of standard-gage overhead trolley line. The president of the company is D. C. Taylor, and the general manager is Thomas McCrady, of Windsor, Mo.

KEWANEE, CAMBRIDGE & GENESEE RAILWAY, of Kewanee, Ill., will connect Kewanee, Cambridge and Genesee. Construction work will be commenced in the spring. The officers of the company are: K. M. Whitam, Aledo, Ill., president; George A. Anthony, of Kewanee, treasurer.

TERRE HAUTE & WABASH VALLEY RAILWAY, of Terre Haute, Ind., will build 35 miles of standard-gage third-rail road. Two amusement parks will be provided. Construction is to begin in April. The president of the company is J. R. Kendall, and the treasurer is Henry Miller.

MISSOURI CENTRAL ELECTRIC RAILWAY, of Glasgow, Mo., early in spring will commence the construction of 194 miles of road. Overhead trolley and possibly third-rail will be used. Power will be furnished for lighting. The president of the company is George B. Harrison, and the general manager is W. H. Chase.

WESTERN ILLINOIS DAILYWAY, of Milan, Ill., in the spring will commence the construction of its 50-mile standard-gage overhead trolley road. The officers of the company are: Robert E. Little, of Milan, president; Franklin H. Caldwell, of Milan, secretary; E. E. Reynolds, of Rock Island, general manager.

ST. LOUIS COUNTY CONNECTING RAILROAD, of St. Louis, Mo., will connect St. Louis and St. Charles and twenty small towns. Construction will be commenced in about thirty days. It is planned to furnish power for lighting. The officers of the company are: J. D. Houseman, president; J. B. Luchs, vice-president.

NORWELL & SCITUATE STREET RAILWAY, of Boston, Mass., will soon begin the construction of 15 miles of line. An amusement park is to be provided, and power is to be furnished for lighting. E. C. Webb, of Boston, is treasurer of the company, and A. U. Jastaad, of Boston, is electrical engineer of the company.

INTERURBAN RAILROAD & POWER COMPANY, of Hot Springs, Ark., about May 1 will begin the construction of 12 miles of standard-gage line. Twenty cars will be operated. A number of amusement parks will be provided. Power will be furnished for lighting. D. S. Ryan, of Hot Springs, is president of the company.

GRANVILLE & POULTNEY RAILROAD, of Poultny, Vt., expects to commence construction next spring. The road will connect Granville, N. Y., and Poultny, Middletown Springs, Wells, Fairhaven, Vt. The officers of the company are: William Nathaniel, of Poultny, Vt., president; C. B. Story, of Hoosic Falls, N. Y., vice-president.

YOUNGSTOWN & SOUTHERN RAILROAD, of Youngstown, Ohio, at an early date will begin the construction of 44 miles of standard-gage line. The officers of the company are: A. W. Jones, of Youngstown; R. L. Andrews, of Cleveland, vice-president; J. H. Ruhlman, of Youngstown, secretary; W. S. Anderson, of Youngstown, treasurer.

THE PATERSON & STATE LINE TRACTION COMPANY, of Paterson, N. J., will build a line to connect Paterson, N. J., with Ridgewood and other towns north of Paterson, to New York State line at Suffern, and at Munsey. Construction is to begin at once. The officers of the company are: Preston Stevenson, president; Jack Frost, secretary.

DETROIT, PONTIAC, LAPEER & NORTHERN RAILWAY, of Detroit, Mich., will connect Detroit, Bay City, Saginaw, Pontiac, Lapeer, etc., and it is expected that construction will commence about April 1. The officers of the company are: Girin J. Price, president; Arthur J. Price, secretary; James Dian, treasurer; C. T. Gregory, general manager.

ROCKLAND COUNTY TRACTION COMPANY, of Nyack, N. Y., will commence construction in the spring. About 9 miles of standard-gage overhead trolley line will be built. The officers of the company are: C. W. Reeve, 150 Nassau Street, New York, president; John W. Dalley, of Nyack, vice-president; E. D. Harris, 150 Nassau Street, New York, secretary-treasurer.

WATERTOWN & LITCHFIELD TRAMWAY COMPANY, of Watertown, Conn., about April 1 will begin the construction of 12 miles of line to connect Waterbury, Watertown, Litchfield, etc. Steam is thought of as motive power. The officers of the company are: C. F. Hamlin, of Plantsville, president; T. H. McKenzie, of Southington, secretary-treasurer.

THE TOLEDO & LIMA TRACTION COMPANY, of Toledo, Ohio, will connect Lima, Toledo and intervening towns of Cairo, Columbus Grove, Ottawa, Deshler and others. The officers of the company are: George O. Metzger, of Toledo, president; Dr. H. A. Tobey, of Toledo, vice-president; Frederick M. Neely, of Lima, secretary; J. D. S. Neely, of Lima, treasurer.

CAPE GIRARDEAU-JACKSON INTERURBAN RAILROAD will connect Cape Girardeau and Jackson, 18 miles. It is to be a standard-gage overhead trolley line, operating twenty cars. An amusement park is to be provided, and power is to be furnished for lighting. Construction is to commence at once. J. S. Lapsley, Burlington Building, St. Louis, is president of the company.

THE RICHMOND & NORTHWESTERN ELECTRIC RAILWAY, of Richmond, Ind., propose to commence construction in the spring. The road is to connect Richmond, Hagerstown, New Castle, Middletown and Anderson. The officers of the company are: Gus. M. Hodges, of Richmond, president; Thomas Milliken, of New Castle, vice-president; Wilfred Jessup, of Richmond, secretary; Thomas M. Randle, of New Castle, treasurer.

ILLINOIS & WISCONSIN RAILROAD COMPANY, of Chicago, Ill., in the spring will begin the construction of an electric railway to connect Morris, Ill., and Lake Geneva, Wis. An amusement park is to be provided. The officers of the company are: Sidney B. Jones, 232 South Clark Street, Chicago, president; O. P. Allegate, 235 South Clark Street, Chicago, secretary; Edward List, 194 South Clark Street, Chicago, treasurer.

THE CINCINNATI, MILFORD & EASTERN TRACTION COMPANY, of Cincinnati, Ohio, will probably commence construction about March 8. About 8 miles of line are to be built. An amusement park will be provided, and the company will furnish power for lighting. The officers of the company are: S. B. Day, of Elyria, Ohio, president; W. F. Rondebush, of Batavia, vice-president; William R. Medaris, of Cincinnati, secretary.

CINCASAW ELECTRIC RAILWAY, of Gainesville, Tex., will connect Davis and Sulphur, J. T., 8 miles. It will be a standard-gage trolley or storage-battery line, and will operate four cars. The company intends to furnish power for lighting. Construction is to be commenced by March 1. The officers of the company are: H. W. Stark, of Gainesville, Tex., president; W. H. O'Beirne, of Gainesville, vice-president and general manager.

WOOSTER & MANSFIELD ELECTRIC RAILWAY, of Shreve, will build 44 miles of standard-gage line to connect Wooster, Millbrook, Shreve, Big Prairie, Lakeville, Londonville, Perrysville, Douglass, Robinson and Mansfield. Construction is to begin next spring. The company expects to run branch lines from Lakeville to New Philadelphia, 45 miles; Londonville to Mount Vernon, 25 miles; Londonville to Ashland, 22 miles. The officers of the company are: W. A. Craig, of Shreve, president; J. B. Keys, of Shreve, vice-president and general manager; David Collier, of Plimpton, secretary; J. C. Chesrown, of Shreve, treasurer.

NEWS OF THE WEEK

CONSTRUCTION NOTES

BIRMINGHAM, ALA.—The new line of the Birmingham Railway, Light & Power Company to Ensley has been placed in operation.

MONTGOMERY, ALA.—A bill has been introduced in the Senate to authorize corporations owning and operating street or suburban railways in a foreign State to extend the same into Alabama, and to furnish and sell electricity for commercial purposes. This is a general bill to enable the Columbus Railroad Company, of Columbus, Ga., to extend its lines to Phoenix City, Ala. The bill has been referred to the committee on corporations.

LITTLE ROCK, ARK.—The Little Rock Traction & Electric Company has recently placed orders for a 1500-hp cross-compound engine to be connected to a new 800-kw railway generator; a new 500-hp water-tube boiler and an improved type surface condenser and feed-water heater. This new apparatus represents only a part of the equipment that is to be installed in the new power plant to be built by the company.

LOS ANGELES, CAL.—The Los Angeles Railway Company announces that it will use about 600 tons of 6-inch rails for retracking portions of its Boyle Heights, Central Avenue and University lines within the next few months.

LOS ANGELES, CAL.—The Board of Supervisors has granted the Pacific Electric Railway Company a franchise for a line between Pasadena and Lamanda Park. The distance is about 3 miles.

SAN FRANCISCO, CAL.—The North Shore Railroad Company, which has its terminus in Sausalito, is rapidly perfecting plans for equipping about 35 miles of its line as a double-track electric road. A. H. Babeock, superintendent of the electric system, recently said that the greater part of the machinery and materials for the electric road was about completed. The site is being graded for the 2000-hp brick power station that is to be constructed at Alto. The Babeock & Wilcox water-tube boilers have arrived and the McIntosh & Seymour engines are nearing completion. The Stanley motor-generator sets will soon be shipped and the transformers are on the way. The bodies of the large electric cars for the road are being constructed in St. Louis and will be completed in April. The interlocking system of the Union Switch & Signal Company will be installed. A rapid steam ferry service will make close connections with San Francisco at the new Sausalito ferry depot.

LOS ANGELES, CAL.—The Pacific Electric Railway Company has announced that it is soon to begin actual work in changing to standard gage its main line between Los Angeles and Pasadena, a distance of about 9 miles. The company's other interurban roads are all standard gage, not to mention particularly its "short line" to Pasadena. It is said that all the necessary material for work on the main line will be on the ground inside of sixty days and that about forty days will be required to complete the work. The company's lines within the city of Pasadena are also to be made standard gage at once.

BOISE, IDAHO.—The Inter-Mountain Electric Railway Company has filed an application for right of way from Boise to Star. It is rumored that the company is negotiating for the purchase of the property of the Boise Rapid Transit Company.

SPRINGFIELD, ILL.—The Springfield & Central Illinois Railway Company has elected officers as follows: H. H. Littrell, president; C. K. Minary, general manager and treasurer; L. W. Botts, secretary. The company, as previously stated in the *STREET RAILWAY JOURNAL*, is to succeed the Springfield Consolidated Street Railway Company. Work will begin on the proposed extensions immediately, and it is hoped to have the new lines completed within a short time. The directors of the company are: Attila Cox, Oscar W. Fenley, William Jarvis, J. W. Gaulbert, Bluford Wilson, P. B. Warren and the officers.

JEFFERSONVILLE, IND.—A preliminary survey has been made by the Jeffersonville & Madison Electric Railway Company of its proposed line between Jeffersonville and Madison. Louis Schneek, of Seymour, is interested in the company.

PORTLAND, IND.—L. G. Holmes, of Portland, has been elected president of the Indiana & Illinois Traction Company, incorporated Jan. 1 in this State. The company was organized to buy, construct or rent interurban railroads, and the towns and counties through which its lines will pass are: Montgomery and Fountain, in Indiana, and Vermillion, Champion, Piatt, Macon, Sangamon, Morgan, Dewill, McLean, Logan, Livingston, Grundy and Joliet, in Illinois. A number of towns are mentioned which are to be connected.

PURCELL, I. T.—Among those interested in the recently incorporated Purcell & Lexington Street Railway Company are: William T. James, Thomas C. Woods and J. F. Sharp. The plan of the company is to build an electric railway between Purcell, I. T., and Lexington, Okla.

DAVENPORT, I.A.—The Illinois & Iowa Railway Company has awarded Peper & Register, of Philadelphia, Pa., the contract for constructing its proposed line between Davenport and Clinton, 42 miles distant. The company has already purchased and contracted for the right of way for the entire distance, and has also made all the necessary arrangements for financing the project. The actual work of construction will commence as soon as the frost leaves the ground. After the line to Clinton is completed the company expects to build other interurban lines west and south from Davenport, touching the county seats of the various surrounding counties.

WICHITA, KAN.—Grading has been begun by the McPherson-Arkansas

City Interurban Electric Railway on its proposed line between Wichita and McPherson. The road will extend through Valley Center, Sedgwick, Halstead and Mound City.

LOUISVILLE, KY.—The Louisville Railway Company has recently placed an order for twenty-five single-truck cars. They are to be equipped with power brakes.

PARIS, KY.—Claude M. Thomas, C. C. Clark and Webb Bratton have been granted a franchise to build an electric railway from Paris along the Paris and North Middletown, Paris and Flat Rock, North Middletown and Plum Lick and Cane Ridge and North Middletown turnpikes.

LEXINGTON, KY.—Twenty carloads of steel rails have been received from the Carnegie mills in Pittsburg by the Bluegrass Traction Company, which is building the interurban line connecting Paris and Lexington, Ky. They are 60-lb. T-rails, and the contract for laying them has been let to Dolan & Sons, who will begin work as soon as the weather permits.

ROCKVILLE, MD.—The Mayor and Council of Rockville have passed an ordinance declaring forfeited the franchise under which the Washington & Rockville Electric Railway Company had a free right of way through the town. The cars, which now run into the town as far as the courthouse, will not be allowed to enter the corporation limits. Before the road will again be allowed to enter the town a new ordinance will have to be passed and the question submitted to a vote of the taxpayers for ratification.

ELKTON, MD.—The application of the Elkton, Newark & Eastern Shore Railroad for a franchise here is pending before the Council. The company proposed to build from Elkton to Delaware City via Newark to connect with the road at the latter point and then use the tracks of the Wilmington City Railway Company into Wilmington. From Delaware City the company also proposes to build down the eastern shore of Maryland.

ELKTON, MD.—The Kent & Cecil Electric Railway and the Newark, Elkton & Eastern Shore Electric Railway Company have applications pending before the City Council for franchises here.

WORCESTER, MASS.—The Aldermen have voted to give the Worcester Consolidated Street Railway leave to withdraw its petition for an extension of its tracks in Summer Street, designed to enable the Worcester & Southbridge Street Railway Company to run cars for the transportation of freight and express matter as provided in its charter. The Aldermen denied the petition on the ground that the privilege of crossing the tracks of the Boston & Maine Railroad at grade on Summer Street by the freight cars of the street railway line might delay the abolition of grade crossings in the city. The Aldermen probably will give the Southbridge line an opportunity to reach a terminal depot in this city over another route.

WAREHAM, MASS.—It is feared that the building of the Plymouth, Carver & Wareham Street Railway may be delayed through a conflict of authority between the Railroad Commissioners and the Selectmen of the town. A grant of location has been drawn up by the Selectmen and presented to the Railroad Commissioners, but approval has been refused, because the Selectmen are given the right of determining what kind of poles shall be used, what the material between the rails shall be, where and how many street lights shall be maintained and the rate of fare to be charged within the town. The commissioners also object to clause which gives to the Selectmen the authority to supervise the construction at the expense of the builders. The Railroad Commissioners hold that it conflicts with the rights of the company. Counsel for the town disputes this. It seems likely that a test case will be made, as neither side appears to be willing to give way.

PITTSFIELD, MASS.—The Berkshire Street Railway Company will build an overhead bridge over the tracks of the New York, New Haven & Hartford Railroad at Lenoxdale.

GREENFIELD, MASS.—The Greenfield & Turners Falls Street Railway Company will start work early in the spring on its Conway extension. This company and the Conway Street Railway Company are negotiating for the joint use of tracks over a portion of their routes.

WORCESTER, MASS.—The Worcester Board of Aldermen has barred the way for the location of a freight station for street railways near the union passenger station, Worcester, by granting leave to withdraw on a petition for locations brought by the Worcester Consolidated Street Railway Company. This was partly due to the objections raised by the Boston & Maine Railroad and the feeling that there should be freight stations established which could be reached by streets less frequently traveled.

STURBRIDGE, MASS.—The Selectmen of Sturbridge have granted the petition of the Hartford & Worcester Street Railway Company for locations in that town.

WEBSTER, MASS.—Boston capitalists are said to have in contemplation the construction of an electric railway between Southbridge and Webster, 12 miles distant.

AMHERST, MASS.—The Amherst & Sunderland Street Railway Company has begun the operation of its line to Pelham.

GREENFIELD, MASS.—The Greenfield, Deerfield & Northampton Street Railway Company has completed its roadbed between Greenfield and Southampton, a distance of 20 miles.

WESTFIELD, MASS.—The Woronoco Street Railway Company will begin early in the spring the construction of a line to Holyoke. Orders are now being placed for some of the material.

MARQUETTE, MICH.—The Council has passed an ordinance extending for seventeen years the franchise of the Marquette City & Presque Isle Street Railway Company.