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Union Opposition to Trolley Mail Cars

When it was proposed several years ago to employ street cars for carrying mail objection was raised by labor unions as soon as it was found that interference with the operation of these cars would be punished by the Federal Government. It is undoubtedly because of this experience that the present movement to have mail boxes attached to trolley cars is so vigorously opposed. Prominent labor unionists complain, according to a press despatch, "that the use of the street cars as regular mail carriers will mean that striking employees of the street railway companies will not be able to obstruct the free movement of the cars without laying themselves open to punishment for interfering with the United States mails," and a member of the American Federation of Labor is quoted as saying: "We shall oppose any proposition that looks to furnishing the protection of Federal Courts and troops to the operation of a private enterprise employing a large number of workmen, under the guise of protecting the mails." This is not the attitude of honest men engaged in legitimate occupation and employing lawful means for their own protection. It is the logical position of the lawbreaker, the rioter and the striker who would use intimidation and force in gaining their ends, and even resort to bloodshed, violence and the destruction of property. The fact that the law is opposed on the grounds stated by representatives of labor unions is a very good reason for strictly enforcing such statutes as may apply to those who obstruct the operation of cars. The attitude that the radical labor leaders have taken toward encouraging the nullification and open violation of existing laws should be met with firmness. We do not believe that these men faithfully represent the great body of American workmen, but in any event they must be taught a wholesome respect for authority.

Electrical Power for Railroads

The current number of the "North American Review" contains an interesting article by Cornelius Vanderbilt on the future of electricity as a motive power on steam railroads. As might be expected the author does not foresee any great future for electrical power on trunk lines. The principal reason upon which Mr. Vanderbilt bases his argument is that the transportation of freight is, after all, the controlling factor in the situation, as it is from this item that most of the revenue of the usual trunk line comes. According to Mr. Vanderbilt the advocates of electric power have not yet demonstrated that freight traffic can be cared for at a less rate per "ton-mile" with electricity than with steam, consequently the former does not possess much chance of adoption until a saving in this department of railroad operation can be demonstrated. If passenger traffic only is considered, Mr. Vanderbilt admits that the question assumes a different aspect, and that after a certain density of traffic is reached the fuel cost may be so reduced and the facilities afforded in the way of speed and frequency of trains so increased as to warrant the introduction of electricity.

We will not stop to inquire now whether this density of traffic does not exist on many portions of trunk lines in the neighborhood of large cities. We believe that it does, and that a good electric suburban service on some of the railroads which center in New York or Chicago would show results which would surprise steam railroad managers. These results might, perhaps, not be so much in the direction of reduced operating expenses per "car mile" as in an enormous increase in net earnings due to higher speed, better train service and the many other advantages accompanying the use of electric traction, and we look for an early demonstration of this fact through the proposed electric suburban service on the New York Central Railroad, with which Mr. Vanderbilt's family has been prominently identified for so long. We prefer, however, to call attention to one point in connection with this subject, the importance of which steam railroad managers do not yet seem to realize fully, and that is the effect of frequency of train service on gross earnings, even in the item of freight. The unit "ton-mile," as given by Mr. Vanderbilt, and as generally



employed on steam railroads, is irrespective of the time taken to transport that ton from the shipper to the consignee. We are not yet prepared to state whether the freight earnings from a frequent train service would show the same percentage of increase as that experienced in the case of electric passenger service, but that there would be an enormous advantage to all concerned if the railroads could handle freight economically in short train loads can hardly be denied. The experience of the express companies that shippers will frequently pay three or four times the regular freight rates simply to insure quick transportation and delivery indicates that the element of time is often as essential in ordinary business affairs as in the C. G. S. system. It not only saves the insurance and interest on the investment of articles in transit, but what is more important will frequently create a traffic in perishable goods and also save the retailer from the necessity of keeping a large reserve stock of standard goods, with attendant warehouse expenses, trans-shipment charges, etc. Experience with the electric freight business in Ohio has demonstrated, without possibility of doubt, that frequency of freight train service increases the amount of business and creates new lines, for the same reasons that have been shown to exist in the case of the transportation of passengers. We do not mean by this that the steam locomotive is yet doomed to the scrap heap, or that a half-hourly express service would necessarily be profitable on a trans-continental line. But in many cases it will pay, and if it is not installed by the steam railroad companies at the points where it will be profitable it will be by the competing electric railways.

#### Local Transportation and the Central's Terminal Plan

An interesting feature of the terminal plan of the New York Central & Hudson River Railroad Company, which has an important bearing upon the subject of improving the transportation facilities of New York and its suburbs, is the provision that has been made for connection with the Rapid Transit subway system at Forty-Second Street. An examination of the plans shows that of the new tracks which the company proposes to lay under the roadways of Park Avenue the outer one on each side will be gradually depressed from a point near Fiftieth Street below the grade of the other tracks, and, running under the Grand Central Station, will connect with the express tracks of the subway company. It has been assumed heretofore that it was intended to give the Central's suburban passengers the benefit of easy transfer to and from the underground rapid transit trains, but the proposed arrangement will enable the company at any time to make an actual traffic connection. In order to carry out such a plan provision must be made for the sale of suburban tickets at subway stations, but only at express stations, which will be few. Some modification would also be required in the Central's rolling stock, as the large and heavy cars of the type now in use on steam roads cannot run through the subways. Schedules would also have to be adjusted so as not to interfere with the natural operation of the subway system, and doubtless there would be other complications, but details may be worked out after the essential condition of track depression along Park Avenue has been secured. Such a plan may not be adopted for some time to come, if, indeed, it is ever found needful or desirable, but it is evident that the railway companies and the Rapid Transit Commissioners are looking ahead, and that whatever plans are approved to-day must contain ample provision for the city's future.

#### Traction

There are times when the trend of engineering practice along certain lines has a general shaking up by the introduction of some new principle. The whole tendency of modern practice in electric traction has been to distribute electric motors over a large number of axles in order to get traction for accelerating purposes. If the experiments with magnetic devices for increasing the traction between rails and car wheels, which are noted elsewhere, are as successful as present appearances would indicate, it is likely to make much difference in the electric locomotive practice of the future as well as in the braking possibilities of the

present. An increase of 350 per cent in the tractive effort of a 15-ton electric motor car, with an expenditure of only  $2\frac{1}{2}$  hp in electrical energy, is something to make electrical engineers rub their eyes and wonder why the matter was not worked out before. To be sure, the field was a very unpromising one, and we are informed that at the beginning of the experiments the amount of wire and electrical energy required to produce anything like a satisfactory increase in traction between wheels and rails was something enormous, the results being correspondingly discouraging.

The success of the present arrangement is explained by the utilization of certain principles of the magnetic circuit, which are not commonly considered in connection with the design of magnetic devices, together with some better-known and thoroughly established principles used in dynamo design. That a short magnetic circuit is necessary to maximum efficiency has long been recognized. It is not, however, so generally known that the reduction of the cross section of a magnet at its point of bearing on the armature which it attracts greatly increases the tractive effort. For example, in the experiment on this magnetic traction apparatus it was found that the pull required to lift a car wheel from a rail, with the coil energized, was much greater with the ordinary car wheel than with a wheel which had a flat surface planed upon it, if this flat portion rested upon the rail. To this principle is undoubtedly due much of the success of the apparatus under discussion; otherwise, the small area of contact of a car wheel upon the rail would prohibit its success.

Taken altogether it is a matter of much interest, both in its bearing on electric railway engineering problems and on the design of magnetic apparatus.

#### Labor Unions in Politics

The recent collapse of the street railway strike in New Orleans made it necessary for the labor leaders in that city to take effective measures toward revivifying the movement, and they have decided that the quickest way to do this is by getting the workingmen involved in a political controversy. The local conditions lend themselves very readily to this plan, and consequently it has been determined that the labor unions of the city shall go into politics. Hereafter the members are expected to cast their ballots, not necessarily in accordance with their own views, but to meet the wishes of the leaders. The excuse for this action is found in the late difficulties, the car men holding that they would have won a signal victory had not Governor Heard and Mayor Capdevielle taken the side of the company. Under the new regimen, it is confidently asserted, no one having political ambition will dare run counter to the demands of the politico-labor bosses. The key to the political situation in Louisiana is the poll tax. No one can vote in the next State and city elections, which occur in 1904, unless he pays the poll tax for 1902 before Jan. 1. In order to vote the entire strength, the Street Car Men's Union has offered to pay out of its treasury all the poll taxes of its members, 1500 in number. The other unions have followed its example, and it now looks as if every union man in New Orleans will have his poll tax paid for him, and thus be entitled to the ballot. On the other hand there is no one to pay the poll taxes for the non-union voters, and unless they do so themselves they will be disfranchised. Less than 11,000 citizens have so far fitted themselves for the franchise, of which nearly half are union men. The Street Car Men's Union has adopted resolutions calling upon all members to take part in politics, in all primaries and elections.

\* \* \* \* \*

The New Orleans organization would do well to take a leaf from the experience book of its co-worker in the field at Richmond, Va. The union in the latter city is an educational force; it has undertaken a series of meetings for the instruction of the members in their duties toward their employers, the public and the union, and judging from recent reports of their meetings there is a conservative element in the organization sufficiently strong to defeat any such measures as those now advocated at New Or-



leans. One speaker declared: "I have no sympathy with the people who tell us we ought to start a new party and revolutionize the politics of our city. Politics has no place in our labor meetings. Labor organizations must foster a feeling among their members such as is found among the Odd Fellows." A second speaker, who had been an employee of the company about eleven years, said: "If we don't treat ourselves, our union, our employers and the public right, we can't expect them to treat us right. Give the company what belongs to it, treat the passengers courteously, and the company won't want to see our union broken up, and no one can break it up." Again: "Let us have confidence in our officers and our employers, and stick to and uphold them, and we will be more successful." The secret of the success of the Richmond union lies in the fact that its officers and members have not been blindly led by designing and interested politicians.

\* \* \* \* \*

There is one feature of the plan proposed at New Orleans that must be viewed with indignation and alarm by self-respecting workingmen, whatever their condition or affiliation, namely, the idea of disposing of the union vote in bulk. We do not believe that these self-styled leaders can deliver the goods, but aside from the resentment and humiliation an intelligent voter must feel at such an outrageous attempt to disfranchise him, as is practically proposed in New Orleans, there is grave danger to the community and the labor organizations, too, through the opportunity which this power places in the hands of unscrupulous men, that it will have a demoralizing influence and result in wholesale corruption in municipal politics. These conditions present a problem which merits serious consideration, and as similar symptoms have been discovered in other quarters it might be well for those who are now philandering with reform to turn their attention to this matter.

#### The No-Seat-No-Fare Campaign

We learn that a concatenation of presumably well-meaning ladies has been formed in this city with the avowed object of taking up this venerable hue and cry. Heretofore similar kickers have taken it out in talk, and perhaps such will be the real issue of the present movement, but the promulgators have started out with the threat to purchase control of one of the transportation companies and then run the system according to their own sweet will, provided matters are not remedied soon. If this should not bring the offenders to terms, or should otherwise prove impracticable for any reason, the *soi disant* reformers propose to appeal to the legislature or other powers that be. To do the crusaders justice they have modified the original howl somewhat, and suggest half fare for those who stand. Just what half fare is to mean they do not deign to state, and we are quite in the dark as to whether they may contemplate 3 cents or 2 cents; whether they expect Uncle Sam to coin a 2½-cent piece, or desire the conductors to carry cutting pliers to facilitate making change. As in most campaigns of self-appointed reformers this has as its basis a single pile of justice driven in a slough of nonsense. The average man or woman knows nothing, and cares less, about the difficulties of traffic management on a great street railway system. He has a touch of dyspepsia and straightway tackles the first grievance that he can find with an energy that should be put to better use. If he has to hang to a strap for a few blocks he curses the street railway company; if a shower comes in summer he howls for closed cars to be supplied then and there, and if there is a warm day about Christmas he demands open ones—always howls for the thing which is evidently not at hand.

\* \* \* \* \*

The complaint of inadequate seating accommodations is one which has at its basis the undoubted fact that the patron of a street car line frequently has to stand during the rush hours for part of his journey. This has as its cause the desire of everybody to hurry over the same line at the same time. A record by hours of the number of passengers carried by the surface lines in any large city would show some very surprising figures. One gets a

vivid idea of the facts by inspecting the load curve of a power station during the peak, but even this gives but a faint idea of the real rush, since there is a large and somewhat variable substratum of load which cannot be charged to any increment of passengers carried. In actual practice the street railway companies do make strenuous efforts to rush on all available cars to meet the daily jam, but the more cars there are the more people simultaneously desire to ride, and there finally comes a point when the available facilities are exhausted. They might, of course, be still further increased, but it will usually be found to be the case that any effective increase would do more harm than good by increasing the congestion. It is small comfort to get a seat if thereby one gets into a blockade and loses time. There is a practical maximum for the mere number of cars that can be effectively worked over a given line in the heart of a city, and there is no doubt that a mass of cars sufficient to give every passenger a seat during the busiest part of the day would prove utterly unmanageable and woefully inconvenient. We should like to see it tried just once, on Broadway for example. Unless we are greatly mistaken the result would be a mob of enraged citizens, all late at dinner, and breathing out threatenings and slaughter against the soulless corporation that ran those cars. It is again the old story of everybody trying to occupy the same space at the same time. The secret of rapid transit is so to distribute the traffic as to prevent its convergence at a single time and place. This is the direction toward which the newly-formed "Car Passenger Rights Association" in New York, and other similar bodies in other cities might more profitably direct their attention. Let them exercise their utmost endeavors to induce their male relatives to travel to and from their places of business before or after the "rush hours," during which time it is safe to say that they would stand a much greater chance of obtaining the seats for which they seem so anxious. This plan, however, would hardly suit the average American, who is constitutionally in such a hurry that he guides his progress through space more by impulse than by judgment. If he is on his way to reach a destination he jumps on the first conveyance which will take him there, whether he is actually in a hurry or not, and if it is a crowded street car, will inveigh against the company audibly or inwardly for the entire journey. On his arrival he will sit down and write to the "Daily Scold," denouncing the management and demanding full municipal management, although one-tenth of the time taken in writing the letter, if devoted to waiting on the street corner for an empty car, would have insured a seat.

\* \* \* \* \*

The fundamental difficulty in preventing over-crowding in street cars lies less in the difficulty of providing sufficient cars than in the reasonable control of those who use them. The Continental system of refusing passage after all the seats are taken would irritate the average denizen of our cities more than standing occasionally, although after getting used to it he might calm down a trifle. In many cities in this country the plan is rigorously enforced as regards the open cars, and with pretty satisfactory results. It is, of course, the duty of every street car company to make reasonable provision for the traffic that may properly be expected, and if then a sudden crowd overwhelms a particular car or group of cars, it must either be taken on so long as standing room lasts or refused entrance. But the proposition to charge standing passengers no fare or half fare is nothing less than ridiculous, and moreover it would lead to the most obnoxious kind of crowding, for it would promptly be taken as a convenient method of getting rides at half price. We could wish no more fitting punishment for the particular aggregation of ladies who have raised the present wail than to travel under compulsion in cars run on their own approved plan, with the half-fare contingent walking over their pedal extremities. The only plan which would ensure seats for all is the Continental practice, and we shudder to think of the language that would be used by those left by the wayside.



### The Brooklyn Rapid Transit Employees' Benefit Association—Some Interesting Features Concerning Its Organization and Methods of Work

The social betterment of the employees and the establishment of more friendly trustful relations with the officers of all large enterprises is now receiving from the managements more marked attention than ever before. Movements with this end in view,



BILLIARD ROOM IN CROSTOWN DEPOT

wherever they have been undertaken, have invariably aroused the interest and sympathy of the more intelligent classes of the men, and in many cases have had their active support. Where the co-operation of the men has not been secured the cause has usually been that they did not fully understand the objects and aims of the work, or were not in accord with the methods to be employed. To be successful any work of this kind must proceed upon the principle of co-operation with the men. They must be made to feel that they are a factor of equal importance with the management in the development and carrying out of the plans which are eventually to become of mutual advantage to both.

President Greatsinger is one of those who believes thoroughly in a closer and more cordial relationship between the officers and the employees, and that the best results can be obtained for both when there exists between them a spirit of mutual confidence and trust. It is now generally recognized that one of the great problems of railway management is for the manager to gain and hold the respect, confidence and loyalty of his men. That President Greatsinger possesses in an eminent degree those kindly qualities of heart and that sunny cheerfulness of disposition which enable him successfully to do this was clearly shown by his cordial friendly relations with his employees, of low and high degree, on the road over which he presided for many years before coming to Brooklyn. Having worked his own way from the lower ranks his employees know that he is no stranger to hardships and long hours of toil, and that they will always find in him a patient and sympathetic listener to the stories of their crosses and trials, and that he will take an active interest in smoothing over the rough places in their daily lives. When he assumed the management of the Brooklyn Rapid Transit Company he found the conditions ripe for carrying into effect plans similar to those he had successfully adopted in the West. To understand the situation properly the reader is reminded that not very long ago the roads now comprising the Brooklyn system were operated under separate

managements, whose interests were not identical. At one time there was a distinct feeling of antagonism between the employees of the competing companies, such as would naturally result from the long continued strife between conflicting interests. At the time of consolidation there was no community of interest among the men belonging to the constituent companies. In fact, they looked upon one another as aliens, and it required considerable time and no small amount of tact to cement them together in friendly and brotherly relations. One of the first means adopted

to bring them together was the organization of base-ball teams from different parts of the system, and the playing of match games, of which the officers of the road were always interested spectators. For several years the officers or some of the directors personally contributed the money to equip the base-ball teams. Three of the directors each gave a pool-table, and one of the directors contributed a piano for the equipment of local club rooms at the different depots. The company installs and maintains these local club rooms wherever possible, and furnishes light, heat, water, etc. At several of them the company installed first-class bowling alleys, which, with the billiard and pool-tables and shuffleboards, seem to attract the chief interest of the men. The photographs shown herewith are typical views of the local club room at the "Crosstown" depot in the Greenpoint section, at the corner of Manhattan Avenue and Box Street, on the second floor of the car house. This depot has about 700 men, and at times the large club room, 35 ft. x 120 ft., and the bowling alley adjoining, are crowded to the full capacity. This club room has four pool-tables, one double shuffleboard, a piano, a gramophone, horizontal bars, punching bags, chest weights, dumb bells, Indian clubs, etc., and the reading table is filled with the popular magazines and papers and several of the technical railroad journals.

The penny charges exacted for the use of the pool tables, shuffleboard and bowling alleys are sufficient to pay for attendance of porters, pin boys, etc., and in some cases to provide for the maintenance and repairs of the equipment.

Soon after assuming the management of the Brooklyn system



BOWLING ALLEY IN CROSTOWN DEPOT

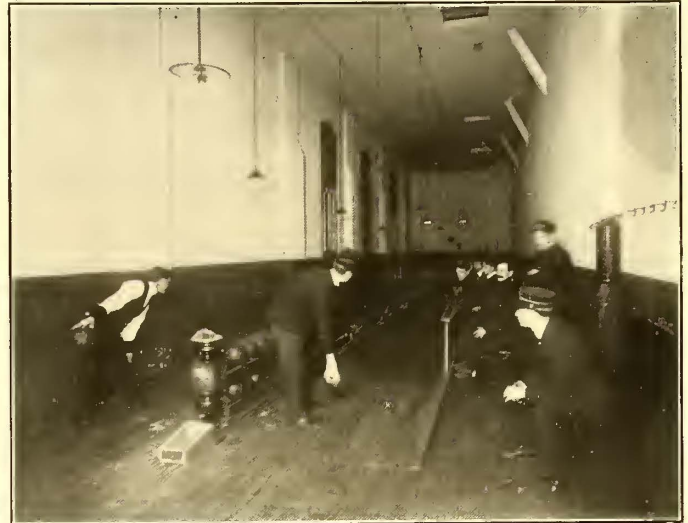
President Greatsinger took an active part in carrying into effect plans, which had for some time been under consideration, for the organization of an association of the employees. As a preliminary step he secured the services of J. M. Dudley to act as secretary and devote his entire time to the association work. Mr. Dudley is himself a railroad man, having been a brakeman and conductor on the Chesapeake & Ohio Railroad, and, like his chief



is in sympathy with the aims and aspirations of the workers among the rank and file. Many years ago he became associated with the work of the Young Men's Christian Association among railroad men, and just previous to coming to Brooklyn was the secretary of a railroad men's association in Chicago, having among its membership representatives from several of the largest railroad systems entering the city. The wisdom of securing Mr. Dudley's services has been demonstrated by the ability he has displayed in infusing the men with a fraternal feeling toward one another and toward the officers of the company, and by the happy faculty which he possesses of encouraging, by precept and example, a more wholesome robust manhood. Gradually and naturally, and as rapidly as the conditions seem ripe for it, the methods which the Young Men's Christian Association has so successfully applied elsewhere among railroad men will be inaugurated in Brooklyn. As is well known this work is not bounded by any denominational lines, and in fact it can hardly be called a religious work, but is purely an effort toward the up-building of mind and body and the establishment of a higher, cleaner standard of individual character. For such purposes all right-minded men can unite and work together. This feature of the association work on street railways was first inaugurated in Brooklyn, and shortly afterwards in Rochester, N. Y., and the example will undoubtedly not be lost upon other railroads that are studying the social and industrial betterment of their employees.

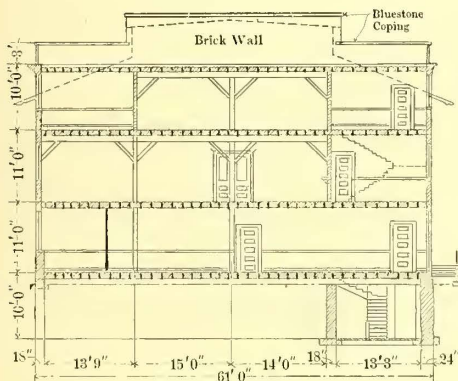
The association in Brooklyn, which forms the nucleus for the work of the Young Men's Christian Association, is known as the Employees' Benefit Association. It was organized not by the officers and subordinate officers, but by the men themselves, under the advice and guidance of the officers. One of the most important features of Mr. Greatsinger's methods of organization is that in all those combinations of effort by which the men are to be benefited

Young Men's Christian Association, assisted by others of the same training, will conduct for the men the affairs of the benefit association and apply to its social and educational work the same successful methods which have stood the test of time and experience on the

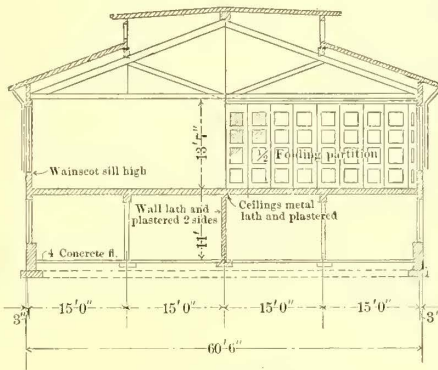


BROOKLYN RAPID TRANSIT EMPLOYEES' RECREATION ROOM

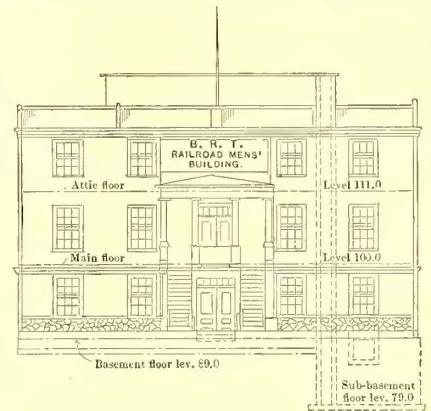
steam railroads. The benefit features are free medical attendance and reduced price of drugs, \$1 per day sick benefit, with suitable restrictions, and \$150 in case of death. It is evident that in many



Transverse Section through Employment Bureau looking toward rear.



Transverse Section looking toward rear.



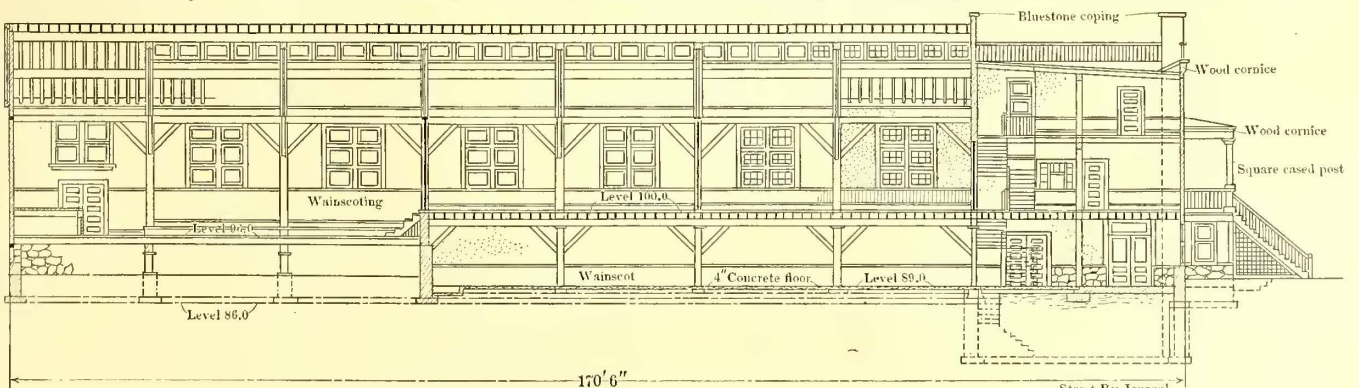
Front Elevation.

Street Ry. Journal

ELEVATION AND SECTIONAL DRAWINGS OF NEW CLUB ROOMS

the executive officers of the road take but little active part, and then only in an advisory capacity. He believes that if the men are left to themselves and choose their officers from the operating force with which they are so much more closely connected, a much

cases the absence of doctors' bills for minor ailments will more than cover the annual dues of \$6 and the initiation fee of \$1. Valuable privileges in the handsome central club house about to be erected by the company for the association work goes with the



LONGITUDINAL SECTION OF CLUB BUILDING

firmer foundation is made upon which to build an association for mutual benefit. He, therefore, holds no office in the benefit association, the president being the general superintendent of the road. The Young Men's Christian Association has no official connection with the benefit association, and it is mentioned in connection with the benefit association because a man, trained in the methods of the

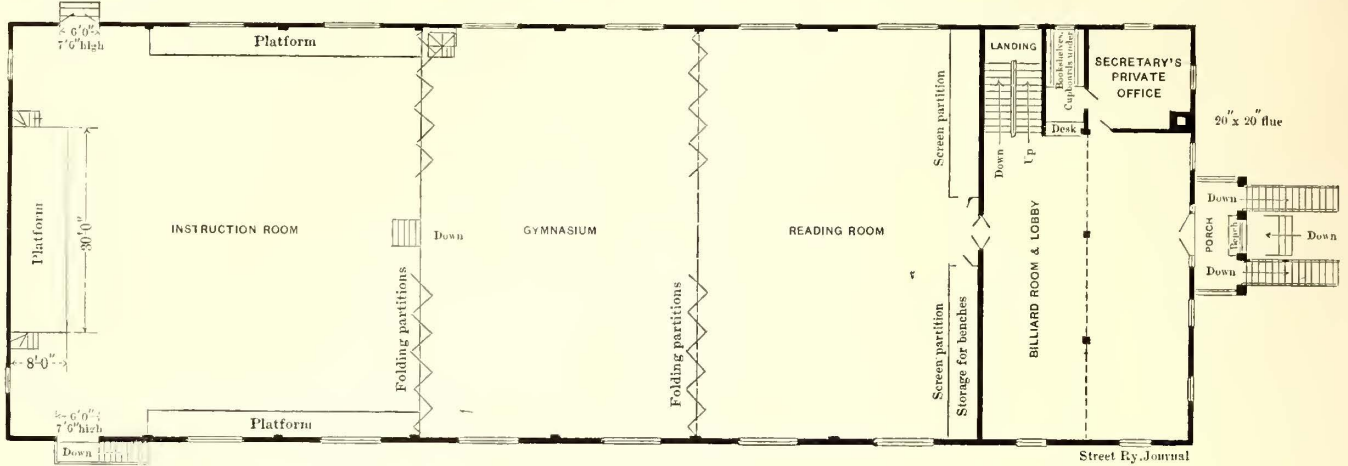
membership. When the association was organized the company contributed \$2,000 to its treasury, and agreed always to pay the salary of its secretary. The new central headquarters, which is soon to be built, and which is described herein, will cost upwards of \$30,000. The company also proposes to provide and equip local club rooms at those depots and terminals that are now with-



out such facilities, at a cost of several thousand more. Those who talk about the soulless nature of corporations will do well to make a note of these facts.

Within six months after the organization of the association it had taken in over 3000 members, and this number will probably be doubled within another year. The association, after paying the organization expenses and the running expenses, including several death benefits and many sick benefits, ended the first six months with a cash balance of about \$4,000 in its treasury. The men in organizing happily made special provision for taking in as charter members all of the old superannuated employees who

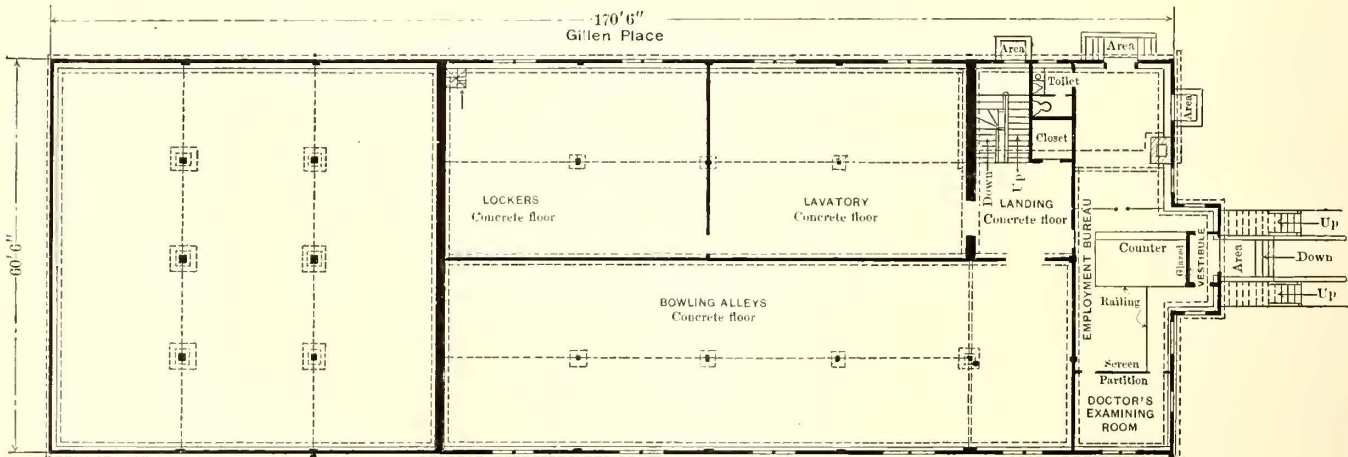
room. The game room has four billiard and pool-tables, a shuffleboard and numerous small games, such as checkers, dominoes, chess, etc. The reading room is to be provided with plenty of popular books, papers and periodicals and technical railway journals. It is the intention eventually to have a good circulating library, from which books may be drawn and sent to members regularly in any part of the city. The reception room will have a pianola, contributed by the former president, C. L. Rossiter, who was always much interested in the welfare of the men. The gymnasium is expected to be up to date in every respect. It will be provided with Indian clubs, dumb bells, chest



SECOND FLOOR PLAN

had served the company long and faithfully, and who were beyond the established age limit of fifty years. Partly in consideration of this, and for other reasons, the company guaranteed the financial integrity of the association, and should it be called upon will see that all of the obligations are met. In the April 12, 1902, issue of this paper there appeared a description of the proposed central headquarters, which it was planned to locate at Ridgewood. On account of finding a better location at East New York it has been decided to erect there a separate building in close proximity to the terminals and shops of the surface and elevated lines for the exclusive use of the association, and it is expected that the building will be completed early in the coming spring. It will be of

weights, muscle developers, horizontal bars, parallel bars, vaulting horses, spring boards, tumbling mats, jumping bars, trapeze, flying rings, traveling rings, ladders, basketball and handball courts, etc. A competent physical director will conduct classes in physical culture on certain days of each week. It will be noticed that the gymnasium is immediately over the locker room and baths, and communicates with them by means of a stairway, thus giving convenient access for the devotees of physical culture to be one of the most completely equipped of its kind in the country. It is to have two skeleton car equipments, one representing the surface and another the elevated railway equipment. They will



BASEMENT PLAN

frame construction, except the front walls surrounding the association offices, which will be of brick. It will be three stories in front and two in the rear, with dimensions 60 ft. x 170 ft. It will be seen from the floor plans with shown herewith that the first and second floors are devoted to the association work. The employment bureau for the system occupies the front of the basement floor, but is separated entirely from the association rooms. The remainder of the basement floor is devoted to the bowling alleys, the lavatories and the locker room. There are two pairs of (four) alleys, built and equipped in the most modern fashion. The baths and locker room are immediately adjoining the alleys. The baths, as is usual in association work, are mostly showers. The men prefer running water, with the opportunity to vary the temperature as often as desired.

The second floor, as indicated by the plan, contains the secretary's office and lobby, the reception and reading room, the game and billiard room, the gymnasium and the instruction or class

have precisely the same kind of apparatus as those in regular service, and all the working parts, including the wiring and the electrical and mechanical details, will be exposed to view, so that the men can have a practical demonstration of the working of the entire apparatus. There will be an instructor to explain the elementary principles to the novices and to give them information concerning actual operation, including the rules and regulations of the road. From time to time lectures will be given to the old as well as the new men, and made interesting and instructive by practical illustrations of the several points covered. Educational work is to be made one of the leading features at these rooms, and the classes will bring the employees into actual contact with the other desirable features of the association. The partitions on the second floor are folding or removable partitions, the idea being to throw all the rooms together, making a seating capacity for over 1000 persons, when needed for large affairs. The association will give a course of vaudeville entertainments and lectures

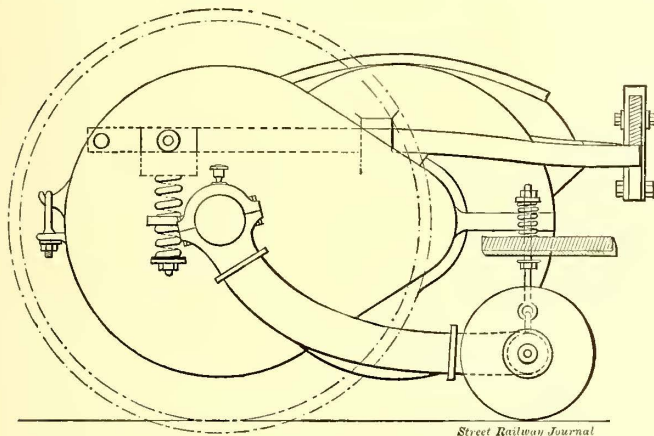


during the year, which will be free to the members. Such occasions may be taken advantage of by the officers of the road when they desire to meet and talk with "the boys."

Up to the present time the association work has shown its great value by bringing the men from the different divisions together and placing them in friendly social intercourse with one another and with the officers of the company. There is manifested now a truly fraternal feeling, where before there was suspicion and distrust. The free semi-weekly excursions for the men and their families, which went to Rockaway Beach by special train service, contributed by President Greatsinger during all of the hot months of last summer, seemed to be one of the valuable agencies for bringing men and officers together, and it was done under the association auspices. A bowling tournament is now being conducted, in which fifteen teams, including one from the general office, are striving for the honor of winning one of the several handsome prizes, costing from \$5 to \$50, for the individual scores and \$200 for the team scores. In all of the efforts of this kind which are making for the mutual good of the employer and the employee, the restraining, refining and uplifting influence of the Young Men's Christian Association workers is quietly and unostentatiously being exercised, and it is safe to say that no individual who comes in contact with that influence will be injured thereby.

### Increasing Traction by Magnetism

Some interesting experiments have been made at Seattle, Wash., the last two years on electric railway trucks equipped with devices for increasing, by means of magnetism, the adhesion of the wheel to the rail, or in other words the traction. The results which have been obtained are somewhat remarkable, and may be of far-reaching importance in railroad work. The apparatus has been



PLAN AND SECTION OF AN ELECTRIC TRUCK WITH MAGNETIC ADHESIVE DEVICE

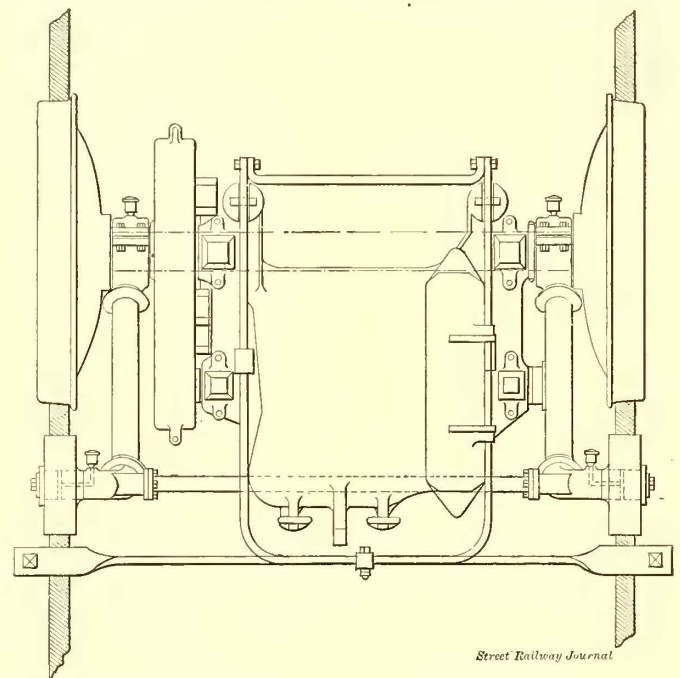
much perfected since the first experiments, and its weight, as well as the amount of energy required to energize it, seem to be well within practical requirements. Furthermore, it obviates the necessity for important modification of existing trucks or motors, which will, of course, be an important consideration with the management of roads already equipped.

Herewith are presented diagrams showing the magnetic equipment of a truck now in Seattle, placed on all four wheels of a double-truck 15-ton car, equipped with two 50-hp motors. On each side of the motor, between the motor casing and the wheel, is a bearing which supports an arm, upon which the magnetizing coil of wire is wound. The other end of the arm carries a wheel without any flange, which rolls along the rail when the device is in operation, and is held  $\frac{5}{8}$  in. above the rail by springs when the coil is not energized. The object of this arrangement of an idler wheel upon the rail is to give a short magnetic circuit. The lines of force in this case, of course, flow from the arm to the car journal and wheel, from the car wheel to the rail, from the rail to the idler wheel, and hence through the coil-wound arm. Some earlier experiments attempted to dispense with the idler and make simply a magnetic circuit from one car wheel to the other through the rails; but these arrangements required a great deal more electrical energy than the present one. With an expenditure of  $2\frac{1}{2}$  hp in electrical energy, to magnetize the four coils, an increase in tractive effort of 350 per cent is obtained, and, what is still more remarkable, the tractive effort does not fall off when the wheels begin to slide or spin, but, on the other hand, increases slightly. This is accounted for by the generation of eddy currents in the wheel and rail when slipping takes place.

This increase in tractive effort being due to magnetic attraction

between the wheel and rail is by no means an equivalent of an added weight which would give the same traction. In order to demonstrate this a car was loaded with a weight which would give it a tractive effort 350 per cent greater than the empty car. The current required to propel the car on the level was noted; the current required to propel the empty car under the same conditions without the magnetic adhesion device, and finally the empty car was run with the magnets energized. It was found that the increase in power required to propel the car on the level, with the magnetic device in action, over that needed when the magnets were not energized, was only 23 per cent of the increase required to propel the car loaded with a weight which would give it 350 per cent increase in tractive effort without the aid of the magnetic device. The difference between 23 per cent and 100 per cent, therefore, would represent the difference between the rolling friction of the wheel on the rail with magnets in action, and the bearing and rolling friction caused by an increase in dead weight sufficient to give 350 per cent increase in traction.

In the tests at Seattle, which were made by the division master-mechanic of the Northern Pacific Railroad, it was found necessary to grease the rails and wheels with axle grease in order to bring the slipping point of the wheels down to the limits of the motor capacity when the magnets were energized. The draw-bar pull upon this greased rail before the wheels began to slip was 1500



lbs. It was increased to 5250 lbs. upon the energizing of the magnets.

It will be seen from the drawings of the truck that the device does not take up an unreasonable amount of space on the axle, though, of course, it would be somewhat crowded with larger motor equipments, and in some cases might preferably be mounted on the truck frame rather than on the axle. It is proposed to use this device to increase the traction of steam and electric locomotives as well as electric motor cars. In electric railway operation, as at present carried on, probably the most valuable feature of this improvement is the increased braking power it affords for emergency stops, especially when the rails are slippery and for controlling the car on grades. An increase in tractive effort of 350 per cent is by no means to be despised. According to modern methods, with motors on every axle, there is not as great need for increase in traction during acceleration as there would be if the motive power were concentrated at one point in the train, yet there is a possibility that the use of a magnetic device of this kind will modify the present tendency to distribute motors throughout the train, and will tend to a more extensive use of electric locomotives for certain kinds of service. The electric locomotive, equipped with magnetic traction-increasing apparatus, would have its traction so increased that the necessity for distributing motors throughout a train would not be as great as at present. It greatly increases the possible train weight an electric locomotive can start without increasing the locomotive weight.

This apparatus is now controlled by the Magnetic Equipment Company, of Chicago, and the invention is credited to A. A. Honey, formerly of Tacoma, Wash.



### New Repair Shops of the Brooklyn Rapid Transit Company

Some twenty or more years ago an extensive series of plans were made for improving the steam railroad facilities of Long Island, and one of the features of the scheme was an immense terminal station at Thirty-Eighth Street and Second Avenue, Brooklyn. This station was erected by the South Brooklyn Rail-



INTERIOR OF SHOP

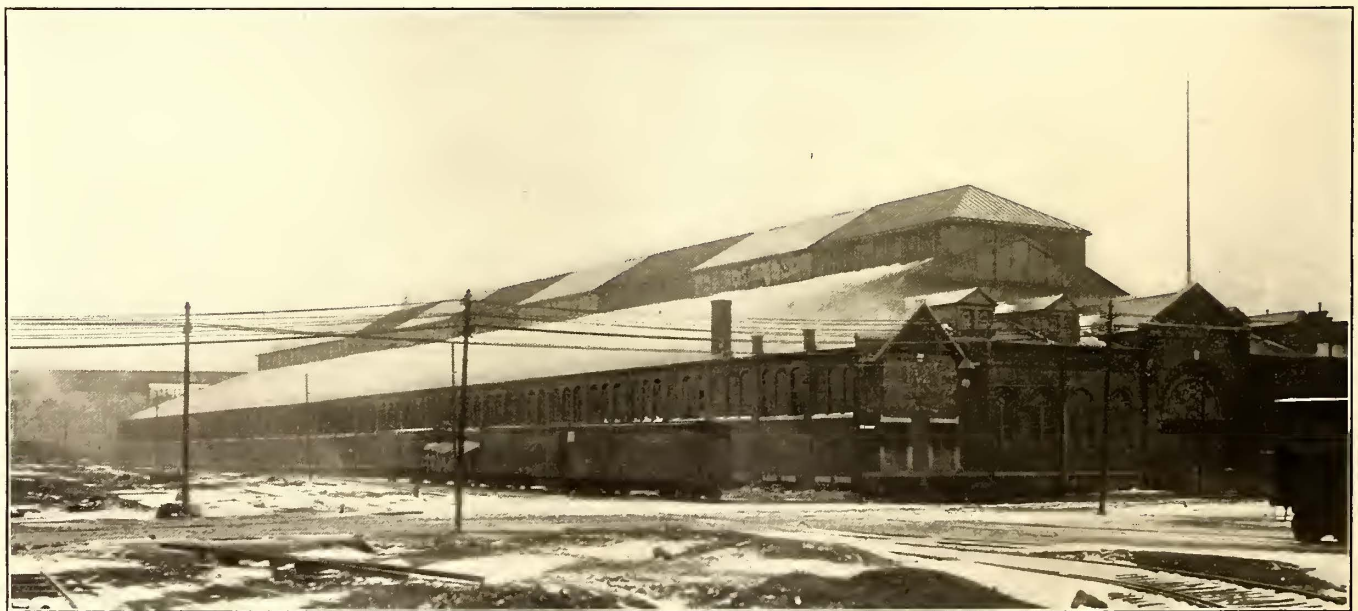
road & Terminal Company as the enterprise was called, but was never used, and has remained practically idle for many years. The property was acquired by the Brooklyn Rapid Transit Company a year or more ago, and has been since used as a shed for the storing of cars. Plans have now been perfected, however, for transforming the structure into what will probably be one of the most extensive and convenient repair shops in the country.

It is expected in the near future to rebuild and equip 240 of the steam coaches at present used on the elevated with motors. These cars are to be considerably changed, in order to conform with the standard elevated equipment used since the introduction of electrical operation on the road. The platforms will be lengthened to

cently taken on the ground, show the present general appearance of the building and the state of the work of changing it into a repair shop. The shop is 148 ft. 6 ins. wide, and 513 ft. 4 ins. long. At the Second Avenue end there is a partition about 44 ft. from the end, which encloses what was originally intended as a waiting-room. It will be used as a carpenter shop. At one end of this space, which is two stories high, in the corner of the building, offices have been partitioned off, and along the second story a balcony will extend across the building, from which an inspection of the whole shop can be readily made.

There are eight tracks in the station. The ground is now being broken for a concrete filling, which will be evened off level with the head of the rail, making a hard, smooth floor for the shop. A novelty of the construction is that the roof is supported on trusses that extend entirely across the shop, leaving the interior free from posts. The track on the south side of the building is to be extended so as to run out by a slight grade to Second Avenue. This track will be used for bringing in supplies, etc., and none of the repair work will be done upon it. The next two tracks have a pit running their entire length, and will be used for truck and motor work. Tracks 4, 5 and 6 will be used for the wood work. The last two tracks, 7 and 8, will be used by the painters. Along the north side of the building the station platform, which was one of those originally intended for use by passengers, has been left, but at the south side the floor has been evened off at the same level as the rest of the floor space. At the east end of the building there is to be built at the side of the first track a high platform about 50 ft. long for receiving goods on flat cars. At both sides of the building a platform is to be placed about 8 ft. wide and 8 ft. 8 ins. below the roof. These platforms will be supported by brackets underneath, and their outer edges will be hung from iron rods. The platform on the north side will be used by the wiremen, and that on the south side for the storage of light parts of the equipment. Over the two pit tracks will be two traveling cranes, supported on rails suspended from the roof trusses, as shown in the cross section. These cranes will be provided with two air hoists on transverse travelers. About the floor between the other tracks are suspended platforms upon which the workmen can stand while rebuilding and painting the cars. These platforms are hung from the roof trusses. At the west end of the building a transverse traveling crane, 55 ft. in length, traverses the entire width. This crane will be capable of picking up a complete car body and moving it to any track desired.

The windows at the north of the building are unobstructed, but at the south the windows in the walls are darkened by buildings built on the adjoining property. In order to give more light,

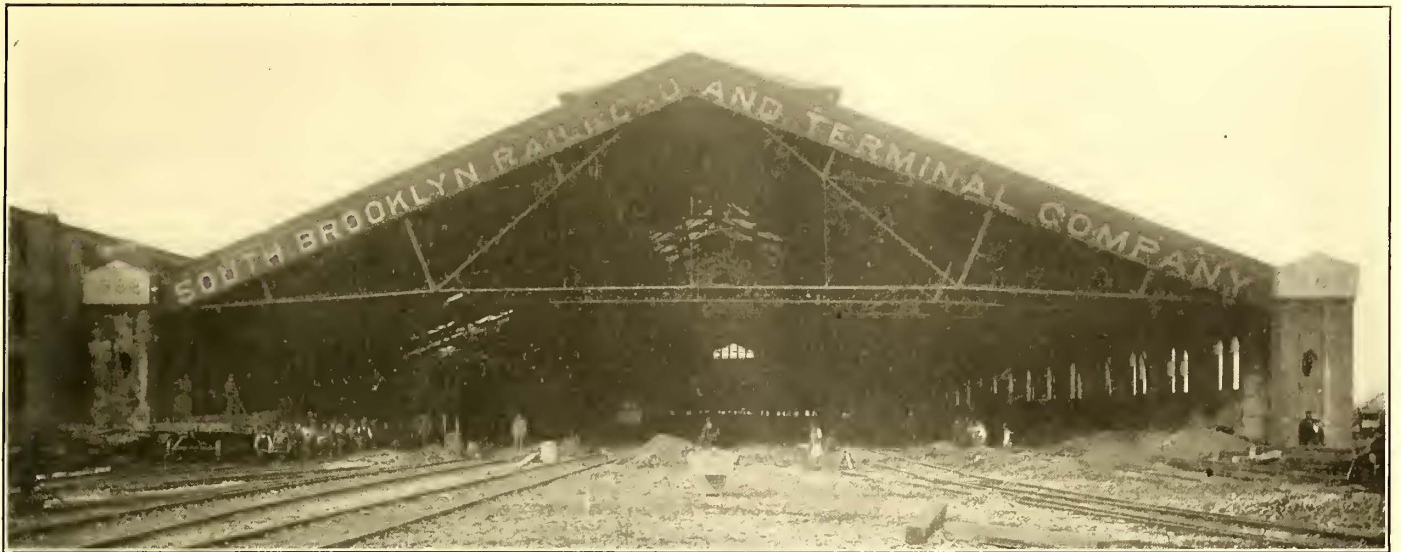


GENERAL VIEW OF TERMINAL STATION BEING MADE INTO REPAIR SHOP

4 ft. 1 $\frac{3}{8}$  ins. from the present dimensions of 3 ft. 2 ins., necessitating the changing of the hoods, etc. Additional sills will be placed under the car to strengthen the present side sills, and new trucks will, of course, be required. The present shop facilities of the road are entirely inadequate to handling this immense amount of work, and the old station of the South Brooklyn Railroad & Terminal Company was thought of as a solution to the problem. The idea was immediately put to use, and the accompanying half-tone engravings, which are reproduced from photographs re-

therefore, to this part of the shop openings are being made in the roof, and skylights will be introduced. The central part of the structure is lighted by a monitor running the entire length of the roof. The top of this monitor consists of sections alternately glazed and solid, about half the surface being glazed. The sides of the monitor, which are now only partially glazed, will probably have sash placed in them for the entire length. The shop will be heated by steam, radiators being placed in various parts of the building, while in the pits and under the galleries at the side, steam



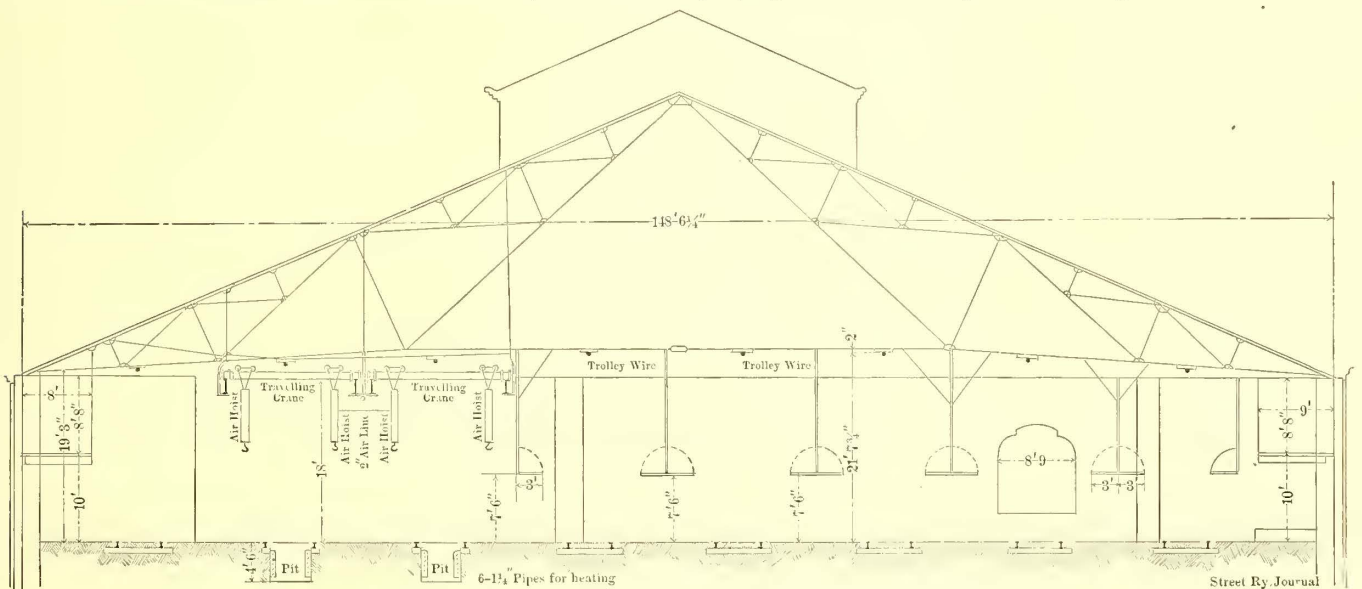


EAST FRONT OF NEW REPAIR SHOP

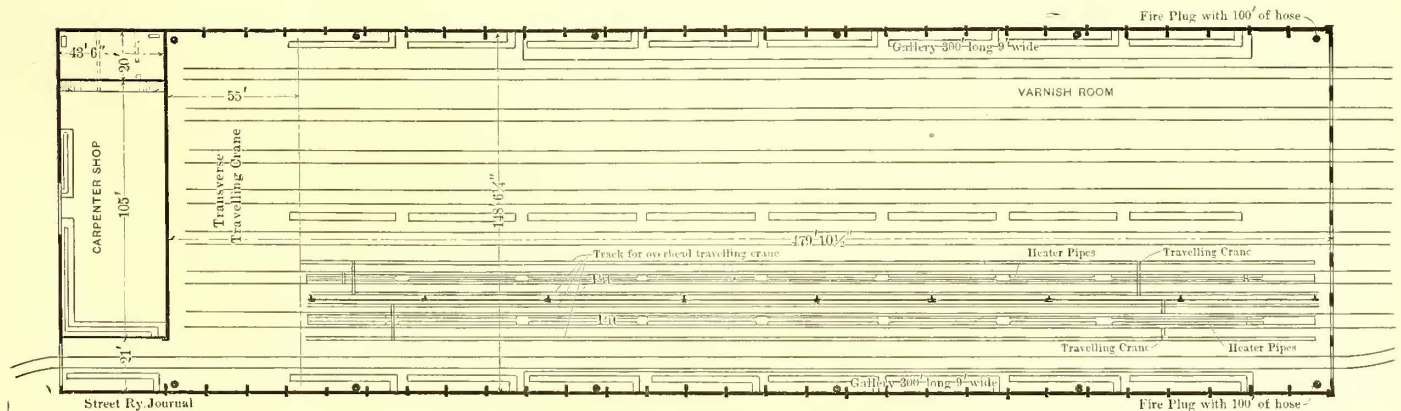
pipes will be suspended. The boilers for the steam heating system will be in the west end.

This carpenter shop will contain only a few tools, such as a circular saw, a band saw, small forge, drill press, tool grinder, lathe, etc., as the greater part of the work is expected to be

ready the cars will be run in for conversion to the new standard. When finished there will be room for forty-two cars on the floor, so distributed that the workmen will not interfere with each other. The plans have not yet been fully decided upon, but the accompanying cuts show the probable changes and method of dis-



TRANSVERSE SECTION, SHOWING CRANES AND PLATFORMS



PROPOSED GROUND PLAN OF REPAIR SHOP

done at the Fifty-Second Street shops, where every facility is afforded for wood and metal working (see a complete description of the Fifty-Second Street shops which was given in the STREET RAILWAY JOURNAL for Dec. 1, 1900). In the carpenter shop will be lockers for the convenience of the men, lavatories, etc.

Work is being rapidly pushed on the transformation of the old station into an up-to-date shop, and as soon as the building is

tributing the platforms, cranes, etc. The situation of the shop is one of the most convenient possible. It lies between two streets having surface tracks, connects with the tracks of the Long Island Railroad, and is within a minute's walk of the elevated railroad station. The alterations are in charge of Master Mechanic A. J. Wilson, of the railway company, who, of course, will have the building under his direction after their completion.



### The Wheel Capacity for Engine-Driven Alternators

BY H. F. SCHMIDT

The wheel capacity for engine-driven alternators has been the subject of much discussion among the electrical and mechanical fraternities ever since the problem of parallel operation of generators was first met with. This is shown by the paper on this subject by Mr. Schlichter, before the American Society of Mechanical Engineers last week, as well as the extended discussions by Messrs. Keilholtz, Emmett, Steinmetz, Berg, Schlichter and others at the October, 1901, meeting of the American Institute of Electrical Engineers.

One of the first requirements for the successful operation of alternators in parallel is that the engines driving them have as nearly as possible a uniform torque, since alternators are particularly sensitive to the instantaneous changes of angular velocity of the shaft, due to the inertia of the reciprocating parts, angularity of the connecting rod and drop of steam pressure on the piston, due to the expansion of the steam after cut-off.

Of these causes for the variation of the angular velocity the effect of the inertia of the reciprocating parts is the most serious, though not so much so in the first as in the second half of the stroke. In the first half of the stroke the mass of the piston, piston rod and connecting rod must be accelerated, requiring, at high-piston speeds, a force as great as the total pressure of the steam on the piston, while in the second half of the stroke the masses must be brought to rest, giving out the stored energy, resulting in an excessive thrust on the crank-pin and an increased torque. The extent of this effect is directly proportional to the mass of the reciprocating parts and as the square of the number of revolutions per minute. Hence the low-pressure piston will affect the torque most, owing to its weight. This excessive thrust at the end of the stroke can be somewhat counterbalanced by having considerable compression and making the low-pressure piston as light as possible. A change of the position of the cranks from 90 degs. will also tend to give a more uniform torque, though this will lead to difficulties in the steam distribution between the cylinders. Also if the load is not divided equally between the cylinders, the greater part being done by the low-pressure cylinder, the "peak," as shown by the indicator card at the end of the low-pressure stroke, will be much flattened.

For the foregoing reasons there are but two or three impulses obtained in one revolution of a cross-compound engine instead of four, as would be expected, and for similar reasons it has been found that the three-crank triple expansion engines are little better in this respect than the cross compound. Thus, it would seem as though a more even crank effort could be obtained from the cross-compound type, by converting it into a two-crank triple-expansion engine, with the high and intermediate cylinders in tandem, thus more nearly equalizing the weight of the reciprocating parts, and obtaining a greater uniformity of the steam pressure throughout the high-pressure stroke.

Owing to the angularity of the connecting rod the effect of gravity on the piston of vertical engines is not the same on the up as on the down stroke, thus making the torque variable, therefore the horizontal engine has an advantage in this respect.

The result of these various causes for the instantaneous change in the angular velocity is that a massive fly-wheel is required, since if an alternator has  $p$  pairs of poles, and the maximum angular displacement of the shaft is  $\Delta$ , then will the electrical displacement be  $a = p \Delta$ , hence the greater frequency and the slower the speed of rotation, the smaller the angular displacement of the shaft permissible.

The energy in foot pounds which a fly-wheel of moment of inertia  $J$  can store up with a displacement  $\Delta$ , will be given by

$$\text{energy} = J \int_0^{\Delta} \left( \frac{d^2\theta}{dt^2} + \frac{d^3\theta}{dt^3} dt \right) d\theta, \text{ or we have}$$

$$M = \frac{\text{Energy}}{r^2 \int_0^{\Delta} (\ddot{\theta} + \dddot{\theta} dt) d\theta}, \quad \text{where}$$

$M$  = mass of the fly-wheel, and  $r$  is the radius of gration, and  $\theta$  is the variable angular displacement in circular measure. Therefore, it follows that the greater the unbalancing factor and the smaller the value of  $\Delta$ , the greater must be the mass of the fly-wheel.

From the nature of the fly-wheel and the duty it performs it is evident that its action is like that of the pendulum—an oscillatory motion—acting on the governor, which if sensitive will be affected by it, often causing cumulative "hunting," with the result that the machines will be thrown out of step. There are several remedies for this trouble, the most effective of which probably is the use of "time delay" dash pots, the invention of H. W. Buck and H. Cooke. Another successful means of preventing this trouble is in

changing the weights on the governor, keeping the moment of the weight the same, but changing the moment of inertia by lengthening the lever arm. This gives the governor a different period of oscillation from that of the fly-wheel, causing them to neutralize each other.

While an absolutely uniform torque is desirable a constant speed of rotation is not necessary, for, as has been shown by Mr. Steinmetz, under that condition the division of the load between the machines is indeterminate, consequently a small decrease of speed is desirable with increase in load.

Having discussed the steam engine side of the question there are certain electrical requirements which must be considered, which are more or less contradictory to the facts governing the conditions of uniform rotation of the engine, were it not connected to the alternator. Namely, considered separately, absolutely uniform rotation of the engine could be obtained if we made the fly-wheel of sufficient capacity, but when considered in its relation to the alternator we must consider the synchronizing action which exists between the alternators operating in parallel, and to the rotaries and synchronous motors on the circuits. Considering the form of the waves as sine waves, and if the angle of lag or lead between the machine is  $B$ , then will the cross current through the machines be

$$i = C \sin \frac{B}{2}$$

and as the synchronizing force is proportional to this current, that is

$$F = \text{synchronizing force} = K \sin \frac{B}{2}$$

$$\text{and } B = 2 \sin^{-1} \frac{F}{K}, \text{ or as } F = J (\ddot{\theta} + \dddot{\theta} dt)$$

$$B = 2 \sin^{-1} \frac{J (\ddot{\theta} + \dddot{\theta} dt)}{K}$$

It follows that an increase in  $J$  means an increase in  $B$  and  $i$ . Therefore too large a fly-wheel is almost as bad as one which is too small. From experience with a large number of representative alternators it has been found that the maximum short-circuited current was about 2.5 times the full-load current, hence the

impedance is  $Z = \frac{e}{i} = \frac{E}{2.5}$ , whence

$$\text{cross current} = \frac{2 E \sin \frac{B}{2}}{2 \times \frac{E}{2.5}} = 2.5 \sin \frac{B}{2}$$

this shows the maximum allowable electrical displacement to be 2.3 if a cross current of 10 per cent of maximum full-load current is to be permitted. The synchronizing torque due to this current may aggravate the unbalanced effect of the engine by as much as 30 per cent, which has been found in some cases.

The unbalancing factor found in average engines may be expected to be about

- .15 to .3 for single-crank engines.
- .075 to .15 for two-crank compound.

Three-crank compound and triple-expansion engines show about the same unbalancing factor as the cross-compound engines, for reasons already stated.

"Hunting" or "surging" can be greatly reduced by the use of "deadeners" (short-circuited windings on the field coils), but cannot be prevented entirely, for, like the governor, they depend for a change in velocity to make them come into play, therefore a slight angular deviation must exist. When deadeners are to be used armature slots, which are almost closed, will be found advantageous, as they keep the flux density in the pole face more uniform, resulting in a smaller loss from eddy currents.

In considering two or more alternators operating in parallel, driven by steam engines, it has occurred to the writer that if instead of having the alternators rigidly connected to the engines, they were driven through a spring coupling, and the engine fly-wheel were only of moderate weight and the rotating part of the alternator of great weight, then would any momentary change in the angular velocity of the engine shaft be taken up by the spring without changing the angular velocity of the moving part of the alternator to any great extent. It might seem at first as if cumulative oscillation would take place under these circumstances, but if the moments of inertia of the two rotating parts and stiffeners of the springs were properly adjusted, such oscillation could not take place. Also in a plant in which several alternators were running the stiffeners of the various springs would each be resigned differently so as to prevent any resonance. The chief objection is that it cannot be adapted conveniently to engines of large power.



The action of these springs would be very similar to self-induction placed between the generators, except that it would not cause any heating of the alternators and permit their carrying a greater load without overheating.

### Flywheel Capacity for Engine-Driven Alternators\*

BY WALTER I. SLICHTER

The paper is written with the object of showing certain considerations which must be borne in mind when selecting a steam engine to drive an alternating-current generator which is to run in multiple with another generator or which is to generate power for a system in which synchronous apparatus, such as synchronous motors or rotary converters, are to operate.

A detailed analysis of the mechanical action in the engine which is the cause of the trouble is to be found in J. I. Astrom's paper, and the discussion thereon, read before the society last year at Milwaukee.

An alternating-current generator, when direct-connected to a steam engine, is sensitive to certain irregularities in the speed of the engine, which affect no other type of apparatus. This irregularity is in the instantaneous value of the speed, or the variation of the angular velocity during one revolution, as distinguished from the changes in the average speed, due to a change of load or of steam pressure.

During one revolution the force applied to the crank-pin of a steam engine varies considerably, due to the following causes:

- Transfer of reciprocating to rotating motion.
- Variation in steam pressure on the piston, due to expansion.
- Inertia of the reciprocating parts.
- Weights of the reciprocating parts.
- Throw of connecting rod.
- Shortness of connecting rod.

Of these the first three are of the greatest magnitude. The first causes the torque to pass through zero twice in each revolution, the second causes the torque to be less in the second half of a stroke or impulse than in the first. The effect of the reciprocating parts is to diminish the torque in the first half of the stroke and increase it in the second half. Therefore, it is opposed to and counteracts the effect of expansion. The inertia effect is of considerable magnitude, and frequently more than balances the effect of expansion. This is particularly the case in high-speed engines and in the low-pressure cylinder of a cross-compound engine, which is necessarily very large and bulky. The effect of the reciprocating parts is the most interesting, as it may be either harmful or beneficial—harmful in producing a peak at the end of the low-pressure stroke, where it overlaps the admission of the high-pressure stroke, thus merging the two impulses; beneficial in lowering the excess energy during admission of the high-pressure stroke.

In a single cylinder double-acting engine there are two impulses per revolution, and in a cross-compound engine there are four impulses. During the first part of the stroke the effort is less than the average, during the second part (equal to about one-half the period of the stroke) it is greater than the average. During the last part of the stroke the effort is less than the average again. This is shown diagrammatically in Fig. 1, Curve 1. Curve *F* is the varying crank effort or torque in foot-pounds at the center of the shaft. The straight line *AG* represents the average value or mean effort. The difference between these two at any time represents the excess of deficit torque, or the force acting on the fly-wheel or given by the fly-wheel.

This force *F*, acting on the mass of the fly-wheel *M*, gives the wheel an acceleration  $a = \frac{F}{M}$ , or  $a = \frac{F}{I}$ , where *I* is the moment of the fly-wheel.

From *a* to *b* in the diagram the acceleration is negative and the speed drops (Curve 2), from *b* to *d* the acceleration is positive and the speed rises, the gain in speed from minimum to maximum (*b* to *d*), represented by *S*, being proportional to the area of the figure *bcd*. The acceleration is negative again from *d* to *e*, and the speed drops back to its original value at the end of the impulse to pass through a similar cycle in the next impulse.

While the speed is less than the average during the first half of the impulse (as from *a* to *c*, Curve *V*), any definite point of the revolving masses, as the crank-pin center, will fall behind the position it would maintain if the angular velocity were constant; and at *c*, where the speed becomes greater than the average again, it will have reached its greatest displacement and will commence

to regain its correct position, which it reaches at *d*, and passes to a displacement ahead of that of constant velocity. The change of position from *c* to *e*, represented by  $2 \Delta$ , is proportional to the area of the Curve *V* between *c* and *e*.

Thus we find that the displacement angle is proportional to the double integral of the curve of unbalanced effort. This would be a long and tedious operation, but it is the only correct method of obtaining exact values. The method was given in the discussion on Mr. Astrom's paper. The work may be considerably shortened by the use of the integrator (of Coradi, Zurich), an instrument which will graphically integrate each curve in turn. By tracing the curve to be integrated with the pointer, a recording pointer will draw a curve, each ordinate of which is proportional to the area enclosed by the original curve up to that point. Its principal objection is that to get accuracy the original curve must be on a large scale, for the deduced curve is of such a scale that a 1-in. ordinate represents at least 4 sq. ins. of area in the original.

The displacement may be obtained approximately quite easily on the assumption that the curves are more or less regular and symmetrical, resembling sine curves.

In a bipolar alternator the e. m. f. performs a complete cycle for every revolution; in a four-pole machine there are two cycles per revolution; that is, there is a cycle for every pair of poles per

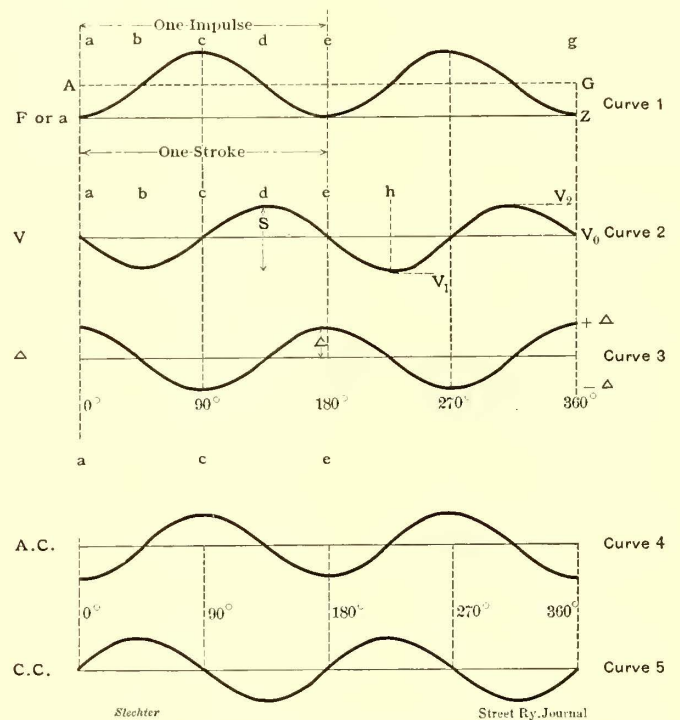


FIG. 1.—TORQUE, SPEED AND DISPLACEMENT OF A SINGLE-CRANK ENGINE

revolution, and if there are *p* pairs of poles on an alternator one cycle of the crank corresponds to  $p \times 360$  degs. in the electrical circuit. The effect produced in the electrical circuit is due to this displacement rather than to the variation in speed.

A displacement of phase in the electrical circuit of 2.5 from mean will cause a cross current of about 10 per cent of full-load current to flow. Therefore we assume  $a = 2.5$  as the limiting value of the displacement. This cross current heats the windings of the generators and may cause considerable loss of power in the resistances of the connecting cables.

The value  $a = 2.5$  is one which builders of electrical apparatus have more or less generally agreed on as the limit, if satisfactory parallel running of apparatus is expected. If other conditions are favorable, such as low resistance between generators, and few synchronous motors in circuit, the generators will work well in parallel with a considerably greater displacement, but when the conditions become exacting 2.5 is the limit.

A synchronous motor or rotary converter having a constant load tends to run at constant speed and has more or less fly-wheel effect in its rotating member. If now this is connected to an alternator driven by an engine which has an irregular angular velocity, giving a displacement from  $+ 2.5$  to  $- 2.5$ , there will be a continual give and take of current between the two, which may lead to the phenomenon known as hunting. That is, when the generator is ahead of the motor, the motor tries to catch up and takes power from the generator to do so; then, when the generator is behind in relative position, the motor tries to drag it along, and in so doing gives its power back again.

We have seen that the evil effect in the electrical circuit in-

\* Abstract paper presented at the New York meeting (December, 1902) of the American Society of Mechanical Engineers.



creases with  $p$ , the number of pairs of poles. Thus it is that high-frequency generators give more trouble than low-frequency generators. In most designs of engines the fly-wheel capacity necessary to carry the engine over a change in load while the governor is operating is sufficient to maintain the angular velocity within reasonable limits, but in cross-compound engines the inertia of the reciprocating parts of the low-pressure cylinder (the cylinder being so large) is usually so great that the crank effort diagram is much distorted. Instead of getting four peaks per revolution we get two or three, and each of these peaks lasts longer, the period of high speed lasts longer and the displacement is greater.

There is also an aggravating action in the electrical generator itself, as pointed out by H. E. Longwell in a paper before the Engine Builders' Association last May. This is what may be called the synchronizing force, or torque, of the generator. As mentioned before, each generator, as well as each motor and rotary of the system, tends to keep in step with the rest of the system—that is, resists any displacement. If some external force causes a displacement, there occurs in the generator a torque proportional to the displacement, tending to bring the revolving part back to the mean position.

If the displacement is backward, as at  $c$  of Curve 3, Fig. 1, there will be a torque trying to pull the revolving part forward into step (as in Curve 4, Fig. 1), which torque, it will be noticed, is greatest where the displacement is greatest, and where the engine effort is greatest; thus the synchronizing torque of the generator is in step with the unbalanced effort of the engine and additive thereto.

Two generators connected in multiple will share the load between them at any instant in proportion to the angular displacement between them. If the displacement is not very great, the variation in load or, in other words, the synchronizing force in each is proportional to the sine of one-half the angle between them—that is, is proportional to the cross current. Thus we find that at 2.5 degs. displacement there is a torque equal to 10 per cent of full-load torque tending to pull the alternator into step, and this torque occurs simultaneously with the excess effort of the engine, and increases that excess and the unbalancing factor.

In the case of the 800-kw set, the curves of which are given here as an example, we find a displacement of 3.4 degs., due to unbalanced engine effort alone, and this displacement causes a synchronizing torque in the alternator varying up to 15 per cent of full-load torque as a maximum. This increases the unbalancing factor 30 per cent, and would increase the displacement about the same amount. But this is an old plant and an unusually severe case (sixty cycles). This shows that it does not necessarily follow that alternators of large synchronizing power will run in parallel better than those of small synchronizing power, but rather the reverse, though there are reasons why the other extreme is not desirable either.

It might be interesting here to note that in a continuous current machine this torque is proportional to the speed instead of the displacement. When the speed is high the torque is negative, and when the speed is low it is positive, or additive to the engine effort. This is shown in Curve 5 of Fig. 1. The effect of this torque is merely to distort the curve of engine effort, as it is displaced 90 degs. therefrom. It is interesting to note that this torque is just opposite in effect to that of the reciprocating parts at any given time.

From a number of engines I have analyzed, and from data collected from some German and French technical publications and different American engine builders, it may be considered reasonable to expect an unbalancing factor of:

- .15 — .30 in a single-crank double-acting engine,
- .075 — .15 in a two-crank engine.

But in the two-crank engine, as mentioned before, the distorted curve of effort usually gives only two displacements per revolution instead of the four we would expect; therefore we may say that the "apparent" unbalancing factor is .15—.30. A three-crank engine has about the same apparent unbalancing factor as a two-crank.

A vertical engine gives a little more unbalancing than a horizontal, due to the dead weight of the moving parts, for which we should make some allowance.

To determine a weight of fly-wheel which would limit the displacement to a value approximately equal to 2.5, I have derived a formula based on the foregoing unbalancing factors with a reasonable increase to allow for overloads. While not always giving the most desirable fly-wheel capacity, since it would be impossible to take into account all the irregularities of some engines, yet it gives a value suited to the various conditions, such as frequency of alternator, style of engine, etc., such that if the engine is reasonably good we will get the results desired. If this

weight of fly-wheel does not give satisfactory results it would be much better (for the electrical circuit) to make such changes in the engine itself as to give a better crank effort diagram than to increase the weight of fly-wheel, for a fly-wheel may easily give trouble by being too heavy.

As changes in the engine I might suggest:

*First*, as best though most difficult, changing the angle between the two cranks.

*Second*, changing the proportion of load taken by the different cylinders, and make the low pressure take more load.

*Third*, introduce compression at the end of the stroke to take up inertia, particularly in low-pressure cylinder.

The formula is:

$$Wr^2 = \frac{KW \times C \times 10^9}{S^4}$$

where

- $W$  = effective weight of wheel,
- $KW$  = rating of generator,
- $S$  = speed of engine in R. P. M.,
- $r$  = radius of gyration,
- $C$  = a constant as follows:

	Horizontal Single Crank	Vertical Cross Compound	Horizontal Cross Compound
25 cycles.....	315	275	250
40 " .....	505	440	400
50 " .....	630	550	500
60 " .....	755	660	600
125 " .....	1575	1380	1250

In some cases it is necessary to use a larger fly-wheel than this to carry the load during the short time it takes for the governor to operate. In railway power stations the load varies so greatly and so suddenly that an immense fly-wheel has to be adopted to meet these changes and the angular displacement has to be ignored. But so far as hunting and parallel operation are concerned, too great a weight of fly-wheel is almost as undesirable as too little, for a large inertia in the circuit means that much power must be expended in bringing any oscillating mass back into synchronism. Therefore, where a very heavy fly-wheel is not necessary for definite reasons, it is desirable to keep the weight down, and the weight necessary to limit the displacement to 2.5 degs. will be found a reasonable medium value.

In many cases where hunting has occurred, due to a pulsating prime mover or other cause, it may be held in check and practically suppressed by connecting a dashpot to the governor mechanism. This dashpot should have the characteristics that it is not sensitive to sudden changes in load or speed, but that any prolonged change will cause it to move. This has been used successfully in practice to a considerable extent.

To determine by test the variation in speed of an engine is a very delicate and complicated experiment, and there have been many ways tried and suggested, but with very little success. At the meeting of the French Société Internationale des Electriciens last winter this subject was discussed, and many methods described. The most successful was that of E. W. Mix, in which a bevel-gear wheel is driven from the engine shaft by some very positive method—as gearing, or a bicycle wheel pressed against the engine fly-wheel. This gear wheel drives in opposite directions two other bevel gears on concentric shafts at right angles to the shaft of the first gear. The outer hollow shaft of these two concentric shafts drives a light aluminum disc. The other gear wheel is connected to a shaft consisting of a long elastic steel wire, and this drives a disc with a heavy fly-wheel rim. These two discs are placed side by side. One being light and connected by a rigid shaft, follows all the irregularities of the prime mover; the other, having considerable inertia and being driven by an elastic connection, revolves at practically constant angular velocity. There are slits in both discs, and by an arrangement of a light and mirror the relative displacement of the slits causes a beam of light to be deflected.

If an alternator becomes very much displaced in phase it may absorb power electrically and drag the engine along. If now the governor does not meet the condition properly, there may be no steam admitted to the cylinder; then at the end of the stroke the vacuum in the cylinder may be sufficient to draw water from the condenser, which may cause damage. Electrical damping devices are used in many cases to overcome these irregularities. They consist of short-circuited windings on the poles of the alternator. When the alternator oscillates ahead of or behind its correct speed, currents are generated in these devices which tend to oppose these oscillations. This is quite effective if the oscillations are rapid or of a short period, but, of course, it wastes power just in proportion as its effectiveness increases, being nothing more than a friction brake,



To give an idea of the fly-wheel capacity required to meet the requirements advocated, and show that, contrary to the general opinion among mechanical engineers and engine builders, a very heavy wheel is not necessary, I append a table giving a comparison of the weights calculated by the above formula and those actually installed by the engine builders:

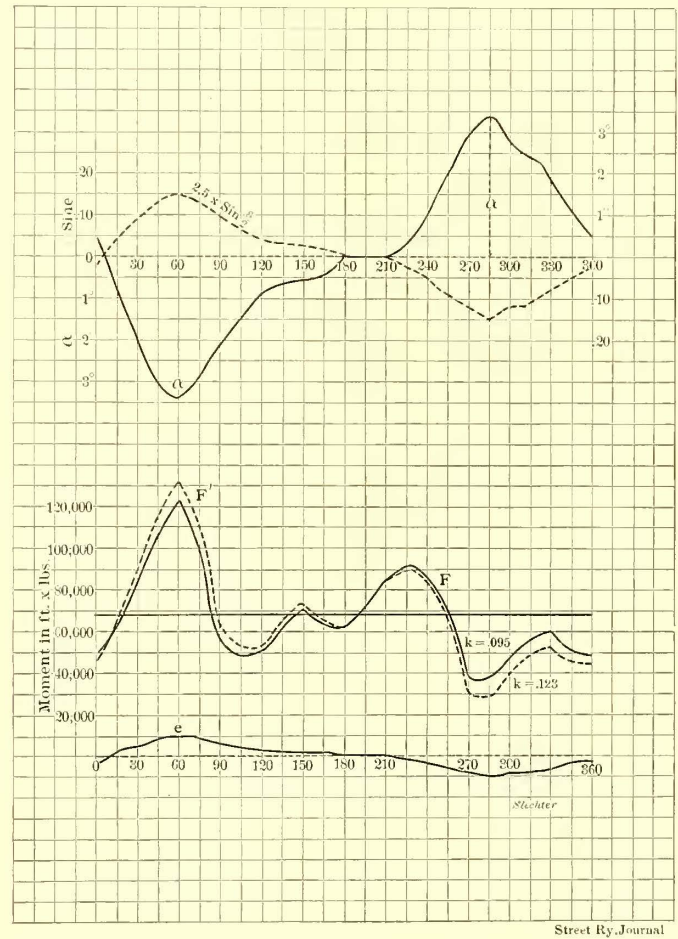
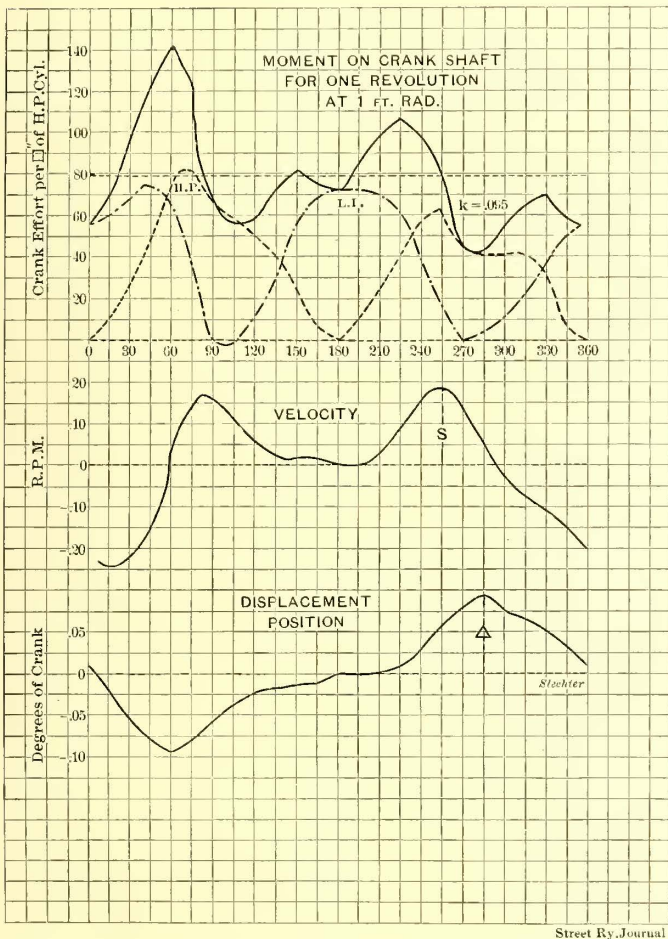
	Installed	Calculated
Altoona .....	13,000	11,000
Cleveland .....	41,000	75,000
Glasgow .....	148,000	164,000
Hanover .....	40,000	53,000
Baltimore .....	73,000	45,000
Metropolitan .....	240,000	193,000
Washington .....	15,100	17,500
Philadelphia .....	70,000	107,000
Omaha .....	24,000	18,000
Santa Catalina .....	34,000	21,000
Tornavento .....	72,000	44,000
Santiago .....	17,000	13,300
Milwaukee .....	50,000	40,000

seventy-two poles; hence the displacement in the electrical circuit is  $36 \times .95 = 3.4$  degs.

In Fig. 3, Curve 1, is shown  $\alpha$ , the displacement, and the broken line shows the variation in synchronizing force. In the lower part of the figure we have in full lines the crank effort diagram, and curve  $e$  is the synchronizing torque of the alternator in foot pounds. Adding these two together, we get the resultant unbalancing torque, which, as mentioned before, gives an unbalancing factor of .123, or 30 per cent greater than that due to the engine alone. In these diagrams the high-pressure cylinder takes 47.5 per cent of the load and the low-pressure cylinder 52.5 per cent.

### Smoke Consumption

Among the topical discussions at the New York meeting of the American Society of Mechanical Engineers last week the contribution by Professor F. R. Hutton, on the subject of smoke consumption, will prove particularly interesting at this time.



FIGS. 2 AND 3.—CURVES OF HORIZONTAL CROSS-COMPOUND ENGINE

I have given attached the curves of a horizontal cross-compound engine, cylinders 24 ins. and 48 ins., by 48-in. stroke, which is direct-connected to a 60-cycle alternator of 800 kw, at 100 r. p. m. There were several of these in the station, and there was considerable trouble from "hunting." It was finally necessary to put short-circuit windings on the poles, and a dash-pot governor on the engine, since which time the plant has run satisfactorily. The plant was laid out several years ago.

The irregular shape of the curve of combined high and low-pressure crank efforts will be noticed. There are practically only two impulses per revolution. The maximum unbalancing factor is .095, is negative, occurs during the (high pressure) return stroke, and lasts for 126 degs., or over a third of a revolution; this is the cause of the poor characteristics of the engine. If dead weight were added to the high-pressure piston the diagram would be improved, or if the angle between the cranks were less.

By integrating this curve of crank effort we get the velocity curve as shown, and by integrating this in turn we get the curve of displacement of the crank center, which shows very clearly the "two-impulse" effect of the engine.

The maximum displacement is .095 deg. The generator has

Professor Hutton described a recent visit to an important plant just outside of Syracuse, where his attention was directed to the appearance against the sky of two columns of "products of combustion," a photograph of which he displayed. The stacks are of about equal height, one of brick and the other of steel. The brick one takes the products of combustion from 3500-hp Babcock & Wilcox boilers, which are fired by hand. The steel stack to the right of the brick stack is discharging the smoke from 3600 hp of the same type of boilers, operated with mechanical stoking. The coal used is the ordinary run of mine from the Clearfield district, of the usual soft-coal type, and the rates of combustion, as far as have been observed, average 18 lbs. per square foot grate per hour for the hand-fired battery, and about the same for the stoker. It is, of course difficult in a photograph to secure the profound impression which is made upon the eye even with a background of a gray sky, but in the picture shown the superiority of mechanical firing is very evident. The author says, too, that it happens quite often that the mechanically-fired boilers show less volume of smoke than at the time chosen in the photograph, but that the picture covered average conditions as nearly as could be represented.



### The New Subway in Boston

The passage of the Washington Street Subway Bill on Tuesday of this week by the referendum vote of the citizens of Boston adds the final signature of public approval to this noteworthy piece of legislation, and marks the beginning of a vigorous prosecution of the enterprise. Boston is to be congratulated that the general welfare of its citizens has been again intelligently conserved, and that the ill-advised interference of various irresponsible labor unions has been declared intolerable by the majority of the voters of the city. We have frequently commented in these columns upon the essential features of the act, and consider an extended summary unnecessary.

Briefly, the act provides for a subway to be built by the Boston Transit Commission for the city of Boston, under its principal business thoroughfare, extending from the vicinity of the junction of Broadway and Washington Streets, northerly beneath the most congested section of the city to the vicinity of Adams Square, Haymarket Square or Causeway Street. Two tracks are to be provided for elevated trains and two for surface cars, and suitable connection is to be made with the existing Tremont Street subway, the East Boston tunnel and the present elevated structure. The subway is leased to the Boston Elevated Railway Company for twenty-five years, at an annual rental of  $4\frac{1}{2}$  per cent of its net cost of construction. Bonds designated "Boston Tunnel and Subway Loan" are to be sold by the city of Boston for the purpose of defraying the cost of construction, and the entire income of the subway to the city is to be paid into a sinking fund which will ultimately extinguish the bonds. The term of office of the Transit Commission is extended to July 1, 1906.

The beginning of operation of the new subway will witness the withdrawal of the elevated trains, which have been operated in the Tremont Street subway since the new service began in June, 1901, and the return of the surface cars to its through tracks. There can be no doubt that the latter subway is far more suited to the operation of single cars of the surface type than to large elevated trains. It contains a grade as steep as 8 per cent, and curves of as low as 90-foot radius are frequent in its interior. Considerable alteration was required to adapt it to the use of elevated trains, and it is greatly to be hoped that the new subway will benefit from the experience obtained under Tremont Street. While it must be borne in mind that the existing subway was designed chiefly for surface cars, it is thoroughly essential that the new tunnel be kept as free as possible from the distortions of alignment and grade which a too conservative financial policy would produce. Too much insistence upon moderate grades and easy curves can hardly be made by the designing engineers. The decrease in operating expenses of the subway, maintenance of equipment, and increase in comfort to passengers cannot be lightly passed by, if compared with the heavy wear and tear existing in the Tremont Street tunnel at the present time. If the Washington Street subway is built upon the lines which follow the most modern scientific principles of transportation engineering, there will be little cause for criticism of the kind which has at times been applied to the first attempt which Boston made in subway building. The first subway was one of the pioneers of its kind, and is very well suited for surface car operation, having been studied by railroad men from many countries, to the extent that it constitutes one of Boston's proudest achievements in recent years, but its radical defects for the present type of rapid transit service should be well heeded in the new work now to be begun. Washington Street is notoriously narrow and lined with business blocks throughout the entire tunnel's length, so that the new tunnel will be necessary to depart somewhat from the surface type of subway if the best results are to be secured. Even though the cost of going deeper into the earth be considerably greater, the money must be expended if modern rapid transit is to be secured. It is of little use to purchase expensive, high-powered, rapidly accelerating car equipment designed for high maximum speeds, if the alignment and grade of the track throttles clean and regular speed-time curves between stations into distorted vagaries representing neither rapid transit, economy of operation, nor comfort. Nor must the stations be too close together, especially as the trains will doubtless be operated upon the long free stretches of track of the overhead structure.

While the completion of the new subway will involve a considerable change in the immediate operation of the Boston transportation system, there are likely to be no such radical changes in a limited time, as were evidenced when the present elevated system began to carry passengers. In the latter case the traffic underwent little short of a revolution, and the result was remarkably successful, considering the enormous difficulties involved in handling many thousands of passengers who had never ridden upon an elevated train in Boston before, with new equipment and operating force. Much of this will be avoided when the Washington Street subway opens

for business, and if past experience is noted with the liberality and public spirit which has enabled the elevated management to build up the present efficient system, there is little doubt that the new subway will be a pronounced success from the start. Its connection with the East Boston tunnel, and the new Cambridge Street subway, if the latter is carried out, will help weld into a harmonious whole the avenues of high-speed service which add so much to the transportation facilities of the city. Its employment of large numbers of skilled and unskilled laborers; its destined additions to the operating staff of the Elevated Railway Company, and, above all, its relief of the present greatly congested conditions in the business center of the city, are features which justify its being classed as a general public benefit and a work of enduring good to the Boston community.

### Proposition for Municipal Ownership in Illinois

Provision for the municipal ownership of street railways is contained in a bill which has been prepared by a special committee of the Chicago City Council. This bill, upon approval by the Council, is to be presented to the State Legislature. It provides that every city in the State shall have the power to own, construct and operate such railways. When it is proposed to carry the lines outside the corporate limits, but within the county, the consent of the county must be obtained. The act providing for municipal ownership in any city is not to take effect unless the proposition to adopt it is first submitted to the voters and then receives a majority of votes cast on the proposition.

The proposition to vote for the adoption of the act is to be by ordinance of the City Council after a petition for such an ordinance, signed by 10 per cent of the legal voters, shall have been filed with the city clerk. The Council must pass such a measure on the receipt of a petition. The vote may be taken at a general, municipal or special election. A separate ballot will be provided.

If the act is adopted it will require another vote on a similar petition to compel the corporate authorities to take such measures as may be necessary to acquire, own or operate a street railway system.

To finance street railways the city may issue certificates of indebtedness or bonds for twenty years at 6 per cent, based on the earnings and excluded from the general obligations or liabilities of the city. The sinking fund to meet interest on bonds and to discharge the principal is to be kept in a separate fund, which cannot be touched for any other purpose. All earnings are to be paid into a fund to be designated "the street railway fund." After the certificates have been paid the surplus from this fund can be applied to other corporate purposes.

The city adopting the act is given the power to acquire existing street railway lines, either by purchase or by condemnation proceedings. The lines may be mortgaged or a deed of trust executed in order to raise money for operation. If the mortgage is foreclosed the purchaser is to get the right to operate the lines for twenty years. Any street railways acquired under such foreclosure proceedings are to be subject to regulation by the corporate authorities. The bonds or certificates are to be only a lien on the street railway property and franchise, and will not become general obligations or liabilities of the city. The bonds will not become valid until the ordinances providing for their issue shall first have been submitted to a vote of the people, and have received a majority of the votes cast for the proposition.

The city is given the power to lease all lines and to license cars for not more than twenty years after a favorable vote of the people. The Mayor of any city is given the power to appoint a street railway commission or commission to manage and control the street railway system. A provision is made for an eight-hour day, the placing of all employees under civil service and the doing of work under the day labor system by the city.

### The Sale of the Detroit & Lake Shore Railway-- Financing the Lake Shore

The bankers' committee in charge of the affairs of the Everett-Moore syndicate, of Cleveland, met last week and formally ratified the sale of the Detroit & Toledo Shore Line to the Grand Trunk & Clover Leaf Railroads. The deal has been pending for many months. The price paid for the property was \$1,500,000 in 4 per cent bonds, which will be guaranteed by the Grand Trunk & Clover Leaf. The Everett-Moore syndicate will retain the electrical equipment, and will dispose of it for about \$200,000. The syndicate will finance its indebtedness on the property with the new bonds. A large majority of the creditors have agreed to take the bonds for their indebtedness. Among these creditors are the



Strang Construction Company, which built the road, and which now holds receivers' certificates. Eastern bankers who hold Everett-Moore callateral on the road have agreed to exchange the new bonds for the old. After all transactions in connection with the sale of the road are closed the syndicate will emerge without loss.

It is announced that the completion of the financing of the Lake Shore Electric Railway will be postponed for a short time. All of the necessary bonds have been subscribed for, but the banking syndicate which will handle the securities does not care to close up the deal until money becomes somewhat easier in Cleveland. The liquidation of its debts on the Detroit & Toledo Shore Line lifts a great burden from the syndicate, and will enable it to go ahead with other propositions.

### New York Central's Terminal Plans

The New York Central & Hudson River Railroad Company has completed its terminal plans, and last week it presented them to the Board of Estimate and Apportionment for consideration. The plan involves the depression of the railroad tracks in Park Avenue, south of Fifty-Sixth Street, and the carrying of streets, now closed, over the railway tracks. In view of the expense of depressing the railroad tracks so as to permit streets to be carried over them, and maintaining the present pavement in Park Avenue by placing additional tracks in a subway, the company asks that the city shall bear the cost of the bridges or viaducts on which the streets are to go over the tracks. The company also offers to eliminate grade crossings at several places in the Bronx.

President Newman, in submitting the drawings and description of the proposed improvements, explained very clearly the position of the company and its views on the relative responsibilities of the corporation and the municipality. In part this communication says:

These proposed changes were to be made to enable the railroad company to enlarge the surface yard forming a part of its terminal at the Grand Central Station. The proceeding thus begun was the result of an effort on the part of the officials of the railroad company, after conference with city officials, to do whatever might be possible under existing law of the work necessary to be done in order to effect the proposed change of motive power to be used in the Park Avenue Tunnel, specific enabling legislation having failed at the last session of the Legislature. The enlargement of the existing yard was regarded by the railroad company as absolutely essential, and its enlargement as a surface yard was regarded as the most advantageous method for railroad purposes, and it was supposed that this method, in connection with the proposed adoption of electricity as a motive power, would be satisfactory to the city.

While the depression of the railroad company's tracks to enable the streets to be carried over them would result in advantage to the city, and in great benefit to certain of the property in the vicinity of the terminal, it would make the railroad yard much less desirable for railroad purposes than the proposed surface yard; therefore, it is respectfully submitted that the railroad company, in justice and fairness, should not be called upon to stand the entire expense incurred by such a change, which would benefit the city and property holders solely.

More or less closely related to the proposed change in motive power, two other subjects are under consideration with the city authorities, and these should also be disposed of prior to the carrying out of the contemplated change of motive power.

First—The elimination of grade crossings at Morris Heights, Fordham Heights and Highbridge.

Second—The elimination of grade crossings in the vicinity of Kingsbridge, including Kingsbridge Road, East 250th Street, Broadway, Corlear Street, Tibbet Avenue, West 230th Street and West 227th Street.

The best method, and probably the only feasible one, of eliminating the grade crossings at Morris Heights, Fordham Heights and Highbridge, is by carrying the streets over the railroad tracks by means of bridges, with suitable approaches.

If the method of depressing the entire terminal yard and its approaches to such an extent as may be necessary to carry existing streets over the tracks by means of viaducts or bridges shall be adopted, it will be necessary for the railroad company to obtain the right to use certain portions of Park Avenue and of the intersecting streets beneath the surface. The plan of widening Park Avenue and of widening the existing cut from Forty-Ninth Street to Fifty-Seventh Street, and of closing certain portions of Forty-Sixth, Forty-Seventh, Forty-Eighth and Forty-Ninth Streets could then be abandoned.

With the desire to treat all these matters not only in a fair but in a liberal spirit, and, if possible, to show to the city and its citizens that it is willing to meet any reasonable demand, provided it is not called upon to make changes that will be seriously detrimental to its terminal property, or to incur an expense which would not be justifiable in the proper management of the property, the company submits the following propositions:

(1) The elimination of grade crossings at Morris Heights, Fordham Heights and Highbridge. The company will construct the necessary bridges and abutments to carry the streets over its tracks, and will do all the work within its own lines at its own expense, the city to bring the streets by proper approaches to the grade of the bridges in such a manner as it shall see fit.

(2) The elimination of grade crossings in the vicinity of Kingsbridge, including Kingsbridge Road, East 250th Street, Broadway, Corlear Street, Tibbet

Avenue, West 230th Street and West 227th Street. The company will either (a) construct the necessary bridges and abutments to carry the streets over its tracks on the existing line, and will do all the work within its own lines at its own expense; the city to bring the streets by proper approaches to the grade of the bridges, in such manner as it shall see fit; or (b) it will unite with the city in eliminating these seven grade crossings in accordance with the provisions of chapter 516 of the Laws of 1901.

(3) The enlargement of the terminal yard:

The company will depress all its tracks between the southerly line of Forty-Fifth Street and Fifty-Seventh Street to such an extent as may be necessary to enable the city to carry by means of viaducts or bridges over the tracks, at a grade not exceeding 4 per cent, such of the intersecting streets from Forty-Fifth to Fifty-Sixth Street, both inclusive, as the city may deem necessary in the public interest, the expense of extending these streets over the railroad company's tracks to be borne by the city.

In consideration of the great expense of the railroad company in depressing its tracks for the above purpose, the latter shall be given the right to use, subject to the right of the city to construct and maintain such bridges or viaducts, those portions of Forty-Fifth, Forty-Sixth, Forty-Seventh, Forty-Eighth and Forty-Ninth Streets included within the limits of its enlarged yard, and of Park Avenue from the southerly side of Forty-Fifth Street northerly to Fifty-Seventh Street (the existing roadways of Park Avenue not to be interfered with) and to a connection with the Rapid Transit Subway at Forty-Second Street, and the right to erect and maintain on any bridges or viaducts carrying streets over its tracks such signal, electrical, and other apparatus as may be required for the operation of its road.

If the changes of the terminals at the Grand Central Station are made it may be found necessary to use the land under the surface of Vanderbilt Avenue and Depew Place, but without interfering with the surface of these streets.

The proposition is now under consideration, and it is commended by many property owners along the line, who are especially interested in restoring the grades of cross streets that are now interrupted by the company's cut. The community, as a whole, and the traveling public generally, will welcome any plan that may relieve the present congestion at the Grand Central Station.

### The Reorganization of the Northern Ohio Traction Company

The Northern Ohio Traction & Light Company, which is to succeed the Northern Ohio Traction Company, has been incorporated, with a temporary capital stock of \$10,000, by J. R. Nutt, W. B. Whitney, H. J. Crawford, C. E. Sanders and V. J. Terrell. The majority of the stockholders of the old company have agreed to the change, which will be effected Dec. 29. It has been announced that the company will complete its connection of Akron, Barberton, Cuyahoga Falls, Doylestown, Wadsworth, Ravenna and Cleveland. This means that the Barberton line will be extended to Doylestown and Wadsworth. There is also talk of extending to Medina.

The new company will have an authorized capital stock of \$7,500,000, and the new bond issue will be the same amount. The bonds will be thirty-year bonds, and \$1,000,000 will bear 5 per cent interest and the remainder 4 per cent. For every share of the common stock of the Northern Ohio Traction Company, two shares of the stock of the Northern Ohio Traction & Light Company and \$50 in 4 per cent bonds will be given. For every share of the preferred stock of the Northern Ohio Traction Company, one share of the new stock and \$100 in 5 per cent bonds will be given.

The division of stock of the new company will be as follows: To present common stockholders, \$5,000,000; to present preferred stockholders, \$1,000,000; to be used as a bonus for selling \$500,000 treasury bonds, \$500,000; in treasury, \$1,000,000. The bonds will be divided as follows: Four per cent bonds held to escrow to retire present bonds, \$3,000,000; 4 per cent bonds to common stockholders, \$1,250,000; 5 per cent bonds to preferred stockholders, \$1,000,000; 4 per cent bonds to be sold for improvements and extensions, \$500,000; 4 per cent bonds to be retained in the treasury, \$1,750,000. This plan will increase the fixed charges \$70,000 per annum.

### Report of a Deal at Indianapolis

The incorporation of the Indiana Company at Trenton, N. J., a few days ago, with a capital stock of \$1,000,000, gives rise to the statement that a deal is pending for bringing under the management of that company or the Indianapolis Terminal & Traction Company, the Indianapolis Street Railway Company and a number of companies now operating or building lines in the vicinity of Indianapolis. The avowed intention of the new company is the construction of the new terminal for the interurban lines at Indianapolis, the building of a belt line in that city and the extension of lines of the Indianapolis Street Railway, for which the Indianapolis Terminal & Traction Company recently secured rights. It is said that if present plans are carried out a meeting



of the stockholders of the Indianapolis Street Railway Company will be held in thirty days to vote on a proposition to lease the property on a sliding scale, starting at a low rate, with a bonus of stock of the lessee. The incorporators of the Indiana Company are: Randall Morgan, Thomas Dolan, F. N. MacMorris, C. G. Latorette and G. S. Martin.

### Power Development at Baltimore

On Nov. 15 the Continental Trust Company, of Baltimore, as previously stated in the STREET RAILWAY JOURNAL, in behalf of a syndicate, exercised its option to purchase from the United Railways & Electric Company, of Baltimore, the entire electric light and power business of the city; but it is only within the last few days that details regarding this transaction and the plans for development of water power on the Susquehanna River have become available.

The purchase involves a payment of the United Railways of \$900,000, together with the assumption of the cost of certain improvements to the property, and embraces the \$2,000,000 of common stock of the United Electric Light & Power Company, and the bonds and stock of the Mount Washington Electric Light & Power Company. A forfeit of \$25,000, pledged by the trust company when the option was secured, was applied in part payment when the deal was negotiated, the balance to be paid by Jan. 15. How the acquisitions are to be financed has not been made public. Where one or two companies will be organized is not yet known. A plan which it is said meets favor at the hands of the projectors, is to organize two companies, one to produce the power and transmit it to Baltimore, and the other to distribute it for use.

In connection with its purchase the trust company, for its clients, secures a contract to supply power necessary for the requirements of the United Railways for a period of thirty years. The maximum stipulated is 40,000 of which over one-half will be required when the company to be organized to assume this work is ready to supply power. This company is to be prepared to begin this service by October 1, 1905. It is reported that the contract price for this power is \$35 per horse power per year, indicating a maximum revenue possible from this source to the power company of \$1,500,000 a year. With this contract there is secured a lease for thirty years of all the power houses in the city of Baltimore of the United Railways.

The construction work involved in this undertaking is very elaborate. The scope of the operations on the Susquehanna River extends from the Peach Bottom Pool, just north of the Maryland State line, to a point about Deer Creek. Within these limits two developments of 50,000 gross horse power each are planned. The first starts the building of a dam from the west bank of the river, following a diagonal course down the stream for about 8000 ft., until it reaches a point about 500 ft. from the east side of the river, and then to run parallel to that side to the site of the power house which may be in the neighborhood of Broad Creek. The power house will be built squarely across the head race formed by this construction. Toward the upper end of the dam the walls will slope down, so that in time of floods the excess of water may pass over the walls into the river below the dam and not be carried into the head race to damage the power house. The tail race will also be protected from flooding.

At the power house will be installed ten 6000-hp units. Each unit requires three sets of 48-in. turbine wheels, two being in each set, or six to a unit, and for the ten units sixty turbines will be required. These will be placed in horizontal shafts, built of concrete, and to these shafts the head race will carry 16,000 cu. ft. of water a second. This water, after passing through the turbines, will escape into a tail race, which will be separated from the river channel by a dam. This tail race will then become the head race for the second development, which will be in the vicinity of Conowingo bridge. Here a duplication of the first plant is contemplated, but the present undertaking deals with the first development. To carry the electric current to Baltimore, a transmission line 35 miles long will be built.

### The Chicago Electrical Association Officers

The Chicago Electrical Association has elected as officers for the following year: President, Professor P. B. Woodworth; vice-president, Peter Junkersfeld; secretary, W. B. Hale; treasurer, H. G. Dimick; auditor, DeW. C. Tanner; directors, W. J. Warder, Jr., C. W. Whitney, Albert Scheible.

The next meeting will be held Friday evening, Jan. 16, 1903. H. M. Brinckerhoff, general manager of the Metropolitan West Side Railway Company, will give a lecture on third-rail electric railway systems.

### Electrolysis Ordinance for Atlantic City

The City Council of Atlantic City, N. J., passed what is known as the "Electrolysis Ordinance" recently, the object of which is to enable the city to enforce a supervision over the trolley lines and make tests to see that current from the railway system does not destroy the water mains, gas pipes or sewer system. It is provided that before Feb. 1, 1903, adequate measures be taken by existing operating companies to prevent injury to water mains, service pipes and other metallic structures on account of electrolysis, and details of the plans adopted to accomplish this result must be filed with the water department. In the case of new lines of track plans shall be filed before construction is commenced.

"In no case will bonding to the water mains or other conductors, not provided for the express purpose, be allowed in order to equalize the potential between such conductor and the rail, but means must be taken by furnishing and insulating a complete metallic circuit, both inside and outside of city limits, effectually to prevent leakage of current from the wires or rails of the railway."

The city shifts all the responsibility upon the company, and it does not even suggest a plan that would be acceptable to the municipality. The ordinance says:

"The company or individual operating the street railway may select the particular method of securing this protection and will be held responsible only for the result." The ordinance does, however, specify the following conditions which must be complied with:

"(a) The maximum difference in potential between any part of the metallic return circuit and any water or service pipe, or other metal conductor not intended as a part of such return circuit, shall not at any time exceed  $\frac{1}{4}$  volt.

"(b) The difference in potential between any two points upon said metallic return circuit within a distance of 200 ft. from each other, shall not at any time exceed  $\frac{1}{4}$  volt.

"(c) The current passing along any water or service pipes or other metallic conductor not intended as a part of said return circuit shall not, at any given time and point, exceed 1 amp."

Provision is made for two tests every year, in February and August, "for the purpose of detecting the passage of stray currents in the ground, and between the metallic circuit of the railway and the water and service pipes and other metallic conductors liable to be effected thereby." Should it be discovered, as a result of these tests or at any other time, that damage to water or service pipes, or other metallic conductors, has been caused by electrolysis due to the operation of a street railway, the operating company will be held responsible for damages amounting to the cost of the water department of discovering and repairing the injury, and failure to remedy the cause of the injury without delay shall constitute a violation of the ordinance, for which a penalty is provided.

This ordinance is said to be the first of the kind that has been enacted.

### Eighty Miles by Trolley Through Connecticut

The Connecticut Railways & Lighting Company, which controls and operates 161 miles of electric railway and gas and lighting plants, extending, with connections, from Hartford, Conn., to Stamford, in that State, has in contemplation the construction of the final link—that between Seymour and Naugatuck—in a through line from Waterbury down the populous Naugatuck Valley to Derby, thence through Bridgeport and the Norwalks to Stamford, a distance of nearly 80 miles. The lines of the New York, New Haven & Hartford Railroad will be paralleled for the entire distance, and traffic will be drawn from towns whose aggregate population is nearly 240,000.

The next session of the General Assembly will be petitioned for the right of way, and, this granted, work will begin early in the spring and be completed in time for the heavy summer travel. For the only other section yet unbuilt, from Ansonia to Seymour, the right of way has already been procured, and the material deposited along the route ready for the work, which will be begun at once.

Besides this trunk line a branch from Derby to New Haven, to connect with the lines of the Fair Haven & Westville Street Railway, is being constructed. This will allow of continuous travel as far east as Branford, Conn., along the line destined to become a through route from Boston to New York.

The towns through which the system will run are Waterbury, Naugatuck, Union City, Beacon Falls, Seymour, Ansonia, Derby, Shelton, Oronoque, Putney, Stratford, Bridgeport, Fairfield, Southport, Westport, Saugatuck, Norwalk, South Norwalk and Stamford.



**Franchise Tax Arguments Close in New York**

The argument begun Dec. 1 in the appeal from the decision of ex-Judge Robert Earl, referee, declaring constitutional the Franchise Tax law, passed by the Legislature of New York in 1898, were continued for three days at Albany. Forty-seven corporations, among the largest in New York city, were parties to the controversy, but the arguments were made on behalf of the appeals of the Metropolitan Street Railway, the Brooklyn City Railway, the Consolidated Gas Company, the Coney Island & Brooklyn Railroad Company, the New Amsterdam Gas Company and the Consolidated Telegraph & Electrical Subway Company, which corporations were selected because their cases cover all of the points of law and fact involved in the entire controversy.

The opening argument on Dec. 1 was made by William H. Page, Jr. He discussed the "home rule" objection, directing his attention especially to the ground upon which the referee based his conclusion, that Section 2 of Article 10 was not, as Mr. Page expressed it, "sufficiently violated" to warrant judicial interference. Mr. Dykman presented his argument, and he was followed by Mr. Tomlinson, who appeared in behalf of the New Amsterdam and the Central Union Gas Companies.

When the argument in the cases was continued on Dec. 2 Professor Charles A. Collin, for the companies, presented arguments designed to show the unconstitutionality of the law. He presented to the court what has been called the "Federal point." This is the contention that the Special Franchise Tax act is in contravention of Section 10 of Article 1 of the Federal Constitution, providing that "no State shall pass any law impairing the obligation of contracts," and in contravention of the Fourteenth Amendment prohibiting the taking of property without due process of law. Professor Collin urged that the annual payments by various companies, for which he appeared, of a percentage of the gross receipts, and in some cases of additional lump sums annually, were not a part of the consideration for which the franchise was granted, but were a tax upon the franchise and were so specifically described in the Franchise Tax act itself, and that they were a feature of the contract between grantor and grantee under conditions which assured the grantee that no other or additional tax was at any time to be imposed than that fixed in the grant. Among other things Professor Collin pleaded that it is the plain right of the companies to know how much their tangible property is assessed at and what part of the assessment relates to the franchise.

The argument on behalf of the State was made by Deputy Attorney General Henry B. Coman, assisted by J. Newton Fiero, special counsel. Mr. Coman held that the law does not violate any provision of the Federal Constitution prohibiting the impairment of the obligation of a contract, since the franchise to use the street is property and taxable as such. To escape taxation it must come under some well settled rule of exemption, and a claim for exemption from taxation as against the State must be very clearly shown. No such exemption, he asserted, is shown on the part of the corporations, and no contract, either express or implied, exists on the part of the State that any of the corporations shall not be subject to taxation on their franchises. In connection with this point he cited numerous recent decisions of the Federal Court. Mr. Fiero argued upon the question that the law is capable of enforcement. The value of the special franchise for purposes of taxation can be and has been, he said, ascertained and determined by the State Board with a reasonable degree of certainty.

The argument was closed Dec. 4 when J. Newton Fiero completed his presentation of the State's case. Mr. Fiero devoted his argument to the question of constitutionality, declaring that the law in no particular violated any section of the State or Federal constitution. He cited numerous recent decisions to bear out his contention.

It is not expected that the court will reach a decision before the January term, owing to the mass of testimony to be examined.

**The Interurban Line for Porto Rico**

A despatch from San Juan, Porto Rico, says that the Vandegrift Construction Company, of Philadelphia, has accepted the proposition of the executive council of that city for a franchise to build an electric railway to connect San Juan and Catano, 70 miles distant, and that cash to the amount of \$10,000 has been deposited to insure the faithful performance of the work. As previously stated in the STREET RAILWAY JOURNAL this project also calls for the development of water power, for lighting and railway service. It is proposed to construct a line of ferryboats between Catano and San Juan, on the San Juan Bay, and thus cut off 10 miles of track, which would be required to connect the two cities by rail. It is also planned to build several piers on the Catano side of the

bay, to allow ocean-going steamships to dock. Passenger and wagon traffic will be carried on the ferryboats, and until the concessions for the construction of the piers are granted heavy freight for export trade will be carried out into the bay on lighters and loaded on the steamers. The road will pass through the coffee, sugar and fruit belts of the island, which are densely populated, and the belief is that large quantities of freight will be handled. Electric locomotives will be used for freight work. It is said that the plan for power development calls for the building of a power house of 5000 hp in the mountainous district of the interior of the island.

**Entertainment for the Brooklyn Rapid Transit Company's Employees**

The first large entertainment given by the Brooklyn Rapid Transit Employees' Benefit Association took place at the Academy of Music, Brooklyn, on Monday evening, Dec. 8. The great auditorium was crowded with the employees, their relatives and friends to witness the initial annual vaudeville, and the performance, like all the previous entertainments and outings of the association, was thoroughly enjoyed by all fortunate enough to attend. The boxes were filled with the principal officers of the company and their guests. President J. L. Greetsinger was, of course, present, but following out his principle of never taking active part in any of the proceedings of organizations among the employees of the properties which he has controlled, he remained merely an interested spectator of the performance. After the overture a few remarks were made by prominent members of the association, which not only put the audience into excellent humor, but gave to the ladies present an insight as to what was being accomplished for their husbands and brothers by the organization. The speakers were introduced by Vice-President G. F. Wolfram, whose earnest remarks reflected the enthusiasm which has marked his active labors as an executive of the society. J. C. Brackenridge, first president of the association, thanked the members for the manner in which they had cooperated in increasing and rendering more valuable the membership during the earlier days of its existence. Secretary J. M. Dudley, who has been giving his entire time to organizing the Benefit Association and perfecting the systems that have been adopted of aiding the needy members, read the following interesting report on the progress which has been made:

REPORT FROM JUNE 1 TO DEC. 1, 1902

This report covers the first six months that the Brooklyn Rapid Transit Employees' Benefit Association has been in existence:

The receipts have been as follows:  
 Donation from the Brooklyn Rapid Transit Company.. \$1,853.15  
 Paid by the members for the initiation fees, etc..... 11,543.00

Total receipts..... \$13,396.15  
 The expenditures have been as follows:  
 The amount paid for sick and death benefits, medical attendance and other miscellaneous expenses..... \$9,404.33

Balance on hand Dec. 1, 1902..... \$3,991.82  
 The amount paid for sick benefits..... 5,140.00  
 Amount paid for death benefits..... 900.00

Six members have died since June 1, beneficiaries of whom have received \$150 each.

Sick benefits have been received by 260 men.  
 Five men have drawn \$90 each, the limit that can be paid to a member in any one year.

Twenty-three members have drawn over \$50 each.  
 Twenty-eight members have drawn over \$25 each.  
 Average amount paid to each sick beneficiary is \$19.  
 Seventeen members are on the sick list drawing benefits at the present time.

The membership on Dec. 1 was 2856. Applications on hand, to be entered in December, 244; making a total membership of 3100.

Special mention should be made of the Canarsie division, which has enrolled in its membership all of the eligible men employed, with the exception of four, and the bridge department of the elevated division, which has all of its eligible men enrolled with the exception of seven.

The Crosstown division, with 287 members, has the largest number of any single depot.

Ridgewood, Bergen Street, Flatbush, East New York and the line department all make a splendid showing.

It has been the custom of the Brooklyn Rapid Transit Company to require of all conductors a bond guaranteed by a surety company. After Jan. 1, 1903, conductors will pay \$1 per year to a sinking fund, from which the company will be reimbursed for all



shortages occurring during the year. The remainder, instead of swelling the profits of a surety company, will be given to the benefit association. Judging from the experience of past years this will amount to several thousand dollars annually.

One of the objects of the benefit association, as stated in the constitution, is to promote the social welfare of its members. Carrying out that purpose the association gave a series of excursions in the month of August, running eleven trains to Rockaway Beach, and carrying all told 3100 people (railroad employees and their families). The only charge for these excursions was to cover the cost of the dinner and incidental expenses, the company providing the trains free of charge.

Another important social feature is the bowling tournament that is now in progress, in which fifteen teams, representing every department of the Brooklyn Rapid Transit system, are participating. A beautiful cup is the trophy to be given to the winning team, and ten prizes, ranging in value from \$5 to \$50, will be given to the individuals making the highest records. It should be stated that the prizes were purchased from a special fund and not by the benefit association.

The board of trustees take great pleasure in stating that the contract has been let for the new building at East New York. Ground will be broken within a few days and the work pushed to a finish at the earliest possible date.

Dow S. Smith, the general superintendent of the railway company and president of the Benefit Association, gave the men a hearty talk on the importance of having a community of interest between the men themselves and with the officers of the road. Mr. Smith's remarks were greeted with great applause, and, though brief, showed that the operating department of the road has the welfare of the rank and file at heart, and is giving its enthusiastic support to everything by which the condition of the man on the platform can be made better either when on or off duty. The present officers of the association are: President, Dow S. Smith; vice-president, George F. Wolfram; treasurer, Charles D. Meneely; secretary, Joseph M. Dudley; board of trustees, C. E. Roehl, H. Glassey, George W. Edwards, J. Keating, J. Otten and D. W. Collin.

### Employees' Benefit Association at Mobile

During the last year the employees of the Mobile Light & Railroad Company have formed an athletic and benefit association. The principal object of this association is to aid members while they are disabled by reason of sickness or injuries, and in case of death to contribute aid to their families. The organization was perfected on June 11, and now comprises 153 members. The membership is restricted to the white employees. The company has furnished the association a meeting hall with baths, and also gives heat and light free. At the present time the officers are arranging for the establishment of a reading room.

Each member is assessed an initiation fee of 50 cents, and the dues are 50 cents a month, payment being made by the auditor of the company, who deducts the amount from the wages of the men. It is provided that in case a member be discharged from the service he shall forfeit all his rights and privileges in the association. At the present time the association has over \$500 in its treasury. The benefits to be derived from membership include financial assistance to the extent of \$1 a day, commencing on the fifth day after the member is reported sick, and all the necessary medicine and medical attention, free of charge, provided such disability or sickness does not exceed fifty days in one year. In order to secure the benefits from the association sick members are obliged to notify the secretary immediately and also to furnish a doctor's certificate.

It is further provided that each member of the association shall pay \$1 to the treasurer upon the death of any member, and that the sum thus realized shall be used in defraying the burial expenses. The officers of the association are: President, James M. Maloney; vice-president, Thomas McCowan; secretary, James W. Sconyers; treasurer, P. P. Priester; sergeant-at-arms, W. E. Truett; trustees, S. M. Coffin, J. W. Barnett, R. H. Savage.

### Further Delay on Tunnel Franchise

The form of contract for the Pennsylvania Railroad tunnel, which has been approved by the Rapid Transit Commission and is acceptable to the railroad company, was favorably reported to the Board of Aldermen by the railroad committee of that body on Tuesday, but action upon this report was postponed until next week. There has been considerable influence brought to bear on the Aldermen during the last ten days, and the first result was

apparent when the friends of the measure succeeded in mustering a majority of the railroad committee to the support of the measure. Mayor Low sent a special message to the Board of Aldermen urging favorable action, and pointing out the advantages to be derived from the proposed tunnel. Neither the friends nor the opponents of the measure, however, were certain of enough votes to win, and neither cared to take the risk of pressing the issue. Accordingly, the entire matter was put over for a week.

### Meeting of Engine Builders' Association

Four papers were read at the annual meeting of the Engine Builders' Association of the United States in New York on the following subjects: "Superheated Steam," by Ernest H. Foster, of New York; "High-Pressure Steam Piping," by William Andrews, of New York; "The Early History of the Corliss Engine," by George R. Phillips, of Greene, R. I.; "The History of the High-Speed Engine," by Professor John E. Sweet, of Syracuse, N. Y.

Mr. Foster explained the advantages to be derived from the use of superheated steam, and pointed out the precautions to be observed in designing engines and piping systems where it is to be used. No difficulty is now met in dealing with the moderate superheat. To employ high degrees of superheating, it is at present considered important to use poppet valves on the high-pressure cylinder at least. Superheating will enable the steam pipes and ports to be reduced in area, and the use of the steam jacket to be eliminated. No difficulty is experienced in lubrication if a reasonably good grade of mineral oil is used. Finally, superheated steam is destined to play an important part in the adoption of the steam turbine.

Mr. Andrews sketched the evolution of steam piping the last quarter of a century. Wrought steel piping, in its present form, was introduced about 1892. With the advent of high-pressure superheated steam the size of pipes has been much reduced.

Mr. Phillips presented a biographical sketch of George H. Corliss. The more important early Corliss engine plants were described in detail, and a chronological account given of the improvements made by Corliss from time to time.

Professor Sweet's recollections of the early days of the high-speed engine industry, beginning about 1862 with the Allen engine, and its commercial development under Charles T. Porter, were followed by reference to a number of other automatic engines, including the Buckeye, Payne, "Straightline," Armington & Sims, Westinghouse and Ball.

Officers for the ensuing year were elected as follows: W. M. Taylor, president; C. A. Gates, vice-president; C. S. Bonsall, treasurer, and F. P. Ide, secretary. The meeting closed with a banquet at Sherry's, which was well attended and thoroughly enjoyed.

### Annual Meeting of the Mechanical Engineers

The American Society of Mechanical Engineers held its forty-sixth annual meeting, in New York, Dec. 2 to 5. The sessions were held at the society's house on Thirty-First Street, and at the Sturtevant House, where excellent accommodations were made for the large audiences which attended the reading of the papers. On Thursday evening, Dec. 4, the usual reception was held at Sherry's, where the visiting delegates and their New York friends had a chance to meet each other socially. Owing to a slight illness the president, Edwin H. Reynolds, of the Allis-Chalmers Company, was unable to attend the convention, and Vice-President Arthur M. Waitt became the acting president. The report of the council announced the appointment of Professors Gaetano Lanza and John E. Sweet, S. T. Wellman and R. W. Hunt as representatives of the society on the joint committee for selecting the next recipient of the John Fritz medal. Other committees were also appointed on the standardization of screw threads and to act in conjunction with the American Institute of Architects in planning tests of steel I-beams of large size.

A large amount of time was given at one of the sessions to the subject of junior membership in the society. Out of 531 junior members in good standing 177 were of seven to twenty and one-half years connection with the society, with an average of 10.13 years. The necessity of regulating the junior membership dues was apparent, and the following rule, which was claimed not only to put the membership upon a more logical basis but would increase the revenue of the society, was adopted, viz.: "That after reaching the age of 31 years all juniors should cease to be members of the society unless they affiliated with the grades in which they were eligible, except those elected juniors prior to this rule."



Announcement was made of the election of fifty members, ten associates and thirty-three juniors, ninety-three additions to membership in all.

Considerable attention was given during the convention to discussing the metric system and its adoption by the Government. A paper, presented by F. A. Halsey, on "The Metric System," strongly condemned the proposed bill before the House of Representatives, and in the animated discussion of this paper it was shown that in the opinion of many members there was much ground for opposing it, although a large number of arguments were presented in its favor by Congressman James H. Southard, of Ohio, chairman of the House committee on coinage, weights and measures, F. J. Miller and others. A number of representatives were appointed by the council to confer with other engineering and scientific societies on the subject, and a resolution was adopted to the effect that the society has never officially withdrawn its opposition to the metric system. A paper on "A Rational Solution of the Problem of Weights and Measures," advocating a system which sub-divides by halves, thirds and quarters, was read by Professor S. A. Reeve.

Professor Reeve also read a paper entitled "Entropy Analysis of the Otto Cycle." Among the other papers presented were: "Heat Resistance, the Reciprocal of Heat Conductivity," by William Kent; "Apparatus for Obtaining a Continuous Record of the Position of an Engine Governor and the Speed of the Engine which it is Governing," by J. C. Riley; "Finer Screw Threads," by C. T. Porter; "Fly-Wheel Capacity for Engine-Driven Alternators," by W. I. Slichter; "Filing System for Office Use," by H. M. Lane; "A New Oil Testing Machine," by Albert Kingsbury.

At the annual meeting the following officers were elected: President, James M. Dodge; vice-presidents, F. H. Daniels, James Christie and John R. Freeman; managers, R. C. McKinney, S. S. Weber and Newell Sanders. Treasurer William H. Wiley and Secretary F. R. Hutton continue in those positions.

### Manhattan Elevated Lease

The directors of the Interborough Rapid Transit Company and of the Manhattan Railway Company, on Dec. 10, approved the form of the lease which is to be signed by the two companies. The following formal notice was authorized by the Subway Commission:

At a meeting of the board of directors of the Interborough Rapid Transit Company to-day a form of lease with the Manhattan Railway Company was submitted and in substance approved and the proper officers of the company were authorized to complete the same under advice of counsel, to be submitted to the stockholders of the Interborough Rapid Transit Company for their approval at a meeting to be called for Jan. 15, 1903.

By reason of the practical difficulties connected with the operation of the railroad property under the circumstances that would have been necessary if the rental until Jan. 1, 1906, had depended only on the ascertainment of the net earnings, it was deemed best in the interest of both parties that the rental for that period should be a guaranteed 6 per centum dividend, and an additional 1 per centum per annum if earned.

A similar announcement was authorized by the Manhattan directors. The Manhattan stockholders' meeting has been called for Jan. 16.

### Vote Against Municipal Ownership in San Francisco

At the special election held in San Francisco Dec. 2, the proposition to acquire the Geary Street, Park & Ocean Railroad Company was defeated by a vote of 15,120 to 11,334. A two-thirds majority was necessary to carry the measure. The plan was to issue bonds to the amount of \$700,000 for purchasing the property. The franchise for the road expires Nov. 6, 1903. The question of taking over the property was gone into thoroughly by the city authorities, and an estimate was made by the city engineer of the cost of reconstructing and maintaining the road under municipal ownership.

### A Reported Combination

The announcement a few days ago of the incorporation at Trenton, N. J., of the Inter-State Railways Company, capitalized at \$10,000,000, has caused to be circulated numerous rumors as to the plan of the company. Of course the articles of incorporation divulge nothing, but that an important deal in traction affairs is pending is certain. From one source it is said that the company plans to merge all the lines in New Jersey and operate a high-speed electric railway between New York and Philadelphia. From other sources the statement is made that the company is organized by

the Pennsylvania Railroad in connection with its New York Tunnel plans. From still another source the information is conveyed that one of the most gigantic deals ever put through by the Widener-Elkins syndicate is under way. This report says that the United Gas & Improvement Company and the Connecticut Lighting & Railway Company are involved, and that the plan is to a sort of "community of interest" between the electric railways in New Jersey, the Connecticut Lighting & Railway Company, the New York, New Haven & Hartford Railroad and the Pennsylvania Railroad. No authentic information is obtainable. Frank B. Housel, William F. Eidel and George B. Martin are named as the incorporators of the company.

### Annual Report of the Connecticut Railway & Lighting Company

The annual report of the Connecticut Railway & Lighting Company for the fiscal year ended June 30, 1902, as filed with the Railroad Commissioners of the State, shows:

Gross earnings of all companies:	
From railway.....	\$1,113,777
From electric lighting.....	297,137
From gas plants.....	204,470
Total .....	\$1,615,384
Expenses of operation of all companies:	
For railway .....	\$616,724
For electric lighting.....	188,938
For gas plants.....	130,639
Total .....	\$936,301
Net earnings.....	679,082
Taxes and miscellaneous interest.....	107,179
Net earnings applicable to bond interest.....	\$571,903
Interest on funded debt.....	426,556
Surplus before deducting extraordinary expenses....	145,347
Less expenses incurred in improvements of permanent nature, extensions, etc.....	57,584
Balance surplus.....	87,813

The combined balance sheet shows:

ASSETS	
Construction and equipment.....	\$24,523,339
Cash on hand June 30, 1902.....	41,130
Material and supplies on hand June 30, 1902.....	128,234
Accounts receivable.....	111,541
Accounts paid in advance.....	21,845
Total .....	\$24,826,089
LIABILITIES	
Capital stock.....	\$15,000,000
Funded debt.....	9,350,000
Bills payable.....	260,000
Accounts payable.....	79,494
Advance ticket sales and deposits.....	4,221
Accident insurance fund.....	51,359
Total undivided profits June 30, 1902.....	99,007
Less adjustment during year applicable prior to July 1, 1901.....	17,992
	81,015
Total .....	\$24,826,089

This company controls and operates 161 miles of electric railway and gas and electric lighting plants, extending, with connections, from Hartford to Stamford.

### Elevated Motor Car Burned in Chicago

A motor car on the Northwestern Elevated Railroad, Chicago, was almost completely destroyed by fire one evening last week. The fire started from a short circuit in the motorman's cab. The motorman was badly burned. The incident only calls attention to the importance of precaution against fire in motor cars operating on underground roads, and wiring and controlling apparatus not likely to permit the starting of dangerous arcs.

A special cable from London says that Royal assent has been given to all the bills relating to Charles T. Yerkes' "tube" railroad plans for London. The bills providing for the construction of the roads cover an aggregate of 100 miles of underground and surface tracks.



## Complete Second-Hand Equipments

The growth and extent of the business of Rossiter, MacGovern & Co. is shown by the fact that this firm is doing a large business in complete station equipments for lighting and for railway power stations. For instance, a prospective buyer, such as a new street railway company, can procure a complete station equipment erected and ready for operation, including boilers, engines, generators, switchboards, etc., and even comprising cars and motors, if desired. This should prove a very satisfactory plan to many new companies, as well as a profitable one to the older companies who can thus dispose, if desired, of complete equipments which are perfectly good for many years' service on a less important road, but which, owing to the local conditions, have to be superseded by a more modern or different type of equipment.

An example of the large scale on which the firm does business was shown by a recent purchase in New York city. Owing to the approaching completion of the Metropolitan Street Railway Company's power plant at Kingsbridge, the Metropolitan company has been closing down some of its branch stations. A few months ago the 145th Street station was dispensed with, and the apparatus was purchased by Rossiter, MacGovern & Co., New York. The Metropolitan Company has also recently been able to dispense with its large Twenty-Fifth Street station equipment, and the entire plant, direct-connected generators, engines, etc., has also been purchased by the same enterprising firm.

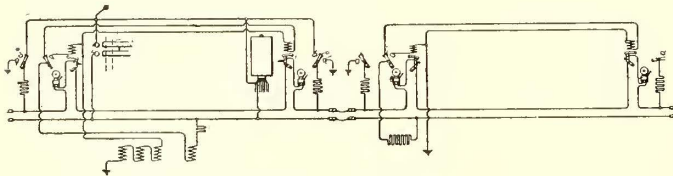
### United States Patents

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

#### UNITED STATES PATENTS ISSUED NOV. 25, 1902

714,126. Hose Protector for Railway Tracks; H. H. Arnold, Cincinnati, Ohio. App. filed July 10, 1902. Bridging rails are blocked above the ordinary rails and detachably secured thereto, the hose passing between the two.

714,142. Railway Switch; A. C. Cambridge, Charleston, S. C. App. filed Feb. 17, 1902. The switch tongue is engaged by a disc or wheel depressed in the track bed and actuated by eccentric connections correspondingly attached to discs or wheels along the track and capable of being turned by extensions adapted to be operated by the traveling wheel of a car.



PATENT NO 714,366

714,167. Method of and Means for the Fixation of Track Rails on Tramway or Railway Lines; W. J. Foot, London, England. App. filed Dec. 19, 1901. The tread of the rail is provided with a tongue on its under side adapted to be seated in a channel in a supporting rail. At the joints, side walls seated upon base flanges, form boxes, whereby the rail can be removed without taking up the pavement.

714,240. Switch for Street Railways; S. S. Roberts, Louisville, Ky. App. filed Sept. 2, 1902. The bar connecting the switch tongue with the switch operating mechanism, is spring mounted, so that the tongue will give when a car is backed down opposite to the switch and spring back to place after the car has passed.

714,267. Trolley Pole Harp; J. H. Walker, Lexington, Ky. App. filed Jan. 14, 1902. A truss-like frame between the end members of which the wheel is sprung into place. Other features are designed.

714,268. Contact for Trolley Harps; J. H. Walker, Lexington, Ky. App. filed Feb. 12, 1902. A modification of the preceding patent.

714,366. Train Signal System; A. G. Davis, Schenectady, N. Y. App. filed March 10, 1902. The starting signal cannot reach the motorman until notice is sent from each platform of the train where passengers enter.

714,370. Adjustable Seat; D. M. Haverly and E. G. Solomon, Omaha, Neb. App. filed June 29, 1901. A reversible car seat in which the seat and back portions may be extended so as to enable the occupant to recline.

714,398. Mechanism for Shifting Points of Tramway Lines; G. D. Ross, Glasgow, Scotland. App. filed July 11, 1902. Details.

714,446. Protector for Third Rails of Electric Railways; H. Brooks, Wheaton, Ill. App. filed June 23, 1902. Consists of a tube non-conducting material, open on one side to admit the contact-shoe.

714,453. Car Fender; W. B. Collins, North Dartmouth, Mass. App. filed May 10, 1902. The motorman presses a spring to throw the fender to operative position in case there is an obstruction on the track.

714,497. Railway Electric Motor Cooling System; C. O. Mailoux and W. C. Gotshall, New York, N. Y. App. filed Aug. 26, 1902. The motor is kept cool by compressed air or gas, which is caused to circulate about the motor in accordance with temperature changes thereof and by automatic means.

714,498. Railway Electric Motor Cooling System; C. O. Mailoux and W. C. Gotshall, New York, N. Y. App. filed Sept. 13, 1902. A modification of the preceding patent.

714,608. Trolley Guard; C. O. Prince, Canton, Ohio. App. filed Sept. 2, 1902. Details.

#### UNITED STATES PATENTS ISSUED DEC. 2, 1902

714,695. Electromagnetic Traction Increasing Device; A. A. Honey, Tacoma, Washington. App. filed April 1, 1902. An iron bar is pivoted to the axle at one end and carries a truck at the other, and is surrounded by a magnet coil which can be thrown into circuit at will to increase the traction by bringing the truck into engagement with the rail, thereby establishing magnetic attraction between the two and between the car wheel and the truck.

714,725. Plate Metal Car Wheel; H. F. Mann, Allegheny, Pa. App. filed June 21, 1902. The web, tread and rail-flange of the wheel are made of a single plate of steel, or steel and iron, the hub being formed separately of suitable material and securely attached to the center of the web.

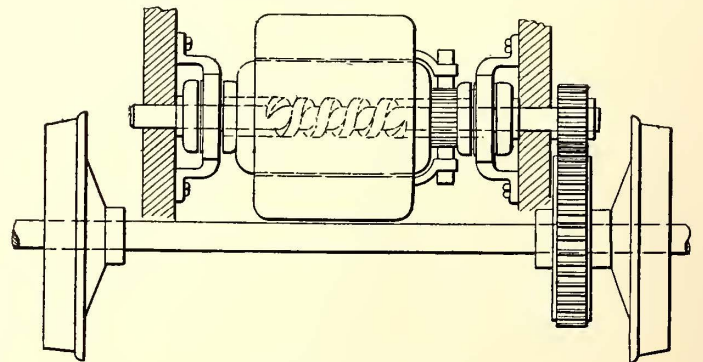
714,734. Electric Block Signal; E. M. North, Brooklyn, N. Y. App. filed March 22, 1902. A combined semaphore and switch lever, adapted to be moved mechanically by the pressure of the car wheel on a push rod.

714,752. Car Spring; T. A. Shea, Oswego, N. Y. App. filed March 1, 1902. Relates to cap plates for coil springs made of tempered spring steel with flat bases and integral opposite side flanges.

714,798. Slipper Brake for Tramway Cars; J. Mitchell and W. G. Rhodes, Manchester, England. App. filed Nov. 2, 1902. Details.

714,851. Railway and Car and Magnetic Appliances Therefor; A. C. Albertson, New York, N. Y. App. filed April 8, 1902. The car carries magnets whose poles are presented to an iron rail so placed that the attractive force tends to lift the car from the track, thereby decreasing friction.

714,910. Car Fender; H. E. Itter, Bay City, Mich. App. filed Oct. 1, 1902. The front of the fender is provided with wheels on a shaft which bear on the pavement, and in advance of these wheels short rollers, which are oppositely rotated by friction contact with the wheels, whereby an obstruction is rolled upon the fender. Other features are shown.



PATENT NO. 714,916

714,913. Track Brake for Electric Cars; O. Keen, Allentown, Pa. App. filed April 23, 1902. An emergency brake in which the brake-shoe is hung from the wheel piece of the truck intermediate of the wheels, and adapted to be forced downward into contact with the rail by a spring released by a system of levers from the platform of the car, which normally holds the brake in operative position.

714,915. Car Brake Lever; W. C. Keithly, San Francisco, Cal. App. filed March 20, 1902. A hand-lever apparatus designed for use on street cars where brakes are applied through the action of a lever.



714,916. Automatic Clutch; J. W. Kellogg, Schenectady, N. Y. App. filed March 17, 1902. The combination in a wheeled vehicle of the driving motor, the motor supporting frame, the traction wheels, power transmitting gearing from the motor to the traction wheels, friction-clutch mechanism interposed in said gearing, and means whereby said friction-clutch mechanism becomes locked to the motor supporting frame when the power transmission gearing begins to run faster than the motor.

714,979. Locking Device for Car Seats; M. Weber, St. Louis, Mo. App. filed Jan. 24, 1902. A device for locking seats known as "walk-over" seats in position while in use.

715,036. Trolley Harp; H. S. Doyle, St. Louis, Mo. App. filed Aug. 15, 1902. A spring fork in which the wheel is mounted is provided with nuts which screw up and down on the neck of the fork to adjust the spring pressure.

715,129. Fare Register; J. F. Ohmer and H. Tyler, Dayton, Ohio. App. filed March 18, 1901. This invention relates to means for recording separately a multiplicity of different denominations of fares and for indicating separately the fares of each denomination and for recording and indicating a total of all fares registered irrespective of the different denominations or classes.

715,153. Automatic Car Fender; H. F. Rooney, Randolph, Mass. App. filed July 26, 1902. The main body portion of the fender is composed of two parts, one forming the seat or platform and hinged to the other part, which is spring mounted upon the dashboard of the car, thereby allowing the fender to tilt downward when an obstruction is encountered.

715,190. Trolley Catcher; E. M. Zwing, Philadelphia, Pa. App. filed Aug. 30, 1902. When the trolley leaves the wire a brake is released, which acts on the trolley rope to prevent the trolley from flying upward.

### ENGINEERING SOCIETY

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—The next meeting of this society will be held on Friday evening, Dec. 19, when the subject for discussion will be "Braking and Traction Brakes." J. D. Keiley and R. A. Parke will contribute papers on the subject.

### PERSONAL MENTION

MR. A. W. SCHALL has been appointed superintendent of shops of the Niles Car & Manufacturing Company, to fill the vacancy caused by the resignation of Mr. A. L. Jacobs. Mr. Schall was assistant under Mr. Jacobs, and has had an experience in practical car building which covers twenty-two years of active work.

MR. GEORGE W. ALDRIDGE has been appointed secretary of the State Board of Railroad Commissioners of New York, to succeed the late Colonel John S. Kenyon. Mr. Aldridge has been in public life ever since he attained his majority, and in that time he has occupied several prominent offices, but he has never been identified with steam or electric railway interests.

MR. JOHN B. McDONALD is the subject of an interesting biographical sketch in the current issue of "The World's Work." As the builder of the New York subway Mr. McDonald has become a man of national, if not world-wide, reputation, and the general public will find interesting reading in an account of his earlier successes as a contractor for engineering "impossibilities." An excellent full-page portrait accompanies the article.

MR. R. S. MASSON has been appointed consulting electrical engineer of the Los Angeles Railway Company. In the official announcement of this appointment it is stated that it will be the duty of the consulting electrical engineer to prepare or to outline all plans of electrical machinery and apparatus and to outline the arrangement of installation. The execution of the work, however, will, as heretofore, be subject to the control of the heads of the respective departments, the office of consulting electrical engineer being advisory rather than executive.

MR. O. W. BRAIN, electrical engineer for the New South Wales government railways, is in America for an extended tour of investigation. Mr. Brain intends, after visiting the principal centers of electric railway interest in the East, to stop at various points in the West on his trip to San Francisco, where he sails for home. While in New York his headquarters are at the Hoffman House. Although a young man for such a responsible commission Mr. Brain's knowledge of engineering and his ready appreciation of the good points in the examples of American practice which he has already inspected, have made him a welcome visitor, and his many new-made friends are doing their best to make his journey a profitable and pleasant one.

MR. W. C. SMITH, who succeeds Mr. A. A. Anderson as general manager of the Pennsylvania & Mahoning Valley Railway Company, of Youngstown, Ohio, has been connected with the company since February, 1902, as assistant general manager. He was formerly a resident of Pittsburgh, where he was connected with the local street railway companies for twenty years. Later he was appointed general superintendent of the Central Traction Company, and was connected with that company from 1890 to 1896. He also acted as superintendent of transportation after the consolidation of that company with other Pittsburgh interests. Mr. Smith, because of his connection with the Pennsylvania & Mahoning Valley Railway Company, has a familiarity with local conditions that could be gained in no other way, and is well qualified for the position to which he has been chosen.

MR. A. A. ANDERSON, for a number of years general manager of the Pennsylvania & Mahoning Valley Railway Company, of Youngstown, Ohio, has resigned from the company, and Mr. W. C. Smith, general superintendent of the company, has been named as his successor. In July Mr. Anderson placed his resignation in the hands of the directors of the company, but they declined to accept it. He finally consented to remain in charge until matters, then in an embryo stage, could be developed. In November a second resignation was presented. This the company accepted. Mr. Anderson's street railway career began in 1878, when he became associated with Mr. Tom L. Johnson in the street railway lines of Indianapolis. He remained there until May, 1893, and on Jan. 1, 1894, took charge of the Mahoning Valley system, which, under his management, has grown to be one of the most important properties in Ohio. Mr. Anderson is



A. A. ANDERSON

considering several propositions, but before making any engagement he will take an extended trip through the West, also to Cuba. On Nov. 24 the employees of the company, as a token of esteem for Mr. Anderson, presented him with a handsome clock, paying also a glowing tribute to the recipient as a man, who, by his energy, absolute integrity and fairness, had won their respect. Mr. W. C. Smith will succeed Mr. Anderson.

MR. GEORGE M. COLE has just been appointed general manager of the Oneonta, Cooperstown & Richfield Springs Railway Company. Mr. Cole is an engineer of established reputation and has had wide experience in the construction and operation of electric railway properties, and also of gas and electric light and power plants. He was formerly associated with Sanderson & Porter, in charge of construction at Youngstown, of the Youngstown-Sharon Railway & Light Company's properties. He has also been general manager of the Plattsburg Traction Company since it was built, and general manager of the Plattsburg Light, Heat & Power Company since 1890. He was also associated with Mr. E. N. Sanderson in the construction of the People's Tramway Company at Putnam, Conn., and with the late Mr. Alfred T. Heyn in building the Columbia (S. C.) Street Railway lines in 1880,



GEORGE M. COLE

and in rebuilding the Newburg Street Railway in 1887. He also had charge of the building of the Hicks Street line in Brooklyn in 1888. Mr. Cole will have entire charge of the management of the Oneonta, Cooperstown & Richfield Springs Railway, which extends from Oneonta to Mohawk, a distance of 67 miles. The company will handle both a freight and passenger business, and will open up a very rich country hitherto inaccessible, particularly north from Cooperstown to the Mohawk Valley. The road will be operated from one power house, and distribution will be effected by means of the three-phase system to sub-stations, of which there are five. The company will have track connections at Oneonta with the Delaware & Hudson and the Ulster & Delaware; at Richfield Springs with the Delaware, Lackawanna & Western, and at Mohawk with the West Shore and New York Central.



## LEGAL DEPARTMENT

CONDUCTED BY WILBUR LARREMORE OF THE NEW YORK BAR

### Res Ipsa Loquitur

In *Paynter vs. Bridgeton & M. Traction Company*, decided by the Court of Errors and Appeals of New Jersey, in June, 1902 (52 Atl., 367), it was held that a mere fall from a street car, without any evidence to show how the fall was occasioned, raises no presumption of negligence on the part of the operators of the car; that the so-called doctrine of *res ipsa loquitur* is applicable only when the thing shown speaks of the negligence of the defendant, not merely of the happening of the accident. This decision was by the highest court of New Jersey; it carefully considers the evidence in the case at bar and cites a large number of authorities touching the subject in the courts of New Jersey and other States. The decision is well sustained on principle as well as by authority, and it may be commended as a typical illustration of the application of the technical doctrine of *res ipsa loquitur* to street railroad companies.

Literally translated this doctrine means simply that the thing itself speaks. In an ordinary case of negligence—as indeed in the general run of litigations—the plaintiff has the whole burden of proof. He must prove his entire case; in a negligence case, not only that the plaintiff was injured, but that his injury was caused by the defendant's negligence, and that plaintiff was free from negligence. The purport of this New Jersey decision is that the doctrine that the fact itself speaks may be made applicable only to the negligence of the defendant. In other words, it is not sufficient to make out a *prima facie* case to show merely the happening of an accident; there must be in addition something tending to show that the cause of the accident is peculiarly within the defendant's knowledge and not within that of the plaintiff.

That the distinction so drawn is just will be apparent upon very slight analysis. If it merely be shown that the plaintiff fell from a street car, there may be a dozen conflicting explanations on the part of both the plaintiff and the defendant tending to establish that the negligence either of one or the other was the proximate cause of the accident. The matter is one of common observation, and its probable cause may properly be cleared up by the facts stated by eye-witnesses. If, however, a passenger seated inside of a railroad carriage or inside of a street car be injured by a collision, or derailment, or electric shock, it is evident that something outside of his own observation, and, therefore, something beyond his own ability to take proper precaution against, was the cause of his injury. As to these occult causes—causes necessarily and peculiarly within the knowledge of a person operating a railroad and not within the knowledge of a passenger—the increasing tendency is to administer the doctrine of *res ipsa loquitur*. When an accident of the latter class occurs, the courts say that as the plaintiff cannot explain just how the calamity occurred, he will be permitted to make out a *prima facie* case on the theory that the fact itself speaks and that the burden of explanation and excuse is placed upon the defendant.

In the recent case in the Court of Appeals of New York, *Griffen vs. Manice* (166 N. Y., 188), the doctrine has been applied to the case of an elevator accident in an office building. The New York Court of Appeals, while it declined to class the proprietors of elevators as common carriers, nevertheless held that if an accident occurred to a member of the public, invited to take passage in an elevator and guiltless of any affirmative fault of conduct, through the breaking down of the elevator or other presumable defect in its machinery, the doctrine *res ipsa loquitur* applied and the burden was placed upon the defendant of showing that it had not been guilty of negligence. The opinion in this case contains a careful discussion of the arguments for and against the doctrine of *res ipsa loquitur*. The most cogent and just reason assigned for the unmistakable tendency to extend the doctrine is contained in the following language by Judge Cullen:

"The maxim is also in part based on the consideration that where the management and control of the thing which has produced the injury is exclusively vested in the defendant, it is within his power to produce evidence of the actual cause that produced the accident which the plaintiff is unable to present."

When it is considered that an accident to a railroad train, or a street car, or an elevator, frequently in the general wreck destroys all possibility of tracing the original cause of the calamity, the justice and expediency of applying the rule *res ipsa loquitur* is quite

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

apparent in the nature of things. This doctrine cannot be resorted to as commonly in street car accidents as in those upon steam railroads, but with regard to electric traction companies, it may properly be applied in the case of accidents resulting from the motor apparatus.

### LIABILITY FOR NEGLIGENCE.

ILLINOIS.—Carriers—Street Railroads—Trial—Verdict—Sufficiency—Instructions—Refusal of Requested Instruction.

1. A verdict against "defendant," in an action for personal injuries by a passenger against a company operating a street railroad and a company owning the road and leasing it to the operating company, in which but one defense is interposed, is sufficient to support a verdict against both companies, both being liable for such injuries.

2. When the instructions given fully state the law applicable to the case, the refusal to give requested instructions is not error.—(West Chicago St. Ry. Co. et al. vs. Horne, 64 N. E. Rep. 331.)

MASSACHUSETTS.—Street Railroads—Repair of Streets—Constitutional Law—Obligation of Contracts—Mandatory Injunction.

1. The grant of a location to a street railroad company required the materials and details of the construction of its tracks to be "to the acceptance of the supervisors of highways and bridges," and its tracks were constructed in accordance with the grant; T-rails being used. The company subsequently replaced such rails, at a large expense, with similar rails of a heavier weight; but they occupied no greater portion of the surface of the street, which was replaced in its former condition, nor rendered it less suitable for travel or less safe. The company accidentally omitted to obtain permission from the supervisors, but there was no intent to evade the laws, and it was not shown that the city objected to such work. The city had intended to require the company to use grooved rails when new rails were laid. Held, that the city was not entitled to a mandatory injunction requiring the removal of the rails, even if the supervisors could have required grooved rails to be laid; the violation of an established right not entitling the injured party to a mandatory injunction as a matter of course.

2. Under St. 1898, c. 578, sections 4, 7, 10, 13, providing that street railroads shall be subject to a certain tax, levied according to mileage, to be adjusted so that the amount collected shall correspond to the amount formerly paid by the company for the repair of the streets, and providing that street railroads shall not be required to keep any portion of the streets and highways in repair, except that such railroads shall remain subject to all legal obligations imposed in original grants of locations granted to the company in the city or town, such railroads are not bound to repair streets over which their lines run which are not embraced in their original location.

3. St. 1898, c. 578, providing that street railroads shall not be required to repair any portion of the streets or highways, is not 52 Atlantic Rep., 461.)

NEW YORK.—Verdict—Indefiniteness—Mistrial.

A jury rendered a sealed verdict as follows: "The jury say that they find a verdict for defendant, with recommendation to the court to award plaintiff \$300 as compensation for her losses." Held that, as the intention of the jury could not be ascertained from the verdict, there was a mistrial.—(Conrey vs. Metropolitan St. Ry. Co., 77 N. Y. Supp., 222.)

NEW YORK.—Street Railroads—Injuries to Passengers—Action—Instruction—Degree of Care to Prevent Injuries—Negligence—Sufficiency of Evidence—Admissibility of Evidence—Custom of Notifying Passengers of Curves—Evidence—Customary Motion in Rounding Curve—Admissibility of Evidence—Materiality—Instructions—Rules for Protection of Passengers.

1. In an action against a street railroad company for injuries to a passenger caused by another passenger being precipitated upon her by a jolt of the car as it rounded a curve, the refusal to charge that defendant owed a "very high degree of care and skill to prevent any injuries" to its passengers was not error, but a charge that the measure of the duty of defendant's servants was "to conduct themselves with reasonable care under all the circumstances, with a view of protecting their passengers," was a correct statement of the law.

2. The mere fact that while a street car is rounding a curve a



passenger is injured by reason of another passenger being thrown upon her is insufficient, in the absence of excessive speed or of the application of more power than necessary to round the curve, to justify a recovery against the company for the injuries thus received.

3. Where the complaint in an action against a street railroad company for injuries to a passenger, caused by another passenger being thrown upon her while the car was rounding a curve, contained no allegations that the roadbed was out of order or improperly constructed, or that the car was not a proper one or not properly equipped, and there was no evidence that the conductor did not warn the passengers of the approach of the curve, the refusal to admit testimony of peculiar motions of the car in going around the curve at other times was not error.

4. In an action against a street railroad company for injuries to a passenger caused by another passenger being thrown upon her while the car was rounding a curve, wherein there was no evidence that the conductor did not notify the passengers of the approach to the curve, there was no error in excluding evidence that it was customary to give such notice.

5. In an action against a street railroad company, for injuries to a passenger caused by another passenger, who was about to enter the car, being thrown upon her while the car was rounding a curve, the fact that the passenger who was so thrown upon plaintiff was talking to the conductor just before the accident was immaterial.

6. There being no evidence in the case that defendant had not made rules and regulations for the protection of its passengers, a charge that it was defendant's duty to make such rules and that failure to make them was negligence was properly refused.—(Merrill vs. Metropolitan St. Ry. Co., 77 N. Y. Supp., 122.)

NEW YORK.—Appeal—Question of Damages—Review—Damages—Personal Injuries—Excessiveness.

1. In an action for death, the appellate court can review the jury's determination on the question of damages.

2. Where an only daughter, twenty years of age, who was well developed physically and mentally, a successful musician, intending to engage in music as a profession, and who assisted her mother in housekeeping and her father occasionally in his store, is negligently killed, a verdict for \$9,500 to compensate the father for his pecuniary injury resulting from her death is excessive.—(Kellogg vs. Albany & H. Ry. & Power Co., 76 N. Y., Supp. 85.)

NEW YORK.—Trial—Directed Verdict—Weight of Evidence.

The fact that the evidence so preponderates in defendant's favor that a verdict for plaintiff will be set aside as against the weight of the evidence does not authorize a directed verdict for defendant.—(Padbury vs. Metropolitan St. Ry. Co., 75 N. Y. Supp. 952.)

OREGON.—Appeal—Dismissal—Defective Notice.

A notice of appeal, reciting the judgment as rendered June 18, whereas it was actually rendered June 8, was not ground for dismissing the appeal, where it was manifest from the appeal papers that there was a mere clerical error, and no injury.—(Salem Light & Traction Co. vs. Anson, 67 Pac. Rep., 1015.)

PENNSYLVANIA.—Contracts—Evidence to Avoid Written by Contemporaneous Parol—Indefiniteness.

1. That, for a while after an employee got out of the house after his injury, the employers, according to their custom, gave him light employment at \$1.50 per day, is not evidence that an oral agreement that they should give him such employment for life was made contemporaneously with a written agreement whereby he, in consideration of certain payments, released them from all liability on account of his injury.

2. A written contract whereby, in consideration of \$20, and payment of \$1.50 per day during time an employee is confined in the house, he expressly releases the employers from all liability for his injury, cannot be avoided by evidence of a contemporaneous oral agreement that they were to pay his doctor's bill, and, from the time he was able to get out of the house, would employ him at \$1.50 per day for the rest of his life; he and his wife alone testifying to this, and two employees testifying to the contrary.

3. Contract that employers should employ an injured employee at \$1.50 per day for the rest of his life is too indefinite to be enforced; there being no provision as to the nature of the employment, or how it should be determined.—(Ogden vs. Philadelphia & W. C. Traction Co., 52 Atlanta Rep. 9.)

PENNSYLVANIA.—Corporations—Actions Against—Venue.

A street railway corporation, whose roadbed, principal office, car houses and rolling stock are in one county, may be sued in another, where its president and secretary reside, where part of its banking business is transacted and where its secretary has its office, from which much of its correspondence is carried on, and in which its board of directors meet, the corporate seal is kept

and used part of the year, its stock certificates are attested and issued, and its ledger account kept, and much other corporate business transacted.—(Jansen vs. Philadelphia M. & S. St. Ry. Co., 51 At. Rep., 311.)

PENNSYLVANIA.—Partnership—Evidence—Appeal—Assignment of Error.

1. Recovery against defendants, sued on a policy as general partners doing business under a certain association name, cannot be had, no business relations between defendants being shown, the policy being signed by the general managers, and not by the individual members of the association, and it or no other evidence disclosing who the members were, though the policy showed the members signed the agreement under which the association was organized; the printing of the names of the officers on the back of the policy not showing that they were officers, much less that they were interested as individuals or partners in the association.

2. Rulings excluding evidence, though excepted to, cannot be considered on appeal, the only assignment of error being the refusal to take off nonsuit.—(Scranton Traction Co. vs. Schlichter et al., 51 At. Rep., 353.)

TEXAS.—Street Railroads—Municipal Corporation—Rail Above Street—Injury to Traveler—Instruction.

An instruction in an action against a city and street railroad company for a death, alleged to have been caused by a rail in the railroad track being allowed to remain above the level of the street, that if the defendants permitted the surface of the street to become lower than the rail, so as to interfere with the safe crossing of the street with vehicles, and if deceased was caused to fall from his wagon and was fatally injured by reason thereof, while in the exercise of due care, the plaintiff could recover, was erroneous, as taking from the jury the question of negligence and the question of proper care in keeping the street in proper repair, though such instruction was immediately preceded by an instruction that the defendants were only liable for failure to use ordinary care.—(Citizens' Ry. Co. vs. Gossett et al., 68 S. W. Rep. 706.)

TEXAS.—Carriers—Injuries to Passengers—Street Railways—Charged Cars—Electric Shock—Proof—Res Ipsa Loquitur—Instructions—Care Required—Definition of Terms—Request—Necessity—Evidence—Similar Accidents—Trial—Statement by Court.

1. Where plaintiff was shocked by electricity as he took hold of the handhold of an electric car for the purpose of boarding it at a point where it had stopped to take on passengers, and he was badly injured, the circumstances surrounding the injury were sufficient to raise a presumption of negligence on the part of the company.

2. In an action for injuries to a passenger on a street car, an instruction that the defendant owed its passengers the duty of exercising "great care and caution" to keep the machinery and appliances of its cars in a reasonably safe condition and repair, was not objectionable as imposing on the company a higher degree of care than is required by law.

3. It was not error for the court, in an action for injuries to a passenger on a street car, to omit to define the term "great care and caution" in an instruction defining the degree of care required of defendant, in the absence of a request designed to correct the omission.

4. Where, in an action for injuries to a passenger from an electric shock from a charged street car, there was no evidence that at the time of the accident the car or its appliances were in proper condition, or that the danger could not have been discovered by the exercise of care, or that the car had been recently inspected, and found in good repair, an instruction that if the jury found that if defendant, by the use of the highest care, could not have discovered the danger, and could not have prevented the same, then the jury could not presume defendant guilty of negligence from the mere fact of the accident, etc., was properly refused.

5. In an action for injuries to a passenger from an electric shock received from a charged street car, evidence of another person that he was shocked by the same car on the same day was admissible as tending to show that the car and equipment were not in proper condition, and that the company knew, or ought to have known, such fact by the use of ordinary care.

6. Where, during the trial, the court asked counsel for defendant if they had any further evidence, and they replied that they had two more witnesses, and requested an adjournment until the next morning, promising to finish with them in a short time, and to offer no further testimony, a statement by the judge on the reconvening of the court and on counsel calling more witnesses than two, that he did not think counsel were treating the court fairly, was not erroneous or prejudicial, either as prejudicing defendant's cause or as tending to impair the weight of defendant's testimony or the argument of its counsel to the jury.—(Dallas Consol. Electric St. Ry. Co. vs. Broadhurst, 68 S. W. Rep. 315.)



VIRGINIA.—Street Railways—Personal Injuries—Declaration—Proof—Variance.

1. In an action by a passenger against a street car company for personal injuries, where plaintiff testified that the step of the car was slippery from frost or ice, he could not tell which, and the motorman testified that there might have been some frost on the step, but he did not think there was any ice, giving as his reason that the car stayed in a shed over-night, an allegation that defendant negligently permitted the step to remain covered with ice was not sustained.

2. The complaint alleged that the motorman negligently permitted plaintiff, a minor, to ride on the footboard from the time he first boarded the car. The testimony of both plaintiff and the motorman showed that plaintiff rode on the front platform until within a square of his home, where it was the motorman's purpose to stop and let him off, at which point he stepped down on the footboard for the purpose of leaving the car. Held, a variance from the declaration.

3. Testimony that the plaintiff, while standing on the footboard, lost his balance, because of the rough condition of the track and consequent jolting of the car, was inadmissible, where not averred in the declaration.—(Richmond Ry. & Electric Co. vs. West, 40 L. E. Rep., 643.)

VIRGINIA.—Appeal—Bill of Exceptions—Rulings on Evidence—Negligence—Exemplary Damages.

1. An exception to the ruling of a trial court on a motion to reject or admit evidence cannot be reviewed unless there is a bill of exceptions, signed by the judge, clearly pointing out the erroneous ruling complained of.

2. Though there may be several exceptions saved by the same bill, each must set forth distinctly the ground of objection relied on.

3. One bill of exceptions duly taken is sufficient to bring up for review all of the instructions given over objection thereto or all those refused.

4. In an action to recover for negligence of defendant, exemplary damages may be awarded if the facts warranting them are stated with sufficient distinctness to inform the defendant of the charge which he is required to meet, though damages are not claimed in the declaration.—(Richmond Passenger & Power Co. vs. Robinson, 41 S. E. Rep. 719.)

VIRGINIA.—Street Railroads—Degree of Care—Injury to Pedestrian—Evidence—Instructions—Harmless Error.

1. It is the duty of a street railroad company to exercise reasonable care to avoid injuring persons who have the right to be on the street, and who are neither trespassers nor licensees as to it.

2. Expert evidence is admissible to determine within what space a car running under certain conditions may be stopped.

3. Where a street railway company was running its cars in excess of the speed allowed by the statutes and valid municipal ordinances, such fact is competent evidence in an action by a traveler on the highway, injured by the cars, though the statute simply imposes a penalty for its violation.

4. That a street railway company has direct authority from the Legislature to use the streets of a city does not exempt it from reasonable municipal control.

5. It is error to give an instruction where there is no evidence tending to prove the facts on which it is based.

6. An erroneous instruction will be presumed to have affected the verdict of the jury, unless it plainly appears from the whole record that the error did not affect, and could not have affected, the result.—(Norfolk Ry. & Light Co. vs. Corletto, 41 S. E. Rep. 740.)

VIRGINIA.—Street Railroads—Negligence—Presumption from places of work.—(Kings vs. Interstate Consol. St. Ry. Co., Morrison vs. Same, 51 At. Rep., 301.)

WASHINGTON.—Master and Servant—Injuries to Servant—Negligence—Evidence—Sufficiency—Instructions—Expert Witnesses.

1. Plaintiff was injured while attempting to lower the gins of a pile driver by being caught in the rope of the driver. Defendant's superintendent ordered plaintiff and five other servants to lower the gins. Plaintiff's evidence showed that the men directed to hold the rope and prevent the rapid falling of the gins were unable to do so, and that the safe way to lower the gins was to first let down the hammer, and that there was risk connected with the method adopted under the superintendent's direction. There was a conflict in the evidence as to the number of men actually having hold of the rope. Held, to warrant the submission of the issue of defendant's negligence to the jury.

2. An instruction that it was the duty of the master to furnish to the servant reasonably safe machinery in the performance of his work, and "not to expose the servant to danger," was proper; the

expression "not to expose to danger," etc., when taken in connection with the entire instruction, not being prejudicial.

3. An instruction that the jury were to carefully separate what an expert witness testified to as a fact and what he testified to as to his opinion, and that the testimony as to the latter should be weighed with "caution," and carefully considered with reference to the supposed or proven facts upon which his expert opinion was founded, was erroneous, as discrediting the evidence of the expert.—(Gustafson vs. Seattle Traction Co., 68 Pacific Rep., 721.)

WASHINGTON.—Street Railways—Injury to Passenger—Negligence—Evidence.

In an action by a passenger against a street railway for personal injuries, evidence examined, and held to sufficiently show that she was injured while attempting to alight from the car while it was in motion, and without the knowledge of the car employees that she desired to get off, and that, therefore, they were not guilty of negligence in increasing the speed of the car.—(Blakney vs. Seattle Electric Co., 68 Pacific Rep. 1037.)

WASHINGTON.—Appeal—Motion for New Trial—Discretion—Street Railways—Evidence—Conductor's Report.

1. Where a motion for new trial is based on corruption of the jury, undue influence brought to bear on them, and fraud in the defense, the appellate court is not in as good position to judge of such matters as the trial court; and, if no abuse of discretion is shown, the order made thereon should be affirmed.

2. The plaintiff was found lying unconscious near a street railway track. She testified that she boarded a car, delivering to the conductor a transfer slip, and, while getting off at the point where she was found, the car suddenly started, throwing her to the ground, and causing unconsciousness and serious injury. The conductor testified to the names and number of passengers he carried on such trip, that they all paid cash fares, that she was not a passenger, and that he had no knowledge of the injury until she was discovered on the return trip of the car. At the end of the trip on which she claimed to be a passenger, the conductor made his usual report of the number of passengers carried and fares received, and whether in cash or transfer slips. Held, that such report, which agreed with his testimony as to the number of passengers, and that all paid cash, was properly received in evidence.—(Callihan et al. vs. Washington Water Power Co., 67 Pac. Rep., 697.)

CHARTERS, FRANCHISES AND ORDINANCES.

ILLINOIS.—Elevated Railroads—Assessment for Taxation.

Elevated railroads, constructed in part over the street and in part over their own right of way, and organized under Rev. St. 1874, c. 32, providing for the incorporation of railroads, should be assessed for taxation by the State board of equalization under Hurd's Rec. St. 1899, p. 1401, sec. 15, providing for the assessment of railroads, and not by the county board of review under Id., p. 1396, sections 40-52, providing for the assessment of street railways.—Knopf et al. vs. Lake St. El. R. Co.; Same vs. Metropolitan West Side El. Ry. Co.; Same vs. South Side El. R. Co.; Same vs. Northwestern El. R. Co.; Same vs. Union El. R. Co.; 64 N. E. Rep. 340.)

MARYLAND.—Street Railroads—Crossing Railroad Track—Damages—Maintaining Crossing.

1. A street railroad company has no right to construct its line across railroad tracks rightfully maintained in a city street, without first compensating the railroad company for damages resulting therefrom.

2. A railroad company rightfully maintaining its tracks in a city street is entitled to require a street railroad company constructing a line across such tracks to pay for the construction of the crossing, and any change in the tracks necessitated by the crossing, but is not entitled to damages for the impairment of the easement in the street.

3. A street railroad company constructing its track across steam railroad tracks rightfully located in a city street must perpetually maintain and repair such crossing according to the direction of the engineer of the steam road.

4. A street railroad company constructing its track across a steam railroad track rightfully located in a city street is not required to pay a portion of the expense of the steam road in maintaining crossing gates and other safety appliances at the crossing.—(Central Pass. Ry. Co. vs. Philadelphia, W. & B. R. Co., 52 Atlantic Rep., 752.)

MASSACHUSETTS.—Street Railroads—Repair of Streets—Constitutional Law—Obligation of Contracts—Impairment.

1. Under St. 1898, c. 578, sections 4, 7, 10, 13, providing that street railroads shall be subject to a certain tax, levied according to mileage, to be adjusted so that the amount collected shall correspond to the amount formerly paid by the company for the



repair of the streets, and providing that street railroads shall not be required to keep any portion of the streets and highways in repair, but declaring that such railroads shall remain subject to all legal obligations imposed in original locations granted to the company in the city or town (defined by section 1 to mean the first location granted to the company in the city or town), such railroads are not bound to repair streets over which their lines run which are not embraced in their original location.

2. Laws 1898, c. 578, providing that street railroads shall not be required to repair any portion of the streets or highways, is not unconstitutional, as impairing contracts, in relieving the roads from such obligations imposed on them by a city in granting locations to them.—(City of Worcester vs. Worcester Consol. St. Ry. Co. (three cases), 64 N. E. Rep., 581.)

NEW HAMPSHIRE.—Railroads—Extension—Nature and Scope—Finding as to Public Good—Preliminary Showing—Alteration of Original Purpose of Corporation—Procedure.

1. Pub. St. c. 156, section 18, provides that, if a railroad desires to extend or build a branch road, it may file a petition to determine whether for the public good, and may build if the question is decided in its favor. Sections 28 to 37 provide that, if any stockholder dissents from the decision to build, the corporation may, by application to court, have the value of his stock determined, and buy it in. Held, that the latter sections indicate that the building of extensions and branches of such a nature as to change the original purposes of the corporation was within the legislative contemplation, so that under the section first quoted a corporation had a right to construct an extension longer than the existing line, and, in effect, constituting a new system.

2. Pub. St. c. 156, section 18, provides that, if a railroad desires to extend or build a branch road, it may file a petition to determine whether for the public good, and may build if the question is decided in its favor. Section 10, relative to the organization of railroad companies in general, provides that, if it appears to the court that the capital stock of the proposed corporation has been subscribed by responsible parties, and no sufficient objection is made, the court shall refer the petition to the Board of Railroad Commissioners, or to a board of three referees. Section 19 provides that, if the court determines that the public good requires the extension or branch, the decision shall be filed with the Secretary of State, and the corporation shall thereupon have authority to raise the necessary money by increasing its capital stock or issuing bonds. Held, that the provision of section 10, when applied to a petition for the construction of a branch, does not require that it be made to appear that stock has been subscribed by responsible parties, but merely that it be shown that there are sufficient resources for that purpose.

3. Pub. St. c. 156, section 10, provides that if it appears in support of a petition for a determination of public necessity authorizing the construction of a branch railroad that there is sufficient capital to build the branch, and no sufficient objection is made, the court shall refer the petition to the Board of Railroad Commissioners or three referees appointed by the court. Held, that on submission to the Board of Railroad Commissioners or referees the financial ability to build the extension would not be considered, but they would assume that that fact has already been determined.

4. Pub. St. c. 156, section 10, relative to petitions to the court for authority to construct a branch or extension of an existing railway, provides that, if it appears that the capital stock has been subscribed by responsible parties, that sufficient notice has been given, that all preliminary steps have been taken, and no sufficient objection is made, the matter shall be referred to the Railway Commissioners or referees. Held, that in determining the preliminary questions an attested copy of all the proceedings of the corporation relating to the subject of the petition should be filed, and also affidavits relating to relevant facts not matters of record, on which the questions may be determined if no issue is raised by an objecting party, but, if issue is made on any of the questions, the objecting party should be allowed to introduce testimony and cross-examine petitioner's witnesses, which may be done by sending the matter to a referee.—(In re Laconia St. Ry., 52 Atlantic Rep., 458.)

NEW HAMPSHIRE.—Corporations—Organization—Subscription Rights—Character—Transfer—Evidence—Title—Ultra Vires—Corporate Franchise—Surrender.

1. After a charter has been granted to a proposed corporation, and all the stock subscribed for, the subscription rights are property rights representing the corporate property and franchise, capable of being assigned, and carrying with them the right to participate in the management of the corporation, though no stock has yet been issued.

2. Subscription rights in a proposed corporation need not be

evidenced by written instrument in any particular form, but may be established by parol.

3. The title of the holder of subscription rights in a proposed corporation is not affected by the subsequent action of the corporation in recognizing or refusing to recognize his title.

4. A subscription right in a proposed corporation is assignable by parol, and ownership passes immediately on consummation of the sale, and by force thereof, and not by operation of law.

5. The fact that an officer of a corporation, buying subscription rights in another corporation in process of organization, took receipts for the amount paid in his own name, and advanced the purchase price from his own funds, did not conclusively show that he bought the rights as an individual.

6. Where an officer of a corporation was authorized to purchase subscription rights in another corporation, a finding that he purchased the rights for his corporation was equivalent to finding that title thereto vested in the corporation immediately on completion of the sale to him.

7. The majority stockholder, president, and general manager of a corporation was directed to purchase for it a majority of the subscription rights in another corporation which was being organized, and which would become a competing corporation, and actually purchased a majority thereof, for which he was subsequently reimbursed by the corporation. Held, that even though he had no formal authorization to make such purchase, so as to vest title immediately in the corporation, he would be estopped, in a suit between himself and the corporation, to deny that he was its agent, and the title would pass to the corporation on its ratification of the purchase.

8. An officer of a corporation was directed to purchase for it a majority of the subscription rights in another corporation being organized, and did so, using his own funds in payment. Held, that, if title to the subscription rights thereby vested in the corporation, a vote of the directors, made subsequent to the purchase, that "this corporation should acquire a controlling interest" in the new corporation, did not divest its title.

9. Where an officer of a corporation purchased for it a majority of the subscription rights in another corporation, a purchaser from the executors of such officer, with knowledge, of the facts, acquired no better title thereto than his vendor had had.

10. An officer of a corporation was directed to purchase for it a majority of the subscription rights in another corporation, and did so. Held, that even if the purchase in behalf of the corporation was void for want of formal authorization, etc., title would vest in the officer individually.

11. An officer of a corporation was directed to purchase for it a majority of the subscription rights in another corporation, which he did; using his own money, and being reimbursed by the corporation. He subsequently sold a part thereof as his own property. Held, that even if the purchase was ultra vires, contrary to public policy and illegal, the purchaser would acquire no rights as against the corporation.

12. An officer of a corporation was directed to purchase for it a majority of the subscription rights in another corporation, which he did; using his own money, and being reimbursed by the corporation. He subsequently sold a part thereof as his own property, and thereafter purchased an equal quantity of shares on his individual account. Held, that such after-acquired rights should be considered as held for the benefit of the purchaser, who obtained no title to the rights first transferred.

13. On an issue as to whether there had been a surrender of a corporate franchise effected by the action or non-action of the stockholders intending to surrender the franchise, evidence as to the intention of another corporation holding a majority of its stock was admissible.—(Manchester St. Ry. vs. Williams et al.)

NEW YORK.—Street Railroad—Lease to Similar Corporation—Rights of Minority Stockholders—Directors—Presumptions—Consideration for Lease.

1. The majority of the stockholders of a street railway company sought to restrain the delivery and operation of a lease by it to another railway company on a vote of 80 per cent of the stockholders of the lessor and unanimous vote of those of the lessee. Held, that the lease was not void on its face, as constituting an illegal transfer of the properties and effects of the lessor.

2. Where the guaranteed rental did not appear to be inadequate, the lease was not a fraud on the minority stockholders.

3. The directors of a street railway company, in the absence of proof to the contrary, will be presumed to have acted in good faith in leasing the railroad to another company.

4. The execution of a lease by a street railway company to another for ninety-nine years at a rental of 7 per cent on the valuation of the property is not a fraud on the minority stockholders, in that it limits the annual dividends, no matter how great the earnings and the profits of the system may become.—(Content et al. vs. Metropolitan St. Ry. Co. et al.; Wormser vs. Same., 76 N. Y., Supp. 151.)



## FINANCIAL INTELLIGENCE

### THE MARKETS

WALL STREET, Dec. 10, 1902.

#### The Money Market

Increased firmness developed in all departments of the local money market during the last week, as a result of the continued heavy losses in cash by the banks to the Sub-Treasury, and the preparations making for the interest and dividend disbursements due Jan. 1, which promise to be the largest on record. The statement published by the associated banks on last Saturday showed a loss in cash of over \$6,000,000, and since then an additional loss of over \$2,500,000 is indicated by the figures at hand. This heavy loss was due in a measure to the shipment of \$1,000,000 gold to South America, but the greater part of the week's loss was due directly to heavy custom payments. The time money market shows increased firmness. The supply of lendable funds appears to be considerably smaller than a week ago, and the larger lenders prefer to deal with the strongest houses only. Short time accommodations show the greatest firmness. For sixty and ninety days contracts which were obtainable last week at 6 and 6¼ per cent have risen to 7 per cent, and in some cases 8 per cent is said to have been paid. For the periods running from four to six months, 6 per cent is asked and generally obtained. The call money market was also firmer, the open market rate ranging between 4½ and 7½ per cent, the average rate being about 6 per cent. The indications at present point to a continued firm market until after the first of the new year. The continued strength of the foreign exchange market is being watched with much interest, but while gold exports to Europe are not expected, the indications are that additional shipments will be made to South America before the close of the present week.

#### The Stock Market

Speculation on the Stock Exchange has been practically lifeless. Total transactions have fallen to the smallest proportions in months, and prices generally have suffered further recession as a result of the uncertainty regarding the immediate future of the local money market. The bank statement of last Saturday, showing a further large falling off in cash was very unfavorable, but that the showing was not unexpected was demonstrated by the recovery which followed the publication of the official figures. The upward movement, however, was of short duration, and values during the early part of this week have shown a downward tendency, being influenced by the further heavy loss in cash by the banks, and the indication of further gold exports. There were a number of favorable influences, however, chief of which were the continued large increases in railroad earnings, and an increased movement of wheat and corn. These factors, however, were entirely disregarded, and there appears to be a general disposition to await further developments in the money market before taking on fresh lines of stocks.

The local traction stocks have ruled dull, and prices moved within a narrow range. Manhattan rose slightly on the covering by shorts, while Brooklyn Rapid Transit was stimulated by the favorable statement of earnings, showing an increase in gross for the month of November of \$62,428. The daily average earnings for the month were \$34,013, a gain of \$2,081 per day, while the gain from July 1 amounted to \$73,183.

#### Philadelphia

The Philadelphia traction specialties have been extremely dull in the market for the last two weeks. There is no foundation for the rumor that an immediate assessment call would be made upon holders of Philadelphia Rapid Transit shares, for the money will not be needed before next summer. But the story circulated in speculative circles had its effect in carrying down the stock from 16¾ to 15½, on light dealings. Union Traction meanwhile weakened in sympathy to 46¾, and Philadelphia Traction lost a half point to 97½. American Railways reacted to 52 on disappointment over the failure to increase the dividend rate. Indianapolis Street Railway broke 3 points to 90 on sales of a hundred shares, recovering later to 91. Consolidated Traction of New Jersey was weak at a decline from 69 to 67½. Other minor transactions comprise Railways General at 4¾, Reading Traction at 30, Columbus Street Railway at 59¾, Hestonville Passenger at 48, Rochester Passenger preferred at 100, and Easton Electric at 20½.

#### Chicago

The traction securities in Chicago have, with one or two exceptions, inclined to weakness during the last fortnight. The exceptions are City Railway, which has held steady around 212, and South Side Elevated, which has reflected some demand around 109. On the other hand Metropolitan Elevated shares are lower at 37 for the common, and 85 for the preferred; Lake Street has weakened to 8¾. Northwestern Elevated has recorded the lowest prices in a long time—31 for the common and 76 for the preferred—North Chicago Street Railway has broken from 168 to 162, and West Chicago has sold as low as 84. For the most part selling has been extremely light, the market reflecting simply complete absence of demand. Not a share of Union Traction has been dealt in during the entire two weeks, which is the most striking evidence of the prevailing dullness. November was a comparatively bad month for earnings on the elevated roads. Increases continued to be reported over the month last year, ranging from 8½ per cent, on the South Side, to 13¼ on the Metropolitan. But these comparisons were much less favorable than during the summer and the early autumn.

#### Other Traction Securities

Dealings in the various markets for local traction securities, outside of those already reviewed, have developed little that is really noteworthy during the last fortnight. In Boston business has been next to nothing. Massachusetts Electric common, the only stock in which even a semblance of activity has appeared, has fluctuated within a half-point range between 35½ and 36, with sales for the most part at 35¾. The preferred selling "ex" the semi-annual dividend of 2 per cent, brings 95. West End common has changed hands at 94¼ to 94¾, and the preferred at 113¾; while Boston Elevated dropped on scattering sales from 154½ to 153. The principal feature in the Baltimore market is the weakness of United Railways of Baltimore securities. The income bonds which sold at 68¾ two weeks ago, went at one time as low as 65¾, rallying later to 66¾. The stock fell from 13¾ to 13, but the general 4s held steady around 95. No explanation is apparent for this movement, save general speculative liquidation. Other Baltimore transactions include Knoxville Traction 5s at 101, Anacostia and Potomac 5s at 99, North Baltimore Traction 5s at 119¾, City Passenger 5s at 106¼, Knoxville Traction stock at 27, Norfolk Railway and Lighting stock at 13, and Nashville stock at 3¾ down to 3¼, then back to 4½. On the New York curb the feature was the drop in Interborough Rapid Transit stock from 116 to 109, about 1500 shares of the "40 per cent paid-in" stock changing hands on the decline. Selling by speculators who bought previous to the confirmation of the Manhattan "deal" is the obvious reason for this decline. Other local curb transactions include American Elevated (400 shares) at 1 and ¾, New Orleans (1000 shares) between 14 and 14½, St. Louis Transit at 27½, United Railways of St. Louis preferred at 82, American Light and Traction at 36¾ and 36½, Brooklyn City Railroad at 247 and 246½, New Orleans 4½ per cent bonds between 77½ and 78½, United Railways of St. Louis 4s at 84½, Washington Traction 4s at 80, and Lexington Avenue and PAVONIA Ferry 5s at 121½ and 121.

Business continues very quiet on the Cleveland Stock Exchange, and last week was the smallest in some time, so far as traction sales were concerned; only 225 shares changed hands. Western Ohio receipts dropped to 26½ on sales of 100 shares. A small lot of Miami & Erie Canal sold at 30, and another small lot of Aurora, Elgin & Chicago receipts at 35. Lake Shore Electric common dropped to 15¼ on a small lot. All of these figures were the lowest that have been recorded for their respective stocks in some time, but sales were not large enough to indicate anything important.

#### Iron and Steel

A quieter tone is noted in the iron market which is reflecting itself, especially in reduced premiums for prompt deliveries of foundry iron and structural material. The customary decline in consumption during the winter months is the main reason assignable for this change. The general opinion is that prices ought to fall to a level where importations of the foreign product will no longer be profitable. Quotations are as follows: Bessemer pig iron \$21.75 to \$22, steel billets \$29 to \$31, and steel rails \$28.

#### Metals

Quotations for the leading metals are as follows: Copper 11¾ cents, tin 24.90 cents, lead 4½ cents, and spelter 5.05 cents.



**Security Quotations**

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

	Closing	Bid
	Nov. 25	Dec. 9
American Railways Company .....	53½	52
Aurora, Elgin & Chicago.....	32	a39
Boston Elevated .....	154	153
Brooklyn R. T. ....	61¼	64½
Chicago City .....	211	210
Chicago Union Tr. (common) .....	15	14
Chicago Union Tr. (preferred) .....	45	45
Cleveland Electric .....	88	85
Columbus (common) .....	58½	58
Columbus (preferred) .....	106	105
Consolidated Traction of N. J. ....	69¼	68¾
Consolidated Traction of N. J. 5s.....	110½	107¼
Detroit United .....	b95	—
Electric People's Traction (Philadelphia) 4s.....	98¾	98
Elgin, Aurora & Southern .....	57	45
Indianapolis Street Railway 4s .....	—	—
Lake Shore Electric .....	12½	12½
Lake Street Elevated .....	9	9¼
Manhattan Railway .....	153¾	147¾
Massachusetts Elec. Cos. (common) .....	36	35¾
Massachusetts Elec. Cos. (preferred) .....	96½	94
Metropolitan Elevated, Chicago (common) .....	37	36
Metropolitan Elevated, Chicago (preferred) .....	85	83
Metropolitan Street .....	139	139¾
New Orleans Railways (common) .....	15	13¾
New Orleans Railways (preferred) .....	48½	45½
North American .....	118½	115
Northern Ohio Traction (common) .....	—	—
Northern Ohio Traction (preferred) .....	—	95
North Jersey .....	31	30
Northwestern Elevated, Chicago (common).....	32½	30
Philadelphia Rapid Transit .....	17	15¾
Philadelphia Traction .....	98	97¼
St. Louis Transit (common) .....	28	27
South Side Elevated (Chicago) .....	107	107
Syracuse Rapid Transit .....	30¾	30¾
Syracuse Rapid Transit (preferred) .....	76	75
Third Avenue .....	126	—
Toledo Railway & Light .....	b37	a35
Twin City, Minneapolis (common) .....	116	115½
United Railways, St. Louis (preferred) .....	—	81
United Railways, St. Louis, 4s.....	84¾	84¾
Union Traction (Philadelphia) .....	46¾	47
Western Ohio Receipts .....	27	27¼

a Asked. b Last sale.

SAN FRANCISCO, CAL.—A report in financial circles has it that the gross earnings of the United Railroads Company for November are \$485,000, an increase of 11 per cent over the same period of last year.

COLORADO SPRINGS, COL.—The Colorado Springs & Cripple Creek District Railway Company has filed for record a mortgage for \$3,000,000, given in favor of the Morton Trust Company, of New York, to secure an issue of consolidated mortgage 5 per cent forty-year bonds. The first and second mortgage bonds are taken up by the new issue, and over \$600,000 additional is raised for improvements.

CHICAGO, ILL.—The directors of the Chicago City Railway Company have declared a dividend of 2¼ per cent, payable Dec. 30, 1902, to stockholders of record Dec. 8, 1902.

CHICAGO, ILL.—The Elgin, Aurora & Chicago Traction Company will pay a semi-annual dividend of 3 per cent on its preferred stock Dec. 17.

LEXINGTON, KY.—The Blue Grass Traction Company, which plans to build an extensive system of electric railways in this vicinity, has increased its capital stock from \$10,000 to \$350,000.

WARE, MASS.—The Hampshire & Worcester Street Railway Company has petitioned the Railroad Commissioners for the approval of an issue of \$80,000 5 per cent bonds to run to 1921. The company now has \$50,000 bonds outstanding.

MILFORD, MASS.—The Milford & Uxbridge Street Railway Company has petitioned the Railroad Commissioners for authority to issue \$225,000 twenty-year 4 per cent bonds, and for authority to purchase Nipmuc Park, in the town of Mendon, which may be bought for less than \$25,000.

BOSTON, MASS.—The Uxbridge & Blackstone Street Railway Company has petitioned the Railroad Commissioners for authority to issue its original capital stock of \$80,000.

ST. LOUIS, MO.—The St. Louis Transit Company's earnings for the month of November are stated at \$550,000, an increase of 15 per cent over the same month in 1901.

UTICA, N. Y.—The Railroad Commissioners have granted the Utica & Mohawk Valley Railway authority to issue a mortgage on its property for \$1,500,000. This is part of a \$4,000,000 mortgage already authorized.

SCHENECTADY, N. Y.—The Railroad Commissioners have granted the Schenectady Railway Company authority to issue a mortgage for \$500,000, part of an original mortgage for \$2,000,000.

BUFFALO, N. Y.—The Buffalo, Hamburg & Aurora Railway, which was sold by the receiver at public auction a few days ago, was purchased by A. E. Leon, of Boston, representing the bondholders. The purchase price was \$51,500.

NEW YORK, N. Y.—A special meeting of the stockholders of the Manhattan Elevated Railway will be held on Jan. 16 to vote on the proposition to increase the authorized capital stock from \$48,000,000 to \$60,000,000. Of this increase 72,000 shares will be issued as soon as authorized, and the remaining 48,000 will be issued not prior to Jan. 1, 1906. The purpose of the increase is to provide funds for improvements. This increase of \$12,000,000 in the capital stock of Manhattan was provided for in the lease of the company to the Interborough Rapid Transit Company.

NEW YORK, N. Y.—The Manhattan Elevated Railway Company has declared a quarterly dividend of 1½ per cent, an increase of ½ per cent over last previous payment. The dividend is payable Jan. 2. Under the terms of the lease of the company to the Interborough Rapid Transit Company earnings up to Jan. 1, 1906, are applicable to demands on the stock not exceeding 7 per cent.

CLEVELAND, OHIO.—Details of the consolidation of the Cleveland, Elyria & Western Railway with the Cleveland & Southern and the Norwalk Gas & Electric Company have been completed. The new company will probably be known as the Cleveland & Southwestern Railway. The capital stock will be \$5,000,000, and, as the three properties have a combined capitalization of much less than this amount, it would appear that a portion of the issue will be retained for the purchase of the Cleveland, Ashland & Mansfield and the Ohio Central Traction Company when the systems are connected. Two millions of this capitalization will be preferred and the balance common stock. For the present the bond issue will be \$2,100,000, covering the underlying issues of the three properties. The \$2,000,000 of the Cleveland, Elyria & Western stock will be exchanged on a basis of 60 per cent of new preferred and 100 per cent of common for each old share. Subscribers to the underwriting of the Cleveland & Southern will receive for each \$10,000 of their subscription \$5,000 in bonds, \$5,000 in preferred stock, and \$10,000 common stock.

CINCINNATI, OHIO.—It is said that the Cincinnati Street Railway will show earnings for the year of \$4,000,000, an increase over last year.

CLEVELAND, OHIO.—The Pomeroy-Mandelbaum syndicate will announce the plan for financing the Ohio Central Traction Company, about Jan. 1. The road is a consolidation of the old road of the same name and the new Mansfield, Crestline & Galion Railway. The entire line extends from Bucyrus to Mansfield, a distance of 35 miles. It will be bonded at \$700,000 with stock of the same amount. The road is now fully in operation, and next year it will be connected with the Cleveland, Elyria & Western Railway by a connecting link from Mansfield to Wellington.

CLEVELAND, OHIO.—There are repeated rumors that the Pomeroy-Mandelbaum syndicate is negotiating for the purchase of the Toledo, Bowling Green & Southern Railway, in order to afford the Cincinnati, Dayton & Toledo Traction Company an entrance to Toledo. If a purchase is not made it is stated an effort will be made to lease the road.

TOLEDO, OHIO.—The stockholders of the Toledo & Western Railway Company have formally ratified the purchase of the Toledo, Fayette & Western, a company formed to build an extension of the Toledo & Western. The Toledo & Western is capitalized at \$1,800,000, of which \$1,500,000 has been issued. Its bonded indebtedness amounts to \$1,250,000, with interest at 5 per cent. The company is famous for its freight business, which is constantly increasing. During the recent summer months the company handled on an average 1,000,000 lbs. of freight a month.

PHILADELPHIA, PA.—The Philadelphia News Bureau thinks that the Philadelphia Rapid Transit Company has certainly, in its conduct, furnished abundant food for the persistent reports that another deal is about to materialize.

PHILADELPHIA, PA.—The directors of the Union Traction Company have declared a semi-annual dividend of 1½ per cent, equal to 75 cents per share, payable Jan. 1. This is the first dividend declared under the lease to the Philadelphia Rapid Transit Company.

WILKESBARRE, PA.—Hancock & Company, of Philadelphia, are offering for subscription \$5,000,000 bonds of the Lackawanna & Wyoming Valley Rapid Transit Company, which is now building a double-track electric railway between Wilkesbarre and Scranton.

WOONSOCKET, R. I.—The Woonsocket Street Railway Company reports earnings as follows:

	1902	1901
Year ended Sept. 30		
Gross receipts .....	\$102,962	\$97,690
Operating expenses .....	77,048	66,115
Earnings from operation .....	\$25,914	\$31,575
Fixed charges .....	18,198	24,631
Net earnings .....	\$7,716	\$6,944
Total deficiency Sept. 30.....	45,456	37,740



TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. \* Including taxes. † Deficit. ‡ Comparison is made with 1900 because in 1901 the earnings were abnormal on account of the Pan-American Exposition.

COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends	COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends
<b>AKRON, O.</b> Northern Ohio Tr. Co.	1 m., Oct. '02	65,627	36,333	29,394	12,603	16,692	<b>ELGIN, ILL.</b> Elgin, Aurora & Southern Tr.	1 m., Oct. '02	33,648	21,041	12,607	8,333	4,274
	1 " " '01	51,479	28,769	22,710	12,438	10,272		1 " " '01	29,578	16,964	11,614	8,333	3,280
	6 " " June '02	318,937	183,362	133,575	77,556	56,018		10 " " '02	341,690	200,165	141,725	83,333	58,391
	6 " " '01	268,967	164,458	104,510	63,494	41,016		10 " " '01	304,144	170,289	133,855	83,333	0,522
	12 " " Dec. '01	617,011	* 350,845	266,166	136,162	130,004							
	12 " " '00	513,725	* 317,475	196,249	141,133	55,117							
<b>ALBANY, N. Y.</b> United Traction Co.	1 m., Sept. '02	132,606	81,990	50,616	23,866	26,750	<b>FINDLAY, O.</b> Toledo, Bowl'g Green & Southern Traction	1 m., Sept. '02	24,289	13,173	11,116	1,991	9,126
	3 " " '02	414,635	251,739	162,897	71,598	91,299		1 " " '01	15,833	11,067	4,766	635	4,130
								7 " " June '02	142,108	76,228	65,880	28,969	36,890
								7 " " '01	105,329	67,679	37,649	20,752	16,898
<b>BINGHAMTON, N. Y.</b> Binghamton St. Ry. Co.	1 m., Oct. '02	17,107	10,693	6,414	-----	-----	<b>HAMILTON, O.</b> The Cincinnati, Dayton & Toledo Trac. Co.	1 m., Oct. '02	41,747	22,648	19,099	16,512	2,587
	1 " " '01	16,884	9,293	7,591	-----	-----		5 " " '02	236,249	118,854	112,395	81,753	30,642
	4 " " '02	82,360	44,675	37,685	-----	-----							
	4 " " '01	80,044	40,317	39,727	-----	-----	<b>LONDON, ONT.</b> London St. Ry. Co.	1 m., Oct. '02	11,645	7,408	4,237	1,911	2,326
<b>BOSTON, MASS.</b> Boston Elev. Ry. Co.	12 m., Sept. '01	10,869,496	7,336,597	3,532,899	2,896,359	636,539		1 " " '01	10,105	6,356	3,749	1,367	1,792
	12 " " '00	10,236,994	6,828,110	3,408,884	2,932,839	476,044		10 " " '02	127,317	78,220	49,086	22,195	26,891
								10 " " '01	117,974	72,274	44,559	19,800	24,739
Massachusetts Elec. Cos	12 m., Sept. '01	5,778,133	3,915,486	1,862,648	937,206	925,442	<b>MILWAUKEE, WIS.</b> Milwaukee El. Ry. & Lt. Co.	1 m., Oct. '02	239,853	114,902	124,951	67,814	57,137
	12 " " '00	5,518,837	3,659,337	1,859,500	994,294	865,206		1 " " '01	206,812	99,249	107,563	63,409	44,154
								10 " " '02	2,254,794	1,061,410	1,193,383	664,625	528,758
								10 " " '01	1,992,060	977,589	1,014,471	624,810	389,661
								12 " " Dec. '01	2,442,342	1,185,534	1,256,808	755,139	501,669
								12 " " '00	2,220,698	1,129,787	1,090,911	824,665	266,347
<b>BROOKLYN, N. Y.</b> Brooklyn R. T. Co.	1 m., Sept. '02	1,124,384	607,581	516,802	-----	-----	<b>MINNEAPOLIS, MINN.</b> Twin City R. T. Co.	1 m., Oct. '02	304,317	140,226	164,091	60,233	103,857
	1 " " '01	1,080,158	664,611	415,548	-----	-----		1 " " '01	270,952	118,054	152,898	58,163	94,734
	3 " " '02	3,587,739	1,881,744	1,705,965	-----	-----		10 " " '02	2,971,411	1,331,546	1,639,866	590,967	1,048,899
	3 " " '01	3,411,101	2,032,345	1,378,855	-----	-----		10 " " '01	2,611,118	1,186,901	1,424,216	561,437	862,778
	12 " " June '02	12,789,705	* 895,214	3,837,490	-----	-----	<b>MONTREAL, CAN.</b> Montreal St. Ry. Co.	1 m., Oct. '02	181,406	96,418	84,986	15,992	68,995
	12 " " '01	12,101,198	* 797,035	4,130,563	-----	-----		1 " " '01	166,001	85,210	80,550	15,984	65,466
<b>BUFFALO, N. Y.</b> International Tr. Co.	1 m., Sept. '02	321,355	161,525	159,831	77,502	82,329		12 m., Sept. '02	2,046,209	1,135,176	911,032	-----	-----
	1 " " '01	255,322	108,934	146,388	81,931	64,457		12 " " '01	1,900,680	1,105,267	795,413	-----	-----
	3 " " '02	1,019,518	506,664	512,854	235,741	277,113	<b>NEW YORK CITY.</b> Manhattan Ry. Co.	12 m., Sept. '02	11,583,546	5,545,395	6,038,151	2,712,069	3,326,062
	3 " " '01	791,470	344,745	446,725	245,793	250,932		12 " " '01	10,455,872	5,338,649	5,127,223	2,683,132	2,444,091
							<b>Metropolitan St. Ry.</b>	3 m., Dec. '01	3,887,936	1,723,972	2,143,964	1,151,140	992,824
								3 " " '00	1,699,649	2,086,381	1,138,467	947,914	947,914
								12 " " June '02	15,866,641	7,395,883	8,480,758	4,815,421	3,665,337
								12 " " '01	14,720,767	6,755,131	7,965,636	4,534,068	3,431,567
<b>CHARLESTON, S. C.</b> Charleston Consol'ded Ry. Gas & El. Co.	1 m., Oct. '02	40,739	27,246	13,494	13,469	25	<b>OLEAN, N. Y.</b> Olean St. Ry. Co.	3 m., Sept. '02	18,401	8,135	10,266	4,062	6,203
	1 " " '01	39,038	24,562	14,476	13,842	634		3 " " '01	16,372	9,485	6,887	4,200	5,285
	8 " " '02	439,007	256,962	182,045	108,062	73,984		12 m., June '02	56,055	29,118	26,937	16,318	10,619
	8 " " '01	324,120	211,870	112,250	110,049	2,201		12 " " '01	52,018	26,228	25,790	16,755	9,035
<b>CHICAGO, ILL.</b> Chicago & Milwaukee Elec. Ry. Co.	1 m., Oct. '02	15,731	6,548	9,183	-----	-----	<b>PEEKSKILL, N. Y.</b> Peekskill Lighting & R. R. Co.	1 m., Oct. '02	9,023	5,706	3,317	2,083	1,234
	1 " " '01	15,253	6,312	8,941	-----	-----		4 " " '02	37,696	21,586	16,110	8,393	7,777
	10 " " '02	163,139	66,395	96,743	-----	-----		12 " " June '02	86,795	* 56,392	30,402	23,125	7,277
	10 " " '01	147,412	62,430	84,982	-----	-----	<b>PHILADELPHIA, PA.</b> Union Traction Co.	12 m., June '02	14,118,159	6,402,398	7,715,830	* 663,778	1,078,038
<b>CLEVELAND, O.</b> Eastern Ohio Traction Co.	1 m., Oct. '02	17,365	10,142	7,224	6,033	1,190		12 " " '01	13,431,681	5,836,186	7,595,494	* 673,432	861,226
	10 " " '02	161,071	89,603	71,468	54,574	16,894	<b>American Railways</b>	1 m., Nov. '02	94,600	-----	-----	-----	-----
								1 " " '01	73,115	-----	-----	-----	-----
								5 " " '02	544,059	-----	-----	-----	-----
								5 " " '01	418,947	-----	-----	-----	-----
								12 " " June '02	1,009,509	-----	-----	-----	-----
								12 " " '01	844,298	-----	-----	-----	-----
<b>Cleveland, Elyria &amp; Western</b>	1 m., Nov. '02	27,924	16,745	11,180	-----	-----	<b>ROCHESTER, N. Y.</b> Rochester Ry.	1 m., Sept. '02	93,762	46,063	47,699	24,833	22,866
	1 " " '01	21,125	12,370	8,756	-----	-----		1 " " '01	82,428	45,854	36,573	24,942	11,632
	11 " " '02	276,135	154,826	121,309	-----	-----		9 " " '02	83,852	433,691	338,161	223,361	164,800
	11 " " '01	229,853	125,768	104,085	-----	-----		9 " " '01	758,110	449,253	308,858	222,018	86,840
	12 " " Dec. '01	249,260	136,865	112,394	57,023	55,371	<b>SYRACUSE, N. Y.</b> Syracuse R. T. Co.	1 m., Sept. '02	61,164	33,545	27,619	19,025	8,594
	12 " " '00	179,698	102,393	77,304	34,562	42,742		1 " " '01	53,992	29,692	24,300	19,025	5,275
<b>Cleveland, Painesville &amp; Eastern</b>	1 m., Oct. '02	16,213	9,655	6,558	-----	-----		3 " " '02	184,314	101,224	83,090	57,075	26,015
	1 " " '01	15,639	8,558	7,081	-----	-----		3 " " '01	168,368	91,526	76,842	57,021	19,821
	10 " " '02	160,677	86,620	74,057	-----	-----	<b>TOLEDO, O.</b> Toledo Ry. & Lt. Co.	1 m., Oct. '02	124,488	60,484	64,004	38,833	25,171
	10 " " '01	139,824	71,801	68,022	-----	-----		1 " " '01	114,666	54,617	60,050	37,813	22,237
	12 " " Dec. '01	164,971	* 87,102	77,869	72,500	5,369		10 " " '02	1,193,546	607,072	586,474	381,541	204,933
	12 " " '00	141,112	* 89,592	71,520	72,500	† 980		10 " " '01	1,031,766	515,502	516,264	339,543	218,721
<b>COVINGTON, KY.</b> Cincinnati, Newport & Covington Ry. Co.	1 m., Aug. '02	96,118	* 53,295	42,823	22,238	20,585		12 " " Dec. '01	1,311,084	* 636,407	674,677	415,168	259,509
	1 " " '01	74,525	* 45,741	28,784	15,807	12,977		12 " " '00	1,182,517	* 616,945	565,572	409,051	156,521
	8 " " '02	596,156	* 344,026	208,169	125,328	82,841	<b>LAKE SHORE Elec. Ry. Co.</b>	1 m., July '02	49,122	25,961	23,161	-----	-----
	8 " " '01	535,784	* 327,615	208,169	125,328	82,841		1 " " '01	39,447	21,837	17,610	-----	-----
								7 " " '02	237,855	158,911	78,944	-----	-----
								7 " " '01	187,270	133,283	53,987	-----	-----
<b>DETROIT, MICH.</b> Detroit United Ry.	1 m., Oct. '02	302,388	174,325	128,063	-----	-----	<b>NEW BRIGHTON, S. I.</b> Staten Island Elec. Ry.	3 m., June '02	56,635	35,622	21,013	25,000	† 3,986
	1 " " '01	267,081	153,504	113,577	-----	-----		3 " " '01	56,936	35,600	22,336	25,000	† 2,663
	10 " " '02	2,885,084	1,623,824	1,257,260	-----	-----	<b>YOUNGSTOWN, O.</b> Youngstown - Sharon Ry. & Lt. Co.	1 m., Oct. '02	41,434	* 23,900	17,534	-----	-----
	10 " " '01	2,512,923	1,382,366	1,130,557	-----	-----		4 " " '02	155,956	* 86,940	69,016	-----	-----
	12 " " Dec. '01	2,919,171	* 1,596,765	1,322,046	652,277	670,129							