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**Contents of this Issue**

The Private Right of Way.....	495
Concerning the Three-Cent Fare Heresy.....	495
Applying Brakes Over Special Work.....	496
Is Cigarette-Smoking Injurious to Eyesight?.....	496
The Trolley in Valparaiso.....	496
Municipal Railway Management.....	497
Street Uses.....	497
Criticism of "Car Ahead" Ordinance.....	497
Double Trolley for Mersey Tunnel.....	497
Financing London Traction System.....	497
Double Trolley at Cincinnati.....	498
From Schenectady to Troy by Electric Railway.....	499
Maximum Trains; their Relation to Track, Motive Power and Traffic.....	499
A New Car House at Paterson.....	499
Improvements in Cleveland Power House.....	500
Electrical Traction on Railways.....	501
The Electric Problems of Railways.....	502
New Open Car for the Elevated Service of the Brooklyn Rapid Transit Company.....	505
Economy in Steam Plants.....	506
The Pennsylvania's New York Tunnel.....	506
Tunnel Bills Vetoed.....	506
Philadelphia Subway Ordinance Signed.....	506
Birmingham Car Equipment.....	507
San Francisco Strike.....	507
The Fender Question in St. Louis.....	507
The Everett-Moore Situation.....	508
Westinghouse Extensions.....	508
"Perfection" Rail-Bond.....	508
Street Railway Patents.....	508
Engineering Societies.....	509
Personal Mention.....	509
Legal Notes.....	510
Financial Intelligence.....	514

**The Private Right of Way**

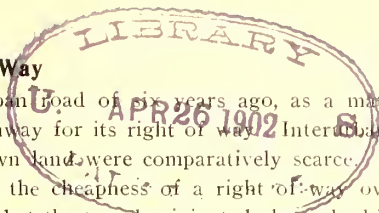
The electric interurban road of six years ago, as a matter of course, sought the highway for its right of way. Interurban lines operating over their own lands were comparatively scarce. It was argued frequently that the cheapness of a right of way over the highway and the fact that the travel originated along the highway made much toward the success of the electric interurban road.

To-day the current of opinion is strongly against the building of interurbans excepting on their own right of way, unless the topography of the country and the franchise-granting bodies are very favorable to the use of the highway. In any ordinary farming country the cost of a private right of way is too small a proportion of the total cost of building a road to be worth considering as an objection, unless there is some special reason why the highway is desirable. The freedom from speed restrictions and damage suits arising from operation of cars on a highway, as well as the saving in grading or power required to surmount highway grades, will usually overbalance the cost of the right of way and make the cost of the land occupied trifling. In towns it is different, where land values are higher and where the speed must be slow in any event. The right to condemn land after the manner of steam railroads is not as yet allowed to electric railways in all States, but even where it is not interurban electric lines have been remarkably successful in securing private right of way.

**Concerning the Three-Cent Fare Heresy**

We have recently made not infrequent reference to the hold which the 3-cent fare delusion seems to have secured in Cleveland under the gentle ministrations of the Hon. Tom Johnson. Now we quite agree with that genial ex-monopolist that 3-cent fares would be quite feasible under certain conditions which would not be unwelcome to street railway managers. These conditions we desire here to put on record, so that he who reads may run; they are: First, a guarantee of eternal life for the equipment, and, second, 50-cent-a-day labor. Granted these, and there would be no material difficulty in giving 3-cent fares. Now the former has been by no means easy to obtain since the very early days of the electric railway business, and we doubt whether even the most enthusiastic constituents of the Hon. Tom would stomach the latter, so that there seems to be trouble ahead. At present, apparatus does sometimes wear out and employees have to receive reasonably good pay. If you stop to consider that on a well-managed city road the motormen are paid annually more than the average minister of the Gospel or school teacher receives, you will begin to appreciate the size of the labor situation. As to material, we have not at hand the data on the Hon. Tom's late roads, but we will hazard a guess that no one of them ever boasted a sinking fund, and that each of them has been substantially re-equipped at least once. This is a safe guess for any road, as a matter of fact, if it has been built eight or ten years. Universal free transfers seem also to be a part of the Cleveland creed, but we look in vain for our dear old friends, the eight-hour day and the no-seat-no-fare stipulation. By what unspeakable remissness were these omitted from the programme? So long as the Hon. Tom has started in the inauguration of a season of blessed rest for everybody except the poor devil who has to live off his investments, he certainly should have done it up in style. We suggest that the charter of his 3-cent road be at once amended in these respects, and that the company also be required to provide boutonnières for each passenger. Let no niggardly economies stand in the way of Cleveland's sanctification.

Joking aside, we honestly wish that the loud-voiced advocates of 3-cent fares would stop talking, get together, fetch out their eelskins and build a road to be run with all the modern improvements for which they have been howling. No amount of argument will convince them of their error, but we think that a very brief experience would work a change of heart. An actual attempt at operation on 3-cent fares would, if properly conducted, be of great benefit to the business in the long run, and would go farther than almost anything else to establish sound,



logical, permanent relations between street railroads and the public. But let the experiment be tried under the ordinary service conditions of urban roads. Let the system be built on the best modern lines, with up-to-date equipment, and let it be operated so as to give first-class service. It should have the advantage of being built for ready cash, but, on the other hand, let full and adequate provision be made for repairs, replacements and depreciation, and let all these items be honestly charged up, not suppressed in the hope of unloading the investment or of finding a plausible excuse for increasing the capital stock when the day of reckoning draws nigh. Then let the aforesaid loud-voiced advocates sit down at the end of each fiscal year and figure up their deficit, and we think they will pipe a gentler tune thereafter. But let the experiment be tried fairly and fully, with a clear field and no chance to snivel about unfair competition when the axe falls. It will take some drastic remedy of this kind to cure the delusions of the afflicted, and the sooner it is applied the better. If the projected Cleveland road is ever built, it will meet some of the requirements, but provision should be made for giving the fullest publicity to the annual balance sheet, and for eliminating any complications due to contact with the other roads. It is time to quit fooling about 3-cent fares and to show once for all the fallacy of trying to furnish gold dollars for 79 cents. The American public at large is not kicking about 5-cent fares when it gets good service, and is tired of hearing so much noise about nothing. Gentlemen, money talks!

#### Applying Brakes Over Special Work

Should brakes be applied when a car is running over special work, such as curves and switches, or should a car be allowed to drift at such places? This question, if propounded to master mechanics and trackmen, would probably elicit many different answers. It might seem that since there are so many places in practice where instructions either for or against entering curves and switches with brake set could not be carried out that a discussion of the proper practice would be mainly of academic interest. However, it is well to analyze the subject sufficiently to determine, at least, what is the correct practice, so that it can be applied wherever feasible.

There are two standpoints from which to consider the question; that of the trackman who wants to reduce the wear on frogs and switch points as much as possible, and that of the master mechanic who wants to keep down wear and tear on rolling stock. Interested jointly with the master mechanic is the passenger who wants the least possible amount of jolting.

First, as to track wear, there will, of course, be slightly more wear on a frog or switch point if the wheels regularly pass over it with the brakes set than if they are usually released, because a small per cent of the time the wheels are almost sure to be sliding. This is demonstrated by the wear on straight track, which is greatest at points where brakes are frequently applied. Considering now the effect on trucks and cars, it is evident that with the brakes set part of the cushioning effect of the springs between the truck frame and the journal boxes (if the truck has any) is lost. This makes the car ride the roughest at the very points where springs are needed most, and this cannot help being harder on both car and passenger than if the brakes were not set. On the other hand, it is probably true that when the brakes are set the play in the truck journal boxes is taken up and the journals are squared better in the truck than if the brake-shoe pressure was relieved. The practical bearing of this on the problem is, however, very small. It would seem, everything considered, that motormen could accomplish the same results with less wear and tear on passengers and equipment by releasing brakes before entering switches and curves than by releasing just after entering, as is most commonly done when a curve or switch is approached at a higher speed than it is desirable to run through it.

#### The Trolley in Valparaiso

The city of Valparaiso, like many other South American municipalities, is only just now awakening to the advantages of electric traction. Heretofore it has been contented with the service afforded by the small horse care lines in the lower portions of the town, and communication with the hill settlements has been attended with difficulties that have had a discouraging effect upon those who were not obliged to make the trip. It has been pointed out that no greater boon to the constantly increasing hill population could be devised than rapid, easy and economical communication between the hills and with the lower part of the city. Those familiar with the local conditions declare that there are populated spots on the hills which, in point of time, owing to the difficult nature of the precipitous paths leading to and from them, are as far from the center of the city as is, for instance, the neighboring town of Quillota. The cost of getting even the bare necessities of life on the majority of the hills exceeds the freight by rail of similar articles from Valparaiso to the town mentioned, and possibly, in some instances, to the capital. To realize the difficulties under which the hill dwellers labor one must witness packhorses and donkeys wearily wending their way under heavy loads, up precipitous goat paths on which few animals besides the sure-footed beasts of the country could travel. Breadwinners, after a hard day's labor, have to trudge the same difficult road. But these hardships would disappear if the hills were connected with each other and the flat by a system of electric locomotion. At the heads of many of the gulleys there are expanses of tableland which would soon become desirable residence portions if only easy and economical communication with the lower part of the city were provided. A change is now promised, the local street railway company having determined to employ electricity to operate its present system, and eventually to extend its lines into the hill country so as to afford cheap and easy means of communication.

This decision was brought about by the action of property owners when the question of transforming the present lines into an electrical system was under consideration. Permission had been asked of the local authorities to improve the present service, and when the hill dwellers learned of the movement they demanded that they, too, be included in any plan of this kind. In the original project the hill country was excluded, but now it is proposed to have every portion of the city joined by trolley lines, and thus the entire community is to share in the improvement. The fact that such unanimity is shown by the people of Valparaiso in their demand for this improvement speaks well for their appreciation of the trolley, and would seem to go far toward ensuring the financial success of the project.

#### Is Cigarette-Smoking Injurious to Eyesight?

The crusade against the "deadly cigarette" is gaining powerful recruits, the latest acquisition to the ranks being an influential street railway man who is opposed to the use of tobacco in this form by motormen. The objection is based upon the belief that cigarette-smoking is injurious to the eyesight. The superintendent of the United Traction Company, of Albany, therefore, has instructed his subordinates to investigate the habits of the men in this particular. A copy of the order issued upon this subject follows:

"I wish you would look after the men who are smoking cigarettes on your division, and where you find any men habitually using cigarettes, please examine their eyes at least once a month. See that their eyes are not impaired."

But what will the motorman say to this? Will he submit to the test, or will he take the position that this is another step toward restricting his personal liberty? That will probably depend upon the character of the man. However, the company undoubtedly has the right to take such measures as are necessary for the protection of its patrons, and it must be admitted that perfect eyesight is an indispensable qualification for a good motorman.

### Municipal Railways Management

Managers of the municipal railways in Great Britain have formed an organization in which twenty cities are represented, the object of which, as set forth in the constitution, is the acquisition of experimental, statistical and scientific knowledge relating to the construction, equipment and operation of tramways; the diffusion among its members of information on all matters affecting tramways, and, generally, to promote the interests of the municipal systems.

Mr. John Young, of Glasgow, who presided at the preliminary meeting, and who took an active part in the work of organization, announced that a number of managers who were unable to attend the opening meeting had signified their interest in the movement and had expressed a desire to secure membership, so that the present list of members is not to be regarded as representing the entire strength of the movement. It is expected, of course, that the subjects to be considered at the meetings of this body shall pertain to the management and operation of municipal roads. American street railway managers will be especially interested in observing the attitude of this organization toward the older association representing the tramway systems operated as private enterprises. Much may depend upon the early relations established between these bodies, their attitudes determining whether existing prejudices and hostilities shall be intensified or obliterated. Harmonious working would undoubtedly greatly advance the general interests involved. Consequently unusual attention will be bestowed upon the first annual meeting, which will be held at London in July, when the policy of the organization will be determined.

### Street Uses

In our legal department of the present issue attention is called to the recent decision of the Court of Appeals of New York, holding that a street car use is not an ordinary use, and that an abutting owner whose title extends to the center of the street may restrain the inauguration of a street railroad. Two of the judges dissent from this decision, and it is quite evident that the majority rendered it under the compulsion of judicial consistency, or, to use a technical phrase, *stare decisis*. It is shown that in most of the states a street railroad use is viewed as an ordinary street use. It further seems reasonably probable that the New York courts will do everything within their power, without departing from technical consistency, to effectuate street railroad rights according to common sense.

The argument which has prevailed in most of the states and has induced two of the New York judges to depart from judicial precedent is very simple. The easement or right of the public in a street comprehends all uses which may legitimately be considered as public street uses. The conception of such right and such uses necessarily varies with the advance of civilization. In former times the use by a pedestrian, a horseman or a stage coach was universally recognized as a highway or street use. Under modern conditions the use by horse or trolley cars to accommodate the traveling public is just as clearly a street use. This is the view taken by most courts, and the New York court might possibly have taken the same position had it not been for an earlier decision resting upon the opposite ground that has been followed and relied upon in subsequent cases. Even in New York the way seems probably open for legislative changes in the existing law, and already in this state the Legislature has shown a disposition to regulate the relations of abutting owners with street railway companies according to justice and common sense.

### Criticism of "Car Ahead" Ordinance

Some of the critics of the Metropolitan Street Railway Company, and of all corporations performing similar services for that matter, have discovered that the much-heralded "car-ahead" ordinance passed by the Board of Aldermen by a vote of 57 to 2 is not,

after all, the measure of relief they are seeking. The "Times," for instance, describes it as "an absurd ordinance," and seems to be startled by the feature we pointed out last week; namely, that enforcement would entail more confusion and hardship than patrons of street railway companies have yet endured under the most unfavorable conditions. The ordinance positively forbids the company to "transfer any passenger until the car shall have reached the termination of its route." Therefore, if a car breaks down, or is smashed in an accident, or takes fire, the conductor would subject the corporation employing him to substantial penalties if he transferred the passengers to another car on the same or a branch line unless such disabling accident happened at the end of the line. By the letter of the ordinance the passenger, by implication, may still enjoy the liberty of getting off a car if he wants to before it has gone the entire length of its run, but he cannot get a transfer, and if he takes another car must pay his fare again.

It has been suggested that, wherever practicable, signs be displayed warning passengers "this car for —— street only." This would eliminate the necessity for any ordinance on the subject. The street railway company has adopted this rule in a limited degree, but it must be recognized that the very nature of this question precludes the possibility of any hard and fast rule. It would be wise to leave the problem to the management of the street railway company for solution, rather than complicate the situation by introducing bungling efforts of aldermen who have no experience or special qualifications for handling such matters. Why not use a little common sense?

### Double-Trolley for Mersey Tunnel

Plans for the transformation of the steam railway now operating in the Mersey tunnel, and connecting Liverpool and Birkenhead, have been adopted, and the general features of the proposed installation have been outlined in our news columns. It is proposed to equip the road practically after the manner of the Manhattan Elevated, in this city, with the exception that the running track will not be used for return, a fourth rail insulated throughout being provided for this purpose. This will, therefore, be a double-trolley system. The reason given for adopting this plan does not seem to be sufficient to American engineers; namely, the prevention of electrolytic action and "economy in operation." Experience has pointed out other effective means for eliminating troubles due to electrolysis, and the stringent British Board of Trade regulations would seem to provide sufficient protection. It is possible, of course, that special local conditions may have influenced the Mersey management in adopting this plan, but, so far as has been disclosed, no good reason exists for this backward step, and in the absence of some satisfactory explanation, there has been considerable comment and much speculation upon the plans as published.

### Financing London Traction System

The press despatches from London for several days have contained many allusions to the project for financing a company to control several traction lines in that city. It is said that J. S. Morgan & Company and Siemens Brothers are interested in the deal, the former agreeing to furnish the capital, while the latter are interested in the equipment. The statement is volunteered that the Morgan and Yerkes interests will conflict in this movement, but it is not taken seriously in this city. Another statement in the despatches is particularly interesting to American manufacturers. It is declared that in the event of this deal going through the equipment will be furnished by British manufacturers. Mr. Dawkins, the representative of the Morgan house in London is reported to have testified before the House of Lords committee on tube railways that it is the intention of the promoters of the enterprise to procure the entire equipment in England.

### Double Trolley at Cincinnati

The electric railways of Cincinnati have always been distinguished from all other electric roads in the United States by the use of the double overhead trolley system instead of the single trolley universally employed elsewhere. Some years ago the fact that the double-trolley system was being successfully operated in Cincinnati was frequently cited as a basis for argument in favor of the use of the system in other places. Engineering practice in this country did not, however, seem to take kindly to the idea; at least, it was sufficiently indifferent to prevent its general adoption, and no other double trolley was built than that put in at Cincinnati. The reason for the installation of the double trolley on the Cincinnati street railway, as many street railway managers already know, was that stockholders in the street railway were also interested in the telephone company. Telephones in those days were operated with grounded circuits, and the installation of a single-trolley system would have necessitated the running of insulated return wires for the previously grounded telephone circuits, as was done in every other city in the United States to prevent noisy telephones. This effect on grounded telephone circuits was the cause of complaint by telephone interests at the time electric railways were first coming into use in the United States. Little was heard of the matter after a year or two, however, because, in the first place, the running of an insulated common return wire for the subscribers to a telephone exchange was not a very expensive operation, and, in the second place, the use of such return wire

knowledge of common practice in other parts of the country, is the cumbersome appearance and great mass of overhead material necessary for the double trolley. This can be easily imagined, and still better appreciated, by those unfamiliar with Cincinnati after a glance at the accompanying views of a street crossing in Cincinnati's residence district. The necessity of insulating the two trolley wires from each other at curves and crossings calls for the hanging of a great amount of vulcanized fiber in the air. But this is not all, for there are few important corners in the city of Cincinnati calling for a considerable amount of overhead work in which a car can go in any direction permitted by the tracks without requiring the conductor's attention in pulling the trolley wheels off of one pair of trolley wires and shifting to another. This is because of the difficulty of putting up enough overhead frogs and switches to permit the passage of cars in all the directions desired. At Fountain Square, which is the downtown terminal of many of the cars, an important percentage have to shift trolleys every trip when rounding the most important corner. An inspection of the trolley wires, clips and special overhead work with the double-trolley system shows that there is a great amount of side wear on the wire. The writer has seen a broken trolley wire which has been worn down to an elliptical shape and on which the smallest diameter of the ellipse was  $\frac{1}{8}$  in. It is most common to have the wire wear kite-shaped, that is, V-shaped, on its lower surface. This side wear is probably considerably more than the ordinary wear on the single trolley because of the grinding action of the trolley wheel. That this wear is much greater than on most



DOUBLE TROLLEY AT CINCINNATI—NETWORK OF OVERHEAD WIRES IN RESIDENCE DISTRICT

greatly improved the telephone service even in cases where there was no electric railway near.

Since American practice has become so firmly settled upon the single trolley the double trolley at Cincinnati has ceased to arouse much interest on the part of American engineers, because a discussion of its merits on this side of the Atlantic would be purely of academic interest. Occasionally, however, agitation of the possibilities of electrolysis of water pipes where the single-trolley system is used has aroused a temporary interest in the double-trolley system. In Europe, where electric railway practice is not so firmly settled as in this country, advocacy of the double trolley is sometimes heard as the only sure way of preventing electrolysis. For instance, the system to be used in the Mersey tunnel will be essentially a double-trolley system, as it will employ the third rail for delivering current and a fourth for return. In the United States it has been found that with proper precaution little need be feared from the electrolysis even with the single-trolley system, and the double trolley has ceased to be seriously considered as a possible form of construction for new work.

In view of the European interest in this matter a brief review of the points favorable and unfavorable to the double trolley may be of interest. Officers in the Cincinnati Traction Company, it should be mentioned, are reticent about condemning or commending the double trolley, but there are points which are evident to any electrical man who will take time to observe the conditions at Cincinnati. One of the first things noticeable, of course, by any visitor, whether he be an electric railway man or without any

single-trolley lines is shown by the fact that to answer emergency calls on the Cincinnati Traction Company's 210 miles of overhead lines ten overhead line trouble wagons are kept constantly at call. These ten wagons are for answering emergency calls only; there are regular repair crews in addition to these.

One peculiar fact which can be noted almost anywhere in Cincinnati where there is a grade is that the trolley wires on the down grade wear faster than on the up grade. It would naturally be supposed that the burning action of the current with the car ascending a grade and drawing a heavy current would cause a more rapid wear on the wire than running without current on and down grade. Speed seems to have more to do with the wear, however, than the volume of current passing. Part of the great amount of side wear on the trolley wire is probably due to the fact that the two trolley poles are swiveled upon a single center midway between the poles. A little thought as to the action which takes place in rounding curves, as well as the action which takes place when one of the trolley poles becomes slightly bent—a frequent occurrence—shows that chances for wear are much greater with both trolley poles on the same base and pivot. The trolley wires are 18 ins. apart. The object of having both poles on the same pivot is, of course, to facilitate turning the trolley from one end of the car to the other. If two separate trolleys with independent bases are used, the conductor must swing first one trolley then the other, and this, of course, takes double the time. In spite of this disadvantage, however, the present management of the Cincinnati Traction Company considers that the two trolleys with independent pivots

will be sufficiently superior to the present type to justify a change. The trolley wheels are a V-shaped groove 9-10 in. x 1½ ins.

The present management of the Cincinnati Traction Company has been in charge of the property more than a year. These gentlemen have had long experience in electric railway operation in Washington, D. C., and Pittsburgh.

One peculiar point in favor of the double overhead trolley has been observed which is worth noting, not only on account of its bearing on the double-trolley question, but because a discussion of it may lead to unearthing some hitherto unsuspected causes of motor troubles. The point referred to is that motor repairs are said to be unquestionably less with the double-trolley system as used in Cincinnati than with the single trolley or with the underground conduit double-trolley system used at Washington. In making this statement these gentlemen have taken into consideration all the factors that might go to influence the number of motor troubles aside from the question of the current supply upon single and double trolley. Consideration of the cause for this difference will doubtless lead to considerable theorizing and argument, and it should result eventually in practical advantage.

### From Schenectady to Troy by Electric Railway

The Schenectady Railway Company, of Schenectady, N. Y., is building a line from Schenectady to Troy, a distance of about 14 miles. The line will be operated ultimately from the new steam plant at the General Electric Company's Schenectady works, and temporarily from the Mechanicville hydraulic-electric plant on the Upper Hudson River. Transmission at 10,000 volts to Latham's Corners sub-station will supply four 300-kw, 40-cycle General Electric rotary converters with the necessary power, which will be delivered to the trolley circuits at 600 volts direct current. Air-blast transformers will be used and the line will be double-tracked with 0000 trolley construction and 80-lb T-rail. There will be a branch line from Latham's Corners to Albany, so that it will be possible to go from Schenectady to Albany by two easy electric routes, and ultimately from Schenectady to Saratoga. The cars will be equipped with type M train control, weighing, with double trucks, about 27 tons and having all the axles driven. Four G.E.-57 (50-hp) motors will be used on each car.

The interval on the Schenectady-Albany line is soon to be reduced to seven and one-half minutes. This line is practically straight for the entire 17 miles between Albany and the Mott Terrace transfer station in Schenectady. Laborers are now at work on the track, lining and leveling it into good condition for the heavy spring business expected. The line is double-tracked throughout, except under the New York Central bridge near McNutt, where the narrow highway compels single track. Double-trolley construction is, however, carried under the bridge. The Karner sub-station is now being enlarged, and will contain four 300-kw, 40-cycle General Electric rotary converters with air-blast transformers. The summer running time between Schenectady and Albany is about forty-five minutes, or 22.7 miles per hour, schedule speed. The transmission line is supported on triple-petticoated insulators. The cars, which were recently described in these pages, are specially large and comfortable, and are divided into a forward compartment containing eighteen seats and a rear section containing eight seats.

### Maximum Trains; their Relation to Track, Motive Power and Traffic

The paper presented by E. E. R. Tratman at the New York Railroad Club on this subject, March 20, related particularly to steam railroad practice, and gave the experience of several prominent engineers, heads of engineering departments and reports of railroads upon this question. The conclusions which the author drew from the facts gathered by him in his investigation and presented in this paper are summarized as follows:

First.—The heavy engines, cars and trains for freight service have come to stay, for the reason that the "maximum train" method of handling the traffic has shown an ultimate economy in spite of the large sums expended in improving the road and the rolling equipment.

Second.—There is undoubtedly an increased wear of the track and cost of maintenance of way due to the heavy equipment and trains, and it would be wise economy in very many cases to make liberal expenditures in materially increasing the strength of the track. The engineer has been able to show conclusively the ultimate economy to be obtained by large expenditures in general improvements, and it is now time for the engineer of maintenance

of way to show a similar economy to be obtained by expenditures upon the track itself. If he fails to impress the management with a realization of these economies, the only thing to be done is to make the best of what he has, for there is no chance of driving away the heavy engines, cutting down the carloads, or reducing the trainloads to conform to the economical capacity of the existing track. Besides the track proper, improvements in passing tracks, double-tracking, yard and terminal facilities, etc., offer further opportunities for effecting economy in operation.

Third.—While the present large engines and cars are generally satisfactory, many improvements remain to be made, especially in reducing the dead weight and strengthening the weak parts which develop under the severe conditions of service. Improvements in draft rigging, in brake equipment and in the proper maintenance of coupler and brake equipment are specially to be noted. It seems unlikely that the capacity of cars will be increased. Such a step is neither necessary nor desirable, for, with the exception of certain classes of freight (and these often hauled in one direction only), the large cars are very frequently run with loads far beneath their capacity.

Fourth.—It would seem that we have about reached the limit of economical weight of the locomotives. Actual weights may still be exceeded in certain cases, but engines of 90 tons to 125 tons may fairly be considered to represent the limit in mere power and weight. The future progress will be rather in increasing the number of such engines, in improving their construction to obtain further economy in service, in improving the methods designed to work them to their full capacity.

Fifth.—The tonnage rating system for making up trains has by no means reached its full development, either in the facility of its application under varying conditions or in securing the desired end of uniformly giving the engines a full load. In fact, much greater development may be expected in these directions than in the direction of building heavier locomotives.

Seventh.—Improvements are much needed in the work of getting the traffic over the road with as little delay as possible. These may be effected partly by increased track and terminal facilities, additional tracks, modern water and coal stations, the block system, etc., but more especially by greater promptness in handling cars and trains at division and terminal points. Closely related to this matter are the problems of restricting the use of cars for storage and the improper use of foreign cars. An auxiliary fast service of smaller and lighter cars for the economical and prompt handling of small shipments in local freight traffic may come at some future time as an offset to the comparatively slow and enormously heavy trains of large-capacity cars.

In the discussion which followed Colonel H. G. Prout called attention to the fact that the electric motor was invading the field to such an extent that it could not be overlooked. The future might demand a marked distinction in the character of the work to be performed, so that there would be two classes of locomotives, those devoted to light freight and moderate loads, and others carrying the maximum. The electric motor was showing great adaptability to freight service, and the development of this system of haulage might aid materially in the solution of the general problem. Railroad managers and railroad engineers could not afford to ignore this important factor in any event.

### A New Car House at Paterson

The Jersey City, Hoboken & Paterson Street Railway Company, whose Paterson, N. J., car house was destroyed in the terrible conflagration that laid waste the whole business section of the city, has prepared plans and specifications for a new car house, to be erected at Market and Jersey Streets, Paterson. The new car house, according to the plans, will be in accord with modern practice and will be up to date in all respects. The building will be of brick, with blue stone facings, and the offices of the superintendent, car starter and cashier will be on the first floor. The building will front on Market Street, extending along that thoroughfare for a distance of 100 ft., while it will extend for 600 ft. on Jersey Street. The first 100 ft. on Jersey Street will be taken up on the ground floor by the offices, while there will be a second story which will be used as a reception room. A large hall fitted up for entertainments will be at the command of the employees. The rest of the building, aside from this portion on the corner, will be one story high. The Market Street side will be made up of seven large swinging doors, and through each of these doors will run a track, seven tracks in all, together with two inside tracks, making nine for the storage of cars. For this purpose there will be 60,000 square feet of room, and this will enable the company to store 150 cars under the roof. The floors are to be concrete, and

as far as possible the structure will be perfectly fireproof. The interior of the building will, however, be equipped with fire hose for use in an emergency.

To the rear of the building will be a stable for the wagon used by the emergency crew, composed of the men who are in charge of the overhead system of the road. Apartments are to be set aside for them to be used as sleeping rooms, while on the first floor the stable for the horses will be located. The harness and wagon are to be rigged out in the same manner as the fire apparatus.

**Improvements in Cleveland Power House**

In connection with the additions to the main power house being made by the Cleveland Electric Railway Company, which have already been described in these columns, the company is making several important improvements in the way of auxiliary equipment. The enlargement of the plant made a partial rearrangement of the old equipment desirable, and thus, together with the addition of new units, introduced some new problems that demanded immediate consideration.

The ground plan of the power house (Fig. 1) shows the extension at the left where an additional generating unit will be installed at once. This machine will be similar in design and capacity to the last one, delivering 1600 kw. The arrangement of the boiler plant will be entirely different from that of the old plant, the seven boilers formerly doing service being removed to make room for the elevator, transfer table and auxiliary equipment. The new boiler room will be at the left of the old one, and will contain several new Stirling boilers. The ground plan indicates the location of the cistern near the Cedar Avenue end of the property. This cistern is an important feature of the new plans.

Chief among the improvements in the power house equipment is the coal and ash handling outfit illustrated in Fig. 2, comprising a plan and sectional side and end elevations. Heretofore the coal for the station has been elevated to the bins above the boilers by means of bucket conveyors, while in handling cinders it has been necessary to wheel them from the basement to cars on a side track, a distance of several hundred feet. To provide for the extensions recently completed, and for that now under construction, it would have been necessary to extend the conveyor system; but this was not found desirable, and it was finally decided to design apparatus which would take care of both features. The plans were made by the Wellman-Sever-Morgan Engineering Company, and the improvements are now under construction. The principal feature of this plan consists of a transfer table to convey the loaded cars from the track at the side of the station and an elevator to raise the cars to tracks running over the coal storage bins. This equipment has a capacity of 100 tons, 75 tons of coal and 25 tons for car. The elevator extends to the basement, and the emptied coal car can

of especially heavy design, in order to handle the load of a modern car, weighing, with its contents, approximately 140,000 lbs. In general, the transfer table consists of a steel platform resting upon and carried by twelve single-flange standard car wheels. Two pairs of these wheels are geared together and are connected to an electric motor which drives a train of spur gearing. One end of the transfer table is arranged to connect with the platform of the car elevator, the framework and guides of which extend from the level of the ground of the cellar beneath the boilers to the top of the roof of the boiler house. On top of the framework is located the hoisting gearing of the elevator. This consists of four drums geared together in unison and connected with a 100-hp motor

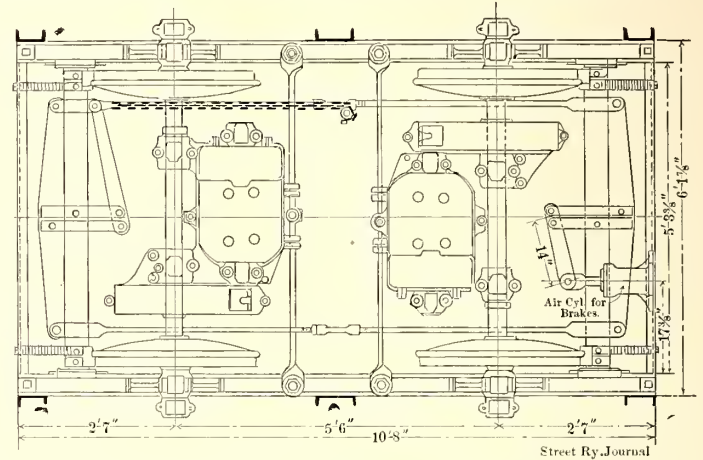


FIG. 3.—IMPROVEMENTS IN CLEVELAND POWER HOUSE—PLAN OF TRUCK FOR HAULING COAL CARS

by a train of steel spur gearing. The gearing is provided with two entirely independent safety devices so arranged as to prevent the load from being dropped. One of the devices is a set of interlocking worm gearing, the other of thoroughly efficient electric and mechanical brakes. To each end of the winding drums are connected four wire rope lifting cables, the lower ends being attached to adjusting devices and equalizers so that the load is uniformly distributed over all of the ropes. Both the elevator and transfer car are designed throughout with exceptionally large factors of safety. The cars are transferred above and below by small electric "dinkies," each equipped with two G. E.-800 motors and geared for slow speed. These small locomotives are carried on four standard 33-in. wheels, they are provided with air brakes and are substantially built. They are 10 ft. 8 in. x 6 ft. 1 1/2 in. The plan of the truck is shown in Fig. 3. The entire outfit can be

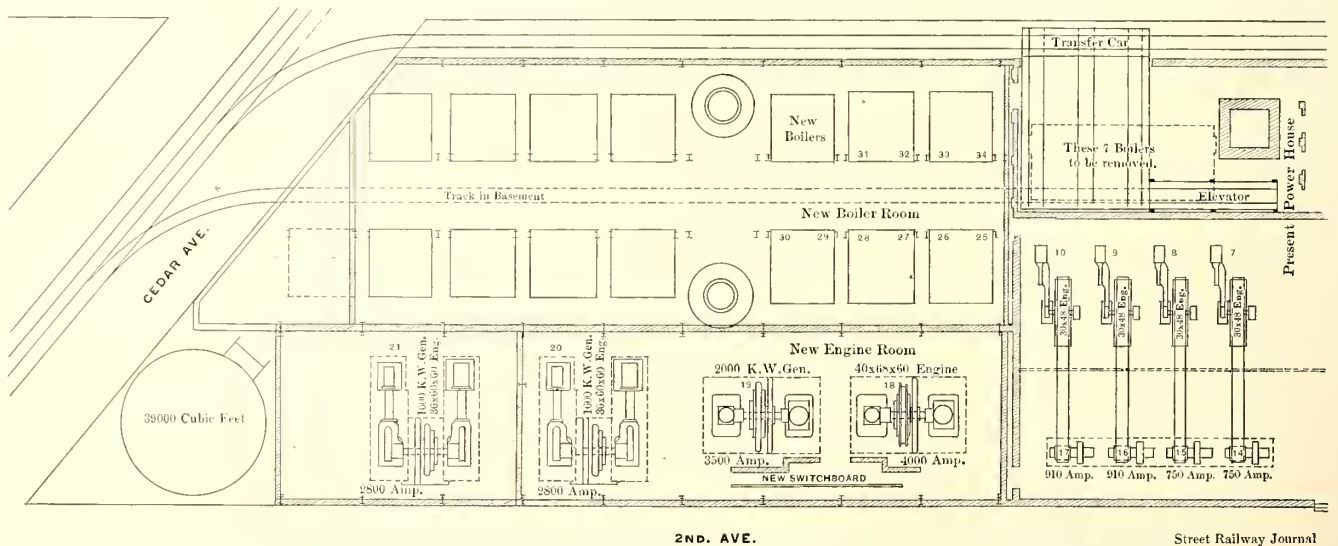


FIG. 1.—IMPROVEMENTS IN CLEVELAND POWER HOUSE—GROUND PLAN OF PLANT WITH EXTENSIONS

be lowered to a track in the cellar running under the ash hoppers. This also provides for directly discharging into the car, which is then returned to the ground level. It is the intention of the company to use its own cinders for construction and repair work, and its own motor cars will be used for hauling purposes. The cinders run in chutes from both rows of boilers. The chutes are provided with covers so that they do not require emptying for two days.

The transfer table is of ordinary form of construction and is

handled by two men, whereas eleven men were employed for operating the old conveyor outfit, wheeling coal and cinders.

To provide an emergency supply of water and to secure rain water to soften the boiler supply, the company is building a large cistern. It will be below the surface of the ground in front of the new addition and in the angle formed by Second Avenue and Cedar Avenue. The cistern will be 61 ft. in diameter by 17 ft. deep, of brick and cement, plastered inside and out. Water will be supplied to the cistern from three directions, namely, the 12-in. main

leading through the center of the house, a main leading into Cedar Avenue and a main leading from the eaves of the several buildings of the station. The water from the last-mentioned pipe passes through a filter before entering the cistern. All of the supply pipes have stop-cocks. Water from the cistern will be used as much as possible, especially during rainy weather, since the soft water will aid greatly in preventing boiler scale. The cistern will have a capacity of 39,000 cu. ft., or sufficient to run the station for eighteen hours. Since the power house is located in the vicinity of numerous manufacturing establishments, the cistern would prove of great value in case of fire should the water supply be cut off.

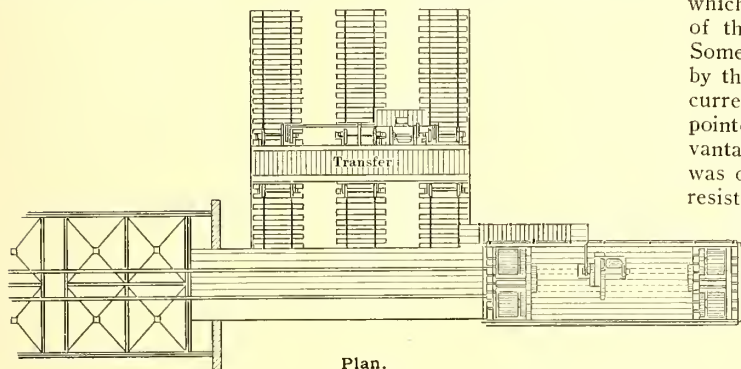
**Electrical Traction on Railways**

At a recent meeting of the Institution of Civil Engineers, of London, a paper was presented on "Electrical Traction on Railways" by W. M. Mordey and B. M. Jenkins, M. Inst. C. E. The authors refer to the recent Inner Circle arbitration in London as to the advantages of different systems of electric railway operation and then take up a general review of the various electrical systems applied to or proposed for railway service. A digest of the paper

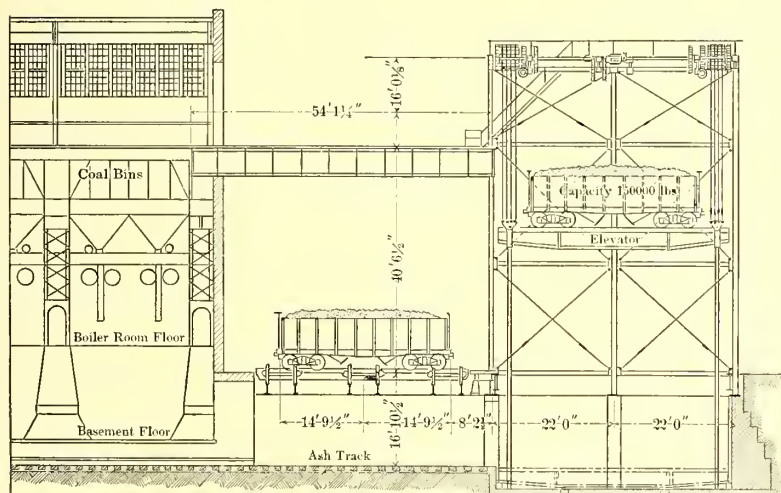
was next described, in which high-tension three-phase alternate-current transmission was used with step-down transformers and rotary converters, to give direct current to the railway. The existing alternate-current methods were all described under three-phase working, and it was shown that on the Continent there was a decided tendency to work out the more difficult traction problems by the use of the three-phase alternate currents, not only for transmission, but also for working the trains themselves. A table was given containing particulars of the principal three-phase electric railways.

The authors then proceed to discuss the comparative advantages and disadvantages of these three classes or methods, giving curves to illustrate the efficiencies of the sub-stations according to the methods adopted, and a table showing corresponding costs of the plant, etc., required. The advantages of the direct current and combined methods in their easy use of accumulators was pointed out, but the possibility of also using these on alternate-current systems was considered. The systems were also compared in their relations to number of conductors, speed, effect of variation of voltage and relative complexity of the sub-stations.

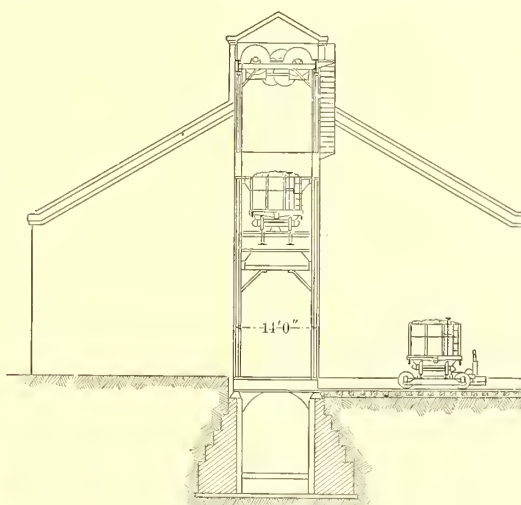
The paper next considered the starting torque of single-phase alternate-current motors, with illustrative diagrams of curves, after which consideration was given to the increased electrical resistance of the rails with alternate current, according to the periodicity. Some tests made by Mr. Blathy on this matter were communicated by the authors. The effect of these results on the use of alternate currents was considered rather fully, the limitations imposed being pointed out and conclusions being drawn as to the probable advantage of using copper conductors in place of the rails. Attention was drawn to the choice of periodicity as affected by lighting, rail resistance and effects. A short section followed on lighting. The return of energy to the line when running down grade and when stopping the train was dealt with; it was pointed out that efforts to do this with direct currents had not had any success; but with alternate currents the problem was much easier; in fact, the method was used on most of the existing alternate-current lines, not so much with the object of economizing energy, but for the sake of obtaining a very convenient brake. The importance of variable ratio control was next considered; the special need for such a process being shown by the fact that with the present methods, direct current or alternate current, the



Plan.



Sectional Side Elevation.



Sectional End Elevation.

Street Railway Journal

FIG. 2.—IMPROVEMENTS IN CLEVELAND POWER HOUSE—COAL AND ASH-HANDLING OUTFIT

appears in a recent issue of *Engineering*, from which the following is taken.

The principal features of existing systems were classified and described under three heads, viz.:

1. Direct-current methods.
2. Combined and alternate methods; and
3. Alternate-current methods.

It was shown, in the first-named class, viz., the direct-current, the principal alternative to the simple 500-volt two-wire system was the three-wire system in various modifications, which were explained. This was followed by a description and diagram of the method adopted on the City & South London Railway, which was the only important example in actual practice of a purely direct-current system using other than the simple 500-volt arrangement. This system was a three-wire distribution combined with feeders supplied at 2000 volts.

The combined method—that used on the Central London Rail-

maximum losses of power and the maximum output of the generating station occurred when the power developed at the train was least.

\* The authors summed up under the following twelve heads the requirement that should be met in any general system of electrical railway working:

1. Extra high pressure for feeding sub-stations.
2. Avoidance of moving machinery in the sub-station.
3. On longer lines a high-pressure distribution to the trains; making necessary,
4. Overhead conductors.
5. Easy extension of distributing system.
6. Ability to supply trains having different systems of motors and control.
7. High acceleration when starting.
8. The return of energy on gradients, or when stopping.
9. Possibility of using different speeds.

10. A variable-ratio arrangement for starting, for speed regulation and for returning energy.

11. Possibility of using motors on a locomotive or distributed on the train.

12. The train equipment and control to admit of extension, and modification to work on other systems.

The first six of these referred to the distribution of power and the last six to the equipment of the trains themselves.

The first five led to single-phase alternate-current working as the only method that fulfilled all the conditions.

The authors accordingly proceeded to discuss whether any system of utilizing single-phase current was possible; and they described in considerable detail a method originally proposed by Ward Leonard. In this system a single-phase motor on the train would drive a direct-current dynamo provided with means for separately exciting it and for varying its electromotive force over any desired range. The current from this dynamo would be taken to a separately excited direct-current motor; by this means there would be provided a most flexible variable ratio transformation; and the advantages of such a system were pointed out. It was then shown that such a system satisfactorily met the other seven requirements laid down, and offered at least a practicable solution of the problem of a comprehensive general system of electric traction for railways.

## ◆◆◆

### The Electric Problem of Railways \*

BY J. SWINBURNE

The electric problem may be divided into four parts—generating, transmitting from the station at high pressure to the railway or to the part of it in question, distributing the power to the passing trains and utilizing it.

#### SHORT RAILWAYS: SYSTEMS OF MOTORS

Beginning at the train end of the subject, as the system adopted there dominates the rest, the first question is: What motors should be employed? In the tube railway the trains are seldom running at full speed; they are stopping or starting or waiting at a station. The important consideration from the motor point of view is, then, acceleration and braking. There is a limit of permissible acceleration which depends on the comfort of the passengers. This may be taken at about 0.7 m (2.3 ft.) per second, and ought itself to start up gradually. The retardation may be a little more rapid, as the passengers are generally sitting down, whereas on starting there are generally many who have not yet found their places.

On constant potential circuits there must be considerable loss of energy each time the train starts, for the motors at rest give no back pressure, and the back pressure increases with the speed until full speed is reached. If the motors are so wound that the back pressure is proportional to the speed, as in the case of shunt motors, for example, or series motors with the current controlled so as to be constant, and if the acceleration is constant with reference to time, the starting has an efficiency of 0.5 m. By arranging two sets of motors so that they can be coupled in parallel or series, 0.166 m extra is obtainable, making an efficiency of 0.66 m. The odd 0.33 m is wasted on resistances. In the case of a tube railway this is a very serious loss, as it obviously means not only extra coal consumption, but larger plant throughout.

Dealing first with starting only, we may assume the stations are 0.75 km (825 yds.) apart, as this is a convenient average distance for a tube railway. With such a small distance the question of acceleration is all-important. It is difficult to know what acceleration is really permissible. To people sitting down the acceleration is not important, but at starting there are always people standing up, finding their seats, and at busy times of the day many have to stand large portions of the way. A sudden change from uniform speed to an acceleration of 1 m would probably upset everyone who was standing and had nothing to hold on to. But if the acceleration itself begins gradually, there is no limit to it, owing to discomfort of passengers, within anything that the conditions of the railway will permit. If a second or two were devoted to the growth of the acceleration, there could be little objection to any acceleration up to, say, 1 m. The gradual growth of acceleration can be secured, in the case of series motors, for instance, by not switching on the full current instantly, but letting it grow up to its full value in a second or two. It may be remarked, in parenthesis, that there is great room for saving time at the stations. Even on the Central London, for example, there is unnecessary delay as the passengers get in and come out at the same doors. It would be better for one end of the car to be the entrance and the

other the exit—people arranging themselves between the stations.

The acceleration is of enormous importance on the type of railway under discussion. If the trains accelerate up to half distance, and then retard to the next station, the time occupied varies inversely as the root of the rate of the acceleration. The energy per passenger, assuming the trains equally full, varies as the acceleration, and as the square of the maximum speed between the stations.

The next question is the maximum speed between stations. In the usual systems there is waste of power in the starting resistances, and the further the speed is from that at which the motors take their normal current without starting resistances the greater the waste. With a given acceleration, therefore, the lower the maximum speed the less the waste of energy. But this is, to some extent, balanced by the longer time.

If a table is calculated out, or curves made showing the relations between the times, distances and accelerations, the great importance of acceleration will be readily seen. In urban railways the train resistance is only some 7 per cent of the highest speed, and less of the lower speeds. Practically all the energy becomes kinetic except what is wasted in resistances and gear friction.

As the energy varies as the square of the highest speed, there is considerable saving in not running up to the maximum velocity. For instance, if acceleration is only carried on for quarter the distance between stations, with an acceleration of 0.5 m (1.65 ft.) it only makes a difference of four seconds between stations, while it halves the energy. At an acceleration of 1 m (3.3 ft. per second, there is a saving of three seconds. For the purposes of comparison we may take an acceleration of 0.7 m (2.3 ft.).

If the ordinary series motors are used, and are coupled in series at first, and then in parallel, they would be probably designed for a full speed of 60 km (37.5 miles) an hour; that is to say, to take their full current with no resistance in series at 60 km an hour. Being series motors they would go on accelerating, and would get to the halfway point in less than 34.4 seconds. The acceleration would still go on, so that the second half of the curve would not be quite a repetition of the first. The result would be nearly as good as if the motor had been designed for a maximum speed of 82 km (51 miles) an hour, as far as time goes, and it would be smaller, and there would be less waste of energy by resistances on each start; 82 km an hour is the maximum speed if the train accelerated at 0.7 m for half the distance to the next station.

The next system to consider is the shunt motor. If the shunt motor is controlled so as to have a constant armature current during acceleration, it behaves like a series machine; but in practice the controller goes in steps, and the current may vary considerably; this gives rise to sparking. In addition, as the field wire is smaller the magnets must be larger, and room is always important in railway work. The shunt machine arrangement is less efficient than the series, because it must be wound for the highest speed. If this speed is reached before halfway, the train will continue from that point at constant speed with a reduced current, and there may be commutator sparking. With best modern practice it is probable this sparking can be reduced so as to be of no importance. Either the shunt or series machine can be arranged to give back some of the energy by electric braking; but it would have the same want of efficiency due to resistances as during acceleration.

The great rival of the direct-current series motor is the polyphase, which corresponds very nearly with the shunt-wound direct-current motor, except that there is no chance of trouble from commutators. Only one of two motors may take the line pressure, the second being coupled in concatenation up to half speed. The first can then be wound for high pressures, and the rest of the circuits may have pressures convenient for handling. This prevents the use of the second machine in parallel with the first above half speed. This is not so serious a loss as might be thought. If it is worked out the time taken between stations is increased very little by the idleness of the second motor above half speed. The chief drawback of the polyphase motor is its limit of speed.

The single-phase alternating-current motor is not at present available, unless it runs at constant speed.

Constant-pressure supply is not a good solution of the problem of dealing with various speeds. Let us, therefore, consider the constant current. At present we are only considering the motors, or rather the train equipment.

The series motors would be wound for the torque to give the acceleration employed, say, 0.7 m. There is no loss by external resistance, and the back pressure increases with the speed till halfway is reached. The connections are then reversed, and the motors become dynamos, giving forward pressure in the mains, and breaking at the same acceleration as before, except that it is negative. As there is no loss by external resistance, and as in the case we have taken for comparison the power spent on acceler-

\* Abstract of paper read before the Manchester section of the Institution of Electrical Engineers, Feb. 25, 1902.



ation is very large in proportion with the power spent on train resistances, the series system returns a large percentage to the mains. Compared with the constant-pressure system there is thus a great gain of energy.

Shunt motors will give approximately the same results on constant potential. The armatures or fields need not be reversed for braking. The shunt motor has no real advantage in this case, and it has the disadvantage of possible commutator troubles, and of large variations of current. The resistances are altered by steps, and not continuously, and this causes a larger variation of current in a shunt motor, as the field resistance is not in series with the armatures, and there are no corresponding variations of field tending to check the variations of current.

The three-phase system is analogous to the shunt direct current. It has the advantage of absence of commutator. Compared with the series-wound direct current, this is of little importance, as there is no trouble from sparking. The motors have an idle current, however. This is really a question that concerns the distribution, mainly; but it also concerns the motors as it lessens the brake power. The idle current depends on the air-gap, and on the frequency. If the second motor has a power factor of 0.9, as the first motor will have to carry the idle current for the second, its power factor will be about 0.72. The first motor will thus have to be rather larger, but the power taken and returned by braking in concatenation will not be materially less than that in the case of the direct-current motors. The power returned by concatenated motors braking is saddled with such a bad load factor that it is probably not worth having.

The three-phase system can also be worked on a constant-current circuit; but as the frequency must vary with the speed, each train must have its own engine, unless some special arrangement is made in the distributing system. One special arrangement will be brought forward in discussing the question of distribution.

#### DISTRIBUTION ON SHORT LINES

Turning now to the question of distribution, the first point is to settle the pressure. The present practice of 500 volts is really due to the street tramway; there is no particular reason why it should be adopted for railways. It may be said that 1000 volts is dangerous, and 2000 volts to 5000 volts means practically certain death if a contact is made. Other things being equal, alternating pressures of the same voltmeter value are more dangerous than direct, and in making comparisons as to danger it might be well to allow the same maximum pressure in each case. This paper is meant rather to deal with the future, and it seems highly probable that as soon as there is a strong commercial necessity for dangerous pressures they will be allowed. If high pressures are to be used they should be made as safe as possible, of course, by the best safety devices. Still, the danger is a drawback, and whether there are safety devices or not, a high pressure line should be considered as dangerous, and people fully warned, so that if they court danger it is at their own risk.

In dealing with a short railway, 1000 volts has been taken as a convenient pressure, and there seems to be an impression that there is something about alternating and three-phase machines which gives them some sort of monopoly of high pressure. The reverse is largely the case as regards danger, and as regards insulation.

As to the distribution in the various cases discussed, the current in the direct-current constant-potential system is half for the first part of the acceleration, so there is some economy there compared with the series system. Roughly, the current for half the time of starting is only 720 amps. It is 1440 amps. for the other half, corresponding to an effective current of 1140 amps. The three-phase takes 720 amps. right through, but there is an idle current to be considered. During the first half the power factor was taken as 0.72, so the current is 1000 amps., and during the second half it is 800 amps., the factor being 0.9. This gives an effective current of, say, 890 amps. The series system, however, demands the whole 1440 amps., not only during acceleration, but during running, and during stoppages at stations. The question of how far series pays depends largely on the distance from the generating and sub-stations. If the distance is great, the constant potential direct current can be modified by only using one motor during the second part of the acceleration. As already explained, this does not increase the time between stations much, and it reduces the current to 720 amps.

If there is a sub-station every second station, and a current density of something like 150 amps. per square centimeter is adopted, the loss in conductors is not serious. In a tube railway the trains are very frequent, so a low-current density pays. In long-distance work the problem is very different. In the sub-stations there is little difference. For the direct-current constant potential

the distribution is generally by extra high pressure three-phase, with transformers and rotaries. For direct constant current the extra high pressure is also direct-current. There is no work of this sort in this country at present. Unless there is some special reason for distributing power in this way, other systems are better, or are, at any rate, more familiar. There is no difficulty in generating extra high pressure direct current, and it is done in Switzerland, where Messrs. Thury have made a specialty of it. There is little doubt the insulation is cheaper, and there are no capacity or self-induction troubles, no idle currents, and no triple switches and measuring instruments.

The three-phase system avoids the rotaries, which is an advantage. On the other hand, three wires are necessary, and this involves an extra contact. The rails are not well adapted for alternating currents. The low-power factor increases the leads, the transformers and the generators.

The constant-current three-phase system demands a dynamotor for each section, which is a drawback. The primary is extra high pressure direct constant current, and the secondary is constant three-phase current. For short tube lines this system seems to have no advantage over the direct constant current.

In the station the constant-current system, whether direct or three-phase, has the peculiarity that the engines always work at constant torque, but at varying speeds. The result is, that for a given daily output the coal consumption is less, as the engines always work at the best cut-off. The wear and tear is also probably somewhat less.

#### LONG RAILWAYS: COMPARISON OF SYSTEMS

Instead of dealing next with an intermediate or suburban line, we will go to the other extreme, and consider a main line. The problem is entirely different. Acceleration is comparatively unimportant, and the energy is chiefly used for overcoming the train resistances. The capital cost in mains and sub-stations is greater in proportion to the traffic, as large proportions are frequently idle. It is therefore important to run light trains frequently. The present system tends toward heavy trains run comparatively seldom, and in goods traffic this practice is carried as far as possible.

It is therefore very difficult to decide on anything like a simple case of main-line traffic. In the first place high speed is advisable, more especially between such centers as London and Manchester, and Manchester and Newcastle. Such cases as intercommunication between Manchester and Liverpool, or between the various busy Yorkshire centers, belong to the intermediate class. It must be remembered that it is comparatively easy to devise systems, not only of block signaling, but of automatic control for electric railways, as the power is not generated on the train, and can therefore be shut off from the outside. We may therefore have lighter trains running at high speeds, and running frequently. As an example we may therefore adhere to the 100-ton train. We may, having regard to the future demands, consider a speed of 125 km (75 miles) an hour. It is difficult to make the case definite enough for clear comparison between the possible systems. We may therefore first run over the peculiarities of each and see how they effect the problem.

The constant-pressure system with direct currents has the drawback of waste of energy during acceleration; but if the trains go long journeys that is no longer important. The chief difficulty is the limit of pressure possible. There seems to be an impression that direct-current motors can only be made for low pressures. As a matter of fact they are mostly made for low pressures; but that is merely because there is no demand for high-pressure machines, except for arc lighting; and there is little series arc lighting now. As a direct-current machine can be easily made to give from 1000 volts to 2000 volts for arc lighting, there can be no difficulty in making large railway motors for such pressures. An arc machine is the most difficult to make for high pressures, because the rate of increase of the pressure relatively to the current has to be negative; so that the field is comparatively weak, and the diameter of commutation varies. If a 10-amp. machine can be made from 1000 volts to 3000 volts, there can be no difficulty in making a similar machine for about 1000 amps.

It may be safe to take 2000 volts as suitable for main-line work. The limit of 2000-volt transmission is not so small as may be thought. Our ideas of transmission distances are largely gathered from incandescent lamp practice. In that case there is an accumulation of small drops: in the high-pressure mains the transformers, the meters and the house leads, and at the end is a lamp which is sensitive to minute variations. In the case of a main-line train, we may lose quite a large percentage of the pressure in the mains. At a current density of 150 amps. per square centimeter the loss of pressure is 27.2 volts per kilometer. If we care to spend 500 volts on the mains between two points of supply, the

points can be 37 km apart, if there is no loss in the return leads. It is unlikely that a main line could be run satisfactorily on the three-wire system, so instead of 37 km it would be better to allow little more than half that distance, say, 20 km. This means a sub-station every 40 km.

The direct constant-pressure system has the great disadvantage of only suiting fixed speeds. Thus, if the motors are wound for 120 km at 2000 volts, they will not work efficiently at any lower speed. The train, therefore, must run at 120 km an hour or waste power. This trouble can be largely overcome by making the motors large, so as to give a better acceleration. Two motors in series will then run the train considerably above 60 km an hour. The two motors in parallel will also run the train above 120 km, so as to give some margin for making up time—a most important consideration.

The series constant direct-current system has no longer the same advantages as in the case of the tube. The acceleration is no longer of vital consequence. With a given maximum pressure, and a given distance between sub-stations, the loss in the leads is greater, for the leads always carry the maximum current. The series system has some compensations, however. It does not follow that because the motors are taken as limited to 2000 volts that the line may not work at, say, 10,000 volts. The difficulty here is that the motor must be insulated from the bogie, so as to stand high pressures. With 10,000 volts and a maximum loss of 25 per cent, or 2500 volts, we would allow a distance of 92 km between sub-stations. This would generally mean that there would be no sub-stations, only generating stations, and they could be placed, as a rule, near large towns, so that they could supply their customers. The series system has the advantage of allowing any speed at high efficiency. The ability to return energy in braking need not be considered, as in long-distance work it is impossible to allow large enough motors to give good acceleration. It would therefore pay better to brake by mechanical means than to waste time slowing down in order to get back a little energy.

The three-phase constant-potential system has some of the advantages of the constant-pressure direct-current. It falls behind in some points. There are three wires instead of two, and the motors cannot exceed their normal speed, however late a train may be. On the other hand, the system has the advantage that it can be worked for long distances, and frequent sub-stations can be put down, as they contain only still machinery. The distances apart of the generating stations are thus only limited by the economy of transmission at high pressure.

The series three-phase system gives the same advantages as regards distance between central stations, but it is at a disadvantage compared with constant-pressure three-phase system, as its advantage in acceleration is more than compensated by the need of having sub-stations with moving machinery for each block, with a dynamotor for each train that may be fed by the sub-station.

#### CONSTANT-PRESSURE DIRECT

For the sake of making some sort of comparison, we may take the generating stations as 80 km (50 miles) apart. This is certainly far enough to prevent the need of an excessive number of power stations. At the busiest time of the day, which is what has to be provided for, we may take a half-hour service each way as sufficient for through traffic. This will demand stations of the order of 6000 kw to 8000 kw, which is smaller than one likes, but still large enough to be fairly economical.

Taking first the direct-current constant-pressure system at 2000 volts, the simplest arrangement would be to have two sub-stations for each power station. A train would then never be more than 13.3 km from a sub-station. The trains want, say, 330 amps. at full speed. A question at once comes up, whether it pays to have greater torque for accelerating. The simplest way of doing this is to have a double allowance of motors. At starting two motors are in series, and at half speed the extra motor is thrown out. As the motors will probably drive at least four axles, there will be, say, four motors of 1000 volts each, and they will all be in series on starting, only two being in series above half speed. The starting motors may be comparatively small, as they only run for a minute or two at a time, and are cooling for the rest of the journey.

The conductors have to carry 330 amps., which at 150 amps. per square centimeter means 2.2 cm<sup>2</sup>. Strictly speaking, however, the lead should not be run at a constant density, for the current is in the parts near the sub-stations longer. We may take the lead at 1.5 cm<sup>2</sup> average area for each track. This would mean 1.5 cm x 2.92 cm = 1.338 tons of copper per kilometer for the main. It is a question how much should be allowed for the return, as it would naturally be worked on the three-wire system; but sometimes one side might be full and the other empty, so it might be as well to

allow, say, 14 tons of copper for the return, of which 7 tons would be charged to each side, making 24 tons.

Each transformer sub-station must supply one-third of the distance between the main stations; that is to say, 27 km. Each ought to be able to supply 1.5 times the power for a single train; that is to say, 2000 volts and, say, 1000 amps. This would be effected by one large rotary with another as spare, or by two 1000-kw rotaries with one spare. Then the transformer sub-stations would have 27 km of high-pressure cable at, say, 8000 volts and 250 amps.

For the constant-potential system at 2000 volts we may reckon for each distance of 80 km:

Distributing mains (copper only).....	25,000	
9,000-kw static transformers.....	11,250	11,250
6,000-kw rotary transformers.....	18,000	18,000
Extra high-pressure mains.....	80,000	53,000

Total..... 94,750

The figures only refer to the parts that vary with the system adopted, and therefore do not give the cost of fitting out the railway electrically. They are also very rough estimates.

#### CONSTANT CURRENT DIRECT.

The series system has two mains for each line, carrying 330 amps., 1.5 cm<sup>2</sup> in action. This comes to 6 cm x 8.92 cm = 5.35 tons per kilometer, or £30,000 per section bare. A large addition would be necessary for insulation for 10,000 volts.

#### THREE-PHASE

The three-phase system is the same as the direct-current constant-pressure, except that there are no rotary transformers. In this case it might pay to have more sub-stations, so as to decrease the cost of the copper, as the cost of subdivision of sub-stations would not be serious.

The constant-current three-phase system saves some £10,000 per section in transformers, but costs extra for extra sub-station rotaries.

The result of these estimates is that series costs less per kilometer, but the comparison is by no means on all-fours, as the constant-pressure has high-pressure cables completely protected from contact, while the series has 10,000-volt conductors exposed, involving danger and cost of maintenance.

It is, perhaps, hardly necessary to work out a sample of intermediate types, such as between Manchester and Liverpool, because they are equivalent to sections of the through main line. The only difference to be considered is the question of frequent stoppings and startings. A main line runs quick passenger trains, also stopping trains, goods and minerals. At present a slow and a stopping train are synonymous. There is no reason why a train that stops at many stations should run slowly between them, except that a locomotive that is designed for acceleration is not suitable for running fast, though the steam locomotive is better than the electric on constant pressure, because it is not wasteful while accelerating. It is just as important that stopping trains should waste little time as that express trains should be fast; in fact, there is greater reason in many cases, as the worst and most uncomfortable carriages are put on these trains. The most important are the suburban trains, carrying large numbers of business men, and stopping at nearly every station. In this case acceleration is of the highest importance, as in the tube railways.

#### CONCLUSION

Enough has now been said to show that it is advisable to pause a little before we convert our railways into electric street tramways. It will be a calamity if our railways take up different systems of electric working. If some have 500 volts, others 1000 volts, 2000 volts or 10,000 volts; if some have constant currents, some direct, and some three-phase, while others have constant pressure of each kind.

There is some slight adaptability in electric locomotives. Of course a three-phase motor will not run on a direct-current circuit, but a constant-pressure locomotive will, with very little addition, be capable of running on a constant-current circuit; and locomotives can be built to run on either, if the pressures and currents are right. The locomotives built for 500 volts are not suitable for 2000 volts. If the 500-volt locomotives are for tube railways with large acceleration, they can hardly be run as express locomotives, as their motors will run too fast; otherwise electric locomotives are more adaptable than steam, as they can have several motors, which can be coupled in different ways.

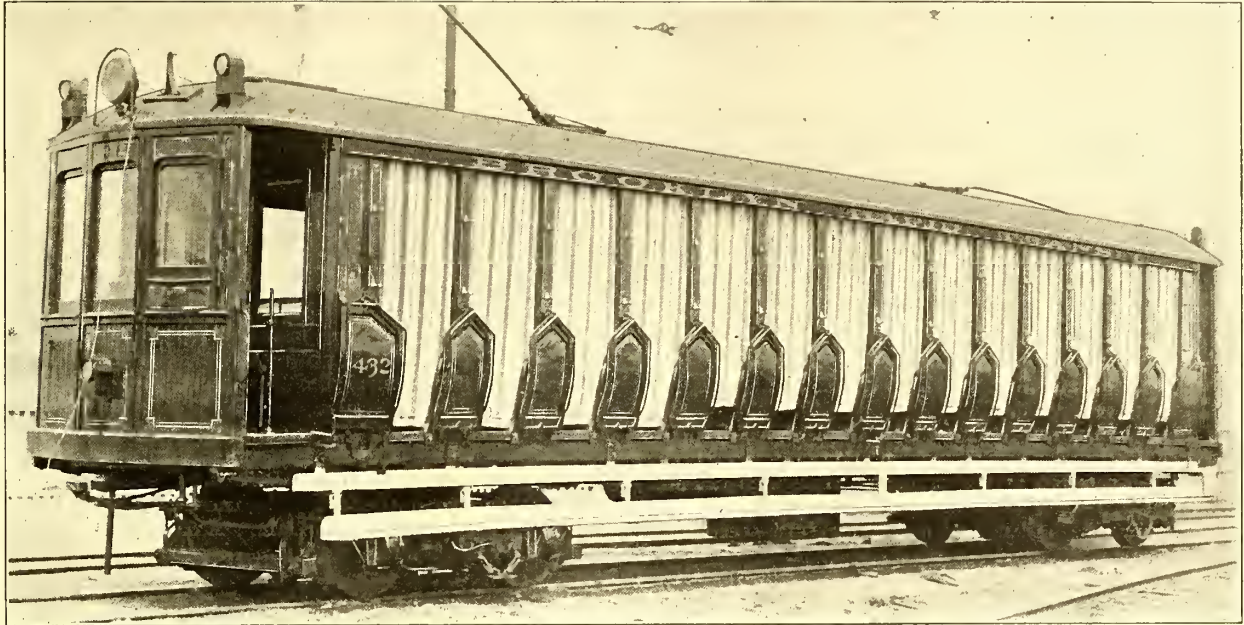
What is most necessary is standard pressures and currents. Each railway would then have, as at present, slow locomotives with great pull for shunting, for goods traffic and for suburban and stopping trains, and fast locomotives with less acceleration but higher speed for through traffic.

### New Open Car for the Elevated Service of the Brooklyn Rapid Transit Company

The accompanying illustrations show a new type of car which has recently been built in the shops of the Brooklyn Heights Railroad Company, and which combines a number of novel and interesting

sander, made by the Nichols-Lintern Company, of Cleveland, Ohio.

Considerable thought has been put on this car in order that it may conform as nearly as possible to the best principles in car building, as well as to the requirements of the service for which it is intended. General Manager J. C. Brackenridge, of the railway com-



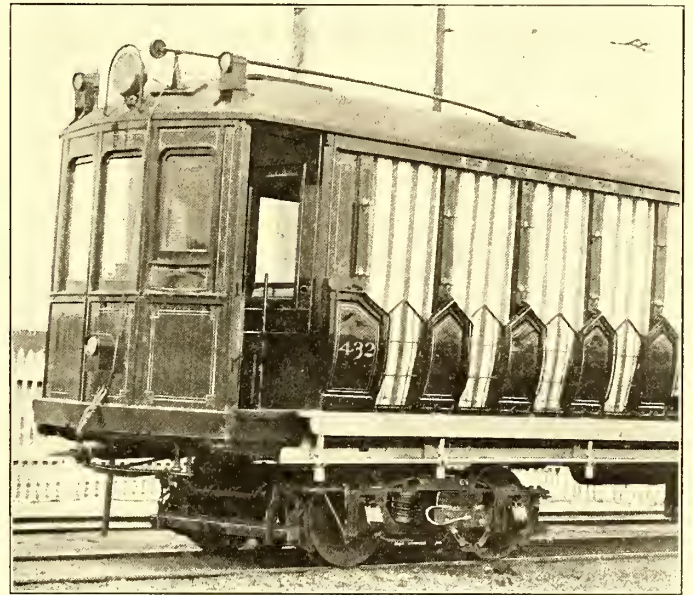
NEW TYPE OF OPEN CAR FOR BROOKLYN ELEVATED LINE

features. The Brooklyn railway operates a combination surface and elevated service on its Coney Island and Brighton Beach lines, the trains running on the elevated structure while in the city and then descending by grade to the surface. This car, therefore, is intended to be used where there are station platforms and where there are none. The steps are of a peculiar design to facilitate operation under these conditions. When closed, as in the smaller cut, the bottom of the lower step is brought level with the floor of the car, giving an additional width to the floor below the concavity of the seat end panel, and in this way providing a safe foothold between the floor of the car proper and the platform. The step, when down, reaches to within a convenient distance from the ground and can be readily mounted from the level of the track. When the lower step is down extra rigidity is given to its position by lugs which are formed by the turned over ends of the metal supports to the second step, seen just below the hinges in the view showing the lower step folded up. The double service of elevated and surface necessitates the installation of both a collecting shoe for the third rail and a trolley pole, as shown in the engravings.

The advantages of open cars in loading and unloading are very great, but the operation of them without efficient safeguard at the ends of the seats is now looked upon as hazardous. In the Brooklyn car, sliding doors are used of a new pattern, the gate at each opening being single and being made of iron lattice work. The general design of the gate with its sloping top, etc., is such that it is practically impossible for a passenger to rest his hand upon the gate closed so that there is danger of having his fingers pinched upon opening it, or that when the gate is open there is any danger of injury upon closing. The gates are operated from either end by a wrench on a vertical rod, seen on the platform in the engraving. This wrench, when not in use, is hung beside the rod. The gates are all fastened to a rectangular bar running along the side sills, and when the wrench on the platform is turned through part of a revolution this bar is slid along in its ways a sufficient distance to close the gates. When open the gates are behind the panels, as shown. Wooden grab handles are provided on the side posts, and there are also metal grab handles around the seat end panels. The curtains are arranged so that they come completely to the floor, thus completely closing the car during stormy weather.

The length of the car over all is 46 ft. 3 ins., and of the body 40 ft. 1½ ins. The seating capacity is 90. The car is supplied with two 15-L Walker motors, both on one truck, and two K-13 controllers. The motor truck was made by the McGuire Manufacturing Company, of Chicago, and has a wheel base of 5 ft. 6 ins., and drivers 33 ins. in diameter. A Wasson truck is used for the trail truck, with 30-in. wheels. The air brakes are from the Christensen Engineering Company, of Milwaukee, Wis., and in connection with the air compressor is provided a pneumatic track

pany, has spent considerable of his own time in perfecting details, and has succeeded in producing a car which will undoubtedly prove



BROOKLYN ELEVATED CAR, WITH STEP UP AND GATES CLOSED

of great service to the road during its heavy summer travel. The car illustrated will probably be used more or less this summer, but it is, of course, too late in the season to think of adding many of this type to the present equipment until next year.

### Philadelphia Approves Trilby Rails

Philadelphia seems inclined to follow the example of New York, Chicago and several other cities. One hundred and thirty-two pound modified Trilby rails are soon to be laid on Chestnut and Walnut Streets. The Board of Surveyors has been considering the subject, but inasmuch as the law was not quite clear on the point whether authority to act was vested in City Councils, in the Department of Public Works, or in the Board of Surveyors, action on the question of adopting the style proposed by the Union Traction Company was postponed until the City Solicitor could be heard from.

### Economy in Steam Plants

So much attention is given to the economical production of power nowadays that authentic reports of the performances of special equipments of steam plants are particularly welcome among managers and superintendents of electric railway power plants. C. S. Wilson, chief engineer of the electric power station at Four and One-Half Street, Washington, D. C., has made a very favorable report upon the performance of the steam loop and Holly gravity return system in the plant under his charge. Mr. Wilson describes the outfit as follows: "This plant contains six boilers aggregating 1,600 hp, four tandem compound condensing engines, and two single cylinder non-condensing engines. The four tandem engines are directly connected to railway generators and two single engines to lighting generators. The six engines have a maximum capacity of 3,000 hp. The engines are all equipped with separators, and the separators with traps, and the traps all discharged in the sewer; now all of the condensation from the high pressure drips goes to the boilers."

Speaking of the performance of the system, Mr. Wilson says: "It is doing all that was claimed for it," and he adds: "I believe I am safe in asserting that the system has made a saving of 0.2 of a pound of coal per kilowatt-hour, which would mean a saving of from 1 to 1½ tons of coal per day."

The importance of this feature of large steam plants will readily be appreciated, when it is considered that, in addition to the purely economical factor illustrated in the saving of coal, it is claimed that there are many distinct advantages of an engineering character, which will be readily appreciated upon a careful inspection of the system in operation.

Boilers seldom furnish dry steam, and they are always liable to foaming and sudden primage; moreover, steam condenses in pipes, however well they may be covered. It is therefore a fact, though not always borne in mind, that steam is invariably wet upon entering a cylinder, and this causes a continual loss. In nearly every engine test will be found a deduction for moisture in steam varying from 2 per cent to 12 per cent. It should be remembered also that tests for dryness of steam are made on samples taken from near the center of the pipe. These do not take into account the stream of hot water that usually runs along the bottom of the pipe, which often represents a loss many times greater than the moisture held in suspension by the steam. It is this solid water in the pipes that accumulates and is swept along into the cylinders, washing away the cylinder oil, and causing the most serious accidents to which steam machinery is liable.

It is to meet and overcome these conditions that the Holly system was introduced. First of all, it effects a considerable saving in the water of condensation, entrainment and primage with the heat it contains, the return being usually made at from 250 degs. to 400 degs., according to the pressure carried, while the best feed-water heaters furnish water at not more than 200 degs. to 210 degs. Another advantage is preventing the loss of steam that is blown to waste in clearing pipes from water, and the numerous wastes from open or leaky drips. Then, too, by returning pure water to boilers, and, by concentrating this return in one or two boilers at a time, loosening the scale, the system frequently furnishes the entire feed water for one boiler in a battery of twelve. Accidents due to water in cylinders are prevented, and uniform temperature is preserved in pipes over nights and Sundays, thus obviating difficulties due to expansion and contraction. This arrangement, moreover, enables engines, especially at the end of long lines, to start promptly and safely, and it reduces the amount of cylinder oil removed by the washing action of the water. It is effective also in maintaining higher temperature in jackets, driers, etc., by reason of better circulation, and in reducing the amount of attention necessary to the steam pipe and its drainage, as it affords a comprehensive drainage system, operating continuously and supplanting all devices requiring attention, manipulation or repair.

This system has been installed in a large number of street railway power plants by Westinghouse, Church, Kerr & Company. This concern has collected considerable data upon the performance of the system under all conditions, and this information, together with a description of the system, and a list of plants in which it has been installed, will be sent, upon application, to engineers and others interested in this subject.

### The Pennsylvania's New York Tunnel

The Pennsylvania, New York & Long Island Railroad Company was incorporated April 21, with a capital of \$20,000,000, to construct and operate an underground railroad in New York and Queens Counties, to be operated by electricity or other suitable power. This is the company that will build the tunnel which will give the Pennsylvania Railroad a terminus in New York, and its

western terminus will be under the waters of the Hudson River, on the boundary line between New York and New Jersey, at a point of connection with the railroad of a corporation organized or to be organized under the laws of New Jersey, and opposite that part of New York City lying between West Thirtieth and West Thirty-Fifth Streets, Manhattan Borough. The eastern terminus will be at a point of connection with the line of the railroad of the Long Island Railroad Company in Queens Borough at Thompson Avenue. The directors of the company are: A. J. Cassatt, Thomas Dewitt Cuyler and Clement A. Griscom, of Haverford, Pa.; John P. Green, of Rosemont; Charles E. Pugh, of Overbrook; Sutherland M. Prevost and W. H. Barnes, of Philadelphia; Samuel Rea, of Bryn Mawr, and William H. Baldwin, Jr., of New York City.

### Tunnel Bills Vetoed

Governor Odell has vetoed the Apgar bill compelling a change of motive power in the New York Central tunnel in Park Avenue, New York, and the Bedell bill granting extraordinary terminal privileges to railroads doing business in cities of the first class. The object of both bills was to make provision for safer operation of the New York Central, the New York, New Haven & Hartford, and the Harlem Railways. The first provided that the use of steam within the Park Avenue tunnel in New York should be discontinued within three years unless further time should be granted by the State Board of Railroad Commissioners, and the second, which was in the form of a general law, applicable to cities of the first class, aimed to give the railroad company the right to acquire by condemnation, purchase, or otherwise, such land as it might need for the improvement of its terminal facilities.

In his message Governor Odell expressed regret that the duly constituted authorities of New York did not prepare and submit a bill in a perfect form, but they did not submit such a bill as a remedy. On the other hand, objection is made because "there are numerous railroads whose charters have been the subject of special grants, and which under the provisions of this act could take advantage of its features and act independently of the local authorities, the only restraining power being the State Board of Railroad Commissioners. So long, therefore, as this law should stand upon the statute books it would be a menace to the cities affected."

The Governor points out that the city authorities have at present the power of granting a franchise for a period not exceeding twenty-five years. "They can also fix the route and the compensation; they can authorize the tunneling of streets or the opening and closing of streets. In fact, they have almost unlimited power, so that the only legislation necessary to carry out these proposed improvements is that which shall prescribe the motive power and the period of the grant."

### Philadelphia Subway Ordinance Signed

Mayor Ashbridge has signed the ordinance passed by City Councils granting a franchise to the Market Street Elevated Passenger Railway Company, which authorizes the building of a subway in Market Street, Philadelphia. The Mayor says the proposed improvement will be an underground road and not a subway. The ordinance requires work to begin within one year, and also specifies that the subway must be completed within three years from that time. On this point, too, the Mayor has ventured an opinion; namely, that the road will be in operation in two years.

The Philadelphia Rapid Transit Company, organized by John M. Mack and his associates, which made application for a charter at Harrisburg about three weeks ago, expect to obtain its articles of incorporation within a few days. The stockholders of the Union Traction Company will meet May 5 to approve the lease of their company to the new syndicate and to approve the proposition to issue collateral trust bonds to the amount of \$1,500,000 to take up the floating debt. So far as can be learned there is no opposition to this programme, and officials of the company do not hesitate to say that no hitch will occur to prevent the lease going into effect July 1, on which date the fiscal year of the Union Company ends.

### Cost of Car Wheels

CAMDEN & SUBURBAN RAILWAY CO.

CAMDEN, N. J., April 8, 1902.

EDITORS STREET RAILWAY JOURNAL:

In reading over the article in your issue of April 5, concerning the cost per million miles of car wheels, I find that our cost per million wheel miles, taken on the same basis that your other calculations are made, is \$282.28.

W. E. HARRINGTON,  
Vice-President and General Manager.

### Birmingham Car Equipment

The car is divided in two compartments, with a single sliding urban service, as well as for city work, and will be used on the Bessemer division of the Birmingham Railway, Light & Power Company's system. They were built for this service by the St. Louis Car Company, and contain some interesting features.

The car is divided in two compartments, with a single sliding door between them. The sash in the partition, as well as in the door, is made to lower. Seven walkover spring rattan seats are arranged on each side of the aisle in the main compartment, and



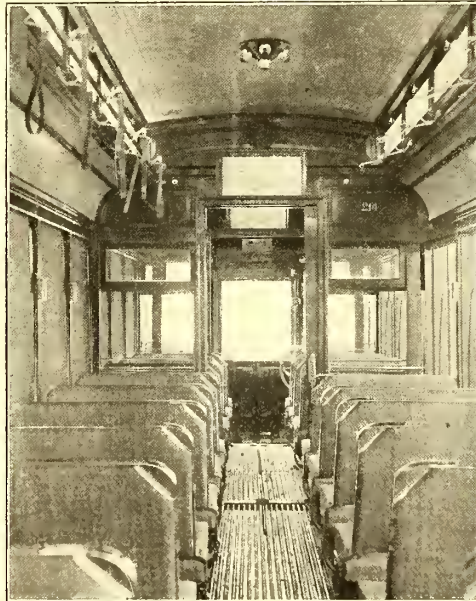
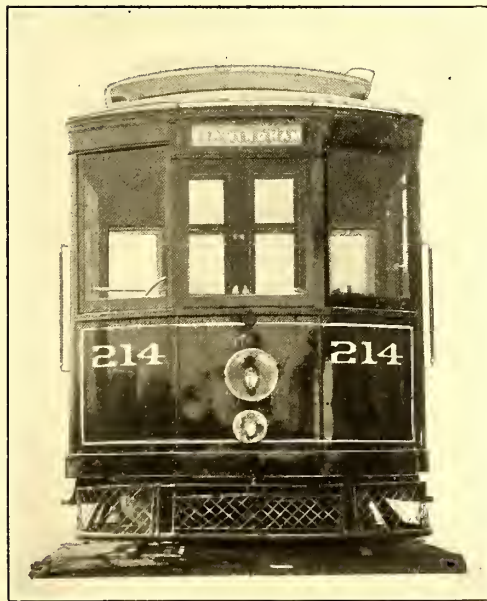
EXTERIOR OF BIRMINGHAM CAR

three on each side in the smaller compartment. The car is constructed with steel sills, and this allows all side sashes to be lowered 8 ins. farther than when wooden sills are used, and this arrangement has the advantage of making practically an open car when windows are lowered.

The car bodies are 29 ft. 6 ins. over corner posts, with 5-ft. vestibuled platforms at both ends, and double folding doors on each side, which may be replaced by folding gates for summer service. The width of sash rail is 8 ft. 4 ins.

The interior finish is in mahogany, which lends to the car a plain but elegant appearance. All trimmings are of solid bronze, nickel-plated. The ceilings are of maple. The outside of the car is painted yellow, with silver lining. Pantasote curtains are used.

The cars are mounted on the St. Louis Car Company's No. 23-A special M. C. B. motor trucks of standard gage, with 6-ft. wheel base. All joints and wearing parts are machine-fitted, and all bolts are of steel. The wheels are 33 ins. diameter, with 5-in. axles, made to accommodate four General Electric motors. The front of the car is provided with a woven-wire fender. The steps are of single Stanwood pattern.



HEAD-ON AND INTERIOR VIEWS OF BIRMINGHAM CAR

The cars are equipped with Christensen air brakes, and with the car company's ratchet brake staff and wheel. Twelve electric heaters are arranged under the seats and each car is equipped with an enclosed arc headlight, and with four clusters of five lights each for interior illumination.

An interesting feature is the illuminated sign designator, placed just under the bonnet in the vestibule, and comprising two incandescent lamps back of a printed curtain on roller. These signs show twenty-five different routes and can be changed at will.

### San Francisco Strike

Employees of the Market Street railway system, of San Francisco, went out on a strike Saturday night, throwing 3000 men out of employment and causing much inconvenience, hardship and financial loss upon those who depended upon the lines to reach their places of business or homes. Only the California and Hyde Street and the Union and Geary Street lines are running. These are independent lines and have nothing to do with the Market Street system.

A complication arises because of the arrangement between the company and the United States Government for carrying mail, not only on the regular white cars, but also on many of the lines that run far out in the suburbs, regular passenger cars being used for carrying mail bags. By placing mail on many cars the company would be able to operate their lines in spite of the strikers. The Labor Council recognized this fact and withheld its approval and support, fearing a conflict between the men and the government. The men demand recognition of the union, a ten-hour working day and 25 cents an hour instead of 22, as at present.

New men are ready to take the places of the strikers as soon as police protection is assured, but it is explained in the press despatches that Mayor Schmitz, who was elected by union labor votes, declared that it was no part of the duty of the police to assist the railroad company to move its cars. Then the company asked permission to employ private armed guards on its cars, but this, also, the Mayor refused.

The strike made it impossible for the people of the city to enjoy a Sunday outing. One result was that instead of 40,000 persons at Golden Gate Park and Ocean Beach, there were not over one-tenth that number. All the suburban pleasure resorts were empty, but the city theaters and saloons did a land office business.

The working people who live in the suburbs were the greatest sufferers, however. All the district south of California Street, from the waterfront out to Ocean Beach, was without means of transit. This was a great hardship on clerks, and especially upon girls who live in the suburbs. A few came in in express wagons, rigged up as carryalls, but the greater number had to walk.

### The Fender Question in St. Louis

Notices have been sent out by the Board of Public Improvements of St. Louis to the street railway companies ordering them to submit fenders and wheel guards for approval. This action followed the report of the fender committee drawn up by the Sewer Commissioner and concurred in by the president of the board. It states that at the recent tests made in the presence of the committee, A. B. Dupont, of the St. Louis Transit Company, and T. M. Jenkins, of the St. Louis & Suburban Railway, 104 designs were submitted. Fifteen were put to a practical test. No form of wheel guard has yet been submitted by either of the railway companies. The report, after detailing the results of experiments with new fender devices, states: "Your committee recommends: First, that the street railway companies of this city be requested to submit, within ten days (by April 28), a design or designs of such fenders and wheel guards as they propose to use on their cars. Second, that the Board of Public Improvements cancel all certificates for fenders heretofore issued.

"In closing, your committee cannot refrain from expressing its belief, based on the experience gained in testing fenders, that the importance of equipping an electric street car with a fender, viewed as a life-saving device, sinks into insignificance when compared to 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 victim, instead of trying to scoop him up after he has been struck."

Santos-Dumont and his air ship may be one of the attractions at Coney Island this summer.

### The Everett-Moore Situation

It is confidently believed by the Everett-Moore bankers' committee that one and possibly three of the railway properties held under option will be disposed of at an early date. President A. E. Lang, of the Toledo Railways & Light Company, and Messrs. Everett and Moore are at present in New York City, and the prevalent belief is that the sale of this property will be arranged this week. It is understood that the Everett-Moore holdings in this property amount to 70,000 shares, while Mr. Lang holds about 10,000 shares. The syndicate originally purchased a large part of this stock at about 6, and later made large purchases at about 14, so that their entire holdings averaged about 10. It is understood that the new purchasers will secure the stock at 26 2-3, which will yield the syndicate a handsome profit. It is generally believed that Mr. Lang will hold much of his stock, and it seems probable that he will continue as chief executive of the company. Chairman Newcomb, of the bankers' committee, declines to make known the names of the prospective purchaser, but he states that they are neither the Elkins-Widener Syndicate nor the Thompson Syndicate, which have been investigating the property. Rumor in New York connects the name of Seligman & Company with the deal.

The committee has given a new fifteen-days option to the Eastern parties who have been desirous of purchasing the stock in the Detroit United Railway Company, but who permitted their first option to expire because they could not buy the controlling interest from the Cleveland people. It is stated that the purchasers have agreed to take the 40,000 shares held by Everett-Moore at \$70, and it is understood that they have secured enough of the Cincinnati holdings to give them a controlling interest. Chairman Newcomb states that if this deal is not closed before the option expires the Detroit holdings will be purchased by Cleveland, Detroit and Cincinnati parties who have signified their intentions of forming a syndicate for this purpose.

The sale of the Northern Ohio Traction Company to Cleveland people already interested in the road is practically assured. The organization of this syndicate will be perfected this week, and Horace E. Andrews has been asked to act as syndicate manager, which he will probably do. The list of persons who stand willing to subscribe to this syndicate has grown to such proportions that it is claimed two or even three of the leading railway systems could be purchased if desirable.

Detroit reports state that W. B. Strang, who holds an option on the Detroit & Toledo Shore Line, will bring about a reorganization of that company in such a way as to take care of all its indebtedness. Mr. Strang proposes to equip the Shore Line with electricity from Toledo to Trenton and then build a new line into Detroit from Trenton to permit faster time into Detroit.

Before the embarrassment the syndicate owned much valuable real estate in Cleveland, besides considerable Eastern bank stock. These properties have all been disposed of at good figures, yielding excellent equities. The sale of the traction properties now under option will bring between \$2,500,000 and \$3,000,000 in equities, so that when these are disposed of the syndicate will find itself in comparatively good financial condition and in position to develop the properties which remain. Mr. Everett has great faith in the Lake Shore Electric Railway property, and it will be his chief aim to develop this to a high earning capacity.

### The Westinghouse Extensions

The Westinghouse Electric & Manufacturing Company will begin immediately the construction of new buildings at East Pittsburgh, which will greatly increase the size of their works. The new buildings will be known as the east extension, and the plans for them were made two years ago, when it was seen that the natural development of this company's business would, about this time, make the additions necessary. The plans also require the building of a river wall along the banks of the Turtle Creek from a point near Turtle Creek station to Brinton station, below the works of the Westinghouse Machine Company. Arrangements have also been entered into with the Pennsylvania Railroad whereby a special railroad line will be built from East Pittsburgh to the new Westinghouse foundries, which are now being established at the town of Stewart, several miles to the east. This railroad will be built for the exclusive use of the Westinghouse companies. The construction of the new works has been entrusted to James Stewart & Company, of Pittsburgh, whose remarkable achievements in erecting, in record time, the new Westinghouse works at Manchester, England, have for several months been the theme of general attention in the English and American press.

The Westinghouse Machine Company is now building an extension to its works which will be devoted to the steam turbine department.

### "Perfection" Rail-Bond

The new bond to be known as the Perfection which has just been placed on the market is illustrated in the accompanying cuts, Fig. 1 and Fig. 2. Fig. 1 shows the bond inserted in the rail, and Fig. 2 the same bond after it has been expanded to fill the hole.

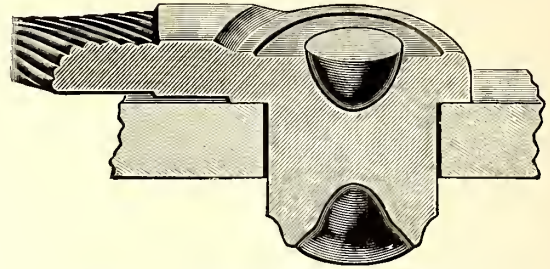


FIG. 1—"PERFECTION" RAIL-BOND.

The plugs shown in the bond terminal are of hard bronze and cast into the terminal. One of the plugs has a flange which forces the copper of the bond terminal out so as to form a riveted head. After the bond is placed in its hole in the rail the two plugs are

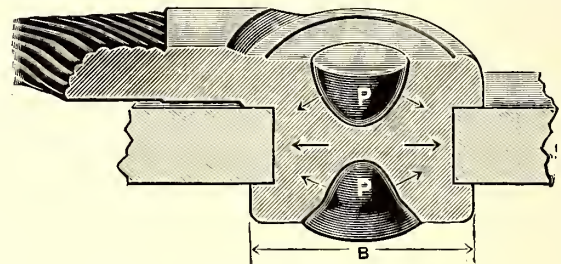


FIG. 2—"PERFECTION" RAIL-BOND.

pressed toward each other with a screw clamp, and the copper in the web between the plugs is forced out laterally 3-16 in. for every 1/4-in. movement of the plugs, as indicated in Fig. 2. The bond is being offered by F. B. Badt and G. M. Willis, of Chicago.

### "Trackless Trolley" for Franklin, N. H.

An ordinance granting a franchise for a "trackless trolley" system, an electrically operated bus line taking current from overhead wires, has been granted to Artemus D. Upham by the Franklin (N. H.) City Council. The first line, it is said, will extend between two steam railway stations at distant points of the town.

### Street Railway Patents

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

697,452. Car Truck; S. A. Crone, New York, N. Y. App. filed Aug. 22, 1901. The bolster is pivoted at the center so that it will tilt when necessary.

697,466. Railway Car Bolster; H. W. Frost, Detroit, Mich. App. filed Jan. 21, 1901. The ends of the bolster are tapered on the top and bottom, the metal of the ends being reduced so that the same amount of metal is retained while the cross section is substantially the same as that of the body portion.

697,531. Side Bearing for Cars; J. E. Norwood, Baltimore, Md. App. filed Aug. 12, 1901. The ball race runs upward at each end so that the balls will automatically return to their central working position.

697,572. Trolley Harp; T. N. Turner & G. R. Mitchell, Springfield, Ohio. App. filed Sept. 11, 1901. The bracket holding the wheel is swiveled to the end of the pole and anti-friction rollers are inserted to make the motion easy.

697,609. Means for Operating Tramway or Similar Points from Vehicles; W. A. Day, Southsea, England. App. filed Oct. 28, 1901. The flange of the wheel operates a pressure plate which throws the switch.

697,674. Automatic Trolley Catcher; T. B. Shanahan, Groversville, N. Y. App. filed Aug. 7, 1901. A spring drum takes up the rope when the trolley jumps the wire.

697,762. Car Fender; L. White, Baltimore, Md. App. filed Feb. 27, 1902. The fender is in two parts hinged on vertical pivots at each side of the dash. Springs throw them outward when an obstruction is encountered.

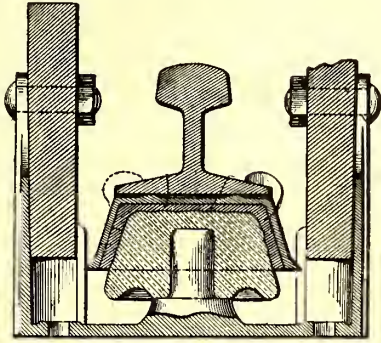
697,795. Brake-Shoe; P. A. Brawner, Chattanooga, Tenn. App. filed Aug. 22, 1901. Soft metal blocks are set diagonally in the face of a hard metal shoe.

697,817. Device for Electrically Connecting Rails; G. Deharde, Wiesbaden, Germany. App. filed Jan. 11, 1900. A hollow split plug holds the end of the bond to the rail.

697,828. Trolley Pole; F. L. Fowler, Philadelphia, Pa. App. filed July 11, 1901. The trolley pole is jointed near the middle, the parts being adapted to twist with respect to each other, permitting the wheel to assume a lateral position.

697,884. Trolley Pole; W. Pullman & C. C. Field, Sodus, N. Y. App. filed Oct. 11, 1901. Details.

697,890. Rail-Bond; B. C. Rowell, Chicago, Ill. App. filed July 21, 1900. A conical split tubular plug of a certain size with respect to the hole it enters in the rail.



PATENT NO. 697,930

697,892. Trolley Wheel; W. Sellers, Haverhill, Mass. App. filed Jan. 31, 1902. A trolley wheel having two hubs, an annular partition arranged between their ends, and two cylindrical bearings oppositely arranged so that their ends engage opposite sides of the partition.

697,930. Rail Chair and Insulator; W. D. Young, Baltimore, Md. App. filed March 5, 1901. A third-rail insulator having on its base extensions provided with one or more flanges to support a guard plank.

697,937. Trolley Wire Hanger; I. L. Edwards, Aurora, Ill. App. filed Jan. 29, 1902. Means for conveniently shifting the hanger along the stringer wire.

## ENGINEERING SOCIETIES

ENGINE BUILDERS' ASSOCIATION.—The spring meeting of the Engine Builders' Association of the United States will be held May 22 and 23, at Hotel Schenley, Pittsburgh, Pa. The programme is as follows: Meeting of the council at 10 a. m. on May 22; open meeting for hearing of papers especially prepared, 2 p. m., May 22; business meeting of the association, 10 a. m., May 23. The afternoon of May 23 will be devoted to a visit to the Westinghouse Machine Company's plant. At 8 p. m., May 23, the usual banquet will be held.

## PERSONAL MENTION

MR. L. W. WHEELER has resigned as general superintendent of the Camden & Trenton Railway, of Riverside.

MR. JAMES COX TOD, an engineer of Edinburgh, Scotland, is visiting this country to inspect street railway conditions.

MR. ALPHONSO L. DUNN, who has been prominently identified with the Terre Haute Electric Company, of Terre Haute, Ind., has resigned from that company to become general manager of the Union Traction Company, of Indiana.

COL. ALLAN C. BAKEWELL, general manager of the Sprague Electric Company and well known in electrical and street railway circles, has recently been elected second vice-president of the Pennsylvania Society of New York.

MR. GEORGE W. MCKISSON, claim adjuster for the Northern Ohio Traction Company, died at his home in Akron a few days ago. Mr. McKisson was formerly claim adjuster for the Detroit Electric Railway Company, and later general manager of the Chicago & Northwestern Street Railway Company, of Chicago.

MESSRS. FREDERICH FUCHS AND GEO. H. NICHOLAUS, of Strassburg, Germany, two engineers of the Imperial German Railroads, are in this country inspecting our practices in both steam and electric engineering. These gentlemen are mak-

ing an extended tour in the interests of the German government, and will remain a month or two on this side of the water. While more particularly associated at home with steam operation, they are both of them electrical engineers, and they will be particularly interested while here in heavy electric railroading. They do not expect to sail for home until they have visited Boston, Chicago, Philadelphia, Pittsburgh and other important cities.

MR. ARTHUR HOLLAND, formerly partner of Naylor & Company, metal merchants, of New York, Pittsburgh and London, and recently London representative of the American Steel & Wire Company and the Federal Steel Company, has been appointed acting president of the United Railroads of San Francisco. The full title of president will be given to Mr. Holland in case he sees fit to remain permanently in San Francisco. It is said that he will receive a salary of \$15,000 a year.

MR. J. B. HAMILTON, general manager of the Leeds Corporation Tramway, who has been making a short visit to this country, sailed for home on April 23. During his three or four weeks on this side he has inspected a number of large roads, and was greatly pleased by the courtesy with which he was received by the American officials and the facilities offered him for obtaining information regarding American railway practice. Mr. Hamilton was formerly assistant manager of the Glasgow system and has but recently been called to Leeds. The many friends that he has made while on this side of the water by his charming personality and hearty appreciation for all favors shown him will be glad to learn that he considers his recent visit a most pleasant and profitable one.

MR. EDWARD C. SPRING has resigned his position as superintendent of the Newton & Boston Street Railway and the Wellesley & Boston Street Railway, now part of the Boston Suburban Electric System, and has accepted a position as general manager of the Dayton, Covington & Piqua Traction Company, with headquarters at Dayton, Ohio. Mr. Spring is one of the best known and most efficient street railway men in the East, and his taking this new and much more responsible position will be a decided loss, not only to his own road, but to the railway interests of New England. His removal to Dayton necessitates his resignation as president of the New England Street Railway Club, which position he has held since the last annual meeting, and, in recognition of his valuable services to the club in the past, and the high esteem in which he is held by the members, a dinner was given to him before his departure for the West, at which Vice-President E. E. Potter, of the club, presided. At this dinner, Mr. Spring was presented with a handsome watch charm, and he also takes with him as a remembrance of his old home a diamond ring, the gift of his employees. The successor to Mr. Spring as superintendent has been selected and is Mr. N. S. Smith, superintendent of the Commonwealth Avenue Street Railway.

MR. H. E. HUNTINGTON, who, having disposed of his interests in the Market Street Railway, of San Francisco, to the United Railroads of San Francisco has retired as president of the company, is a nephew of the late Collis P. Huntington, and previous to his connection with the electric railway interests of California was prominently identified with the various steam roads owned by the Collis P. Huntington interests. Mr. Huntington was born at Oneonta, N. Y., and when but seventeen years of age entered the employ of a New York business house. He remained in New York only three years, however, for his uncle, who was then building the Chesapeake & Southern Railway, sent him to St. Albans, W. Va. Mr. Huntington did not remain with his uncle after the Chesapeake & Southern Railway was completed, but entered into business for himself at St. Albans. After the panic of 1873, which Mr. Huntington felt severely, he returned to New York, and after four years more of business in that city he again entered the employ of Mr. Collis P. Huntington, with whom he now remained up to the death of the latter. In 1880, Mr. Huntington assumed entire charge of the construction of the Memphis, Paducah & Northern Railway, and in 1884 he became superintendent of the Kentucky Central Railroad, which road he conducted in so masterly a fashion that in four years it controlled practically all of the passenger and freight traffic in and about Louisville and was sold to the Louisville & Nashville Railroad at a handsome profit. In 1892, Mr. Huntington became assistant to the president of the Southern Pacific Railroad, and from that time he has until quite recently been prominently identified with the steam railroad interests of California. Mr. Huntington now, however, with his numerous electric railway interests in that State, finds himself in competition for the traffic of the steam roads with which he was formerly connected. Among the roads with which he is at present connected are the Oakland Railroad Company and the Pacific Electric Railway Company.

## LEGAL DEPARTMENT

CONDUCTED BY WILBUR LARREMORE OF THE NEW YORK BAR

### Street Uses

The recent decision of the New York Court of Appeals in *Peck vs. Schenectady Railway Company* (170 N. Y., 298) calls attention to a question which is of considerable importance to street railway interests. It was held that an owner of a city lot, whose title includes the fee of the street, may restrain an electric railway company from laying its tracks in the street in front of his premises until it has acquired from him, and paid for, the right to do so. The right of the public to the use of the street, for street purposes, does not include its use by an electric railway, and such a use is an added burden to the property right of the adjoining owner.

The court divided by a vote of five to two upon the question whether a street railway use should be considered an ordinary or an additional street use, the majority holding that it was an additional burden. In his dissenting opinion Chief Judge Parker emphasized the fact that the courts of most of the other States of the Union had held that a horse car or trolley line use was a legitimate use of a street as such under modern conditions. The argument in support of this view is very simple, but not the less conclusive on the merits. In earlier times the grant to the public of easements, or rights of way, in land laid out as a road, but still owned in fee by the abutting owners, comprehended the right to journey upon such road by any method of transportation then generally recognized. As a matter of fact the horse car, and, later, the electric car, have largely superseded the stage coach, the saddle horse and the buggy. Under modern conditions the use of a street by trolley cars for the accommodation of the traveling public is fairly analogous to the use of the street by the more primitive modes of transportation. This, in effect, was the reasoning of Chief Judge Parker, and of Judge Werner, who concurred with him. This is the position, it is believed, that all the courts of the Union that have recently passed upon the question, except that of New York, have taken.

It happens that in New York in a comparatively early case (*Craig vs. Rochester, etc., Ry. Co.*, 39 N. Y., 404) it was held that a street railway use is *not* an ordinary street use, and that an abutting owner, who also owns the fee of the street to the center thereof, may restrain the construction of a railroad over the portion of the street he so owns. The real controversy in the latest case was whether the court would observe the obligation of technical consistency, that is, follow the so-called rule of *stare decisis*, or would take back its former utterances and put itself in line with other courts and the standard text writers.

The conservative disposition triumphed and the majority held that the technical owner of a section of a proposed roadbed might restrain the construction of the road. It should be noted that at the opening of his dissenting opinion Chief Judge Parker says: "I do not disagree with my associates as to the scope of the decision in *Craig vs. Rochester, etc., Ry. Co.*, nor do they disagree with my contention that the decision was a mistake. If the question were now presented to this court for the first time it would undoubtedly hold that the operation of a street surface railroad for the accommodation of passengers is a proper use, against which the owner of the fee to the center of the street has no legal ground of complaint, thus putting this court in line with the courts of other States in this country." This language is significant upon the probable attitude of the New York court toward future legislation in effect treating a street railway use in a particular case as an ordinary street use. The doctrine of *stare decisis* is simply that a court will adhere to a former judicial enunciation of a principle of law, because, although now deemed erroneous, because to depart from it might inflict great injustice upon persons who have relied upon it as a correct statement of the law. The Legislature has a right to change rules of merely judge-made law, and it would seem that no constitutional privilege would be violated if the Legislature of New York expressly treated the law as being what apparently all the judges of the highest court deem it ought to be.

The New York rule in question affects only cases in which the owner of land abutting a street owns also the fee of the street to the center thereof. In the borough of Manhattan there are three classes of streets, the so-called "Dutch streets," the so-called "English streets" and the streets which have been directly condemned and acquired by the city. The fee of the "Dutch" streets

and that of the streets so condemned is owned by the city of New York, and the scope of the present inquiry as to Manhattan Island is confined entirely to the "English" streets, the bed of which is privately owned. In the borough of Brooklyn to quite a large extent, and generally throughout the State, as it is believed, abutting ownership extends to the center of the street, so that the principle of the decision will apply.

Both by constitutional provision and by ordinary statute the people of New York have assumed to exercise authority over the laying and operation of street railroads. By the constitution (Art. III., Sec. 18) it is provided that "no law shall authorize the construction or operation of a street railroad, except upon the condition that the consent of the owners of one-half in value of the property bounded on, \* \* \* that portion of a street or highway upon which it is proposed to construct or operate such railroad be first obtained." As to the form of execution and effect of consents of abutting owners see N. Y. Laws 1895, Chap. 545; *Adee vs. Nassau Electric R. R. Co.*, 65 App. Div., 529.

In the decision of the Court of Appeals in *Peck vs. Schenectady Ry. Co.*, it was held that whether, in an action to restrain the construction of the road, the Supreme Court will award alternative relief, or compel the company to first acquire, by condemnation proceedings, the plaintiff's rights in the street, is discretionary with that court; and such discretion is not reviewable in the Court of Appeals, especially if there be a dispute or doubt as to the legal right of the defendant to acquire the title.

As bearing upon the discretionary power of the Supreme Court it is significant that in *Adee vs. Nassau Electric R. R. Co.* the Supreme Court intimated that, although an owner of the fee of a street who has not consented to the construction of a road therein may bring an action to compel the payment of damages, he has no right, where a majority of the consents of abutting owners has been procured, to prevent the construction of the road.

### LIABILITY FOR NEGLIGENCE.

ALABAMA.—Carriers—Street Railways—Passengers—Manner of Boarding Car—Negligence.

1. A party who gets onto the step of a street car before grasping the handholds on the body of the car and the platform, or either of them, and though, after being on the step, he catches the rear platform handhold with the hand furthest from it, having to reach across his body to do so—his right hand being incapacitated by reason of packages he is carrying—is not negligent, as a matter of law in such attempt to board the car.

2. A charge in an action against a street railway company declaring that, as a matter of law, it is not negligence for a passenger to attempt to board a street car in slow motion, is improper.

3. Where a count in a declaration alleges that plaintiff, while attempting to board an electric street car, was thrown between the cars and the evidence shows that after stepping on the platform of the car he was thrown under the car, it constitutes a variance.

4. Where a count of a complaint ascribes the injury to one attempting to board a street car to the negligence of defendant in allowing said car to give a sudden lurch while a passenger was attempting to board the car, and there is no evidence from which the jury had a right to infer that there was any sudden lurch, it was error to refuse to charge that, if the jury believed the evidence, they could not find for plaintiff on such count.—(*Birmingham Railway & Electric Co. vs. Brannon*, 31 Southern Rep., 523.)

CALIFORNIA. — Street Railways—Construction—Bonus—Contract—Consideration—Unilateral Agreement—Reasonable Compliance—Reasonable Time—Trial—Findings—Appeal.

1. Where appellants contended that a certain written contract did not contain all the conditions agreed on, but that there were oral agreements made by certain persons as agents of the appellees, but the finding of the trial court is adverse to such contention, both as to the agreement and as to the agency, and there is no evidence in the record tending to show agency, the findings must be deemed correct.

2. In an action on a note executed to a street railway company payable a certain time after the completion of its road, but with no time specified for the completion, a finding that the company "duly performed" the conditions required of it was equivalent to finding that it completed the road within a reasonable time.

NOTE.—Communications relating to this department should be addressed to Mr. Larremore, 32 Nassau Street, New York City.



3. The question of reasonable time was for the jury, or the court sitting as such, on the evidence of the case.

4. A contract to pay a railway company a certain sum on completion of its road, though unilateral, became binding after the company had acted thereon and purchased a franchise, and the promisor could not rescind without restoring the company what it had paid out on the strength of the contract.

5. A contract promising a certain sum to a street railway company after it should "build the road" to a certain place must be deemed to have been entered into with knowledge of Civil Code, Sec. 499, permitting two railways to use the same track for a certain distance; and therefore it was no defense to an action on the contract that the company did not "build the road" in full, but used a portion of a track constructed by another company.

6. The company's use of the track of another company was a reasonable compliance with the contract.

7. The stipulation for a double-track railway was not violated by constructing a single track where the railway turned a corner.

8. There was no failure of consideration, the consideration being performed when the railway was completed.

9. Where appellants promised a sum to a street railway company on completion of its road, and the court found that the company duly performed its agreement, the contention that its franchise was defective, without pointing out wherein the record disclosed any defect, will not be considered.—(Los Angeles Traction Co. vs. Wilshire et al. [L. A. 1003.] 67 Pacific Rep., 1086.)

CONNECTICUT.—Removal of Causes—Separable Controversy—Necessary Parties.

To a suit for the specific performance of a contract, which requires the transfer of stock in a corporation on its books to make the relief prayed for effective, the corporation is a necessary party, and its presence as a defendant, where it is a citizen of the same State as complainant, will prevent the removal of the cause by the principal defendant.—(Patterson vs. Farmington St. Ry. Co. et al., 111 Fed. Rep., 262.)

ILLINOIS.—Street Railways—Collision at Street Crossing—Negligence—Evidence—Defective Brake—Appeal—Review—Finding of Fact.

1. Where the appellate court has affirmed the finding of the trial court on disputed facts, and there was any evidence to support the finding, the supreme court is without power to review such evidence or finding.

2. In an action against a street railway company for negligently running against a person at a street crossing and failing to check the speed of the car, it was not error to receive testimony that the brake and controller of the car worked hard and were out of repair, when the court limited the effect of such evidence to the question of the manner in which the car should have been run when approaching the place of the accident.—(South Chicago City Ry. Co. vs. Purvis, Illinois 61, N. E. Rep., 1046.)

INDIANA.—Constitutional Law—Action for Personal Injuries—Pleading—Statute—Medical Care—Temporary Disability—Damages—Surgical Operation—Evidence—Admissibility—Contributory Negligence—Instructions—Measure of Damages—Loss of Companionship—Appeal—Excessive Verdict.

1. Act Feb. 17, 1899, dispensing with allegations negating contributory negligence in actions for personal injuries, is not unconstitutional as a special law regulating the practice.

2. In an action by a husband to recover damages on account of loss of services of his wife in consequence of defendant's negligence, failure to aver that he used reasonable diligence to provide medical attention and other care for his wife does not render the complaint insufficient.

3. Though, in such action, the husband alleges that the injury to his wife had resulted in her permanent disability, on its being shown that he was deprived of his wife's society and services, even temporarily, he is entitled to recover for such time as such disability lasted.

4. Evidence of the family physician that, in his opinion, a surgical operation might become necessary to relieve plaintiff's wife, as to the reasonable charge therefor, and of the expense of nursing in case such operation should be performed, is admissible to show the amount of damages.

5. Evidence that after the accident and injury plaintiff's wife did not sleep well, and was compelled to take medicine to induce sleep, was admissible.

6. In an action against a street railway company by a husband for injuries to his wife, caused by a defective board in the platform at one of the company's stations, evidence that the crowd of people on the platform prevented the wife from seeing the hole in the platform is not inadmissible as being the statement of a conclusion, and not of a fact.

7. Evidence on behalf of defendant to show that there was no

crowd; that on Sundays, at the hour at which the accident happened, but few people returned to the city by defendant's cars,—is inadmissible, as the term "few," as used and applied to Sunday travel on a street railroad, is very indefinite.

8. It is not error to refuse a requested instruction, the gist of which has been fully covered by other instructions.

9. A requested instruction in an action by a husband to recover for personal injuries to his wife resulting from a defective board in a platform at one of defendant's stations, declaring without qualification that the wife was guilty of negligence if she stepped into the hole or on a rotten board without looking or taking any precaution to ascertain the danger, may be properly refused, as the situation may have been such that she could not see the hole, or the appearance of the plank may not have indicated a defect.

10. The fact that a crowd on the platform awaiting a car pushed plaintiff's wife into the defective place will not shift the responsibility for the injury resulting, as defendant is bound to know that crowds would congregate on its platforms.

11. The question on the matter of damages to be recovered is what were the services of the wife to the husband reasonably worth, and an instruction that the jury should consider the amount the husband had accumulated in the past from the wife's services may be properly refused.

12. The burden of establishing contributory fault on the wife's part was on the defendant.

13. Though the complaint does not, in so many words, charge that in consequence of the injury to the wife plaintiff has and will be deprived of her society, where the averments disclose that such has been the result of the accident damages may be awarded for such loss.

14. Where in every part of the charge the jury are told that everything done by them must be done "under the evidence," an objection to a clause that damages for the loss of companionship, etc., might be given, in that it did not limit the damages to such as were shown by the evidence, is untenable.

15. Where the calculation on appeal in such action to show that the damages awarded are excessive does not take into consideration prospective loss occasioned by the permanent disability, the verdict will not be disturbed.—(Indianapolis St. Ry. Co. vs. Robinson, 61 N. E. Rep., 936.)

INDIANA.—Carriers—Street Railroads—Injury to Passenger—Complaint—Change of Venue—Dismissal of Action—Second Change—Objections—Motion for New Trial—Necessity—Review.

1. A complaint alleging that plaintiff alighted from a street car, and that, after the conductor had assisted her in alighting, he stepped back on to the car, and stepped on plaintiff's skirt, which had not been removed from the car step, by reason of which, as the car moved away, plaintiff was pulled to the ground, and sustained injuries, stated a cause of action.

2. Where, after a change of venue had been granted, plaintiff obtained leave to withdraw her complaint, and on the following day refiled the same in a court of concurrent jurisdiction, without paying the costs assessed on the voluntary dismissal of the prior proceedings, it was not error for the court to overrule defendant's plea in abatement of the second action on the ground that it was wrongful and vexatious, plaintiff having filed an affidavit that the second action was not vexatious, the presumption of vexation being overcome by the slightest countervailing evidence.

3. Legality of an order granting a change of venue attacked on the ground that it was the second change granted to plaintiff in the action, in violation of Burns' Rev. St. 1901, Sec. 417 (Horner's Rev. St. 1901, Sec. 413), declaring that only one change of venue shall be granted to the same parties from the same county, cannot be reviewed on appeal, where the error so alleged is not assigned as a ground for a new trial.

4. Burns' Rev. St. 1901, Sec. 416 (Horner's Rev. St. 1901, Sec. 412), declares that the court in term or the judge in vacation shall change the venue of any civil action on the application of either party, made on affidavit showing one of the following causes, to wit, etc.; and Sec. 417 (Sec. 413) provides that only one change of venue shall be granted to the same party from the same county. Held, that where a plaintiff, after having been granted a change of venue, obtained leave to dismiss her complaint, which she thereupon filed in another court of concurrent jurisdiction in the same county, and applied therein for a change of venue, the gist of the two actions being the same, it was error to grant such change, plaintiff having exhausted her statutory right.—(Citizens' St. R. Co. vs. Shepherd, 62 N. E. Rep., 300.)

INDIANA.—Street Railways—Public Crossings—Negligent Operation—Excessive Speed—Failure to Sound Signals—Collision with Vehicle—Contributory Negligence—Jury Questions.

1. Whether it is negligence to run street cars on the same track over a public crossing in a city, at an excessive rate of speed, in close proximity to one another, and without giving warning signals,

resulting in a collision with a vehicle, is a question for the jury under all the circumstances of the case.

2. Whether one whose team is damaged while he, after looking and listening, but not actually stopping, is trying to drive across parallel street railway tracks at a public street crossing in a city, at a time when his view in the direction of one track is obstructed by a car which has just passed on the other track, and while his ability to hear approaching cars is lessened by the noise of the passing car, is guilty of contributory negligence, is a question for the jury, the same high degree of care required at public street crossings of steam railways not being required at crossings of street railways.—(Marchal vs. Indianapolis St. Ry. Co., 62 N. E. Rep., 286.)

INDIANA.—Carriers—Injury to Passengers—Sufficiency of Evidence—Misconduct of Party—Objections—Appeal—Waiver.

1. Where no objection is taken to the misconduct of plaintiff in making a feigned and theatrical display of distress and emotion while on the witness stand, it will not be considered on appeal.

2. There was no evidence in an action by a passenger against a street railroad company for injuries that the defendant company owned or operated the road at the place where plaintiff was hurt, except a map by the railroad company which designated the railroad by name; and there was no evidence as to the existence of the defendant corporation, or that it owned or operated any railroad. The engineer making the map testified that certain lines designated the street railway tracks. Held, that a judgment in favor of plaintiff would be reversed.

3. Where appellant complains of the action of the trial court in giving certain instructions and in refusing requested instructions, but fails to give the pages and lines of the record where the instructions may be found, or to recite the substance thereof, as required by Sup. Ct. Rules 1889, rule 26, such objections will not be considered on appeal.

4. The failure of counsel for appellant to discuss an exception taken to the trial court's denial of an order requiring further answers to interrogatories constitutes a waiver thereof.—(Citizens' St. R. Co. vs. Stockdell, 62, N. E. Rep., 21.)

INDIANA.—Street Railways—Negligence—Personal Injuries—Pleadings—Amendment—Surprise—Release of Liability—Damages—Itemized Statement—Written Instruments—Consideration—Parol Evidence—Instructions—Cross-Examination—Specific Acts of Dishonesty—Discretion of Court—Objection to Evidence—Explanation of Purpose.

1. Where the complaint, in a personal injury action against a street railway company, alleged that plaintiff was thrown to the ground and injured by defendant negligently starting its car as plaintiff was alighting therefrom, without fault or negligence on her part, and no act was alleged from which negligence on plaintiff's part could be inferred, the complaint was not bad because containing no general allegation of freedom from contributory negligence.

2. The action of the trial court in permitting an amendment of the pleadings after the commencement of the trial is not a cause for reversal, without a showing that such action prejudiced or surprised the other party, or resulted in changing the issues.

3. Alleged defects in a pleading cannot be considered on appeal, in the absence of any showing that a ruling was made on a demurrer to such pleading.

4. Where defendant, in a personal injury suit against a street railway, pleaded a release, and plaintiff, in reply, alleged want of consideration, fraud, and non est factum, on the first and third of which issues the jury found for plaintiffs, failure to submit the issue of fraud to the jury was not prejudicial to defendant.

5. Defendant, in an action for personal injuries, is not entitled to have the jury itemize plaintiff's damages.

6. Where a written instrument was executed releasing a street railway company from liability for personal injuries, and reciting the receipt of a specified sum as consideration, parol evidence was admissible to contradict the recital as to consideration.

7. The jury having found that plaintiff did not execute the release, an instruction that the jury should find generally for defendant if they found that plaintiff received the sum specified as consideration for the release, and had never returned or offered to return it, and other instructions relative to the conditions of the contract, were harmless, even if erroneous.

8. Where upon cross-examination letters from the witness were offered which did not relate to the case at bar, but which were claimed to be incapable of any construction consistent with the witness' honesty, the admission of such letters was a matter within the discretion of the court, and their rejection no error unless showing an abuse of discretion.

9. Upon cross-examination letters from the witness were offered, an objection on the ground that they were not papers connected with the case was sustained, and no explanation made as to

the purpose for which the letters were offered. It subsequently appeared that they were not offered as connected with the circumstances of the case, but because supposed to be inconsistent with witness' general honesty, so that their admission was a matter within the discretion of the court. Held that, though an explanation of the purpose for which the evidence was offered was not necessary to prevent being concluded by the ruling on the objection, yet the absence of such explanation is a proper matter for the appellate court to consider in determining whether or not there was an abuse of discretion.

10. The exclusion of the letters did not show prejudice, partiality, or perversity of will, constituting an abuse of discretion.—(Citizens' St. R. Co. vs. Heath, 62 N. E. Rep., 107.)

LOUISIANA.—Street Railroads—Collision.

1. Not to look to see if a car is coming before attempting to cross the track of an electric car is negligence such as will preclude recovery for injuries caused by a collision with the car, in the absence of proof that the persons in charge of the car by the use of ordinary diligence might have avoided the collision.

2. Held, in this case, as a question of fact, that the motoneer was not negligent, and that he could not have avoided the collision by the exercise of ordinary care.—(Cowden vs. Shreveport Belt Ry. Co. (No. 13,902), 30 Southern Rep., 747.)

MASSACHUSETTS.—Street Railways—Driving on Tracks—Covered Wagon—Collision—Negligence—Contributory Negligence—Highway—Presumptions.

1. In an action against a street railway company for running down a wagon and throwing out and injuring one of its occupants, in the absence of special evidence that its tracks were laid over private land the jury would be warranted in presuming that they were laid in a public highway, and that, therefore, plaintiffs were not trespassers.

2. In an action against a street railway company for running down a wagon and throwing out and injuring one of its occupants, where the place of the injury was in a city, and was called "T. Street," and was spoken of in defendant's bill of exceptions as a highway, an objection that there was no evidence that the place was a public highway was untenable.

3. It is not negligence to drive a covered wagon in a public street containing street railway tracks, though the rear of the wagon is so closed with boxes and drawers that the driver cannot see out behind him through its interior.

4. It is not negligence to drive a wagon on and along street railway tracks, and such fact alone will not preclude a recovery for injuries due to the company's want of care.

5. One who is driving along a street railway track in a covered wagon closed at the rear does his duty if he gets off the track when he knows of the approach of a car, and he is not bound to keep an impossible watch on the rear.

6. A street railway company which runs down a wagon being driven along its tracks, and plainly visible in front of the car, is guilty of negligence or wilful wrong, in the absence of any special circumstances.

7. A street railway company which runs down a wagon and throws out and injures one of the occupants is not within St. 1898, c. 578, Sec. 11, requiring notice to be given such companies of injuries "suffered by any person in the management and use of its [the railway's] car tracks," and no notice to the company of the injury is necessary.—(Vincent vs. Norton & T. St. Ry. Co. (two cases), 61 N. E. Rep., 821.)

MASSACHUSETTS.—Street Railways—Repair of Streets—Surface and Paving—Excavations.

Under Pub. St., c. 113, Sec. 32, providing that street railway companies shall keep in repair the "paving, upper planking, or other surface materials" of the part of the street covered by their tracks, and in case of an unpaved street an additional space of 18 ins. on each side of their tracks, it is not the duty of such a company to fill excavations below the surface level of the street, within 18 ins. of its track, in an unpaved street, made by a sewer contractor by authority of the city; and, where injuries were sustained by reason of such an excavation, the street railway company was not liable.—(Leary vs. Boston El. Ry. Co. et al, 62 N. E. Rep., 1.)

MASSACHUSETTS.—Evidence—Declarations—Admissibility—Statutory Construction—Trial—Argument of Counsel—Exceptions—Request for Instructions.

1. A report of a physician, since deceased, describing the condition of a person injured in an accident at the time of visiting him for examination, is a "declaration," within Statute 1898, c. 535, providing that a declaration of a deceased person shall not be excluded as hearsay if made in good faith before the beginning of the suit, and upon declarant's personal knowledge, though it is in writing, and not by word of mouth.

2. A court is not required to interrupt an argument of counsel on the ground that the inference suggested by it is unsound, and

the opposing party, to save the question, must request an instruction that the evidence does not warrant such inference.—(O'Driscoll vs. Lynn & B. St. R. R., 62 N. E. Rep., 3.)

MASSACHUSETTS.—Insurance—Railroad Injuries—Indemnity—Contract—Construction—Instantaneous Death.

Where a policy provided that it insured plaintiff against loss from liability to any person accidentally sustaining bodily injuries while traveling on the railroad under circumstances which would impose on the insured a common law or statutory liability for such injuries, it did not indemnify the insured against a loss sustained by reason of a person being instantly killed without conscious suffering.—(Worcester & S. St. Ry. Co. vs. Travelers' Ins. Co., 62 N. E. Rep., 364.)

MASSACHUSETTS.—Street Railways—Injuries at Crossings—Contributory Negligence—Taking Case from Jury.

Where plaintiff, in the daytime, drove across the tracks of a street railway, on which he knew electric cars were running, without looking to see whether a car was coming or not, and knew nothing of its approach until it hit the hind wheels of his wagon, or until it was a rail off, it was proper, in an action for the injuries, to rule that plaintiff was not in the exercise of due care, and take the case from the jury.—(Hurley vs. West End St. Ry. Co., 62 N. E. Rep., 263.)

MICHIGAN.—Carriers—Personal Injury—Evidence—Witness—Argument of Counsel—Appeal—Harmless Error—Instructions.

1. Where plaintiff, on an objection to a question asked by him and answered by a witness, states that he will not insist on the question, and the defendant fails to except, an assignment of error based on the admission of such evidence will not be sustained.

2. Where it is not disputed that a witness for plaintiff was the conductor of the car in which plaintiff was a passenger, it is harmless error to allow him to detail a conversation with a third person, in which the witness stated that he could tell who was the conductor of the car.

3. Where plaintiff asks a witness if he did not state that he had heard that plaintiff had received a verdict of \$2,500, at a former trial, and defendant's counsel immediately states that such was not the verdict, and the court directs the jury that it should not consider the question as showing the amount of the former verdict, the question is not prejudicial error.

4. A street car conductor, examined as a witness for plaintiff in an action against the company for personal injuries, testified that he was discharged for incompetency, and defendant introduced evidence that he was discharged for not ringing up fares. Plaintiff's counsel argued that the company was remiss in leaving an incompetent man on the car. Held, that such statement was not prejudicial error as an argument that plaintiff's injury resulted from the general incompetency of the conductor, but was a comment on the testimony affecting the credibility of the conductor.

5. Refusal of an instruction that there was no evidence that the conductor was negligent, and that the defendant cannot be held liable for employing him, where there was evidence of such negligence, cannot be urged as error because incompetency was not alleged in the declaration, when that objection was not raised below.—(Leach vs. Detroit Electric Ry., 88 N. W. Rep., 635.)

MICHIGAN.—Trial—Impeaching Witness—Form of Impeaching Questioned—Evidence—Hearsay.

1. In an action for injuries sustained by being thrown from a street car, a witness denied that he had stated to a certain person that plaintiff got on the footboard of the car, but, before she could get in, the car started, and threw her off. The one to whom the statement was claimed to have been made testified that such witness said that the plaintiff was getting on the car, and was partly on, and the car started up suddenly, and threw plaintiff to the ground. Held, that a proper foundation had been made so as to render the impeaching evidence admissible.

2. Testimony that such witness had spoken of danger to plaintiff's mother, and other similar accidents, being hearsay and immaterial, was inadmissible for purposes of impeachment.

3. The incompetent evidence was not the less damaging because introduced as an alleged impeachment.—(Adams vs. Detroit Electric Ry., 88 N. W. Rep., 634.)

NEW JERSEY.—Street Railroads—Injury to Passenger When Alighting.

A passenger, in alighting from a street car at a temporary terminus selected by the defendant, stepped upon a stone in the highway, and sustained injuries for which she brought suit. The jury was instructed that the plaintiff could recover damages if the place selected by the defendant for her to leave its car was not a safe one for that purpose. Held, that this instruction was erroneous, because it did not submit to the jury the question of the defendant's negligence, which was the gravamen of the action.—(Foley et ux. vs. Brunswick Traction Co., 50 Atlantic Rep., 340.)

NEW YORK.—Carriers—Injury to Passenger—Negligence—Res Ipsa Loquitur.

Where a passenger on a street car was injured by the falling of a fire extinguisher fastened to the side of the car some 20 inches over her head, proof of such accident established a prima facie case of negligence against defendant, entitling plaintiff to recover in the absence of evidence explaining the occurrence.—(Allen vs. United Traction Co., 73 N. Y. Supp., 737.)

NEW YORK.—Street Railways—Injury to Passenger—Leased Track.

Plaintiff's decedent was riding on defendant's tracks on a car belonging to and operated by another street railway which had contracted with defendant to run its cars over the defendant's tracks, and while standing on the platform was struck by a tree growing near to the track. Held, that it was proper to direct a nonsuit, as he was not a passenger on defendant's road to whom any duty as such was owing to defendant.—(Sias et al. vs. Rochester Ry. Co., 62 N. E. Rep., 132.)

NEW YORK.—Injury to Child—Action by Parent—Evidence.

Where a mother sued two corporations jointly to recover damages for loss of her daughter's services and earnings caused by injuries through their negligence, and also for medical expenses incurred in the treatment of the daughter's injuries, held, that admission of complaint and judgment in an action by the daughter to recover for the same injury was fatally erroneous, where there was no evidence that the daughter in her action recovered for medical and surgical expenses.—(Sondheim vs. Brooklyn Heights R. Co. et al., 73 N. Y. Supp., 543.)

NEW YORK.—Street Cars—Street Sweeper—Personal Injuries—Motorman—Duty—Negligence of Motorman—Evidence—Sufficiency—Contributory Negligence.

1. A motorman on a street car must use reasonable care to avoid injuring a street sweeper; the latter having not only the right, but being required, to be in the street.

2. In an action against a street railway company for injuries received by plaintiff's decedent, a street sweeper, plaintiff's evidence tended to show that decedent was standing between the tracks; that the car approached rapidly, without warning, until within 10 feet of decedent, who then looked up, but could not avoid the injury. Defendant's evidence tended to show that the car was moving slowly, and the bell ringing; that decedent stepped back on to the track; and that the car could not be stopped. Held to support a judgment for plaintiff.

3. In an action against a street railway company for injuries received by plaintiff's decedent, a street sweeper, where plaintiff's evidence.—(O'Connor vs. Union Ry. Co., of New York City, 73 N. Y. Supp., 606.)

NEW YORK.—Res Judicata.

In an action by a partner to recover damages for personal injuries sustained by a collision, defendant cannot introduce a judgment recovered by the firm for the injury to the firm horse and wagon at the time of the collision.—(Cahnmann vs. Metropolitan St. Ry. Co., 71 N. Y. Suppl., 317.)

NEW YORK.—Injury to Infant—Same—Negligence of Driver—Same—Questions for Jury.

1. A child four years old, with his sister, nine years old, attempted to cross a street car track, when the car was distant from 50 ft. to 100 ft. The horses were going fast down an incline, and the driver was looking into the car, and without his hand on the brake. The child broke away from his sister, and was run over. Held, error to dismiss the complaint.

2. The conduct of the driver in driving rapidly along a city thoroughfare, without looking ahead, was grossly negligent.

3. The questions whether a girl nine years old, having charge of the child injured, was sui juris, and whether she was negligent, were for the jury.—(Goldstein vs. Dry Dock, E. B. & B. R. Co., 71 N. Y. Suppl., 477.)

NEW YORK.—Personal Injury—Obvious Danger—Contributory Negligence—Proximate Cause—Evidence—Sufficiency.

2. The fact that the car was running at an improper rate of speed is not sufficient to make the railroad company liable, as his placing his hand on the rail was the proximate cause of the injury.

3. In an action for such injury, parties working in the trench, who were not looking or listening for the car, testified that no gong on the car was sounded; but the sworn statement of the motorman, introduced by the plaintiff, was to the effect that the bell was rung. The conductor, a passenger, and another also testified to the latter effect. Held, that, in view of the position in which such laborers were placed and the work in which they were engaged, plaintiff's negative evidence was not sufficient to carry the case to the jury as against defendant's positive testimony. O'Brien and Hatch, JJ., dissenting.—(Nolan vs. Metropolitan St. Ry. Co., 72 N. Y. Supp., 501.)

## FINANCIAL INTELLIGENCE

### THE MARKETS

#### The Money Market

WALL STREET, April 23, 1902.

The position of the local banks showed a further decided improvement in the week ended last Saturday. An increase of \$860,000 in specie and legal tenders represented a small gain from the interior centers combined with a moderate excess of Treasury disbursements over receipts. The decrease of \$5,890,000 in loans, in the face of the heavy borrowings by the Stock Exchange, indicated that banking institutions outside the Clearing House Association and foreign banking representatives were supplying all the credit demands. In consequence of these two changes, surplus reserve rose over \$2,000,000, to a total of \$6,578,000—the highest level reached since the closing week of March. Careful critics of the situation, however, are laying stress upon the point that the \$44,000,000 decrease in loans at the Clearing House since March 1 has been more than offset, so far as the general state of credit expansion is concerned, by the heavy addition to trust company and out-of-town bank loans. They are disposed to argue accordingly that the situation at bottom has not improved during the last month and a half. It is a fact, nevertheless, that money conditions on the surface are decidedly easier than a fortnight ago, and that rates have steadily declined from an average of 6 per cent on call advances to an average of  $4\frac{1}{2}$  per cent. Time money, on the other hand, is more active and a shade firmer with  $4\frac{1}{2}$  per cent and  $4\frac{3}{4}$  per cent asked even on the best collateral. The season has arrived when currency turns backward in steady volume from the interior centers. This influx may be expected to continue until the crop-moving demand sets in toward the end of July. At the same time the relations of government revenue and expenditure are decidedly improved from the standpoint of the market, as compared with a month ago. The only points of danger in the situation are the possibility of further heavy loan increases through speculative operations in the stock market and the possible recall of foreign capital which has apparently extended its credits in this country very largely this spring. Neither of these contingencies, however, threaten any disturbance of the present satisfactory conditions during the near future.

#### The Stock Market

Dealings on the Stock Exchange during the last week have broken all this year's records for activity, and have approached to within measurable distance of the phenomenal total of a year ago. This increase in the volume of trading has partly represented the return of the public to an active interest in Wall Street affairs and partly the gigantic operations of the Western speculative clique whose buying of Louisville & Nashville ten days ago was mainly responsible for the present "bull" campaign. Violent advances have occurred throughout the stock list, succeeded by sharp relapses. But in general there has been no mistaking the fact that an upward movement of very large dimensions is under way. Stocks have undoubtedly risen in most instances to a level which makes them wholly speculative risks. But so long as the outside situation remains comparatively clear, and so long as the manipulation is all in favor of higher rather than lower prices, there is obviously more encouragement to buying than to selling. The crop news this week has been far from favorable, and indeed it has had much to do with increasing the desire to take quick profits wherever they are shown on speculative commitments. Dry weather lasting for as long as six weeks in many sections of the winter wheat belt has been followed by violent and scorching winds and abnormally high temperatures. The effects have unquestionably been destructive, but how much so is not yet clear. According to the latest report of the government weather bureau, which is regarded as an authority, the wheat crop position has deteriorated during the week, but the crops of spring wheat, corn and oats which went into the ground this spring are doing very well. It will be surprising if the incipient "scare" of the last few days goes much further, but the outcome of the harvests is of such critical importance this year to the whole business world that the stock market is bound to be unusually susceptible to all advices bearing upon the subject.

The local traction stocks have moved with a great deal of irregularity, even more so than the average of the general market. On Monday, for the first time, Manhattan and Brooklyn Rapid Transit were taken in hand and bid up very sharply. The advance was entirely speculative in character and was lost, for the most part, during yesterday's severe reaction in the general list. Nevertheless, the feeling in speculative circles is that these issues have not

yet had their advance. This feeling is based, however, rather on the reasoning that other stocks have gone up materially, while the traction group has not, more than upon any prospective development in their particular properties. Metropolitan continues heavy and neglected, showing the absence of outside buying. The "rights" to subscribe to the new Metropolitan Securities stock dropped as low as 5, but have since rallied to  $6\frac{3}{4}$ .

#### Philadelphia

There has been little worth commenting upon in the Philadelphia traction dealings during the week. Camden and Trenton Railway shares, which came into sudden prominence a week ago on rumors of the road being taken into the proposed through trolley line to New York, went up from 5 to 6 on Thursday and Friday, but subsequently lost three-quarters of their gain. Union Traction has merely kept steady around  $43\frac{3}{8}$  to  $43\frac{7}{8}$  on a considerably reduced volume of business. The prolonged absence of authoritative details concerning the proposed new lessee company has checked public interest in the stock. A good deal of the buying is traceable to the same houses that were active in the stock at lower figures. Talk of a possible increase in the dividend on American Railways has caused a sharp rise from 44 to 47, with trading more lively than in a long time past. Other transactions of lesser importance during the week include Consolidated Traction of New Jersey, of which 100 shares sold at 70, Philadelphia Traction at 98, Easton Electric at  $19\frac{3}{4}$  to  $19\frac{3}{8}$ , Germantown Passenger at 147, and Rochester Passenger common at 56. Sales of bonds included Electric-People's Traction 4s at  $98\frac{1}{2}$ , Indianapolis Railway 4s at  $86\frac{1}{4}$  up to 87 (a new high record), Citizens' Passenger of Indianapolis 5s at  $109\frac{1}{2}$ , Newark Passenger 5s at  $118\frac{3}{4}$ , Consolidated Traction of New Jersey 5s at 111 up to  $111\frac{1}{2}$  (also a high record for the season), Union Traction of Indiana 5s at  $101\frac{1}{2}$  and People's Passenger 4s at  $106\frac{1}{2}$ .

#### Chicago

The rise in Chicago Union Traction appears to be based less on local developments than upon the general display of speculative activity at the various centers of the country. The common stock has reached  $22\frac{5}{8}$ —the highest figure on the movement, while the preferred went up this week to  $58\frac{1}{2}$ . It is said that were it not for the excessive city taxes the company would resume payments on the preferred shares. Earnings are reported at the rate of \$60,000 to \$65,000 monthly. West Chicago is up a point to 101, and North Chicago has recorded some dealings at 195. No sales are reported in City Railway. The elevated securities have taken some part in the general speculative advance of the week. Lake Steel on heavy purchases rose from  $12\frac{1}{2}$  to  $13\frac{3}{8}$ , and Northwestern went up from 37 to  $37\frac{3}{4}$ . According to the opinion of high officials in the latter company, April earnings will not equal the record for March, but they will go considerably ahead of a year ago. The market for South Side shares has made no response to the decision of the State Attorney to institute quo warranto proceedings in the interest of the old company's shareholders who are claiming the right to the franchise.

#### Other Traction Securities

The rise in Massachusetts Electric which started two weeks ago has made further progress during the past week, the common advancing from  $43\frac{3}{4}$  to 45 and the preferred from  $96\frac{3}{4}$  to  $97\frac{3}{4}$ . Flourishing earnings continue to be the only reason apparent for the rise. The dealings have been unusually heavy. Boston Elevated on scattering purchases recovered from 164 to 167. West End issues are fractionally lower. United Railways of Baltimore securities were very steady during the week, but with no particular feature. The common is selling freely at  $16\frac{1}{2}$ , the income bonds at  $71\frac{3}{8}$  and the general mortgage 4s at 95. Other Baltimore transactions for the week comprise Norfolk Street Railway 5s at  $111\frac{1}{2}$ , Charleston Electric 4s at 89, Knoxville Traction 5s at 98, Lexington Street Railway 5s at 102, Richmond Traction 5s at 108 and Atlanta Railway 5s at 107. North Jersey Traction is 3 points lower on the bid price than it was a week ago, the bid quotation being 27. Syracuse Transit is quoted by New York specialists at 22 bid for the common, against 24 last week, and at 62 for the preferred, against 64. Rochester Railway shares have been in some demand on the New York curb. A hundred shares of the preferred sold yesterday at  $99\frac{1}{2}$ , against 99 the last previous sale. Nothing of importance has occurred in the local traction markets at Louisville, St. Louis and New Orleans. San Francisco issues in the New York outside dealings have kept fairly active, with prices generally little changed from last week. A hundred shares of the common sold yesterday at 25, and 500 of the preferred at

61½ and 61¾. The subscription privileges are steady around 102. Stocks of the Everett-Moore properties all advanced last week and show increasing strength. Detroit United was particularly active, 3360 shares selling at from 69⅞ at the first of the week to 74¼ at the close. About 700 shares of Northern Ohio common changed hands at 34½ and 35, an increase of 2 points over the previous week. Five hundred Cleveland Electric at 82½ and 82¾, a slight drop from last week. Three hundred and fifty of Elgin, Aurora & Southern sold at 41½ and 42, stationary price. Southern Ohio was quiet, in remarkable contrast to the week before, 100 shares selling at 63¾, a slight drop from the closing last week. Three small blocks of Western Ohio receipts sold at 23½, a gain of 2½ points over the previous sales. Monday 75 shares Northern Ohio Traction sold at 35. Fifty Cleveland Electric Railway sold at 82¾. One hundred and twenty-five shares Detroit United sold at 72½.

**Security Quotations**

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

	Closing Bid	
	April 15	April 22
American Railways Company.....	44	46
Boston Elevated .....	163½	166
Brooklyn R. T.....	65	66¾
Chicago City .....	a220	220
Chicago Union Tr. (common).....	20½	22
Chicago Union Tr. (preferred).....	56½	58
Cleveland City .....	..	105
Cleveland & Eastern .....	a20	30
Cleveland Electric .....	83	82
Columbus (common) .....	54	51½
Columbus (preferred) .....	*101	104¾
Consolidated Traction of N. J.....	70	70
Consolidated Traction of N. J. 5s.....	110¾	111
Consolidated Traction of Pittsburgh (common).....	..	24¾
Detroit United .....	69½	71
Electric-People's Traction (Philadelphia) 4s.....	98¾	98½
Elgin, Aurora & Southern .....	40¾	38
Indianapolis Street Railway 4s.....	86	86¾
Lake Street Elevated .....	123¾	127¾
Manhattan Ry. ....	132½	134¾
Massachusetts Elec. Cos. (common).....	43½	45¼
Massachusetts Elec. Cos. (preferred).....	97	97¼
Metropolitan Elevated, Chicago (common).....	39½	39¾
Metropolitan Elevated, Chicago.....	91	90
Metropolitan Street .....	b153	151½
New Orleans (common) .....	31½	31¾
New Orleans (preferred) .....	108¼	108¼
North American .....	125	127¾
Northern Ohio Traction (common).....	33	35
Northern Ohio Traction (preferred).....	..	85
North Jersey .....	30	27
Northwestern Elevated, Chicago (common).....	37	37¼
Northwestern Elevated, Chicago (preferred).....	85¼	85¼
Philadelphia Traction .....	98	98
St. Louis Transit Co. (common).....	30½	30
South Side Elevated (Chicago).....	113	a114¼
Southern Ohio Traction .....	63½	a67
Syracuse (common) .....	24	22
Syracuse (preferred) .....	64	62
Third Ave. ....	130	130
Toledo Railway & Light .....	..	21½
Twin City, Minneapolis (common) .....	120¼	122¼
United Railways, St. Louis (preferred).....	83	82¾
United Railways, St. Louis, 4s.....	88¾	88
Union Traction (Philadelphia).....	43¾	43½

\* Ex-dividend. † Last sale. (a) Asked. (b) Ex-rights.

**Iron and Steel**

Transactions in the iron market are confined to scattering purchases for immediate delivery, for which more or less fancy premiums are exacted. As a rule, the mills have contracted for their requirements a long ways ahead, and this satisfaction of the demand, taken together with the extreme shortage of supplies on hand, forms a deadlock which is both interesting and extraordinary. Attempts to import foreign pig iron have been abandoned, because after payment of the duty there is no profit in it. But imports continue in moderate quantity of steel billets and steel rails. Current quotations are purely nominal and do not represent the basis on which the scattering trades which make up now the principal part of the business are being made. They are as follows: Bessemer pig, \$19 to \$19.75; steel billets, \$31 to \$32; steel rails, \$28.

**Metal**

Quotations of the leading metals are as follows: Copper, 11¾ cents bid, offered at 12¼ cents; tin, 27½ cents to 27¾ cents; lead, 4.10 cents to 4.15 cents; spelter, 4 7-16 cents.

BIRMINGHAM, ALA.—The Birmingham & Steel Cities Railway & Power Company, formerly the Steel Cities Railway Company, and a consolidation of the Steel Cities Railway Company and the Warrior River Power Company, will increase its capital stock from \$500,000 to \$1,000,000.

CHICAGO, ILL.—It is reported that the suit brought by Sutro Brothers to set aside the lease of the Chicago Consolidated Traction Company to the Chicago Union Traction Company has been settled out of court, and that the Sutro interests receive 80 for the stock controlled by them, as against 45 offered in the original exchange of stock for guaranteed bonds.

CHICAGO, ILL.—Attorney Charles A. Munroe, representing a number of the stockholders of the old South Side Rapid Transit Company, who claim to have been "frozen out" of their holdings in the railway line by the transfer under foreclosure of the property of the old company to the South Side Elevated Railroad Company, is projecting the commencement of quo warranto proceedings against the company looking toward ousting it from the control and operation of the line. The case of the initiators of this action is based on a recent Supreme Court decision, which the attorney asserts declares that the franchise of the old company was not subject to transfer under the foreclosure sale.

PITTSFIELD, MASS.—The Berkshire Street Railway Company has petitioned the Railroad Commissioners for authority to issue bonds to the amount of \$550,000.

SPRINGFIELD, MASS.—The Springfield & Eastern Street Railway Company has petitioned the Railroad Commissioners for authority to issue mortgage bonds to the amount of \$350,000 for the funding of its floating debt, the purchase of new equipment, real estate, etc.

BOSTON, MASS.—The Boston News Bureau says: "March gross earnings of the companies controlled by the Massachusetts Electric Companies aggregated \$410,000, an increase of \$28,000 over earnings of March, 1901, equal to 7 per cent."

DETROIT, MICH.—The gross earnings of the Detroit United Railways for March were \$260,822, compared with \$222,162 for March, 1901, a gain of over \$1,000 per day.

DETROIT, MICH.—The gross earnings of the Detroit & Port Huron Shore Line Rapid Railway for the month of March were \$24,998, compared with \$20,143.70 for the same month last year.

TRENTON, N. J.—The United Railway, Power & Electric Company, capital \$6,000,000, has been incorporated here by Nelson R. Vanderhoof, W. Mands Greene and Edward Cuddy, of Jersey City.

ROCHESTER, N. Y.—The Rochester & Sodus Bay Railway Company has filed with the Secretary of State a certificate stating that it has increased its capital stock from \$1,000,000 to \$1,750,000.

AUBURN, N. Y.—The Auburn Interurban Electric Railroad Company has filed with the Secretary of State a certificate of increase of capital from \$250,000 to \$1,000,000.

MARCELLUS, N. Y.—Edward Moir, of Marcellus, has been appointed receiver of the Marcellus Electric Railroad Company in the mortgage foreclosure proceedings brought by the American Trust & Savings Bank, of Chicago. Mr. Moir is vice-president of the company.

CLEVELAND, OHIO.—Judge Wing, of the United States Circuit Court, has practically agreed to permit Receiver Lang, of the Lake Shore Electric Railway Company, to issue receiver's certificates to the amount of \$293,000 to carry out necessary improvements. This expenditure will place the system in fairly good condition, and will enable cars to be operated through without change from Cleveland to Toledo. The court held that the expenditures should only be such as are absolutely necessary for preserving the property and to make more secure the floating indebtedness. The certificates are to be a first lien upon the portions of the property concerned as follows: Sandusky, Norwalk & Southern, \$27,225; Toledo, Fremont & Norwalk, \$10,000; Lorain & Cleveland, \$5,995; Sandusky & Interurban, \$149,780. This condition arises from the fact that, while the roads are consolidated so far as the stock is concerned, the underlying bonds have not been protected by a blanket issue. The chief improvement necessary consists of extending the alternating-current system to provide for the division between Norwalk and Lorain. To this end two sub-stations and the necessary wiring will be installed at an expense of \$110,000, and about 600 hp of boilers will be added to the Fremont power station. The improvements will be made as soon as possible, and it is expected that when the through service is in operation the road will easily earn at the rate of \$650,000 per year.

LIMA, OHIO.—The Lima Electric Railway & Light Company will meet April 24 to consider the advisability of increasing the capital stock of the company from \$500,000 to \$850,000, and to consider the question of amending the charter to acquire or construct a plant for producing steam heat and power.

CLEVELAND, OHIO.—The gross receipts of the Toledo & Western Railway for the month of March were \$10,897. The freight earnings of the road have nearly doubled within the last three weeks. The March earnings were large enough to pay the operating expenses and fixed charges, leaving a surplus for stock.

DUBOIS, PA.—The Dubois Traction Company is reported to have sold its property to New York capitalists. The sale includes the entire equipment, together with the electric light plant and contracts for lighting the city for eight years. The consideration is not made public.

ALLENTOWN, PA.—The stockholders of the Lehigh Valley Traction Company voted unanimously last week in favor of the proposition to issue \$500,000 of preferred 7 per cent stock to make needed improvements to the system. A quarterly dividend of 1 per cent has been declared on the common stock.

MILWAUKEE, WIS.—The Milwaukee Electric Railway & Light Company has declared the regular dividend of 1½ per cent, payable May 1.

