STREET RAILWAY JOURNAL

SATURDAY, MAY 31, 1902.

PUBLISHED WEEKLY BY
THE STREET RAILWAY PUBLISHING COMPANY
MAIN OFFICE:
NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

BRANCH OFFICES:
CHICAGO .....Monadnock Block
PHILADELPHIA .....929 Chestnut Street
LONDON.....Hastings House, Norfolk Street, Strand
Correspondents in other Principal Cities of the World.
Long Distance Telephone, "New York, 4044 Cortlandt."
Cable Address, "Stryjourn, New York,"—Lieber's Code used.

TERMS OF SUBSCRIPTION.

In the United States and Canada.....$4.00 per annum
Single copies, first issue of each month, 35 cents; other issues, 5 cents.
In all Foreign Countries, per annum..... $6.00 / 25s / 31fr
Subscriptions payable always in advance, by check (preferred), money order or postal note, to order of C. E. WHITTLESEY, Treasurer.

Entered as second-class matter at the New York Post Office.

EDITORIAL NOTICE

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

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

Address all communications to
THE STREET RAILWAY PUBLISHING CO.,
114 Liberty Street, New York.

Contents of this Issue

Mr. Grout's Objections

Comptroller Grout, of New York, is not in sympathy with the rest of the Rapid Transit Commission, of which he is ex-officio a member, and his recent published utterances regarding the formation, organization and powers of that body, as well as his proposed amendments to the form of contract for the Brooklyn tunnel extension, show that he has failed utterly to grasp the situation which confronts the city at this time. Mr. Grout's theory regarding the board itself, and the law under which it was formed, may be all right in the abstract, but he will find very little sympathy or support from the business interests of New York, and the great mass of workers who are clamoring for relief, should he attempt to have his views incorporated into legislative enactment. It is too late in the day to interrupt the progress of work on the plans for rapid transit by a discussion of fine-spun theories on the propriety of creating and continuing such commissions and entrusting them with important undertakings. It is enough to know that the present commission is making material progress, that the members appreciate the grave responsibility of their position and have shown a desire to secure not only temporary relief, but make adequate provision for the future. Mr. Grout's objection to the Brooklyn tunnel plan is in keeping with his views on the entire project—narrow and mischievous in their tendency. His associates on the board have taken a broader view, and in this they will receive the support of the city at large. New York needs improved rapid transit facilities, and the city itself has no means of providing them. It must look to private capital, and, in order to attract it, must adopt a liberal policy. Mr. Grout would hamper the board by insisting upon restrictions and imposing conditions that might in reality defeat the measures. We are inclined to the belief that the mature deliberation of the men who have spent so much time and study upon the problems involved will be productive of a better solution than the hastily formed judgment of the Comptroller, whose connection with the project dates only from the first of the year.

Chicago Transportation Problem

The local transportation committee of Chicago has decided upon a plan of campaign and selected an expert to conduct the investigation into all matters pertaining to the street railway needs of that city. The object is to inquire into the conditions that obtain at present, devise a scheme for the betterment of the service, arrange a plan for relieving the congestion of the downtown lines, secure a transfer system between the lines operated by the several companies, determine whether the conduit trolley system can be successfully operated on the trunk lines where the cable is now employed, determine the value of the present system, cost of operation and earning capacity, and submit a practical plan for a comprehensive system that will provide not only for present requirements, but admit of extensions and modifications that will take care of the growth of the next fifty or one hundred years. This is, indeed, a large undertaking, but it is in line with the policy persistently advocated by the Chicago street railway companies, and if the city is ready to pursue the investigation in a spirit of fairness and with proper consideration for the rights of the present owners, we have no doubt that a solution will be readily worked out. The committee has made a good beginning by selecting a man with a clean record and a professional standing that will command respect, and in whom the street railway interests have confidence. Bion J. Arnold will have charge of this work, and his reputation warrants the assumption that the subject will receive intelligent consideration at his hands, and that his recommendations will embody a feasible plan for furnishing the city a comprehensive system without sacrificing the rights of the people or the traction companies. The position which Mr. Arnold has accepted is a delicate one, owing to the strained relations that have existed between the present municipal administration and the companies, and it will be necessary for him to be entirely independent in order to do his duty toward the community and the corporations, and justice to himself. The fact that he has accepted the task is assurance that the work

will be conducted along proper lines, and we have no doubt that this policy will be pursued as long as he is associated with the investigation.

Dangerous Speed of Vehicles

"No blowing of a horn or of a whistle, nor the ringing of a bell" will be accepted by the Supreme Court of New York as sufficient warning, if the circumstances demand that the speed at which an automobile is operated be reduced. If necessary the operator must slow up and even stop. This is the gist of Justice Freedman's opinion in an action for damages growing out of an accident in which an automobile ran over a small boy who was playing in the roadway.

The court defines the relative responsibilities and privileges of pedestrians and operators of vehicles, and many of the points passed upon are of equal interest to street railway men. It was claimed that the automobile at the time of the accident under consideration was run at an excessive speed, but the court held that the mere rate of speed, whether high or low, lawful or unlawful, was immaterial unless it entered into the cause of the accident. An automobile has the same duties to perform when meeting pedestrians or other vehicles in the streets that other vehicles are subjected to. No matter how great the rate of speed may be which the law and the ordinances permit, as a general rule the operator still remains bound to anticipate that he may meet persons at any point in a public street, and he must look out for them and keep his machine under such control as will enable him to avoid a collision with another person also using proper care and caution. On the other hand, the court points out, every operator has the right to assume and to act upon the assumption that every person whom he meets will also exercise ordinary care and caution according to the circumstances, and will not negligently or recklessly expose himself to danger, but, rather, make an attempt to avoid it.

It must be admitted that many operators of automobiles have persistently violated the law as interpreted by Justice Freedman, especially in the crowded thoroughfares, and at the street crossings. Their responsibility, it would seem, would be even greater than that of the motormen on street railways, as the public is accustomed to look out for cars on streets occupied by railway lines. On an ordinary thoroughfare it is quite different, however, and the recklessness displayed by many amateurs in handling automobiles could not fail to be considered criminal if passed upon by an intelligent jury.

Chicago "L" Trains to Go to Evanston

An excellent opportunity will be afforded for introducing high-speed electric service between Chicago and Evanston if the plans proposed to extend the Northwestern "L" system over the lines of the Chicago, Milwaukee and St. Paul steam road to the north are adopted. Evanston is a beautiful university town on the shore of Lake Michigan, about 12 miles north of Chicago, and a very large portion of its population goes to Chicago on business every day, thus furnishing an unusually profitable suburban business. The Chicago & Northwestern and the Chicago, Milwaukee & St. Paul roads monopolized this traffic for years until an extension of the trolley lines from Chicago was completed, and then the people showed a decided preference for the electric car, especially during the summer months. The line passed through many attractive suburban towns and became very popular for pleasure riding. Moreover, the service was good, the distance was covered in a reasonable time, the cars were much more attractive than the stuffy, upholstered coaches on the steam lines, the fare was cheaper than on the latter, and connection was made with the city surface lines, thus enabling passengers to reach the heart of the business district, whereas the terminals of the steam lines were across the river, and a considerable distance from the retail district. There has always been lively competition between the Milwaukee and Northwestern steam lines for suburban traffic, and it is more than likely that the partiality shown for the trolley line has induced the Milwaukee management to make the arrangement for running the Northwestern "L" cars over its system. It should prove a distinct advantage for the railroad, and a great accommodation to the people of Evanston, who would thus be enabled to reach any part of Chicago without walking a considerable distance, as at present. Such an improvement in the suburban service along the Milwaukee line might also force the Northwestern into adopting electricity upon its suburban branches, a project that has long been considered by the company, but postponed simply because the "other fellow" offered nothing better, and consequently was unable to make any noticeable inroads into the business of its rival.

European Polyphase Railways

The recent paper by De Muralt before the American Institute of Electrical Engineers puts the facts regarding the present status of polyphase electric traction in very convenient form for reference. We have from time to time in the last few years published descriptions of all the roads concerned, but they have been scattered through successive seasons, and it is hard to realize that half a dozen three-phase railway lines, several of them of considerable importance, are now in operation, or that one of them has been in highly successful operation for nearly half a dozen years. In speaking of the application of polyphase motors to railway working one is continually tempted to apply to it the term "experimental," without, of course, implying any reproach; in point of fact we must awaken to the realization that polyphase electric railways are not experimental, but must be ranked as definitely successful from an operative standpoint.

American engineers may hold, as some do, that polyphase railway equipment is undesirable or unsuitable, that it is establishing an unwise commercial precedent, or upsets beautifully crystallized ideas of standardization, but it cannot at the present time be maintained with any show of reason or candor that the polyphase motors fail to do their work well. If there had been any serious question in the minds of those with the opportunity to judge as to the thoroughly successful operation of the Lugano road, it would have had no successors. Continental financiers are not governed by sentiment, or moved by a fine frenzy of experimentation in making their investments, and the fact that polyphase traction has been steadily intrusted with more and more important tasks should be decisive as to the facts.

The question now is not as to the suitability of polyphase motors for railway working, but as to the limits within which lies their legitimate sphere of action. Electrical engineering is past the stage of panaceas; its methods are chosen with a view to practical results in each individual case, and the vital problem in this instance is to decide on the nature of the cases to which polyphase railway motors can be applied to the best advantage. It does not necessarily follow that the solution will be the same for American as for Continental conditions, or that the methods to be adopted here should be the same as those found best there.

Making a rough classification of the foreign railways completed up to date, we find that the pioneer road of Lugano was an ordinary tramway in a place of moderate size, the three succeeding ones were mountain railway under rather severe grade conditions, each of them using a rack rail for at least a part of the line, while the two latest roads are typical high-speed interurban lines. The Lugano tramway presents a case which in this country would unhesitatingly be treated by rotary converters. But it must not be forgotten that on the Continent apparatus and labor are cheaper than with us, and copper is considerably dearer. Hence the use of several sets of static transformers kept down the cost of the working conductors to good purpose, and incidentally lessened the attendance so that the use of alternating motors showed economy. Moreover, while in this country there would have been an enormous difference of cost in favor of continuous current car equipments, that difference abroad is much reduced. In the final result there is little doubt that here a case exactly similar to the Lugano tramway would show material advantage in the use of continuous cur-

rent. And generally in roads requiring frequent stops, as in typical railway service, the fixed normal speed of alternating motors makes it difficult to make up lost time and to meet the usual exigencies of a variable traffic. There seems no doubt that the practical working of the electrical equipment on the Lugano line is excellent, but we should much like to see a report on the general operative situation made by a wide-awake American street railway manager familiar with the everyday working of a small system. The mountain railways present a widely different condition of affairs. They are of fair length and require a powerful motor equipment. Stops are relatively few, and the trains are few in number, and run at moderate speed, but demand a large input. There is little doubt that in this country a road like that on the Gornergrat only 5.6 miles long would be better treated by a single rotary converter station than by the adoption of a three-phase system for the cars in spite of the heavy feeder copper required for delivering nearly 200 kw at the end of the line. As the length of such a road increases and the service grows heavier the advantages of a polyphase system increase, and in the Jungfrau road we are inclined to think that even under American conditions the three-phase car equipment would show a decided advantage both in first cost and in operating expense, particularly if the working voltage were raised to a point that would give the induction motors the advantage over commutator machines that is really their due. On the Stanstad-Engelberg line this very obvious step was taken and the voltage on the working conductors is 750, a pressure certainly unobjectionable for motors of the size used and giving a tremendous gain in the cost of copper. It is difficult to understand why this voltage was not used on the earlier mountain roads, for the induction motor can be so easily wound for rather high voltage, that such a procedure would seem altogether obvious.

We have at present few of these characteristically mountain railways in this country, but as time goes on more and more will be built; indeed, scarcely a season passes without a project of this kind. It is a kind of work for which polyphase motors have some very marked advantages, but to the best of our recollection the only instance in which the use of such apparatus has been taken up is in the case of the Mt. Lowe railway near Los Angeles, and that is a balanced cable incline only 3000 ft. long. The power, however, is transmitted from Santa Ana Cañon, 90 miles away.

It is worth noting that the foreign polyphase roads thus far considered are worked at moderate frequency between 32 ~ and 40 ~ which is common European practice in plants for power work, and each is at a different frequency. American practice in this respect is far more arbitrary, adhering pretty closely to 60 ~ or 25 ~ and seldom going to an intermediate point.

By far the most important polyphase roads yet constructed are the Burgdorf-Thun, and the Valtellina lines. Both of these have been described in our columns, the former at some length, but De Muralt's paper gives some additional facts that are of importance. Both are true interurban lines, the former 25 miles, and the latter 65 miles in total length. The Burgdorf-Thun road follows along the line of progress marked out by its predecessors, and it is interesting to note that the voltage of the working circuit, nominally 750, is practically a couple of hundred volts higher. A similar difference between the ostensible and real voltages on interurban trolley roads is not altogether unknown in this country, but it never rises to such dimensions. The acceleration lists given by De Muralt are by far the most interesting addition yet made to our knowledge of the Burgdorf-Thun road. On the whole they are very creditable, particularly in the rather moderate values of the current-maxima. The motors, four per car, were started in the manner usual on such roads, with resistance in the secondary, and the process seemed, as might be anticipated, very effective in keeping the current steady and under close control all through the period of acceleration.

The actual rates of acceleration attained were not at all out of the ordinary. A single 32-ton four-motor car was brought up to 24 miles per hour in 32 seconds, which is equivalent to 1.1 ft. per second. During this effort the speed rose from 12 to 24 miles per hour in 13 seconds, so that the maximum rate of acceleration was 1.35 ft. per second. The car came to its full speed in a run of about 560 ft. This performance answers perfectly well for a road operated as the Burgdorf-Thun line is, but in many instances the acceleration would be quite insufficient to meet the requirements of American practice. On the other hand, the starting current used was not severe as starting currents go, and considerably greater acceleration could easily have been attained had it been thought desirable in planning the equipment. The braking effort on down grades proved to be very useful, and the train could be kept under perfect control by that means alone. The tests show admirably, also, the very steady speed of a train operated by induction motors, and the thoroughly operative character of the whole equipment.

But the road of greatest interest to American engineers is the Valtellina Railway equipped by Ganz & Co., completed, but not yet in full operation, although the scene of many tests which figured somewhat prominently in the controversy over the electrical equipment of the "Inner Circle." The line is an interurban one fully equipped for freight and passenger service at normal railway speeds. The system differs somewhat radically from anything heretofore tried in that the frequency is reduced to 15 ~ while the transmission voltage is put up to 20,000, and the distribution voltage is 3000. These latter steps are, considering the magnitude of the plant and the size of the units, well taken, but the extremely low frequency is a more dubious matter. Its purpose is, as appeared during the controversy in the "Inner Circle" case, to render it possible to use successfully the "cascade" or "concatenated" arrangement of motors in which one pair of motors takes current from the line, and another pair from the secondaries of the first. This device has been tried in this country by Steinmetz some few years ago with fair results, but it is open to the serious objection of adding the reactances of the motors coupled so as seriously to affect the power factor. By greatly lowering the frequency and designing the motors with particular care, Ganz & Co. claim practically to have obviated this difficulty so as to obtain in alternating current practice the substantial advantages of the ordinary series multiple control.

No data adequate to back up this assertion have as yet been made public, but the statement having been deliberately made by so distinguished an engineer as Herr Blathey we are justified in taking it at substantially its face value. Granting that such a result is reached, it is unquestionably of value, but in dropping the frequency to 15 ~ is not too high a price paid for the beneficial effect? A frequency of 15 ~ is decidedly uneconomical of material, and is inconvenient in many respects, so that it seems to us a bit dubious whether the game is worth the candle in a case like the Valtellina road. An interurban line with comparatively few stops and only a moderate schedule speed presents few difficulties for the ordinary rheostatic control, and while, were stops more frequent, some energy might be saved by the cascade connection, such an arrangement cannot, in our opinion, ever give the torque per ampere obtained by a well-designed rheostatic control, so that the practical disadvantage of a lessened power factor might well outweigh the small saving in power. Of course in a case like the "Inner Circle," or on any road in which most of the work is that of acceleration, the cascade connection might prove very beneficial, and to a certain extent the Valtellina road must be considered as an understudy for this larger work. It is reported that the scheme worked admirably in the matter of giving high acceleration, as well, in fact, as would be permissible from the standpoint of safety to the passengers. There has been a tendency of late to make a fetish of acceleration in the worship of which the live load has sometimes been well-nigh forgotten.

All things considered, the progress in polyphase railway working on the other side of the water has been a striking feature of the engineering progress of the last few years. Here the tendency has been all against it, but we think that it must be admitted that in certain classes of work, belonging rather to railroading than to tramway working, polyphase traction must be seriously reckoned with. It behooves American engineers to beware lest the next great competition catch them unprepared. They cannot always count on having such a combination of favorable conditions as in the "Inner Circle" arbitration.

Electric Freight and Express Service for Eastern Ohio

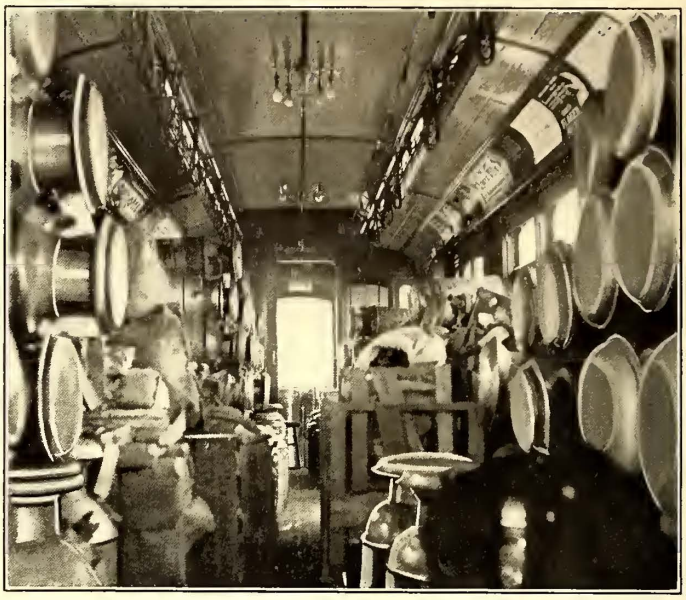
There is probably no electric railway in the country which has secured better results from handling package freight than the Cleveland & Eastern Railway, now one of the divisions of the Eastern Ohio Traction Company. When this road was built several years ago the matter of handling freight was carefully considered, as it was believed it would prove an important factor in the earnings of the road. After mature consideration it was decided to depart from the rule established by the other interurban lines radiating from Cleveland. All of these roads have towns of considerable size on their lines, and to a large extent the business is handled by the Electric Package Company, which has the same relation to electric roads that the express companies do to steam roads. Because of the fact that these interurbans are closely paralleled by established steam trunk lines, they have been unable thus far to secure the heavy freight business. The bulk of the business comes in the form of comparatively small packages and consists to a large extent of hurry-up shipments made by Cleveland houses to their customers in the surrounding towns. The Electric Package Company maintains a number of express wagons in the city, and branch offices and wagons in all the towns on the roads over which it comes. Its rates are slightly in excess of express rates and its greatest forte lies in the fact that goods are called for and delivered to their destination generally within a few hours.

The situation on the Cleveland & Eastern is somewhat different. It traverses a farming country which has been almost wholly isolated, there being no steam roads running from Cleveland in this direction. Chardon, Middlefield, Burton and several smaller hamlets are touched only by a north and south line, which is an iron ore road and gives the poorest of passenger service. Connection with Cleveland by this route means an all day trip, and in consequence of this fact much of the trade of the district has been diverted to Pittsburgh, 100 miles distant.

It was seen that in order to serve the people living in this district, and to make the electric road a paying investment, it must handle practically everything which a steam road would handle, and at rates which would induce the people to turn their trade to Cleveland. The results obtained have amply demonstrated the wisdom of this policy, since to-day, although drawing from the smallest county in the State in point of population, it is claimed by General Manager Andrews, of the company, that the freight tonnage amounts to more than all other Cleveland roads combined. During the last year the freight business has amounted to about one-third of the total receipts, and the proportion is constantly increasing. The most pleasing feature of this business is that it cost only about 7 per cent of the gross freight receipts to operate the freight business. No extra men are required on the cars, as the bulk of the business is handled on combination cars, and the conductors and motormen attend to the loading and unloading, way bills, etc. Only in the largest towns are agents maintained, and these attend to passenger as well as freight business. Milk forms the largest single item of freight, as the country traversed is essentially a dairy country, and this is handled by the package freight cars illustrated herewith, one making two trips a day over each division.

LOADING FREIGHT CAR ON CLEVELAND & EASTERN RAILWAY

On March 1 of this year the Cleveland & Eastern was consolidated with the Cleveland & Chagrin Falls and Chagrin Falls & Eastern roads, extending from Cleveland to Chagrin Falls and Garrettsville. This is now known as the Garrettsville division. The conditions on this division are much the same as on the other, but until recently the freight business had never been pushed to its full development. Under the management of R. L. Andrews, who developed the freight business on the Cleveland & Eastern, it is now making rapid gains.



INTERIOR OF MILK CAR ON CLEVELAND & EASTERN RAILWAY

The freight charges and method of handling the business follow steam road practice as closely as possible. The standard steam road freight rate book is used in determining the class of any article and the charges are figured on the hundred-weight as shown in the accompanying table of freight rates from Cleveland. There is a minimum charge of 25 cents on any package. A way bill accompanies each shipment, the agents having a white bill and the conductors a pink bill; when freight is delivered to the latter it must be prepaid. Stubs of way bills are forwarded daily to the auditor, the agent first making a copy on his record of freight forwarded sheet. An abstract of freight forwarded and received is sent to the auditor weekly. Copies of shipping receipts and expense bill forms are shown herewith, the latter being made out in duplicate. Frequently freight is transferred to other electric roads or to steam roads. In this event a new way bill is made out by the receiving agent, one copy going with the shipment, and another to the consignor. A charge of 3 cents per hundred-weight is made for transferring shipments.

In the company's accounts and statements the class of freight mentioned is designed as express matter to distinguish it from carload shipments of freight. Ordinary steam freight cars are handled on all parts of the system except inside the Cleveland city limits, and the receipts from this class of business are very large. Needless to say, this branch of the business is of immense value to the farmers of the district, who, heretofore, have been without any means of transportation, except by teaming. Wood, coal, grain, ice, and in fact almost every article ever handled by a steam road is transferred to and from the electric line at Chardon, Middlefield and Chagrin Falls, the freight cars being handled by the large package freight motors or by the combination snow plows owned by the company. All coal for the power house at Gates Mill is hauled from Chardon. The flourishing little town of Gates Mills, which is being built up by a land company whose interests are closely identified with the traction company, is rapidly becoming a favorite summer residence resort for Cleveland's swell set. It is wholly de-

RECORD OF FREIGHT RECEIVED

THE CLEVELAND & EASTERN RAILWAY CO. ..... AGENT AT .....

Date	Way Bill No.	SHIPPER	SHIPPER'S ADDRESS	CONSIGNEE	ADDRESS	ARTICLES	Car	Collect	Prepaid	SIGNATURE

RECORD KEPT IN FREIGHT OFFICE

The Eastern Ohio Traction Co.
AGENT'S STUB.

DATE ..... W. B. NO .....
FROM ..... TO .....
SHIPPER .....
CONSIGNEE .....

ARTICLES	PREPAID	COLLECT

Agents will make Way-Bill and Stub for each shipment, allowing bill to accompany shipment and forwarding all stubs daily to the Auditor, after having copied same on their record-of-freight forwarding sheets.

LOCAL FREIGHT WAY-BILL

The Eastern Ohio Taction Co. ..... 190....

FROM ..... TO .....

Form 8 & M-5-19-2

W.-B. No .....

Car ..... A. M ..... P. M .....

Cond .....

SHIPPER	CONSIGNEE	ADDRESS	ARTICLES	WEIGHT	ADVANCED CHARGES	COLLECT	PREPAID

RECORD OF FREIGHT FORWARDED

Form No. 9—5M—4 1902

No. .....

SHIPPING RECEIPT

THE EASTERN OHIO TRACTION COMPANY.

..... 190 ..

Received from .....

The property described below, in apparent good order except as noted, (contents and condition of contents of packages unknown), marked, consigned and destined as indicated below, which said Company agrees to carry to the said destination, if on its road.

It is Mutually Agreed, as to all or any of said property, over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the conditions, whether printed or written, herein contained, both on the face and on the back hereof, and which are hereby agreed to by the shipper, and by him accepted for himself and his assigns as just and reasonable.

DESCRIPTION	VALUE	ADDRESS	Weight Subject to Correction	CHARGES

RECEIPT GIVEN SHIPPER

Form 8. 2m-8-1902.

THIS SPACE FOR BINDING WHEN FILING AWAY.

..... STATION, ... 190.....

M..... PRO. NO. .....

RECEIVED OF THE CLEVELAND & EASTERN RY. CO.

THE FOLLOWING DESCRIBED PROPERTY IN GOOD ORDER FROM .....

DATE OF W. B. ..... W. B. NO. ..... COND. ..... TIME .....

SENDER.	NO. OF PKGS.	ARTICLES.	WEIGHT.	RATE.	NET FREIGHT.		ADVANCES.		TOTAL.	

RECEIVED THE ABOVE ..... 190.....

DELIVERED BY ..... RECEIVER'S SIGNATURE .....

RECEIPT TAKEN FROM CONSIGNEE

FORMS USED IN FREIGHT AND EXPRESS SERVICE ON CLEVELAND & EASTERN RAILWAY

THE CLEVELAND & EASTERN RAILWAY COMPANY.

ABSTRACT OF WAY-BILLS RECEIVED

At ..... Station, from ..... 190... to ..... 190...

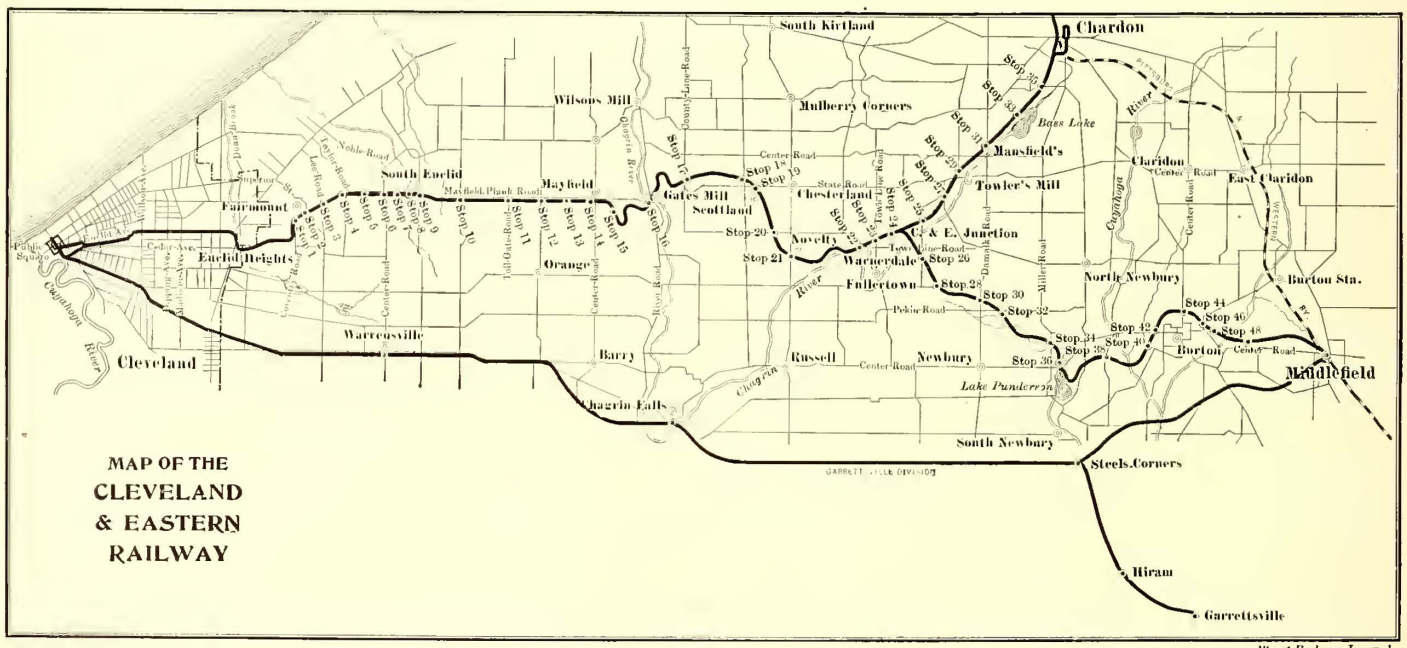
WAY-BILL DATE	WAY-BILL No.	FROM WHAT STATION	PREPAID	COLLECT	WAY-BILL DATE	WAY-BILL No.	FROM WHAT STATION	PREPAID	COLLECT

ABSTRACT TO AUDITOR ONCE PER WEEK FROM WAY BILLS. FREIGHT FORWARDED COPIED SAME WAY

FORMS USED IN FREIGHT AND EXPRESS SERVICE ON CLEVELAND & EASTERN RAILWAY

pendent on the electric road for all coal, provisions and building material. In handling carload freight the company receives its proportion of the total charge figured on the mileage handled. Coal from Chardon to Middlefield is 40 cents per ton; from Middlefield to Burton 30 cents per ton.

The two divisions bring into Cleveland on an average of something over 3000 gallons of milk and cream per day. Before the road was built very little of this product was shipped to the city, because



MAP OF DISTRICT SERVED BY CLEVELAND & EASTERN RAILWAY

of poor facilities. Now that the farmers are learning to appreciate this method of disposing of their product, shipments are increasing rapidly, and the company will soon be forced to provide additional cars for the milk service. Much of the milk is delivered to wagons in the outskirts of the city, while the balance is brought to the center of the city. Milk is handled at a flat rate of 2 cents per gallon for any distance. This plan has been found satisfactory because it places farmers at the extreme limits of the system on the same basis as those nearer the city, thus inducing the former to push the business. Packages of tickets are sold to the consumers at the rate mentioned, a 20-cent ticket being handed to the conductor with each 10-gallon can. The conductor punches the tickets and hands them into the office. Several shipping points have switches, and the shippers are supposed to assist in loading. The leading shippers have the tops of their cans painted in different colors or combination of colors, rendering them easily distinguishable, and each shipper has his own tag which is attached to the cans. Empty cans are returned free of charge.

At present the company is considerably handicapped in handling the freight business, because of poor terminal facilities in Cleveland. A freight station is maintained on Ontario Street, adjoining the station of the Electric Package Company, so that transfer is easily accomplished, but the facilities for unloading and storage are wholly inadequate. There is an extra track for the interurban cars, so that the city cars are not interfered with, but the freight has to be unloaded on the sidewalk, and where one car happens to have a heavier load than others, the latter are held up sometimes for fifteen or twenty minutes. Naturally this is not pleasing to passengers, and interferes with schedules. There are also frequent controversies with the city over the obstruction of sidewalks.

The difficulty would have been obviated long ago had it not been for the Everett-Moore embarrassment. Over a year ago a freight station company was organized, the roads being interested in proportion to the number of cars operated, and work on the building was started, but the project was held up before it progressed very far. It is understood that the Eastern Ohio Company will build a temporary station on the site selected, turn-outs having just been laid for the purpose. The site is located on Eagle and Boliver Streets, just west of the Erie Street tracks. When this station is in use, the express cars will load and unload there, and then run

	C. & E. Division, February, 1902	Both Divisions, March, 1902
Passenger	$3,500	$8,700
Express	500	1,300
Freight	450	1,300
Milk	350	1,200
Mail	350	400
Special cars	83	260
City companies (two cents per car mile)	250	418
Other incomes	200	712
	$5,683	$14,190

	C. & E. Division, Week Ended April 21		C. & E. Division, Week Ended April 28	
	1901	1902	1901	1902
Total	$1,149.94	$2,116.16	$990.53	$2,922.86
Passenger	655.09	1,280.20	630.38	1,246.17
Express	190.02	292.93	150.51	261.17
Milk	127.15	213.65	124.44	203.50
Freight	66.48	133.48	6.00	92.12
Special car	30.00	-----	10.00	140.70
Mail	79.20	79.20	79.20	79.20
Number of passengers	3,736	6,941	3,685	6,529

BOTH DIVISIONS, WEEK ENDED MAY 5

	C. & E. DIVISION		GARRETTSVILLE DIVISION	
	1901	1902	1901	1902
	$	$	$	$
Passenger	1,153 56	1,559.63	-------	1,115 90
Express	226.99	260.97	-------	140.07
Milk	143.15	194 80	-------	150.67
Freight	79.00	139 20	-------	59.61
Special car	49 00	32.50	-------	------
Mail	79.20	79.20	-------	13.38
City mileage	----------	41.70	-------	30.70
Miscellaneous	----------	7.00	-------	------
Totals	1,730.90	2,355.00	1,190.85	1,510.15

	1901	1902
Total system	$2,921.75	$3,865.15

EASTERN OHIO TRACTION COMPANY

Table of Freight Rates from Cleveland, Superseding all Previous Issues, Taking Effect January 1, 1902

Miles	To	CLASSES					
		1st	2nd	3rd	4th	5th	6th
9	*South Richfield	9½	8½	8	7½	6½	5½
11	*Toll Gate	12	11	10½	8½	7½	6½
13	*Mayfield	12	11	10½	8½	7½	6½
16	Gates Mill	12	11	10½	8½	7½	6½
20	Scotland	14½	13	12	10	7½	6½
22	Novelty	14½	13	12	10	7½	6½
25	*Fullertown	14½	13	12	10	7½	6½
28	Fowler Mills	14½	13	12	10	7½	6½
29	*Mansfield	14½	13	12	10	7½	6½
30	*Bass Lake	14½	13	12	10	7½	6½
32	Chardon	15½	14	13	10	7½	6½
28	*Smiths	14½	13	12	10	7½	6½
31	*Punderson Lake	15½	14	13	10	7½	6½
35	Burton	15¼	14	13	10	7½	6½
39	Middlefield	15½	14	13	10	7½	6½
8	*Warrensville	9½	8½	8	7½	6½	5½
18	Chagrin Falls	10	9	8½	8	7	6
30	*South Newbury	13	12	11	9	7½	6½
33	*Steels	13	12	11	9	7½	6½
35	Troy	13	12	11	9	7½	6½
40	*Hiram	13	12	11	9	7½	6½
--	Garrettsville	--	--	--	--	---	---

*Prepaid stations. Freight must be prepaid. Minimum charge, 25c.
Baggage cars leave Cleveland for Chardon, 8.00 A. M. and 4.00 P. M.
For Burton and Middlefield, 9.00 A. M. and 3.00 P. M.
For Chagrin Falls, 11.00 A. M. and 7.00 P. M.
For Chagrin Falls, Hiram and Garrettsville, 8,00 A. M. and 3.00 P. M.
Subject to change.

to the Public Square, half a mile distant. Recent figures as to the freight and passenger business of the Cleveland & Eastern division, as well as the entire system, are given herewith; also comparative figures showing the gains being made by this property.

President H. Clark Ford, of the Eastern Ohio Traction Company has given considerable attention to the development in Northern Ohio through the Cleveland interurbans and the lines of the Eastern Ohio Company in particular. In a recent conversation Mr. Ford said: "I do not believe that the people of Cleveland and Northern Ohio appreciate what the Everett-Moore Syndicate has done for that section. There is not a foot of land in a township of Cuyahoga, which has not advanced in value by these trolley operations. The indirect benefits of this improved transportation are immeasurable, and will be more and more appreciated and recognized as time goes by."

The same conditions obtain in other Northern Ohio counties. The Chagrin Valley has for years cut off Geauga commercially from Cleveland. Chardon, the county seat, is only thirty miles from Cleveland, yet, as has already been mentioned, its traffic and that of its neighbors has been going eastward to Pittsburgh, which is much farther away than Cleveland, for the sole reason that transportation could be had direct, with no transfer of freight. This was an unnatural and artificial state of things that needed but the opening of an outlet into the natural metropolis of Geauga County. The Cleveland & Eastern line was opened to Middlefield, and connection secured with the line from Cleveland to Chagrin Falls, which runs on through Hiram to Garrettsville. The lines of the system traverse eastern Cuyahoga County, go through Geauga and Portage counties, and come within a few miles of Trumbull. As a result of the development of this system the entire situation in the freight and package or express business of the locality has been changed, and Cleveland is apparently the principal gainer thereby.

Special officers of the Union Traction Company, of Philadelphia, co-operating with the police, have begun a crusade against the small boys who persist in jumping on street cars. It is reported that twenty-three arrests were made in one day recently in Philadelphia.

The Brooklyn Tunnel Contract

The Rapid Transit Commissioners have before them the proposed form of contract adopted by their committee for the building of the subway from City Hall in Manhattan to Flatbush Avenue in Brooklyn, and several amendments advocated by Comptroller Grout. The "majority report," which outlines the form of contract, is a voluminous document, and can only be summarized here.

In general the proposed contract follows that drawn for the subway in Manhattan, and provides that the miximum fare between the two boroughs shall be 5 cents. Mr. Grout dissents and offers as a substitute a provision that the bidders be restricted to a 3-cent fare. The comptroller also protests against the clause of the majority report, which appropriates $1,000,000 for terminal purposes. Mr. Grout thinks that the contractor should be obliged to bid on the terminals.

An important provision in the document is that every bidder must specify what he is able to furnish in the way of connections with other rapid transit or surface lines; that is to say, the connecting lines upon which he can assure to passengers over the Brooklyn-Manhattan Railroad continuous trips without change of cars for a single fare not exceeding 5 cents.

The bidder must state the maximum fare to be charged by him upon the railroad within the limits of 5 cents, thus making the amount of the fare an element of the competition.

It is also made optional with any bidder to offer to subject himself or not as an element in the competition to a provision for future operating agreements inserted in the contract. The provision is intended to secure to the city the right, as traffic increases or local conditions change, to compel reasonable provisions for continuous service within the city at reasonable fares.

The successful contractor must give security by a deposit of $1,000,000 in cash or in securities of the character in which savings banks are authorized by law to invest their moneys for the proper construction, and further security in the sum of $1,000,000 for the proper operation of the road after it has been built.

The city assures to the contractor the right to construct and operate the railroad "free of all right, claim, or other interference, whether by injunction suit for damages or otherwise on the part of any abutting owner or other person."

The railroad and its equipment are declared to constitute great public works which must "be designed, constructed and maintained with a view to the beauty of their appearance as well as to their efficiency."

The bid of the contractor is to include $1,000,000 for terminals and for real estate otherwise required for the construction of the railroad, but this amount is subject to increase to an amount not exceeding $1,500,000. If the total cost of terminals and real estate exceed $1,500,000 the contractor will have to provide it at his own cost.

The entire railroad is to be completed, constructed, equipped and ready for operation within two years from the date of the contract, and work is to begin within sixty days after the execution of the document.

The rental will be the amount of interest which the city must pay upon the bonds issued to provide the cost of construction, and a further annual sum of not less than 1 per cent upon the whole of the bonds.

No provision is made for express service, as there are but two tracks, but all trains are to be run on the average, stops at stations included, of not less than 14 miles per hour. There is a compulsory provision for night service.

The comptroller's principal objection is to the rate of fare proposed. He believes that a 3-cent fare should be compulsory. On this point his "minority report," or proposed amendment says:

The draft contract provides that the bidder must state the maximum fare to be charged by him upon the railroad within the limit of 5 cents. This extension is slightly longer than the Brooklyn Bridge, upon which it has always been the practice both of the city and now of the railroad company of the old bridge cars, to charge 3 cents for a single fare, with two tickets for 5 cents. I am disposed to believe that the contract should prescribe similar terms for this extension of the tunnel. An additional reason is found in the fact that there are but two probable competitors for this tunnel, who will not apparently be upon an equality as to fares now collected by them. For instance, the Brooklyn Rapid Transit Company, it is stated, receives an average fare of only 4 cents a passenger, because of its extensive system of transfers. The Subway Company, which will operate the Manhattan-Bronx tunnel, is free, however, from any transfer arrangements, and will get the full 5-cent fare for each passenger, long or short haul. Three cents for the short ride in this new tunnel is adequate compensation for any railroad company.

On the other hand it is feared that such a provision may exclude bidders, who might otherwise enter the competition.

The board referred the proposed form of contract and Comptroller Grout's amendments to the corporation counsel for examination. It is expected that the final report will be approved on June 5, and that a public hearing will be held on that day.

Some Notes on European Practice in Electric Traction With Three-Phase Alternating Currents*

BY CARL L. DE MURALT.

There have recently been some pretty lively discussions between the advocates of continuous current and those of alternating current systems for electric traction purposes. Now I wish to state right at the beginning that in the opinion of the author there are certain cases where continuous current is preferable and where alternating currents could not do the work as well, on the other hand there certainly are cases where alternating currents are particularly well adapted to solve the problems in question and where continuous current could not be used advantageously.

First Tests by Siemens & Halske.—The first tests with alternating current traction were made by Siemens & Halske, of Berlin, in 1892, in Charlottenburg on a specially constructed track of about 360-m length with one curve of 40-m radius. There were two overhead trolleys, the rails forming the third conductor. The voltage was between 500 and 600, the periodicity 50 cycles per second. The primary winding of the motor was arranged to allow being connected in delta for starting purposes, whilst it was changed to star connection for full speed. The starting torque of the motor was therefore made about six times the full-load running torque. The motor was also provided with slip rings on the rotor, which allowed for inserting resistance into the secondary winding.

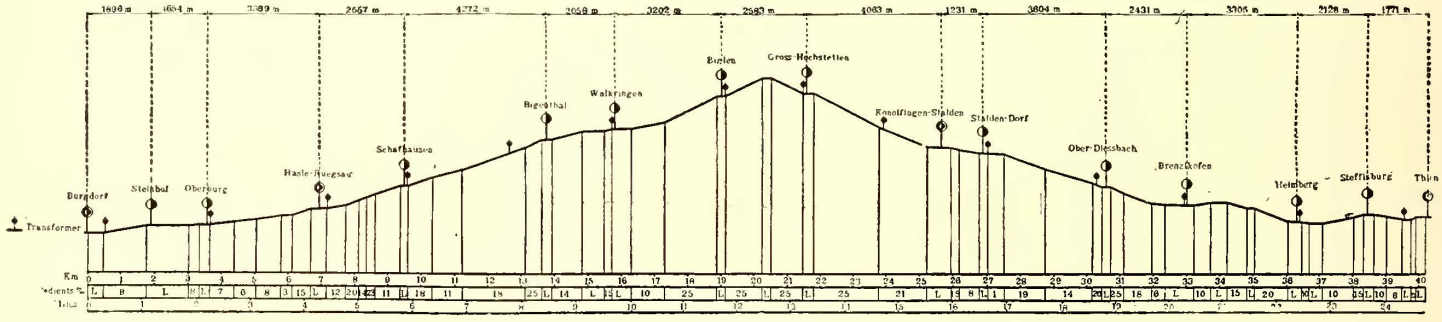
These tests showed clearly that an alternating current railway was absolutely feasible, and proved that no serious difficulties would be encountered in regard to the trolley line construction.

Lugano Tramways.—Brown, Boveri & Co., of Baden, Switzerland, may claim the honor of first putting alternating current into actual use for traction on a commercial scale. The tramways of Lugano, the first three-phase railway, were opened for traffic in 1895. The transmission voltage is 5000 volts at 40 cycles. Transformers reduce this to 400 volts. Two trolley wires of 6 mm diameter 25 cm apart are used and the rails serve as third conductor. Speed of car 15 km (9.3 miles) an hour. Two trolleys, one 1 yard behind the other, make contact with the two lines. Motors are started by means of a reversing switch, and their speed is controlled by means of a resistance in the rotor circuit. Three transformer stations of 180 kw, each 2 km, 5 km and 8 km respectively from the beginning reduce from 5400 to 540 volts. The high-tension lines follows a separate route. The trolley line consists of two wires of 8-mm diameter, suspended by means of cross-wires from wooden poles every 25 m, the rails forming the third conductor. The locomotive weighs 10.5 tons. The motors are controlled by a reversing switch, through which the stator is connected to the line and by the usual starting rheostat in the rotor circuit. Two trolleys are employed on each line wire on account of the large current and in order to pass switches without making a break. This line was completed in 1897 and opened to traffic in 1898.

Jungfrau Railway.—The total length of this road is 13 km (8 miles), with a difference in altitude between the two terminals of 2100 m (6900 ft.). The grade, almost immediately after leaving the little Scheidegg station, is 10 per cent, and this is increased to 20 per cent at about half way to the Eiger Glacier station. From there on the grade increases to the maximum of 25 per cent, when the line enters the tunnel. Water power is made use of in the valley of the White Lutschine to generate 3-phase currents at 7000 volts and 38 cycles, which is transmitted by overhead wires to transformer stations along the line, where it is transformed down to 500 volts. There is a double trolley line as on the Gornergrat. The locomotives weigh 13 tons complete, and their control is similar to those on the Gornergrat line. The motor-controlling devices and the contact arrangements are exactly the same as on the Gornergrat road.

Stansstad-Engelberg Railway.—The voltage generated on this road is 750 volts at 32.5 cycles, and this is fed direct into the trolley line. A 90-kw step-up transformer produces 5300 volts, which is transmitted to two sub-stations situated at about 3 km and 7 km respectively from Stansstad, and containing each a similar transformer, reducing the voltage again to 750 volts. The trolley line construction is similar to that found on the Gornergrat and Jungfrau Railways. The speed of the car is 20 km (12.5 miles) per hour. The contact with the trolley line is made by means of two double contact bars attached to the roof near each end of the car. The control is similar to that already described for the other roads. A locomotive is used on heavy grades, but on more moderate ones the cars are operated by their own motors. The locomotive not only serves for the above-mentioned purpose but is destined also to haul freight trains of 20 tons total weight over the lower part of the road at a speed of about 11.5 km an hour.

Burgdorf-Thun Railway.—The Burgdorf-Thun Railway, which was opened in 1899, is not exactly what you would call a trunk line. Yet it is of normal gage and forms a very important link between three of the main steam lines of Switzerland. The service conditions are the same as encountered on the other Swiss railways and it uses the same size and shape of rolling stock as the main steam roads. The total length of the line is 40.3 km (25 miles). The main reason for adopting electric traction was that the timetable could be arranged much more conveniently than for steam traction. With the steam there would have been five trains per day in each direction, costing per year at the least 52,000 francs for coal alone, and each additional train would have cost 10,000 francs more for coal alone. Now, 50,000 francs allows, with electricity as motive power, the running of ten passenger and two freight trains per day in each direction over the whole length of the line, and besides three or four trains per day from Thun to Konolfingen and back. Each train consists nominally of one motor car and one or two trailers, with a total seating capacity of 130 to 140 passengers This means that not only is the public benefited by a better service, but the number of passengers actually carried is larger and thus increases evidently the income of the railway by a handsome percentage.



PROFILE OF BURGDORF–THUN LINE.

There are sixteen stations, four of which have connection with existing steam lines. The gage is normal = 1.435 m, the minimum radius in curves is 250 m, and the maximum grade in any place 2.5 per cent.

The energy is furnished by the power station on the Kander, about 10 km (6 miles) beyond Thun. The primary line voltage is 16,000, the number of cycles 40 per second. Fourteen transformer stations reduce this voltage to the voltage in the trolley lines, which was fixed at 750 volts, this being the limit set by the federal authorities at that time. This voltage, however, seems to be increased slightly in actual practice.

The trolley line consists of two copper wires of 8 mm diameter, suspended by means of steel cross wires from wooden poles placed on both sides of the track. The rails form the third conductor, and are bonded by means of a special metallic paste.

The contact devices of the cars consist of four steel frames per car, two on each end of the car roof, at a distance of about 9.5 m (31 ft.) from the other two, the contact bar being a brass roller of special shape.

There are two kinds of motor cars, the passenger motor car and the regular locomotive for freight trains.

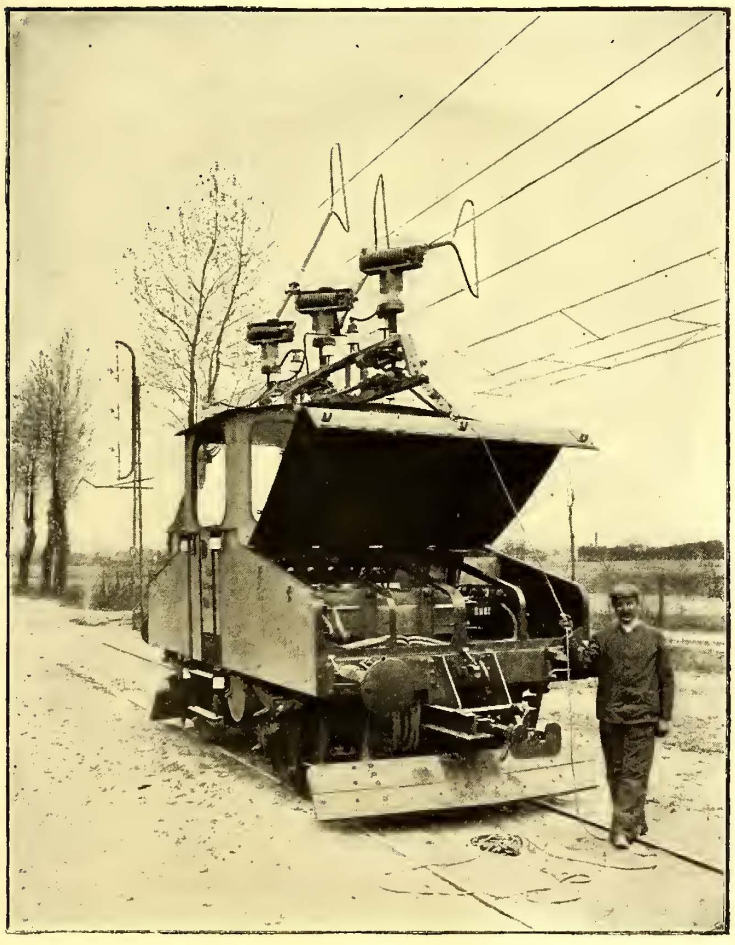
The motor car is a double-truck car, with a 64-hp 3-phase motor geared to each axle. The gear ratio is 1.3, and the speed of the motors 600 r. p. m, equivalent to a train speed of 39 km (24.2 miles) per hour. The four motors are connected with their

* Abstract of a paper presented at the annual meeting of the American Institute of Electrical Engineers, New York, May 20, 1902.

stators in parallel. The line current passes first through one of the two controllers, placed one on each car platform, then through automatic cut-outs to the motors. The first motion of the controller handle closes a switch and connects the stators to the line, at the same time cutting in four rheostats, one into each rotor circuit. Subsequent turning of the controller handle works a combination bevel and chain gear through which three carbon brushes are moved on a sort of cummutator attached to each rheostat, whereby all the resistance is gradually taken out and the rotors left short-circuited. A second handle on the controller reverses the direction in which the car is going by changing two of the main leads. Each car platform is equipped with two ampere-meters, one voltmeter and a recording tachometer. A Westinghouse brake and an electric lighting and heating installation complete the equipment.

The freight locomotives are designed for a speed of 19½ km (about 12 miles) per hour, and will haul a weight of 100 tons (not including their own weight) up the steepest grade of 2.5 per cent. The weight of a locomotive complete is 30 tons, equally divided between two axles. Two motors of 150 hp each are mounted on a common shaft half way between these two axles, and drive by means of a reduction gear first an intermediary axle and from this axle by means of connecting rods all four driving wheels.

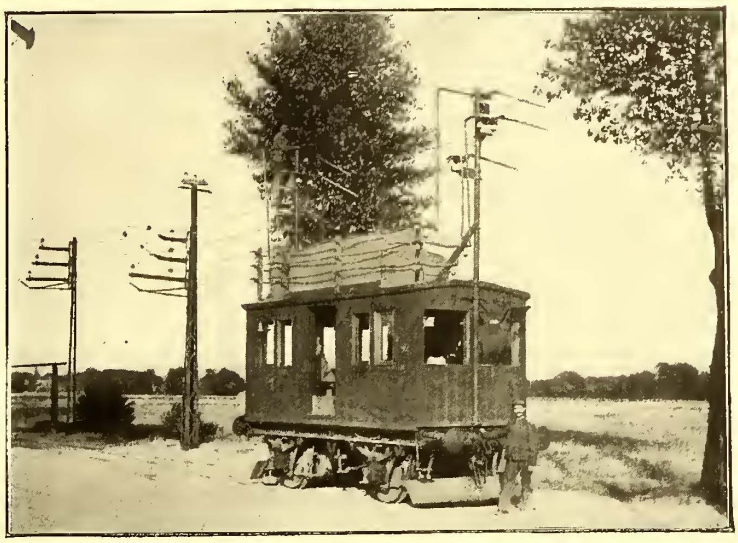
Lecco-Colico-Sondrio-Chiavenna Railway.—In 1901 Ganz & Co., of Budapest, finished the electric equipment of what is usually called the Valtellina Railway in the northern part of Italy. The normal speed is 60 km (37 miles) per hour for passenger trains and 30 km for freight trains. The power station generates 20,000 volts at 15 cycles per second, 12 transformers of 300 kw each, along the line about 10 km from each other, reduce this to 3000 volts. There are two 8-mm trolley wires, the track serving as a third conductor. The rolling stock consists of passenger motor cars weighing 50 tons, and freight locomotives weighing



MODIFIED FORM OF CONTACT DEVICE USED IN TESTS AT GROSSLICHTERFELDE

40 tons each. Both are of the double-truck type, with one motor of 150 hp on each of the four driving axles. The motors are mounted direct on hollow shafts on the axles, driving the latter by means of a flexible coupling. For the passenger cars the so-called "cascade" connection is made use of, two of the motors being connected to the 3000 volts directly, the other two to the 300 volts induced in the rotors of the first two. Thus half-normal speed is obtained and a certain economy in starting. The freight locomotives, however, use resistances only for starting purposes. The contact device is of the roller type, two copper rollers 40 cm long being separated by a piece of hard wood 12 cm long, saturated with parafin under pressure.

Tests at Grosslichterfelde.—Still higher voltages were used by



CONTACT DEVICE USED IN ORIGINAL TESTS AT GROSSLICHTERFELDE

Siemens & Halske in 1899 and 1900 during extensive tests made on the Teltower road, between Grosslichterfelde and Zehlendorf, on a specially constructed test track a little over one mile long, normal gage, with curves of 200 m, 100 m and 40 m radius. On account of the traffic on this public road the contact line had to be placed on one side of the road, and for the same reasons a guard-wire net had to be fixed under all wires. The main object of these tests was to find a suitable contact device and the best possible line construction to handle a current of 10,000 volts, and at car speeds up to 60 km (37 miles) per hour.

The first tests were made with a device making contact with the line from above. The line wire was fastened to triple petticoat porcelain insulators by means of special brass pieces. The insulators were mounted on wooden cross-arms of different lengths, which were hinged to iron poles in such a way as to permit the tension in the wires to be equalized without difficulty. The three wires formed an inclined plane.

Later the line construction was changed and arranged for making contact from the side. The three wires were placed in a vertical plane with distances of about one yard from one another. The wooden cross-arms were replaced by elliptically-curved angle irons provided with a guy wire, to which the insulators were fastened, inclined toward the tracks.

In both cases tests were made with line voltages of 750 volts, 2000 volts and 10,000 volts. The locomotive was fitted with two three-phase induction motors, one on each axle, and each for 30-hp normal and 120-hp maximum output at 650 volts. With 850 volts the output would be increased to 200 hp per motor. These motors had interchangeable armatures so that they could be used for 750 volts or 2000 volts directly with the line voltage. For the tests with 10,000 volts on the line, a transformer was installed on the locomotive to transform down to 750 volts. There were two different reduction gears which could be inserted alternatingly, one for 40 km an hour, the other for 60 km an hour. The total weight of the locomotive completely equipped was 16 tons.

From the tests made the following results were deduced:

1. It is entirely feasible to use line voltages up to 10,000 volts, and the necessary energy could be taken from the line in each case without difficulty.

2. The contact from the side is rather the better of the two.

The Zossen Railway—These results were availed of for the tests which are now being made on the normal gage line from Marienfelde to Zossen, about fifteen miles long, where the line voltage is 10,000 volts at 45-50 p. p. s. and the speeds attempted up to 220 km (135 miles) an hour.

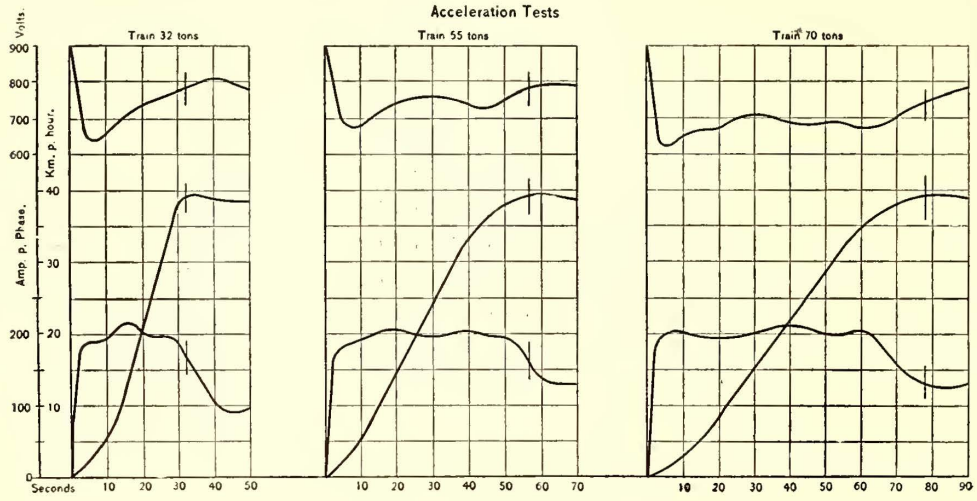
It would lead too far to go into details regarding these tests which have not been completed. Suffice it to say that as far as the electric equipment is concerned, they have been entirely satisfactory. The maximum speed obtained up to now is 160 km (100 miles) per hour.

Tests on the Burgdorf-Thun Railway.—First, the overload

capacity of the passenger cars were tried. These cars were designed to haul nominally a total train weight of 50 tons on all grades at a speed of 39 km (24 miles) an hour.

A test train was put together to weigh 70 tons total, i. e., 40 per cent overload, and the motors did their work very well indeed, starting on the 2.5 per cent grade without any trouble whatever. If, therefore, one of the four motors of a car should ever be temporarily out of order the other three motors will be able to deal with a normal train alone.

In actual service neither the motors nor the transformers show any appreciable rise in temperature. The transformers are, of course, under load for short periods only, say ten minutes at a time. Their size was therefore evidently not determined by their heating but by the maximum drop in voltage, which in this case is not quite 10 per cent.



CURVES OF STARTING TESTS

The accompanying curves show the results of some starting tests made under three different conditions:

a. One motor car alone weighing 32 tons.

b. One motor car hauling two trailers, total weight 55 tons.

c. One motor car hauling three trailers, total weight 70 tons.

The curves show speed, amperes per phase and volts as functions of time. The tests were made on the level, and the controller manipulated so as to keep the current as nearly as possible constant at 200 amps. This represents actual working conditions.

Readings were taken on the instruments mounted on the car at regular intervals of five seconds, the usual employee of the road acting as motorman. The automatic speed record made by the speed indicator corresponded very closely in each case with the curves thus obtained.

It will be found that a weight of 32 tons was brought up to a speed of 24 miles an hour in about thirty-two seconds, a weight of 55 tons in about fifty-seven seconds, and a weight of 70 tons in about 78 seconds.

The total energy input up to a point where full speed was reached is something like 1600 watt-hours in the first case, 3000 watt-hours in the second case, and 3900 watt-hours in the third case, or approximately 52 watt-hours, 55 watt-hours and 56 watt-hours per ton respectively, a power factor of 0.8 being used to calculate real energy.

These results appear to compare very favorably with such as have been recently obtained with continuous current motors, and this in regard to time of getting up speed as well as in regard to energy consumed during acceleration.

By the use of the series parallel controller continuous current motors can be made to consume, I believe, as a minimum about 40-45 watt-hours per ton under similar conditions, which would be a little less than 80 per cent of the energy consumed by the above alternating current motors. There is, however, this point to be taken into consideration, that the maximum power input in the case of the alternating current motors is not very much above the average input, whilst in the case of the continuous current motor the energy curve has a very decided point, making the maximum input always more than 50 per cent and often 100 per cent more than the average input. The times given above for getting up full speed are rather better than has been obtained so far with continuous current motors.

The second diagram represents some readings taken during a regular timetable run of a normal passenger train, weighing 50 tons from Walkringen to Konolfingen, viz.: up and down over the highest point of the road.

It will be noticed that very severe grades were encountered. The curves show the normal speed up the grade to be about 38 km, on the level stretch on the top about 39 km, and on the down grade about 40 km, or a slip of about 2 per cent both ways.

The ampere curve clearly shows the difference between energy consumed in going up, and energy returned when coming down. Of course the power factors will be different in the two cases, and the real amounts of consumed and returned energy cannot be calculated from this curve. It is, however, interesting to see how the voltage increases on the down grade, thereby clearly indicating that the load is taken off. This test was made with the brakes wide open all the time and the motor resistances were used for starting purposes only.

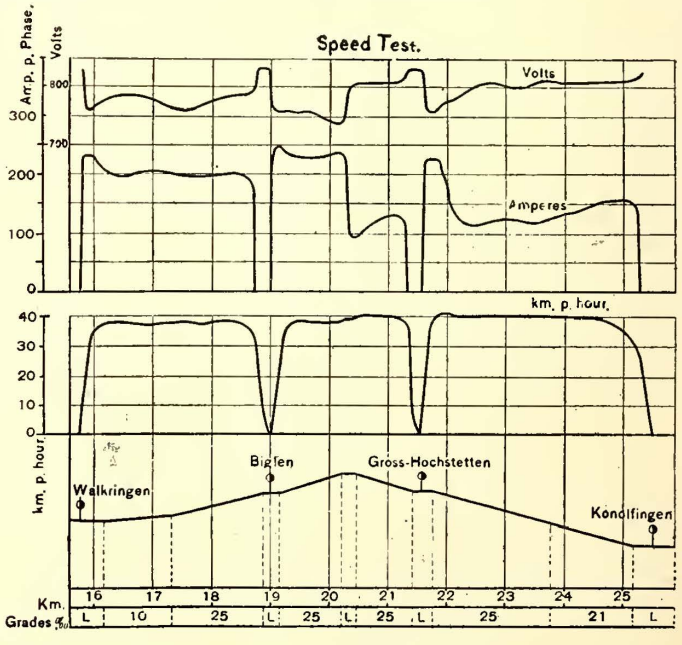
A further test showed that by inserting resistance in the motors while on the down grade the speed can be increased materially and the speed reached on this occasion was about 44 km on a down grade of about 1.4 per cent.

Finally a test was made on a fully-loaded train, which was going up hill on a 2.5 per cent grade. It was suddenly changed to going down. All brakes were left open, and yet the train settled on its downward trip at the normal speed of about 40 km, which was not exceeded. Then its direction was changed again and the start was made without any difficulty whatever.

Conclusions.—From these tests we may draw some interesting conclusions.

I shall first sum up the results more especially in regard to the motors and the car equipments, which may be formulated as follows:

1. If properly designed, alternating current motors can be made to start under full load with not more than normal full load running current. They will also start under a considerable overload. The only condition which has to be strictly observed in the case of alternating current motors is that the drop in the line voltage many not exceed a certain percentage, say 15 per cent, to be on the safe side. In this respect the continuous current system is more elastic, and a continuous current motor will start with full torque even under very low voltages. In practice there is, however, no reason for allowing excessive drops in the line. Besides it



READINGS TAKEN ON REGULAR RUNS OF NORMAL PASSENGER TRAINS WEIGHING 50 TONS

would be easy to instill on particularly exposed points transformers giving a somewhat higher secondary voltage in order to increase the torque of the motors in these cases.

2. In regard to acceleration we may say that alternating current motors are well adapted for accelerating quickly and uniformly up to full speed. Compared with continuous-current motors they show a somewhat better, viz.: shorter, time to get up full speed, a somewhat increased amount of energy consumed during the acceleration and a smaller maximum energy input.

3. During the run we find the speed of the alternating current motor to be practically constant on the level as well as on all grades, as it is dependent practically only on the number of cycles of the generators. This means that alternating current motors must be proportioned so as to be able to draw the maximum weight at abnormal speed on the maximum grade. Continuous current motors need not have the same output, as it is possible, especially in the case of several motors per car, to give the motor momentarily a greater torque by reducing the speed. This, however, is only feasible within certain limits, and actual practice has shown that the gain in weight of motor thus obtained is very small compared with the weight of an alternating current motor running always at the same speed. In most cases it will hardly exceed 10 per cent to 15 per cent. Besides, as pointed out above, the voltage of the line might be increased at the grades in order to increase the capacity of the alternating current motor.

4. On down grades the alternating current motor acts as a generator returning energy to the line. This recuperation of energy is not only theoretically feasible, but is of actual interest in the case of prolonged down grades where the motors thus automatically brake themselves, and where the descending trains greatly relieve the power station. In Siemens & Halske's tests the alternating current generators were driven by continuous-current motors from a storage battery. When the car was going down grade, energy was returned and the storage battery actually charged. The Swiss mountain lines have installed water resistances to use up the excess of energy made free by descending trains.

5. In a mechanical way the alternating-current motor is, of course, superior to the continuous-current motor. The absence of the commutator alone is an advantage. Then the voltage in the rotor can be chosen as low as convenient, which makes the rheosats better and safer. All the Swiss roads which have been operated now between three years and four years, the Lugano Tramways even seven years, report having had practically no repairs whatever on any parts of the electrical equipment, none whatever on the motors, which is more than can be said of the usual continuous current equipment.

6. Finally the manipulation of the cars is greatly simplified by the constancy of speed, which in this connection is a decided advantage. All the motorman has to do is to start his car and bring it up to speed. The car itself will do the rest until it is stopped by the application of the brake. The concatenated motor control, although showing a slightly better efficiency during starting, makes the controlling apparatus more complicated, and it is therefore preferable in most cases to adhere to the ordinary resistance control, which has really showed up to be pretty efficient after all.

7. The increased voltage admissible for alternating current systems reduces the dimensions of the line wires. If carried beyond a certain point the installation will, however, have to be increased. In cases where the energy used is so large that it cannot be taken off the line at voltages below 1000 volts, alternating current becomes a necessity. I believe that 100-150 amps. per contact device is just about the maximum permissible, although I know that in some cases, especially in America, as much as 300 amps. have been taken off by one trolley wheel.

8. The transformation of the high voltage alternating currents universally used for transmission on long roads into continuous current means the installation of rotary converter sub-stations. For transformation into alternating currents stationary transformers are used, which do not call for any particular attendance, and having no rotating parts do not show any deterioration from use.

Concluding, I might now make the following few general remarks regarding the applicability of the two systems for traction purposes:

Both systems are probably capable of satisfactorily doing the work demanded by any traction problem. I therefore repeat that each case ought to be studied for itself in order to find out which system presents the greater advantages.

Very irregular profile and frequent stops, especially if combined with greatly varying speeds, as found, for instance, in congested city street traffic, make a line generally more suitable for continuous current, whilst a regular profile, even in the case of steep grades and long runs between stations, would make it better fitted for alternating currents.

Those cases are rare, however, which allow of an *a priori* decision in this respect, and I believe that a discussion on the merits of the two systems in general is a difficult thing.

What I would like to call your attention to is the fact that the Burgdorf-Thun Railway answers a whole series of questions relating to the application of three-phase alternating current to electric traction, and proves without doubt the possibility of replacing the present steam locomotive by electrically-driven vehicles. This, of course, is of special interest to countries like Switzerland possessing natural resources in the way of water power, but large coal fields may also be put to better use by erecting electric central stations in their immediate neighborhood and transmitting the energy thus generated electrically to the places where it will be used on the cars.

B. J. Arnold Selected as Consulting Engineer of the Chicago Local Transportation Committee

The local transportation committee of the Chicago City Council has had under consideration for some time the appointment of an expert in technical matters relating to street railways to report on questions upon which the committee and Council need engineering advice in connection with the terms of franchise extensions. The selection of such an expert was of course a matter of great importance, as it was recognized that the ability and honesty of the engineer selected would greatly influence the street railway future of Chicago. It was with much approval then, on May 22, that the announcement was received of the committee's decision to recommend the apointment of Bion J. Arnold, of Chicago. This action was subject to ratification by the Council, and on Monday, May 26, a resolution confirming the committee's report was passed.

Mr. Arnold has a large task before him, but is abundantly capable of handling it, as he has had large experience with important railway questions. Probably no man could have been chosen who would have been more acceptable to all parties concerned. Mr. Arnold's honesty and fairness are recognized by all who are acquainted with his personal and professional career, and his standing as an engineer will insure respectful consideration for his recommendations.

It is Mr. Arnold's intention to give this work much of his personal time, and to employ a corps of specialists to assist him in some of the matters to be taken up. All of the chief assistants employed will be men of standing. Indeed, in view of the volume of work that must be done within a short time it will be necessary to establish a large temporary organization or bureau.

Among other things he is to report a general scheme of reorganization of downtown terminals to relieve congestion and provide for the city's growth for many years to come. This will include recommendations as to subways, and alterations in the Union Elevated loop. Estimates are also to be made as to the cost of overhauling and altering present systems to give the city the best possible surface lines, together with estimates on the probable future receipts of the street railway systems. He is to report on the feasibility of a conduit trolley system for Chicago, similar to that used in New York and Washington, and the cost of such construction for the lines in the heart of the city. Among other things upon which reports are to be made are the abandonment of the present practice of running long trains; a universal system of transfers; an estimate of the value of all lines the franchises of which do not expire in 1903; the desirability of through routes as against downtown terminals; the advisability of the joint use of tracks by different companies; the prevention of electrolysis; cost and desirability of laying cement roadbeds; cost of operation and earnings of the present street railway companies; capitalization of the present companies; value of present plants; number of passengers carried during different hours of the day; the wages paid employees, and rules under which they work; a design of rail to be used in the future.

Along with the question of the feasibility of the underground trolley in Chicago is that of enlarging the sewers, for it is admittedly impossible to operate such a system with any degree of regularity in Chicago unless better drainage is provided than is common with the present cable conduits. In connection with possible subways for the downtown district and the rearrangement of downtown terminals Mr. Arnold's task will require not only close analysis of conditions, but far-seeing judgment as to future growth of the city and the city's traffic.

Proposed Combination of Jersey Traction Companies

There is talk of a combination, through a holding company, of all the electric traction and all the electric light companies in New Jersey. Such a combination would represent a capitalization of about $100,000,000. President E. F. C. Young, of the North Jersey Street Railroad Company, is quoted as saying that the plan has been discussed, but that no definite steps have been taken.

Electric Traction in England*

BY PHILIP DAWSON

The real advent of electric traction in England may be said to date back to the opening of the Bristol line in 1895. The Bristol electric tramways, although not by any means the first opened, was the first electric line which was commercially successful from the beginning. Since that date constant progress has been made, so that at the present time there are eighty-five electric tramways and railways in actual operation, while there are over one hundred tramways and light railways under construction or conversion, which are intended to be worked electrically. The following figures give a very good idea of the state of things at the present day:

Electric Tramways and Railways in the United Kingdom

	Route Mileage	Track Mileage	Number of Cars
Constructed (approximately)	800	1,300	4,000
Under construction	600	900	800
Authorized and about to be constructed	1,000	1,400	------
Total	2,400	3,600	4,800

I have compiled a series of tables which I thought would be of interest to you, and would give you an idea of the cost of installation and operation, as well as of the probable results which may be expected. I have also compiled some figures showing the increase of traffic which takes place when electric traction is introduced, and the rapid growth of electric traction. This system has not only been applied with remarkable success in the United States and on the Continent of Europe, but it has within the last six years found great favor in our country, and the importance which it has attained may be gauged by the capital which has already been invested in it.

In 1896 the total capital invested in electric undertakings in this country was about £6,000,000. No corporation had at that time invested any money in that branch. At the end of last year the total capital invested by private companies exceeded £40,000,000, and municipalities had invested over £11,000,000, making a total investment of over £51,000,000. The schemes of power distribution, may for our purposes, be also counted in, as a large number of them will undoubtedly supply electric current for traction purposes. The capital which has already been raised for such undertakings amounts to nearly £20,000,000. If we take into consideration the new tube railways, and the conversion of the Metropolitan and District Railway to electric traction, which that successful American financier, Mr. Yerkes, has now in hand, we shall have to add another £20,000,000; it will thus be seen that, taking all the power distribution and traction schemes which are now either completed or under construction, the total amount of money invested reaches nearly £100,000,000. Taking the capital expended on electric light undertakings, we find that the municipalities have spent, in round figures, £100,000,000, and private companies £28,000,000. It will be seen from these figures that the subject which I am considering to-night is therefore a very important one. The enormous increase of electric traction in the United States is remarkable; thus, while in 1894, of the total tramway systems in America, amounting to nearly 13,000 miles, 9000 miles were operated electrically. At the present moment over 20,000 miles are operated electrically, and approximately, 60,000 cars are in operation.

The total station capacity in kilowatts installed for lighting and traction purposes in the United Kingdom amounts to above 500,000 kw, and that at present being installed in the neighborhood of 150,000 more. The total station capacity installed in London for all purposes is not much over 100,000 kw. This sounds large, but if we compare these figures to those of New York City we find that New York has nearly 250,000 kw.

You may be interested to have some figures showing what surface lines or tramways have done in other towns. Taking New York City with a population of 3,370,000, we find that the tramways carry the total population 260 times every year; for more details, and to show the rapid increase in traffic due to the electrification of the New York line, I would refer you to Tables I. and II., from which you will see that within the last five years the traffic has more than doubled. Taking into consideration the elevated roads and the various outlying districts which make up Greater New York, we have a population, in round figures, of 3,500,000, and the tramways and elevated railway systems carry 1200 million passengers per annum, or, in other words, the total population of New York is carried once a day. Comparing these figures with what is obtained in London, we find that the tramway omnibuses and Metropolitan lines only carry from 60 per cent to 70 per cent of the population of Greater London every day, from which it is evident that the inhabitants of London do not move about as much as those of New York. This may possibly be attributed to the difference of temperament and the different mode of conducting business. The total length of the London tramway system is, in round figures, 140 miles. A very important point, and one which has to be considered when comparing financial results obtained in England and America, is the average fare per passenger carried. It appears that the average amount paid per passenger on the different London transit systems is approximately 1½d., whereas in New York there is a uniform fare of 5 cents, or 2½d. It is evident from this that lines which would pay very well in America might not pay in England. Besides this fact, there is another one which has to be considered, viz.: that the difference between the income and the actual expenses incurred by the working population of this country is a much smaller quantity than that which is at the disposal of the American work-

Table I.—New York City Surface Lines (from Street Railway Journal).—Population, 3,370,000

	1901	1900	1899	1898
Miles of track	963	952	930	914
Passengers carried	871,799,558	816,661,361	753,740,052	679,967,283
Car miles operated	110,557,911	112,361,704	112,671,413	105,797,835
Car miles per mile of track	114,800	118,000	121,100	115,800
Passengers carried per mile of track	905,000	858,000	810,000	744,000
Number of times population carried	260	240	220	200

Table II.—Growth of Passenger Traffic on New York Surface Lines

	Approximate	
1890	224,000,000	
1891	238,000,000	
1892	268,000,000	
1893	265,000,000	Period of changing motive power and consolidation of lines.
1894	263,000,000	
1895	263,000,000	
1896	320,000,000	
1897	380,000,000	
1898	400,000,000	
1899	465,000,000	
1900	559,000,000	

Table III.—Approximate Capitalization of Electric Tramways

Name	Population	Miles of Route	Capitalization	
			Total	Per Mile of Route
Birkenhead	110,926	11	112,000	10,000
Blackburn	137,000	4	225,000	56,000
Blackpool & Fleetwood	--------	9	190,000	21,000
Bradford	279,767	25	338,000	14,000
Bristol	321,908	28½	960,000	34,000
Coventry	73,000	10½	130,000	12,000
Dover	44,000	3½	38,000	11,000
Dublin United	252,239	45	1,715,000	38,000
Glasgow	762,000	20	1,681,000	84,000
Halifax	106,000	13½	117,000	9 000
Huddersfield	95,000	20	266,000	13,000
Hull	240,620	9½	270,000	28,000
Leeds	428,953	25	217,000	9,000
Liverpool	684,947	66	1,084,000	16,000
London United	--------	13	494,000	38,000
Manchester	543,969	75	900,000	12,000
Norwich	111,728	14.4	330,000	23,000
Portsmouth	189,160	15	602,000	40,000
Sheffield	400,000	18	232,000	13,000
Central London	--------	6.5	3,550,000	546,000
City & South London	--------	6.0	2,081,000	347,000
Liverpool Overhead	--------	2.5	709,000	318,000

Table IV.—Approximate Cost of Various Parts of Electric Traction System

Approximate Cost of Modern Power Plant per Kw Installed.

	£ s. d.		£ s. d.
Buildings	4 0 0	to	16 0 0
Boilers	2 0 0	to	5 0 0
Steam and water piping and feed pumps	0 12 0	to	3 0 0
Steam engines and condensers	3 0 0	to	11 0 0
Dynamos and switchboards	2 10 0	to	12 0 0
Total cost of power plant, not including building			£25 to £35

Approximate Cost of Rolling stock

Maximum traction trucks per set	£130
Ordinary bogie trucks per set	125
Standard four-wheel truck	70
Extra long truck	75
Double deck car bodies	£220 to 300
Single-deek car bodies	210 to 265
Double-motor equipment, including resistances and controllers	260 to 320
Single-car motor, 15–50 hp	75 to 120

Cost of Track Laying.

Cost per mile of single track, 4 ft. 8½ in. gauge, 100-lb. rails wood or granite paving, including necessary electrical bonding	£5,500 to £6,500

Overhead Work.

Cost per mile, three-section tubular poles, standard braekets, 1/0 trolley wire.

Double trolley wire on side brackets	£1,100—1,400
Double trolley wire on span wire	1,700—2,000
Double trolley wire on centre brackets	1,300—1,500
Single trolley wire. side brackets	1,000—1,200
Single trolley wire, span wire	1,600—1,800

* Delivered by request before the tramways committee of the Northampton Corporation.

man, and that it is, therefore, probable that whilst the American will travel on an electric car for a very short distance, and whenever he gets a chance, the English workman will only travel when he is forced to do so.

TABLE VI.—BOUBAIX—TOURCOIND ELECTRIC TRAMWAYS

Increase in Passengers Carried

1897	4,484,025
1898	4,763,980
1899	5,365,500
1900	7,120,420

30 klmts. of route at end of December, 1900

Ratio of Expenses to Receipts

1895	65 per cent
1896	58 "
1897	56 "
1898	54.8 "
1899	53.5 "
1900	54.6 "

Population, 204,000.

It may be interesting to you to examine the probable costs of electric installation, and for this purpose I have prepared some tables, from which I will give some extracts. It will be evident, from a glance at Table III., that there is a very large variation of the capitalization per mile of route. It is also evident that the smaller the system the less will be the cost per mile of route, provided the general conditions are favorable. It will be seen that the total expenditure varies from a minimum of £9,000 per mile of route in the case of Leeds and Halifax to respectively £56,000 and £84,000 in the case of Blackburn and Glasgow. As regards main lines, railways, such as the Liverpool Overhead and the London Tube, the capital expenditure must be very much heavier, and has reached, in the case of the Central London Railway, over half a million per mile of route. It may be stated that, for estimating purposes, the very best system, including power station, track, car, overhead work, feeders, etc., should be installed for from £15,000 to £20,000 per mile of route.

It may interest you to have an idea of how this total cost is made up, and for this purpose I have made out Table IV., from which you will see that the total cost of the power station can be safely taken at £30 per kw installed, and that as regards the motor cars, a figure of £750 is a safe one to estimate on. For the permanent way with standard gauge and for heavy rails, such as are now nearly always adopted, £6,000 per mile of single track should be allowed. As regards the overhead construction, a figure of from £1,500 to £2,000 per mile of route is a safe one to estimate on. It must, however, be pointed out that all these figures can be used for roughly approximting costs and preliminary estimates only, as the conditions that obtain may considerably influence the total cost. It is only by a traction expert examining these conditions in the light of his experience that a real idea of the total capital which will eventually have to be expended, can be obtained.

In investigating the question of how much money can be properly invested, it is necessary to ascertain the probable receipts and expenditure, and for this purpose I have prepared Table V. It will be seen that the population, in the cases given, is carried from sixty-five to 180 times a year. The receipts per head of population vary, in the figures I give, between 5s. and 19s. per head. It will be seen that the receipts per mile of route vary between £2,200 and £7,300. The average fare per passenger varies from .98d. to 1.62d., and the ratio of operating expenses to receipts from 49 per cent to 85 per cent. I give, in Table VI., some figures for electric systems in the north of France, and it shows the rapid increase in traffic and the decrease in ratio of expenses to receipts. Table VII. gives the increase of passengers carried in the case of some British electric tramways; it will be seen, for instance, that in the case of the Dover electric tramways the passengers have more than trebled within the last three years. In this connection the figures as regards the city of Berlin, with a population of 1,810,000, may be of interest. The tramways which have now been converted entirely to electric traction carried 188,000,000 passengers in 1899, as against 306,000,000 in 1901. To give you an idea of the total amount of power which will have to be installed, I have compiled Tables VIII., IX. and X. From Table VIII. the amount of power per car mile run can be ascertained. I may state here that, for rough estimating purposes, it is safe to take one B. O. T. unit per car mile for the conditions which generally obtain in this country. Tables IX. and X. show the amount of power installed in various German and British stations per motor car operated, and per mile of route. For rough estimating purposes, it may fairly be said that approximately 10 kw per car operated should, under normal conditions, prove sufficient.

TABLE VII

	Passengers Carried per Annum			Miles of Route Open		
	1898	1899	1900	1898	1899	1900
Blackpool Corporation..	2,279,209	2,881,027	3,42',736	4	4	6
Blackpool & Fleetwood	Opened July	1,782,683	1,831,531	----	8	8
Cork	Opened December	4,744,528	5,137,141	----	8,25	9
Dover	787,745	2,170,590	2,437,863	3½	4½	4½
Halifax	Opened June	2,594,478	7,308,998	----	6,33	11,125
Leeds	15,620,985	24,237,440	27,634,105	21.75	23	26
Liverpool	Opened November	63,771,450	82,367,958	----	78	82

The question of laying down a proper power station which will economically supply electricity for traction purposes, is a very important one, and as the conditions that obtain in traction are entirely different from those which are met with in lighting work, a station eminently well designed for lighting purposes will generally be uneconomical for traction work. Electricity has been used commercially for lighting during the last twenty years, but

TABLE VIII

Name	Maximum Grade	Average B. of T. Units per Car-Mile	Average Speed Miles per Hour	Lbs. of Coal per Car Mile
Aix-la-Chapelle	1 in 11	.589 to 1.236	8	3.5 to 6.9
Hamburg	------	.902	6 to 12	3.21
Brussels—La Petite Espinette	1 in 25	1.2 (heavy cars)	16	4.6 to 4.9
Glasgow	1 in 14	1.370	6	8
Bristol	1 in 15	1.000	8	7

the amount of power used for generating purposes would not be excessive, even if electric lights were to supersede all other methods of illumination. The hours during which light is required every day are restricted, and the generating plant has to be idle the greater portion of the twenty-four hours, hence even with the most careful study of the conditions that obtain, it is generally impossible to lay down a purely lighting plant which can produce electricity at all economically. The load on a station used only for lighting is very uneven, increasing from an insignificant amount most of the day to a very heavy demand for a few hours in the evening. Furthermore, the demand in winter and in summer is very different, and the maximum load in winter may attain proportions necessitating a plant which will lie idle most of the year. These conditions call for a large number of units of varying sizes, and it is often essential to have as small a first outlay as possible, as no economy in working can make up for the loss due to the capital which lies unproductive for relatively long periods, and for the waste due to maintaining steam and keeping the engines hot. This accounts for the heavy price which we have to pay for our electric lighting.

The extensions in the uses of electricity have naturally influenced the design of the power house. Electric light was the first comer, and the plants laid down were as far as possible designed to fulfil the special conditions required in lighting. Thus

TABLE V

Name	Population.	Miles of Route	Passengers Carried	Passengers Carried per Mile of Route	No. of Times Pop. was Carried	Total Receipts	Receipts per Cap.	Receipts per Mile of Route	Receipts per Car-Mile	Average Fare per Passenger	Ratio of Expenses to Receipts	Total Expenses
						£	s.	d.	d.	d.	%	£
Bristol	329,000	28	26,972,000	960,000	82	165,115	10	5,900	----	1.47	67	110,795
Cork	75,000	10	5,137,000	514,000	68	21,875	6	2,200	7.2	1.02	63	13.840
Dover	42,000	3	2,710,000	903,000	65	11,141	5	3,700	10.0	.98	85	7.997
Dublin United	252,000	45	45,165,000	1,000,000	180	241,825	19	5,400	----	1.28	67	161,692
Halifax	106,000	13.5	9.430,000	700,000	89	39,383	7	2,900	13.3	1.00	77	30,273
Hartlepool	23,000	5.0	2,130,000	426,000	93	12.266	11	2,400	----	1.38	62	7,557
Hull	241,000	9½	19,350,000	2,040,000	80	80,118	7	8,400	10.5	.99	49	39,754
Leeks	429,000	25	39,240,000	1,570,000	92	183,199	9	7,300	12.6	1.12	61	121,402
Liverpool	685,000	66	93,768,000	1,420,000	137	455,530	13	6,900	12.2	1.16	73	330,073
Middlesbro'-Stockton	------	9	8,783,000	976,000	----	47,219	--	5,200	---	1.29	69	32.581
Norwich	112,000	14.4	7,816 000	542,000	70	36,376	6	2,500	9.4	1.11	62	22,463
Blackpool	47,000	9.5	4,912,000	517,000	104	33,060	14	3,500	15.0	1.62	59	19,535

up till quite recently, with the exception of those who, like myself, have grown up with electric traction, practically all electrical engineers who were not telegraph men were lighting engineers. When electric traction began to come into use many stations were consequently designed as though intended for lighting. Indeed, it was not till electric tramways had been in operation some time that it was discovered by costly experience that what was right for electric lighting was out of place in traction work. A few moments' consideration will show that this result was inevitable by reason of the widely different demands. An electric lighting station, as we have seen, only works for a comparatively short time every day, and the load, though varying, is more or less steady. On the other hand, a traction plant works nearly continuously, and the load is scarcely ever steady for two consecutive minutes, due to cars starting and stopping. It is not an infrequent occurrence for a considerable number of cars to start simultaneously, thus putting a heavy overload on the generating units. The capital expenditure in the case of a traction installation is much greater than in the case of a lighting plant, and the long hours of working render the question of labor and fuel consumption of the very first importance. The practice is now coming in of designing stations to supply power for all purposes. When this is done at the commencement a very good station can be obtained, but where existing lighting stations are utilized the results are generally far from satisfactory. This appears to have been generally admitted, and except when a new station designed for traction and lighting work was being laid down, special plants have been put down. As examples I may give Glasgow, Leeds and Newport. In the case where an old lighting station exists and power is required for traction work, in nine cases out of ten there is but one thing to do, and that is, to install an entirely new plant, with the possible exception of boilers, for the traction work. This method may appear drastic, but it is the most economical in the end. The whole question of cheap power supply depends upon the station being properly laid out, so as to adequately fulfil the conditions required, and to secure as good a load factor as possible. It may be well to state here that by load factor is understood the ratio of the actual B. of T. units measured at the switchboard in the power station to the amount which would be generated if the plant ran continuously at the maximum load which it is at any time called upon for. Table XI. shows how much importance attaches to getting a high load factor.

Table IX.—German Power Station.

Name	Mean Grade	Number of Motor Cars	Number of Trial Cars	Total Capacity in Kw. of Station	Battery Cap in Ampere-Hours	Total Station Capacity per Kw., Including Motor Car	Total Power, Including Spares per Mile of Single Track	Cap of Cells in Ampere-Hours per Motor Car,
Bochum	1.20	32	32	400	165	9.3	12	4.1
Portmund	1.25	36	32	375	264	8	28	5.5
Plauen	1.20	13	--	144	100	11	32	7.7
Horder	1.14	30	15	300	277	8.5	25	8
Coblentz	----	29	--	300	---	10.4	--	--

Table X

Name	Total Station Capacity Kw.	Total Track Length	No. of Motor Cars	Total Station Capacity	
				Per Mile of Track	Per Motor Car
Bristol	2,000	52	200	38	10
Dover	200	4.5	16	44	12
Dublin United	3,000	74	240	40	12.5
Halifax	600	15.25	42	39.4	14
Liverpool	7,200	114	441	63.2	16.3
London United	3,000	26	150	77	13.3

It is evident that a lighting load by itself can under no conditions be favorable to a good load factor. It need hardly be pointed out that before proceeding to lay down the station the question of what load factor can be secured should be most thoroughly investigated.

It has been assumed by many that where free water power is available electrical energy can be generated very cheaply, this, however, is now always the case, as the capital required to harness the water power is often so great as to more than outweigh the saving in cost of production. Thus the electrical energy generated at Rheinfelden, at Zurich, and according to Mr. Kearshaw, even at Buffalo, costs more than it would if generated in the coalfields of England in large central stations by steam power. In the case of Zurich, the city engineer stated to me that notwithstanding the high cost of fuel (Frs. 30-35 a ton), the only way to cheapen the cost of production was to increase the steam plant, which at the present moment generates electrical energy approximately at five-eighths what it costs to do it by water power. In this connection I have inserted a table of the price of selling electrical energy at Buffalo, as supplied from Niagara—it will be seen here that for amounts exceeding 80,000 units per annum the price charged is less than one-third; when we compare this to Table XIII., which gives some of the prices charged for electrical energy for traction purposes, it is remarkable that, under the high rates charged for electrical energy, electric tramways should be able to exist, except where they generate their own supply of power. Table XIV. gives some very interesting results of the Leeds Tramways; it will be seen that the cost of power, which does not include sinking fund or interest, is very low, and that the results generally obtained are most satisfactory.

TRACTION SYSTEMS

If we neglect the method of working by means of accumulators carried on the car itself, which has been abandoned, there are three methods of operating an electric tramway, all similar in that current is generated at a central station and picked up by cars from a charged conductor. These systems of traction are known as:

(*a*) The surface contact system.
(*b*) The underground conduit system.
(*c*) The overhead trolley system.

Of these the last two are really the only practical methods in existence.

(*a*) In the surface contact system, a number of contact studs are laid in the track, each stud containing a switch by means of which it can be connected to the feeders leading from the generating station. The switches are designed to be operated only when the car is over them, this being done by an automatic device of which there are several varieties. Most of them are based upon the action of an electro-magnet. When the stud is not covered by the car, the connection between the stud and the feeder is supposed to be broken, and the stud should be dead and harmless. The car picks up the current from the stud by means of a slipper, which is made rather longer than the distance between the studs, so as to always make contact with one of them.

This system while perfectly correct theoretically cannot be said to have been a success commercially. In Paris a number of miles of track were equipped on this principle, but this system was found to be a complete failure; at present most of the lines in question are being converted to the overhead trolley system. There is only one example of the surface contact system in England, and that is the experimental line which has just been put in by the Lorain Steel Company at Wolverhampton.

The chief objections to the system are:

1. There is always a possibility that one of the automatic switches may fail to act, with the result that a stud will be left energized after the car has passed.
2. The studs must project to a certain distance above the level of the road, or else the collector on the car will not make contact without rubbing on the road—hence the studs must always offer some obstruction to ordinary traffic.
3. There is considerable loss through leakage from the studs.

Practically the only thing that can be said in its favor is, it obviates the necessity of overhead wires, with their possible dangers without the terrible expense which is entailed by the construction of an underground conduit.

(*b*) In the underground conduit or slot system a conduit is constructed under the whole length of track, and contains the charged conductors from which the car collects current. Communication between the car and the interior of the conduit is established through a narrow slot in the roof of the latter, which permits the collector carried by the car to move along the conduit, and thereby making rubbing contact with the conductors. The conduit can be constructed with a separate slot rail in the center of the track, or under one of the track rails, which combines the offices of slot rails and track rail. The objection to this latter method is the difficulty experienced at points and crossings. This difficulty can, however, be overcome by deflecting the conduit to the center of the track when points or crossings are encountered.

The chief qualities required of a conduit are that it should have ample strength to resist any tendency of the slot to close, and that it should be easily cleaned out.

The chief objection to the conduit system is its very heavy first cost, and the amount of disturbance caused to ordinary traffic by excavations which are necessary when building it. In the case of the conduit of the Metropolitan Street Railway of New York the cost of construction came out at about £30,000 per mile of track. With conduits special work is very expensive, not only in

first cost but in repairs and maintenance, owing to the additional number of slot points and crossings.

The principal advantages of the system are:

1. An insulated return can be used and the use of the track rails for this purpose dispensed with, thus avoiding bonding and any possibility of electrolysis.

TABLE XI.—INFLUENCE OF LOAD FACTOR ON COST OF GENERATION
Station of at Least 2,000-kw. Capacity

Local Factor Per Cent	Fuel at 10s. Per Ton	Total.
10	.6	1.0
15	.5	.78
20	.4	.56
25	.35	.45
30	.32	.4
35	.3	.35
40	.26	.33
45	.25	.3
50	.24	.28
60	.22	.25
70	.19	.24
90	.16	.23

These costs do not include interest and sinking fund, but they do include maintenance and repairs in the generating station.

LOAD FACTORS USUALLY OBTAINED

	Per Cent
Ordinary town lighting, with no motor load	10
Lighting goods yards and railway lighting generally	15—20
Cotton mills and ordinary engineering works, working in day time only	25—30
" " " working double shifts	35—45
Coal mines under favorable circumstances	40
Traction	15—30

TABLE XII.—RATES CHARGED TO ORDINARY CONSUMERS BY THE CATARACT POWER AND CONDUIT COMPANY

1,000 units or less per month				1	per unit
1,000 units up to	2,000 units per month			0.75	"
2,000 " "	3,000 "	"		0.60	"
3,000 " "	5,000 "	"		0.50	"
5,000 " "	10,000 "	"		0.40	"
10,000 " "	20,000 "	"		0.375	"
20,000 " "	40,000 "	"		0.35	"
40,000 " "	80,000 "	"		0.33	"
80,000 " "	200,000 "	"		0.32	"

TABLE XIII.—PRICES PAID BY TRAMWAYS FOR ELECTRIC POWER

Supplying Station	Tramway
Blackburn, 1.5	Blackburn Corporation.
Plymouth, 2.3d	Plymouth Corporation
Ashton-under-Lyne, 4.5d	Oldham, Ashton and Hyde.
Cheltenham, 2.0d	Cheltenham Tramway Company.
Hamburg Lighting Company, 1.0d	Hamburg Tramway Company.
Geneva Corporation, 1.0d	Geneva Tramway Company.

2. It is not necessary to have overhead trolley wires, and thus any danger from their presence is done away with.

The system is a thoroughly sound one, and has operated with perfect success commercially in several cities in the United States and Continent.

(*c*) The overhead trolley system is the one which is almost universally used for tramways and light railways, and it is very doubtful if engineers would ever install any other system, except under special circumstances. Where such has been the case, however, it will usually be found that the reason why the overhead system was not employed, was because the city authorities would not grant permission to erect overhead wires.

There are very few real objections which can be urged against this system. Many people object to the trolley wire on the ground of its appearance, but this is a matter which is generally remedied by use and familiarity; after a short time it is scarcely noticed.

It lacks one advantage of the conduit system, viz.: the insulated return circuit, and special care in the bonding of the track is consequently necessary. Of course, it would be quite possible to have an insulated return circuit overhead, but the additional trouble and expense of stringing double trolley wires would completely swamp any slight advantage which might be gained therefrom.

The real objection to the overhead wire is that there is always a possibility, however slight, of its breakage and fall. This, however, is a most infrequent event, and there are numerous safety devices to prevent the possibility of any serious accident should such a thing happen.

On the other hand the system has considerable advantages. It is much cheaper than conduit construction, and putting down the line does not cause nearly such disturbance in the streets. All the insulators, etc., are visible and accessible, thus facilitating and cheapening repairs and maintenance.

Electric traction is having a considerable influence on the value of land, and considerable areas which before the advent of electric traction was a drug in the market are now being covered with houses. The reason of this is that the rapid transit facilities afforded by the use of electricity enables people to live at considerably greater distances from their work than formerly and bring the outlying suburbs into much closer touch with the center of business. It is in this expansion which is thus rendered possible that we may look for a solution to the ever-present "housing" problem.

TABLE XIV.—LEEDS CORPORATION ELECTRIC TRAMWAYS
(Year ended March 25th)

	1900	1901
Total electric car receipts	£63,436 10 5	£133,449 11 5
Total car mileage	1,205,812	2,506,655
Receipts per car-mile	12.62d.	12.77d.
Working expenses per car-mile	5.97d.	6.49d.
Ratio of expenses to receipts	47.3 per cent	50.8 per cent
Cost of generation per B. O. T. unit	.82d.	.67d.
Total units generated	1,095,231	2,452,741
Supplied to arc lamps, shed lighting, &c.	59,682	190,251
	1,035,549	2,262,490

Every part of the electric railway has received the most careful study by those who are interested in the subject, and at the present day there is absolutely nothing experimental about the whole subject. A very large amount of experience has been gained, and everything has been standardized, so that there need be no hesitation as to the results which will be obtained through the installation of the ordinary direct current system. It cannot be urged too strongly the importance of using the best material in every branch of the system, and equipping the line in a thoroughly sound and solid manner.

The increased capital expenditure is more than counterbalanced by the smoothness of working of the whole system and the freedom from accident, breakdown and such like. The power plant especially should be most carefully designed, so that, in the event of extensions being required in the future, these can be made in a proper manner, so that the enlarged station will work economically and conveniently as a whole and not, as is sometimes the case, as two separate stations side by side.

In conclusion, I would like to say a word upon traction on main line railways. Until it may be satisfactorily proved that electric traction will reduce the working expenses, it is certain that no railway company will adopt it unless it is forced to. I do not personally believe that any of the high-speed railways which are proposed to-day can be financially successful for long-distance traveling—it is expense rather than time which will be the determining factor. If railway companies can greatly increase their traffic by increased speed they can do so at once without adopting electric traction. Thus at the present moment the Pennsylvania Railway Company are running trains at a schedule speed of from seventy miles to eighty miles an hour for long distances with heavy trains. We are by no means near the limit of speed of locomotives in this country—thus at the present moment in France the Northern Railway runs a distance of 184 miles in three hours and ten minutes, as compared to a distance of 183½ miles between London and Manchester run in four hours and ten minutes—capital is easily obtained when a profit is assured. Long-distance electric traction is no doubt a fascinating subject, but should not be at the present moment considered practical. I am convinced that we are entirely unprepared at the present moment to undertake the electrification of main lines, and it has not been shown that it would pay if it were done, and we really do not know how to do it.

Given all the schemes which have been so far suggested, there are such serious objections that it is not probable that anyone will be found hardy enough to carry them out. On urban and suburban lines the case is entirely different, as I have so often said. There the traffic is ready-made, awaiting greater facilities which electricity alone can furnish. Here there is knowledge and experience to point the way in which the work should be carried out.

London Looks to America for Relief

Americans who believe that they have a monopoly on the overcrowding of street cars as well as the abuse of the managers of transportation lines will be surprised to learn that similar conditions prevail in London and many Continental cities. The daily press of London "welcomes American commercial invasion," and one influential journal says of the London railways: "At present they are a public scandal and disgrace. The overcrowding is indecent. The carriages are little better than cattle trucks and the time kept the worst possible. If American capital will deliver us from these things it deserves to be blessed." Nothing worse than this has been published by American yellow journals about American street railways.

Consolidation of Ohio and Pennsylvania Lines

The consolidation of the electric railway properties in the Mahoning Valley, which a Cleveland syndicate has been working on for some time, has been effected, and the Pennsylvania & Mahoning Valley Railway Company, capitalized at $8,000,000, has been chartered under the laws of Pennsylvania as the successor of the consolidated street railways. Included in the consolidation are the Trumbull Electric Company, the Mineral Ridge Railway Company, the Mahoning Valley Railway Company, the New Castle & Lowell Railroad Company, the New Castle Traction Company, the Lawrence Gas Company and the New Castle Electric Company. All of these companies have heretofore been owned by the same interests, except the New Castle Traction Company, the New Castle Electric Company, and the Lawrence Gas Company, which were recently purchased from R. R. Quay, Senator M. S. Quay, Hon. Don Cameron and others. The syndicate also purchased the Cascade Park, near New Castle. The consolidation will bring under the management of the Pennsylvania & Mahoning Valley Railway Company over 90 miles of road extending from Leavittsburg, Ohio, to New Castle, Pa., including the city lines of Warren, Niles, Youngstown and New Castle. The following officers have been elected: M. A. Verner, of Pittsburgh, president; James Parmelee, of Cleveland, vice-president; John McVey, of Youngstown, secretary; A. A. Anderson, of Youngstown, general manager; B. F. Miles, of Cleveland, treasurer. Myron T. Herrick is also prominently interested.

The capital stock of $8,000,000 is divided into $3,000,000 5 per cent preferred and $5,000,000 common stock. Nearly all underlying bonds have been retired, and a new issue of $2,750,000 5 per cent twenty-year gold bonds will be issued under a mortgage to the United States Mortgage & Trust Company, of New York. The first mortgage, however, is subject to mortgages on the New Castle Traction Company, and the New Castle Electric Company, aggregating $750,000. The bonds have been purchased by N. W. Harris & Company, of Chicago, New York and Boston. The estimated earnings for 1902 are placed at $750,000.

It is expected that ultimately the road will be a part of the system from Cleveland to Pittsburgh, although the report that the roads between these centers are to be consolidated is denied. However, through traffic arrangements will doubtless be made when the missing gaps are built. Between the systems of the Eastern Ohio Traction Company and the Mahoning Valley Company there is a gap of but 12 miles from Garrettsville to Leavittsburg, and it is expected the former company will build this during the coming year. Out of New Castle, on the route to Pittsburgh, there is a 2-mile road, and at Beaver Falls and Rochester the Beaver Falls Traction Company has several miles in operation. From Pittsburgh to Coropolis and Monica, the Philadelphia Company, of Pittsburgh, has lines in operation, so that from New Castle to Pittsburgh it is figured that only about 30 miles remains to be built. A number of companies contemplate building lines which will fill these last gaps.

The Everett-Moore Situation

The bankers' committee in charge of Everett-Moore affairs has abandoned the idea of attempting to sell the controlling interest in the Detroit United Railways, and is disposing of the Everett-Moore interests piecemeal. About 10,000 shares of the stock were sold last week to different parties at prices netting $70 and better. This stock has been sold in Cleveland, Cincinnati and Detroit, and the prices were, of course, better than could have been obtained had the entire interest been sold at 70, as had been contemplated. About 1000 shares were sold in Cincinnati last week at 71. It is understood on good authority that negotiations have been completed whereby 20,000 shares will be sold during the coming week to Cleveland parties. This would leave the syndicate still in possession of about 10,000 shares, which possibly will be retained. The syndicate's interests in the Aurora, Elgin & Chicago Railway have been sold at prices aggregating about $200,000. Negotiations for the sale of the Northern Ohio Traction Company and the Toledo Railways & Light Company are still dragging. Representatives of Tucker, Anthony & Company, of Boston, were in Cleveland last week going over the Northern Ohio Traction property. The $300,000 of receiver's certificates on the Lake Shore Electric Railway are being taken by Cleveland banks and are selling at par and interest. They draw 6 per cent interest and are a first lien upon the property of the company. The syndicate has announced its intention of selling all of the telephone properties except the Cleveland Exchange and the long distance lines. Four of the properties have already been disposed of.

Subway for Jersey Tunnel

Application has been made to the Rapid Transit Commissioners by the New York & New Jersey Railroad Company for a franchise to build a tunnel railroad in Manhattan from a point in West Street to a terminal to be constructed at West Tenth and Greenwich Streets. William G. McAdoo, president of the company, said that the right and property of the old Hudson River Railroad Company, which has already constructed over 4000 ft. of tunnel beneath the Hudson River, had been acquired by the applicant. The company now desires to obtain the right to continue the Hudson River tunnel from the existing opening in West Street, eastwardly to Morton Street, to Greenwich Street and thence northwardly to the junction of West Tenth and Greenwich. It was further explained that this was an entirely new proposition, as it was designed to bring the Jersey trolley lines into the city, while the Pennsylvania's plans were for the bringing of the trunk railroad lines into the metropolis. The matter was referred to the committee which has in its charge the tunnel franchise to the Pennsylvania company.

William Barclay Parsons, the chief engineer of the Rapid Transit Board, said: "From a physical and engineering view I see no reason why permission should not be granted."

The following officers and directors for the New York and Jersey Railroad Company are announced: President, William G. McAdoo; vice-presidents, Walter G. Oakman and Edmund C. Converse; treasurer, Henry A. Murray; secretary, Charles W. King; chief engineer, Charles M. Jacobs; directors, Walter G. Oakman, E. H. Gary, John Skelton Williams, E. C. Converse, A. N. Brady, Charles H. Russell, E. F. C. Young, David Young, John G. McCullough, Frederic B. Jeenings, G. Tracy Rogers and William G. McAdoo.

Consolidation of Steam and Electric Roads

The bill to consolidate the Grafton & Upton Railroad Company, the Upton Street Railway Company, the Milford & Uxbridge Street Railway Company, and the Milford, Holliston & Framingham Street Railway Company has passed the House of Representatives successfully. This bill provides that the Railroad Commission shall approve of the consolidation of a steam railroad with several street railway lines—something that it has never been possible to do in Massachusetts. The fight against the bill will be continued in the Senate.

General Electric Acquires Sprague Company

Announcement is made that the General Electric Company has purchased the Sprague Electric Company, and thus acquires the factory, contracts and patents controlled by the latter concern. According to a recent statement the Sprague Company had, exclusive of patents and good will, something over $2,700,000 assets, against $1,100,000 liabilities, exclusive of capital stock, or net assets of $1,600,000, of which more than $300,000 was in cash. It is reported that the total present payment of the General Electric Company for the net assets and for the patents, good will and contracts amounts to nearly $2,610,000 in 3½ per cent debenture bonds, and $850,000 in Otis common stock. It will be remembered that the Sprague Company's interest in electric elevators was disposed of sometime ago to the Otis Elevator Company. The most valuable asset of the Sprague Company was undoubtedly the patents covering the multiple unit system. There has been considerable litigation between the Sprague Company and the General Electric and Westinghouse Companies over the control of this system, but the purchase of the Sprague Company by the General Electric Company will, of course, stop any further proceedings among these lines. As to Mr. Sprague's personal connection it is understood that he will be in a position to continue engineering work, although he will be retained by the allied interests.

Electric Railways in Switzerland

Henry H. Morgan, United States Consul at Aarau, Switzerland, says: "The old-fashioned diligence which up to the present has been the means of transportation between the smaller towns and villages of Switzerland, situated off the lines of railway, is being rapidly superseded by electric railways, and the day is not far distant when most of the towns of the country will be so connected. A short time ago, an electric line was opened connecting Aarau with Schöftland, a distance of about 10 miles. Until the opening of this line, the time consumed in making the journey was one hour and ten minutes. Now, including several stops at villages along the line, the time occupied is forty minutes.

"A company is seeking a concession for a line from Aarau to

Menziken, on the border of the Canton of Lucerne, and this will be joined by a line running from the city of Sursee northward, thus making an electric tramway connection for a distance of about 30 miles. Still another line is projected to run from Aarau to Frick—a most important plan, as it will place Aarau in direct communication with Laufenburg, Säckingen, and other towns in the Rhine Valley. The length of this line will be also about 30 miles.

"The power to be used by these different roads will be derived from the waterfalls of the country.

"In view of the important works in contemplation, it might be of advantage to our manufacturers of electric railway supplics to investigate the subject."

Street Railway Patents

UNITED STATES PATENTS ISSUED MAY 20, 1902

700,172. Car Truck; E. Cliff, Newark, N. J. App. filed Feb. 26, 1902. The elliptic springs are in two independent halves, the facing portion of their end having pockets confining rollers, which permit the two parts of the spring to move longitudinally with respect to each other.

700,186. Wheel or Rail Tread; B. C. W. Evans, New York, N. Y. App. filed Dec. 2, 1901. The wheel or rail tread comprises a series of cylindrical protuberances diagonally disposed with respect to the face of the wheel, and affording friction to avoid the use of sand.

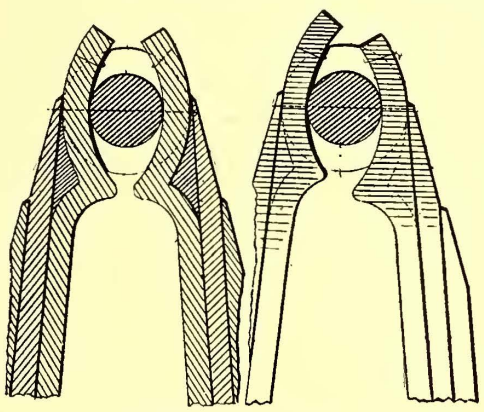
700,265. Car Truck; B. W. Tucker, Newark, N. J. App. filed March 19, 1902. In this truck the transom is capable of a limited tortional action whereby the wheels at both sides of the track may retain their relation to the track rail at points where one rail may be lower than the other.

700,269. Street Car Fender; C. O. West, Kansas City, Mo. App. filed Nov. 1, 1901. The rear portion of the fender is mounted to slide on a curved frame attached to the car, the fender having wheels which ride upon the track rails and shift the fender in going around curves, so that it will always follow the direction of the curve.

700,346. Electric Rail-Bond; W. J. Long and J. B. Nolder, Windber, Pa. App. filed Feb. 25, 1902. The bond is a copper plate inserted in a groove on the inner face of the fish-plate.

700,386. Automatic Switch; J. A. Tancock and T. C. Cochrill, London, Canada. App. filed March 16, 1901. A block on the end of a plunger is moved by means of a cam into position to throw the switch, the operation being accomplished from the car platform.

700,400. Brush; F. Becker, New York, N. Y. App. filed Sept. 3, 1901. A brush and scraper for cleaning the rails.



PATENT NO. 700,172

700,402. Car Bolster; W. P. Bettendorf, Davenport, Ia. App. filed Nov. 25, 1901. A tubular bolster consisting of one piece of sheet metal bent into shape and having its longitudinal edges united.

700,425. Car Truck; H. R. Keithley, Buffalo, N. Y. App. filed Nov. 27, 1901. Structural details.

700,461. Electric Railroad Signal; W. D. Vandecar, Grand Rapids, Mich. App. filed June 6, 1901. An automatic block signal system operated electrically.

700,564. Truck Bolster; R. V. Sage, Johnstown, Pa. App. filed Oct. 19, 1901. The bolster is built up of I-bars and channel pieces, to which the seats for the springs and the kingbolt are secured.

700,609. Electric Propelled Vehicle for Single-Rail Elevated Railways; F. B. Behr, Twickenham, England. App. filed Feb. 24, 1902. The room for passengers is free from side to side, the motors being suspended below the floor and below the level of the single rail.

700,615. Railway Switch; E. E. Carneal, Washington, D. C. App. filed Jan. 8, 1902. Details of a mechanical switch to be operated by an arm from the car.

700,703. Fare Register; A. E. Nielsen, Brooklyn, N. Y. App. filed Feb. 7, 1899. Improvements in the various parts of the fare register described in United States patent No. 547,981.

700,716. Fender; A. Bech, Atlanta, Ga. App. filed Sept. 16, 1901. The fender is a horizontal wheel having a conical apron arranged above it.

11,991. Electric Railway System; G. L. Campbell, Nyack, N. Y. App. filed Aug. 21, 1900. The sections are energized by a trolley which is drawn through a closed conduit by the attraction of a magnet carried by the car.

11,992. Convertible Car; J. O'Leary, Cohoes, N. Y. App. filed Jan. 1, 1901. The side panels can be shifted into storage chambers in the roof.

PERSONAL MENTION

MR. EDWARD OWEN has been appointed superintendent of the Sandusky-Milan-Norwalk division of the Lake Shore Electric Railway.

MR. FRANK SHEPARD, the electrical engineer, has just returned from England, where he has been engaged in several important electric traction enterprises.

MR. F. S. PEARSON, of New York, has been appointed to the position of consulting engineer of the Montreal Street Railway Company and the Montreal Light, Heat & Power Company.

MR. LOUIS LIPPHARDT has resigned as superintendent of the Steubenville, Mingoe & Ohio Valley Traction Company, of Steubenville, Ohio, and has been succeeded by Mr. James McFarland, who entered the employ of the company as a motorman.

MR. THOMAS FITZGERALD, JR., has been appointed general manager of the Norfolk, Portsmouth & Newport News Railway Company. This road operates about ten miles of railway in Portsmouth, and the ferries between Norfolk and Portsmouth and Berkley.

MR. CHARLES T. CHAPIN has been elected a director of the Rochester Railway Company, to fill the vacancy caused by the resignation of C. Ford Stevens. Mr. Chapin is well known among street railway men, through his connection with the Rochester Car Wheel Works.

MR. JAMES A. STEWART, superintendent of the Herkimer, Mohawk, Ilion & Frankfort Railway, of Herkimer, N. Y., since the road was equipped with electricity, has been appointed general superintendent of the Utica & Mohawk Valley Railway, of Utica, N. Y., succeeding George L. Radcliffe, who has become superintendent of the Cleveland Electric Railway.

MR. W. G. ROSS has been appointed to the position of comptroller of the Montreal Light, Heat & Power Company. Mr. Ross has for years been comptroller of the Montreal Street Railway, and upon the death of Mr. M. H. Watts, Mr. Ross became secretary, and now is secretary-treasurer of the Montreal Street Railway Company. Mr. Ross still retains his position with the Montreal Street Railway Company, thus serving the two companies.

MR. W. B. LONGYEAR has been appointed comptroller of the Brooklyn Heights Railroad Company. Mr. Longyear has been auditor of the company for a number of years and is thoroughly familiar with the details of his road, having studied the property under his supervision from all points of view. He is not only conversant with the purely financial end of the road's management, but understands the requirements of the operating departments. The duties of auditor will in future be performed by two men instead of one, being known as the auditor of disbursements, and the auditor of receipts, and both of the positions have been filled from Mr. Longyear's former assistants.

MR. HENRY A. EVERETT, who has retired as president of the Cleveland Electric Railway Company, of Cleveland, Ohio, was summoned to the office of the company a few days ago, all of his former associates having assembled there to express to him their regrets at the severing of the pleasant relations that had existed between them. Mr. Everett was completely surprised at the demonstration in his honor. After a short speech he was made the recipient of a silver loving-cup and a magnificent piece of Carrara statuary. The statue was entitled "First Impressions of Water," and was a life-size figure of a young woman in bathing costume, her posture and expression indicating that she was afraid to enter the surf. The loving cup was inscribed with the words: "Presented to Henry A. Everett by the employees of the Cleveland Electric Railway Company."

LEGAL DEPARTMENT

CONDUCTED BY WILBUR LARREMORE OF THE NEW YORK BAR

Liability for Negligence in Construction and Repairs—Independent Contractor

The New York Court of Appeals has recently decided a case which clears up some uncertainty as to the law in that State, and also is believed to lay down the law now existing in most jurisdictions. (Deming vs. Terminal Railway, of Buffalo, 169 N. Y., 1.) It was held that a railroad company which, by an order of the Supreme Court, granted under the authority given, and practice prescribed by the railroad law of New York (L. 1890, ch. 565), has been permitted to carry a public highway over its tracks, is liable for an injury occurring to a traveler on a dark night resulting from the failure of an independent contractor to whom the entire work had been let, to properly guard or light an embankment made in the highway. The exact ground of the decision may be stated, using the language of the opinion of Chief Judge Parker, that a party having authority to make the public streets dangerous for passersby may not be relieved from the burden of guarding the place of danger in the street by letting the work to an independent contractor.

The general rule is recognized everywhere, that a party about to cause work to be done upon real estate may exonerate himself from personal liability for injuries occasioned in its prosecution by farming out the whole job to an independent contractor. This rule is, however, subject to exceptions and uncertainty. One distinction is fairly well settled as to works of construction or repair, either of a public or private character. An owner may not shield himself by committing the entire responsibility to another if the work to be performed is essentially dangerous; he may obtain immunity if the work is not necessarily dangerous. This distinction has recently been exemplified in the decision of the Appellate Division of the New York Supreme Court, First Department, in Koch vs. Fox & Zimmerman (75 N. Y. Supp., 913). There the work was the construction of a building by a private owner of land. He employed an independent contractor, and an employee of a sub-contractor was injured by the falling of a brick upon him from a scaffold over the sidewalk, where other employees were laying brick. A city ordinance required that "the owner or general contractor engaged in the construction or erection of any building * * * shall build, or cause to be built, a temporary roof-structure over the sidewalk in front of said building * * *." As the language of the statute imposes the duty of erecting such a structure, which would have averted the injury in the case under consideration, upon the owner or general contractor in the alternative, it was held that it was a duty which might be solely confided to a general contractor as part of his contract, and that the owner was not absolutely bound, in common with the contractor, to see that the precaution was taken. In arriving at this result the court laid stress upon the circumstances that the work was not either "imminently or necessarily dangerous; it did not involve any interference with the surface of the street." The same right of exoneration has been recognized in cases of the letting of work to a general contractor where injuries have occurred from negligent blasting, even though the work was being done upon or adjacent to public highways.

Exoneration of the employer of a general contractor from liability in blasting cases may still be recognized by the courts, notwithstanding the decision in the Deming case, as blasting, while dangerous if negligently done, may still be done in such a manner as not to be dangerous. It is not absolutely and necessarily dangerous and it does not constitute a dangerous use of a street *per se*. The dangers from negligent blasting are the same, whether performed on a public street or on private property. The doctrine of the Deming case is that leaving unguarded excavations or embankments in the street renders the street *per se* dangerous, and that a contract which necessarily contemplates excavations, necessarily contemplates a dangerous condition of the street.

Quite early in the history of the New York Court of Appeals it was held (Blake vs. Ferris, 5 N. Y., 48) that where persons having a license or a grant to construct at their own expense, a sewer in a public street, engage another person to construct it at a stipulated price for the whole work, they are not liable for injuries resulting from the negligent manner in which the sewer may be left at night by the workmen employed. This amounted to administration of the "independent contractor" rule in a very broad sense. After that case decisions were made by the same court in Pack vs. Mayor of N. Y. (8 N. Y., 222), and Kelly vs. Mayor N. Y. (11 N. Y., 432), which were cases of injuries through blasting, where the independent contractor rule was applied to exonerate the city, relying upon the decision in Blake vs. Ferris (supra). Subsequently, in Storrs vs. Utica (17 N. Y., 104), Blake vs. Ferris was distinguished, and its authority very substantially limited. Judge Comstock, in the opinion in the Storrs case, conceded that the opinion in Blake vs. Ferris contained a correct exposition of the doctrine of *respondeat superior*, but contended that such doctrine had not been correctly applied to the facts in Blake vs. Ferris. Judge Comstock argued that the obligation of a city corporation to keep its streets in safe condition for travel is absolute; that "although the work may be let out by contract the corporation still remains charged with the care and control of the street in which the improvement is carried on. The performance of the work necessarily renders the street unsafe for night travel * * *. The dangers arise from the very nature of the improvement, and if it can be averted only by special precautions, such as placing guards or lighting the street, the corporation which has authorized the work is plainly bound to take these precautions."

Between the two lines of authority considerable uncertainty has arisen in subsequent cases. The effect of the recent decision of the Court of Appeals in Deming vs. Terminal Railway of Buffalo (supra) is authoritatively to adopt the doctrine of the Storrs case as to actual excavations or obstructions in streets. It is clearly held that works of this character are essentially and necessarily dangerous, and that municipal corporations may not shelter themselves from liability by the employment of independent contractors. The decision directly applies the same rule to persons or corporations, other than a city itself, or one of its departments, who change the bed of a street by excavation, embankment or otherwise, under legislative or municipal authority. Its effect as applied to railroad or construction companies of any kind is to render them responsible for not guarding unsafe places in city streets, although they may have employed independent contractors to perform the work. Upon this point the concluding language of the opinion may appropriately be quoted:

"Now, dominion over the highways was, by the operation of the statute, upon the order of the Supreme Court, for the purpose of carrying the highway over the railroad tracks vested in the defendant railroad company, which having accepted the privileges and benefits conferred upon it by statute, necessarily took with them all the obligations and liabilities in respect to the highway which its absolute dominion over it for the purpose of carrying it across the railroad track made necessary, among which was the duty of so guarding the obstructions to the highway which were made under its direction as to save passersby from injury."

CHARTERS, FRANCHISES, ORDINANCES, ETC.

CALIFORNIA.—Street Railways—Easement—Encroachment—Ejectment—Railroad—Right of Way—Acquiescence—Corporations—Officers—Knowledge.

1. Where a street railway's use of a street under its franchise is interfered with by another railway company, ejectment is not the proper remedy.

2. Where, when a railroad track was laid so as to encroach on the rights of a street railway company to the use of a street under its franchise, the president of the latter company desisted from a contemplated injunction at the request of the president of the former, and on promise of payment of all resulting damages, such street railway company or its assigns cannot thereafter maintain ejectment to remove such railroad from such street.

3. Where the rights of a street railway company in the use of a street are encroached on by a railroad with full knowledge and acquiescence of the president and other officers of the street railway company, and on promise of payment of all damages, the company is bound by such knowledge and acts of its officers.—(Fresno St. R. Co. vs. Southern Pac. R. Co. et al. [S. F., 1903], 67 Pac. Rep., 773.)

NEW YORK.—Street Railroads—Construction—Damage to

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

Abutting Property—Easements in Street—Benefits and Burdens—Injunction—Benefits—Sufficiency of Evidence—Construction of New Tracks—Benefits Conferred by Old Tracks—Jurisdiction—Damages—Payment of Compensation—Withholding Injunction—New York Elevated Railroad Company—Authority to Construct New Tracks—Transfer of Franchises—Constitutional Limitation—Laying Down New Tracks—Constitutional Limitations—Railroad Commissioners—Authority — Termination — Construction—Statutory Time Limit.

1. Where it appeared that the construction and operation by defendant Elevated Railway Company, which already had two tracks past plaintiff's property, of a third track would impair plaintiff's easement of light, air and access to the street, and impose burdens additional to those already imposed, plaintiff was entitled to restrain the construction and operation of such third track until defendant acquired plaintiff's easement by making sufficient compensation for its impairment.

2. In an action to restrain an elevated street railway company, which already had two tracks past plaintiff's property, from constructing and operating a third, it appeared that most of the trains run upon such third track passed plaintiff's property at great speed, and did not stop near enough thereto to furnish any accommodation to the people in that section, and that the few trains that did stop near the property were always too crowded to furnish accommodation. Held, that the third track did not confer any benefit upon plaintiff's property sufficient to justify the obstruction of plaintiff's light and air by such third track.

3. The benefit that such road, without the third track, conferred upon the locality in which plaintiff's property was situated by reason of the means afforded for transportation from other parts of the city, would not authorize defendant to extend its structure for the benefit of people residing in other localities without acquiring the right to plaintiff's property in the street at this locality.

4. As when the action was commenced plaintiff was entitled to an injunction, the court had jurisdiction to give him such damages as were caused by the illegal structure, and to require payment by defendants of the value of plaintiff's property in the street appropriated by them as a condition for withholding the injunction.

5. Act 1867, page 489, sec. 4, authorized the P——— Company to extend its elevated railway along both sides of Ninth Avenue. Act 1875, chap. 595, sec. 1, conferred upon the Elevated Railway Company, which had purchased P——— franchises, the rights and franchises so purchased. Section 3 provided for the continuation of a commission created by the act of 1867. Section 4 empowered the Elevated Company to make such alterations in its railroad structure as should be authorized by the commission, and provided that the location of lines or routes not specifically located by law which the Elevated Company was or might be authorized by law to construct might be such as the company might adopt and the commissioners approve. Section 5 provided that the particular location, number of tracks, etc., might be such as the commissioners should approve, and that the Elevated Company might locate its tracks along both sides of Ninth Avenue. Held, that the act of 1875 did not give or attempt to give the Elevated Company the right to lay down a third track along Ninth Avenue, since the power given it to locate and construct tracks was limited to such structure and tracks as it was or might be authorized by law to construct.

6. So far as the act of 1875 conferred upon the Elevated Company the rights and franchises held by the P——— Company, it was not in violation of Const. 1875, art. 3, sec. 18, which prohibits the Legislature from passing a private or local bill granting to any corporation the right to lay down railroad tracks, or any exclusive franchise.

7. So far as the act of 1875, if it should be so construed, granted or attempted to grant any authority to lay down tracks in addition to those authorized by the charter of the P——— Company, it was invalid, as in violation of Const. 1875, art 3, sec. 18.

8. The authority conferred upon the commissioners by the act of 1875 being substantially a continuation of the authority conferred upon them by the act of 1867, which, as shown by section 5, prescribing their powers, was confined to the construction of the railroad, was not a continuing authority, and hence ceased when the road was completed as provided for in the act giving it its powers.

9. Sec. 2, act 1875, having limited the time in which the Elevated Company was authorized to build its railroad to five years from the passage of the act, any construction of that road, either with or without the approval of the commissioners, after the expiration of the specified time, would be unauthorized.—(Auchincloss vs. Metropolitan Elevated Ry. Co. et al., 74 N. Y. Suppl., 534.)

VIRGINIA.—Taxation—Street Railways—State Tax—Basis—Ad Valorem Taxation—Municipal License—Unequal Taxation—Exemption.

1. Under acts 1895-96, page 93 (Newport News City Charter, sec. 104), providing that the City Council may raise taxes by assessments on all subjects taxable by the State, etc., the municipality has power to impose taxes on all subjects not withheld from taxation by the Legislature, whether they be taxed by the State or not.

2. Under Const., art. 10, sec. 4, authorizing the General Assembly to levy license taxes on lines of business not capable of ad valorem taxation, the fact that the property of a street railway is subjected to ad valorem taxation by the State does not prevent a municipality from imposing a license tax in addition to taxation by the municipality on the ad valorem basis; the privilege of operating a street car line being a proper subject for a license tax.

3. The imposition of a license tax by a municipality upon "each and every street railway company," in addition to ad valorem taxation on a company's property, is not unequal taxation, since the only uniformity required as to licenses is that the tax shall be the same on all those in the same business.

4. The imposition of a license tax upon a street railway, in addition to a tax upon the property used in carrying on the business, is not double taxation.

5. Acts 1895-96, page 94 (Newport News City Charter, sec. 105), authorizing a license tax on certain named pursuits, and all other business and pursuits on which a license tax is levied by the State, does not preclude the city from levying a license tax on any business not specifically mentioned; but a street railway, though not specifically mentioned, may be made the subject of a license tax.

6. The fact that the lines of a street railway system extend beyond the limits of any one municipality does not prevent its taxation by a city whose streets it traverses.

7. To entitle a city to levy a license tax on a street railway, it is not necessary that the right so to do be reserved in the ordinance granting the franchise; the right to levy taxes not arising from contract, and exemption from taxation never being presumed. (Newport News & O. P. Ry. & Electric Co. vs. City of Newport News, 40 S. E. Rep., 645.)

LIABILITY FOR NEGLIGENCE.

CALIFORNIA.—Negligence—Last Clear Chance—Evidence—Pleadings—Objection Waived by Instruction.

1. Judgment for plaintiff, struck by defendant's street car, cannot be disturbed, though he was negligent in being on the track; there being evidence that the motorman saw his peril in time to avoid the accident, and did not attempt to stop the car.

2. Defendant cannot complain that the complaint alleged no wilful or wanton act; instruction having been given, at its request, that contributory negligence defeats recovery unless, in the exercise of care after discovery of plaintiff's peril, defendant's employees could have avoided the injury, or their action was wanton and reckless.—(Lee vs. Market St. Ry. Co. [S. F., 1590], 67 Pac. Rep., 765.)

INDIANA.—Street Railways—Crossing Accident Case—Injury to Child—Negligence of Motorman—Contributory Negligence—Care Required—Trial—Pleading—Evidence—Sufficiency—Instructions—Appeal—Harmless Error.

1. Plaintiff, who was a boy seven years old, and of average intelligence, size and vigor, with good sight and hearing, was run over and injured by a street car while attempting to cross defendant's tracks. There was a double track on the street, and plaintiff's attention was attracted by a south-bound car, in front of which he crossed. He was also in front of a north-bound car, running at the rate of five miles an hour, by which he was injured. It was a clear day, and there was nothing to prevent the motorman from seeing the plaintiff for 300 ft., but the motorman, who was talking with an occupant of the car, did not see plaintiff until within 5 ft. or 6 ft. of him, and did not make any effort to stop the car, though it could have been stopped within 30 ft., but ran 100 ft. from the point of collision before stopping. Plaintiff's leg was cut off after he had been carried nearly 100 ft. The motorman did not sound the gong. Held, sufficient evidence of the motorman's negligence to sustain a judgment for plaintiff.

2. A motorman cannot assume that a child seven years old, hurrying toward the track, and looking in the opposite direction, will not go on the track in front of the car.

3. Where the plaintiff in a street railway crossing accident case contends that the person injured was non sui juris, such incapacity, being a matter of fact, should be pleaded.

4. A child seven years old is only required to exercise such reasonable care to avoid accident in crossing a street car track as a child of that age, intelligence and capacity would exercise.

5. The question whether a child seven years old, injured by a

street car while crossing a street, is able to exercise any care for its safety, and whether it exercised such care, is for the jury.

6. The fact that a child seven years old, injured by a street car while crossing the track, could have seen the approaching car is a fact to be considered in connection with other circumstances in determining the child's negligence, but is not sufficient in itself to show such negligence.

7. A child seven years old was somewhat familiar with street cars, and knew that his coming in contact with a moving car would hurt him, and had been told that the crossing where he was injured was dangerous. His attention was attracted, while crossing the street, by a street car coming toward him, and sounding a gong, which he hurried to avoid, and was struck and injured by a car going in the opposite direction. Held, not sufficient, as a matter of law, to show that the negligence of the child contributed to the accident.

8. A street car striking a child at a crossing was going at the rate of 5 miles an hour, and a car going at three times the speed could have been stopped in a distance of from 20 ft. to 27½ ft., but the motorman failed to stop the car, and plaintiff was carried by the car, and his leg was crushed, at a distance of about 100 ft. from the point of collision. Held, that the negligence of the motorman in failing to stop the car after the collision was actionable negligence, even though the negligence of the child might have contributed to the original accident.

9. An instruction as to contributory negligence in a street car crossing accident case hich does not state any facts in reference to defendant's negligence, is incorrect in stating that, in case certain facts are found, the finding "should be for plaintiff," without specifying that such finding is to be confined to the determination of contributory negligence.

10. Such instruction is harmless error if the jury is specifically instructed in other portions of the charge as to defendant's negligence.

11. A verdict for plaintiff being clearly correct under the evidence, the error in the instruction is not sufficient to authorize a reversal of the judgment.—(Citizens' St. Ry. Co. vs. Hamer, 62 N. E. Rep., 658.)

KENTUCKY.—Damages—Physical Examination by Physicians Appointed by Court—Examination After Withdrawal of Motion Therefor—Evidence as to Acts of Negligence Not Alleged.

1. Where the court, upon motion of defendant, in an action to recover damages for personal injuries, appointed two physicians to examine plaintiff, but defendant, before any examination had been made, withdrew its motion therefor, it was error to permit the physicians thus appointed, who were introduced by the court on its own motion, to testify, over defendant's protest, as to an examination made by them after the motion was withdrawn.

2. The jury should have been confined by the instructions to the consideration of such acts of negligence as were specifically alleged in the petition.—(South Covington & C. St. Ry. Co. vs. Stroh, 66 S. W. Rep., 177.)

MARYLAND.—Street Railroads—Action for Personal Injuries—Standing on Steps—Contributory Negligence.

Plaintiff was a passenger on a street car, and, not being acquainted with the streets, went on the platform, and told the conductor to let him off at a certain street. Being told that they had passed that street, he asked to be let off at the next corner. Plaintiff testified he got on the lower step to jump off. When he got down on the step the car was going too fast for him to jump, and while he was waiting for it to slow up the conductor signaled to go ahead, and plaintiff was thrown into the street. Defendant's evidence showed that the car stopped, but, as plaintiff made no attempt to get off, the conductor signaled to go ahead, and that the car was 15 ft. beyond the corner when plaintiff jumped off. Defendant's cars contained posted notices that the cars stopped near intersecting streets, and passengers must not leave their seats until the cars stopped, nor stand on the platform, nor leave the car while in motion. Held, that plaintiff was guilty of contributory negligence.—(Baltimore Consol. Ry. Co. vs. Foreman, 51 Atl. Rep., 83.)

MICHIGAN. — Electricity—Live Wire—Knowledge—Private Grounds—Duty to Trespasser.

The power house of an electric company was situated in a railroad yard between the tracks and a river. Near the house was a pole 26 ft. high, on which was an electric wire. A guy wire extended from this pole to the top of another over 5 ft. high, and 32 ft. therefrom. There were several tracks between the depots and the power house, and a notice, on the end of the passenger depot nearby, read: "Dangerous! The public is hereby warned not to trespass upon these grounds." Teams sometimes drove across the tracks to and past the power house, and occasionally persons on foot went that way, but there was no evidence that it was a public way, or to indicate an invitation to the public to enter on the grounds Deceased and a companion, with two bottles of beer, went to this spot in the evening, and in some unexplained manner deceased came in contact with the guy wire, and received a shock which instantly killed him. There was no evidence that the company knew the guy wire was a live wire. Held, that the company owed no duty to deceased to guard the premises, and the direction of a verdict for defendant was proper.—(McCaughna vs. Owosso & Corunna Electric Co., 89 N. W. Rep., 73.)

MICHIGAN.—Street Railways—Personal Injuries—Contributory Negligence—Direction of Verdict.

A business man, of good intelligence, and who had lived in a city for a number of years, and was familiar with the running of street cars, stepped off a car, started to cross the street, and was struck by a car on the other track, which he claimed was shut from his sight by the first car. He stated that he saw a car on the further track a block away, but not the car which struck him. Held, proper to direct a verdict in favor of defendant, for contributory negligence.—(Doty vs. Detroit Citizens' St. Ry. Co., 88 N. W. Rep., 1050.)

MINNESOTA.—Street Railway—Injury to Passenger—Ice on Platform.

1. A street car company is required to exercise the highest degree of care to keep its platforms and steps in safe condition for use in the season when operated, so far as it practically can do so, in consideration of the climate, temperature and condition of the air with respect to snow, moisture and frost.

2. Evidence considered, and held to sufficiently support a verdict for plaintiff upon the claim that she was a passenger on a street car, and, when alighting therefrom, slipped and fell from the same by reason of ice and snow negligently permitted by the carrier to be and remain upon its steps and platforms.

3. Held that, under the evidence in this case, the verdict of the jury cannot be held to be excessive.—(Herbert vs. St. Paul City Ry. Co., 88 N. W. Rep., 996.)

NEW JERSEY.—Attorney and Client—Employment—Construction of Contract—Evidence—Sufficiency—Compensation—Costs.

1. A contract between a husband and an attorney which states that the former, in consideration of legal service to be rendered by the latter in and about the husband's claims for damages against a certain railroad company for injuries sustained by the husband and his wife may bring action for the husband does not authorize the attorney to bring action on behalf of the wife.

2. A wife who had been injured by a railroad accident was visited by the representative of an attorney desiring to obtain her case, and was referred to her husband, and entered into a contract with the latter authorizing the attorney to commence suit against the company on behalf of the husband. The attorney's representative swore that the wife and husband authorized the attorney to commence suit for the wife, but this was denied by both husband and wife. Held, insufficient to show an employment of the attorney to bring suit for the wife.

3. A mere authority to an attorney to institute a suit, being revocable by the client, only entitles the attorney to compensation for services performed before its revocation.

4. An attorney employed by a husband to commence action against a railroad company in behalf of the husband for injuries to the wife for half of the recovery, but having no authority to act for the wife, instituted action in the name of the latter for personal injuries, which action was afterward discontinued by her. There was evidence that the wife had settled with the company, but this was denied by the wife and by the company, and there was evidence that there was a suit pending in another State therefor. Held, that an order requiring the wife to pay the attorney one-half of the proceeds of the settlement, and authorizing him to proceed with the cause in default of such payment, was erroneous.

5. An attorney who commences an action without authority from the plaintiffs is not entitled to compensation or costs. Laughlin, J., dissenting.—(Whitesell vs. New Jersey & H. R. Ry. & Ferry Co., 74 N. Y. Suppl., 217.)

NEW YORK.—Master and Servant—Negligence—Res Ipsa Loquitur—Evidence.

1. The doctrine of res ipsa loquitur is not confined to accidents where the injured party has no contractual relation with the party sought to be charged, but is applicable in suits for negligence by a servant against the master.

2. Where a servant, while under an elevated railroad structure maintained by his master, was injured by a block falling on him from such structure, but there was no evidence to show whether it was a part of the structure, merely lying on it, and the evidence showed that a train was passing over the road when the block fell, so that it might have fallen from the train, there was no evi-

dence raising a presumption of negligence on the part of the master under the doctrine of res ipsa loquitur.—(Nolan vs. Brooklyn Heights R. Co., 74 N. Y. Suppl., 120.)

NEW YORK.—New Trial—Newly Discovered Evidence—Credibility of Witnesses.

Where plaintiff and her mother, both of whom had given testimony as to the accident, testified that plaintiff had been healthy before the injury complained of occurred, and after judgment defendant moved for a new trial upon the ground of newly discovered evidence that this testimony was false, it was improper for the court to grant the motion upon condition that defendant would admit its own negligence and plaintiff's freedom from contributory negligence.—(Crane vs. Brooklyn Heights R. Co., 74 N. Y. Suppl., 117.)

NEW YORK.—Judgment—Opening Default.

The giving of leave by the appellate division to apply to the court below to open a default does not indicate that, in the opinion of the appellate division, the default ought to be opened.—(Csatlos vs. Metropolitan St. Ry. Co., 73 N. Y. Suppl, 981.)

NEW YORK.—1. Jurisdiction of Federal Courts—Citizenship of Plaintiff—Finding of Jury—Appeal—Review—Damages Awarded for Personal Injury.

1. Where the question whether or not a plaintiff was a citizen of another state from defendant at the time of the commencement of the action, as alleged in his complaint for the purpose of giving a federal court jurisdiction, is submitted to the jury under proper instructions, and on evidence which is not conclusive, their finding thereon in plaintiff's favor will not be set aside on a writ of error.

2. An award of damages made by a jury for personal injuries, on which judgment is entered by the trial court, will not be set aside as excessive by the circuit court of appeals on a writ of error.—(Metropolitan St. Ry. Co. vs. Beattie, 111 Fed. Rep., 945.)

NEW YORK.—Street Railroads—Negligence—Contributory Negligence—Evidence—Sufficiency—Evidence—Privileged Communications—Statements to Physician—Statutes.

1. In an action for injuries sustained by being run over by defendant's street car it appeared that the plaintiff was struck probably through his own contributory negligence, but there was evidence that after plaintiff was struck, and before he was run over, his body was resting against the fender of the car, that the car traveled nearly 100 feet before it stopped, that it could have been stopped within 30 or 35 feet, and that by reason of the jolting of the car in its progress the plaintiff was thrown from the fender, and run over. Held, that the evidence was sufficient to sustain a verdict in favor of plaintiff.

2. Code Civ. Proc., Sec. 834, provides that a physician shall not be allowed to disclose any information acquired in attending a patient in a professional capacity, and which was necessary to enable him to act in that capacity. Held, that, in an action for personal injuries, statements by plaintiff in answer to questions of the physician of the hospital to which he was conveyed as to the manner in which the accident happened were privileged, where, under the rules of the hospital, it was the physician's duty to obtain such a statement. Ingraham, J., dissenting.—(Green vs. Metropolitan St. Ry. Co., 72 N. Y. Supp., 524.)

1. Where plaintiff, who was familiar with his work, and was engaged in laying bricks in a trench that ran partially under the track of a street railway, and knew that cars frequently passed over the track, put his hand on a rail while one of the cars was so passing, whereby the hand was injured, he cannot recover for the injury, since the danger was an obvious one, with which he was chargeable with knowledge.

NEW YORK.—Death—Injuries—Proximate Cause.

Plaintiff's ankle bone was fractured in an accident, but the bone did not perforate the skin. Over two months after the injury, and prior to the appearance of swelling on the thigh, the bone had united, was in good condition, and presented no indication of sepsis. Decedent died from septic pneumonia four months after the injury, death resulting from the swellings of the thigh, etc., and experts testified, in answer to hypothetical questions, which incorrectly assumed a septic condition at the point of fracture prior to the swellings, that the injury was the cause of the septic pneumonia. Held, that the evidence was not sufficient to show that the fractured bone was the cause of the septic pneumonia, so as to sustain a verdict for the death.—(Seifter vs. Brooklyn Heights R. Co., 62 N. E. Rep., 349.)

NEW YORK.—Street Railroads—Injury at Crossing—Negligence—Sufficiency of Evidence.

In an action against a street car company for negligently causing the death of a pedestrian at a street crossing, evidence examined, and held sufficient to show such negligence in defendant as to sustain a verdict for plaintiff.—McCluskey vs. Metropolitan St. Ry. Co., 73 N. Y. Supp., 324.)

NEW YORK.—Trial—Nonsuit—Street Railway—Negligence—Contributory Negligence—Question for Jury—Collision—Death—Proximate Cause—Verdict—Cause of Cerebral Hemorrhage—Expert Testimony—Competency.

1. Where at the close of plaintiff's case a nonsuit is granted, on appeal she is entitled to the benefit of every fact that the jury could have found from the evidence adduced by her, and to all inferences warranted thereby.

2. Where, while plaintiff's intestate was on a loaded wagon, driving across a street railway, the rear wheel of the wagon was struck by a car which was 70 feet away when he drove on the track, and which could have been stopped in less than one-fifth of that distance, the questions of the negligence of the motorman and of the contributory negligence of the deceased should be submitted to the jury.

3. A teamster thirty-one years of age, who had not been sick for seven years, was thrown from his wagon by collision with a street car. He immediately complained of pain, was taken to his home, and a few hours after went to bed, where he remained until he died, two days after the accident. Between the collision and his death he had several convulsions, the last of which resulted in his death. A physician testified that his death resulted from cerebral hemorrhage. Held, that a verdict that the accident was the proximate cause of his death would have been justified.

4. Where plaintiff's intestate, previously in good health, died from cerebral hemorrhage two days after being thrown from his wagon by collision with a street car, it was an error to exclude the question asked a physician, in an action against the railway company for damages for causing the death, whether "cerebral hemorrhage may or may not be caused by a fall from a wagon into the street in consequence of a collision with a trolley car."—(Bruss vs. Metropolitan St. Ry. Co., 73 N. Y. Supp., 256.)

NEW YORK.—Street Railroads—Injury at Crossing—Evidence—Question for Jury—Trial—Directing Verdict.

1. Plaintiff was driving a wagon across street car tracks when he was struck by a car and injured. His evidence tended to show that he attempted to cross the tracks when the car was about half a block away; that he turned practically straight toward the tracks to make the crossing; that he saw the car about half a block away, but proceeded to guide his horse without watching its further approach; that the car was coming very rapidly; that there was nothing to obstruct the motorman's view of the horse and the street; that the grade was practically level; that the rails were not slippery; that the car could have been stopped within 10 or 15 feet. Held, that the evidence, though contradicted by the defendant, was sufficient to take the case as to defendant's negligence and plaintiff's contributory negligence, to the jury.

2. Where the evidence presents an issue of fact, the trial court cannot direct a verdict, though it may properly set aside any other verdict as against the weight of the evidence.—(Smith vs. Metropolitan St. Ry. Co., 73 N. Y. Supp., 254.)

NEW YORK.—Personal Injuries—Street Railways—Contributory Negligence—Injury at Crossings.

Where plaintiff alighted from a south-bound car at a street intersection, and stood for a moment at the corner, awaiting opportunity to cross, and looked in both directions, having an unobstructed view of about 20 ft to 50 ft., and saw no car except the one from which he had alighted, which was from 20 ft. to 50 ft. away, and then started to cross the tracks, and was struck by a car running at a rapid rate, coming from the south, and which gave no warning of any kind, the questions of negligence and contributory negligence should have been submitted to the jury.—(Sesselmann vs. Metropolitan St. Ry. Co., 72 N. Y. Supp., 1010.)

NEW YORK.—Evidence—Hypothetical Question—Competency—Waiver of Objections—Instructions—Damages—Excessiveness.

1. In an action for personal injuries, a physican was asked, assuming that plaintiff was hit on the shoulder, to state whether the injury was the exciting cause of certain fatty tumors, to which he answered it was, assuming no other tumors had developed. Subsequently plaintiff testified that there were no other tumors. Held, that such testimony was competent under the question as it was put after plaintiff's testimony.

2. Failure of defendant to make a motion to strike out the physician's testimony, after plaintiff had testified, waived all objections to the same, though incompetent.

3. In an action for personal injuries there was evidence that certain tumors were caused by the injury, and that it was necessary to permit a surgical operation, and a physician testified that there was a defective condition at the place where the tumors were removed, and that such condition would be permanent. Held, that a charge that there was no permanency of injury proved was properly refused.

4. A verdict for $1,900 was not so excessive as to warrant the conclusion that it was the result of passion or prejudice, so as to be erroneous.—(Jarvis vs. Metropolitan St. Ry. Co., 72 N. Y. Supp., 829.)

FINANCIAL INTELLIGENCE

THE MARKETS

The Money Market

Wall Street, May 28, 1902.

Money rates have undergone further relaxation during the week and conditions generally have continued to grow more favorable. The principal factors have been the reduction in loans through the placing of foreign credits in this market, and heavy remittances of currency from the Western centers. This latter movement is entirely a natural and customary one at this time of the year, but it appeared to need the high local bids for money prevailing a fortnight ago to stimulate it into the normal proportions. Against average receipts of a million dollars and less in the preceding weeks, the banks received last week from their out-of-town correspondents a net balance of something over $4,000,000. This, together with large pension disbursements, which kept down the Treasury withdrawals, enabled the local institutions to increase their cash holdings by upward of $4,800,000. With the help of a further $8,000,000 decrease in the loan account, the cash gain brought the surplus reserve up nearly $6,000,000 to a total of $14,300,000. This, to be sure, is still considerably below the normal average for the end of May, but the comparison with the low level of March, April and the early part of this month is sufficiently good to encourage the view that money will remain easy until the end of summer, when the financing of the crops begins. The general confidence given to European capital by the virtual certainty of early peace in South Africa is one of the most important factors in the situation, which did not exist a year ago, that foreign credits will not be suddenly withdrawn to the embarrassment of the local market. Sterling exchange keeping high at Paris and not being inclined to advance here, the present outlook is that the gold exports which so depleted New York bank reserves in June a year ago will not be repeated this season.

Call money is very easy at the Stock Exchange, with loans freely made at 3 per cent. Time money is offered at 4 per cent to 4½ per cent on good security collateral for all periods up to six months.

The Stock Market

Another dull week on the Stock Excange has left conditions about the same as they were at our last writing. The possibilities of the bituminous miners joining the coal strike and thus causing a suspension of practically the entire coal output of the country, is naturally the deterring influence at the present time. Next week, moreover, the order requiring the engineers and pump-runners in the anthracite districts to quit work will take effect, and there is grave uncertainty lest the refusal of many of these men to go out will occasion violence, and possibly bloodshed at the strike centres. Everything else in the financial situation at the moment appears favorable, but the larger interests in the speculation are inclined to discourage active operations until the strike uncertainty is disposed of. As we have already noted, the relaxation in the money market has continued, and thus removed one of the chief causes of uneasiness existing a fortnight ago. Crop news continues altogether favorable. The cessation of rain in the northwestern spring wheat territory and the further fall of moisture in the corn-growing and winter wheat regions have greatly improved the outlook in all directions. Added to these favorable developments are the prospects for an early peace in South Africa. The situation, as reflected in the stock market, may be summed up in the statement that present holders of securities are unwilling to sell and generally believe in higher prices, but that nobody, whether speculator or investor, cares to buy at all freely at this juncture.

The only feature among the local traction stocks during the week has been Brooklyn Rapid Transit. The rise in these shares is simply due to speculative operations, which are taking advantage of the general impression that the earnings of the system will increase heavily during the summer months. As a matter of fact, of course, the extremely concentrated character of the stock holdings is the main factor in the manipulation for the advance. All the current Wall Street gossip about the stock relates to the great future possibilities of the system, and not to the chances of any early payment of dividends. The New York traction stocks, Manhattan and Metropolitan, moved upward in sympathy with the advance in Brooklyn Transit at the end of last week, but their rise was not sustained. There is no pressure to sell at present figures, but, on the other hand, especially in the Manhattan's case, buying is restricted by the idea that insiders are in no hurry to see higher prices yet awhile.

Philadelphia

Trading in all the Philadelphia traction stocks has again been exceedingly light during the week. Union Traction is the only issue in which business has been at all active, but even here the volume of transactions is insignificant by comparison with what it was a month to six weeks ago, before the lease to the Philadelphia Rapid Transit was an assured fact. The quotation of the shares selling "ex-rights" does not rally from the recent low point, and this fact together with the continued decline in the price of the rights themselves, rather indicates that speculators who bought in hopes of a further rise following the publication of the details of the deal, are now selling out. The rights have sold this week as low as 3 against 6, when they first began to be dealt in a month ago. Philadelphia Traction, which regularly moves in sympathy with Union Traction, is off a fraction to 97½. Other transactions of the week are of only minor importance, including fractional lots of American Railways at 46, Easton Consolidated Electric at 20, Consolidated Traction of New Jersey at 69, United Traction of Pittsburg (preferred) at 51, Fairmount Park Transportation at 23, Railways Company General at 5, and Indianapolis Street Railway at 65. The quotation for the last named stock is the highest on the present movement, and the 4 per cent bonds of the same company also touched a high record this week when they sold at 88¾. The buying is said to come entirely from people familiar with the management and plans of the company. Other bond sales include Electric People's Traction 4s at 98¾, Consolidated Traction of New Jersey 5s at 111⅞, Citizens Passenger of Indianapolis 5s at 109½, People's Passenger 4s at 106¼, Union Traction of Indiana 5s at 101½, and Syracuse Rapid Transit 5s at 103.

Chicago

The most interesting item of gossip in traction circles in Chicago this week was the rumor that attempts were being made to secure control of the Lake Street Elevated Company. According to the story a part of the buying had been done in the open market, and the rest of the necessary majority had been secured at a considerable advance over market quotations, from a prominent stock-holding interest. It now appears that there was never very much substance to the whole report, and that if any outsiders were seeking to gain control, they must have abandoned their effort. The stock was actively dealt in at an advance to 14½, but when the speculative gossip was not confirmed it dropped back to 12¾ which is the old figure prevailing for months. Whether or not they were directly affected by the incident, the shares of the other elevated lines are generally lower for the week. Metropolitan is off a half to three-quarters of a point, selling at 38¾, and the Northwestern stocks are also fractionally lower at 37¾ for the common, and 85¾ for the preferred. There is talk of extending the Northwestern to Ravenswood, about a mile and a half northwest of the present Wilcox Avenue terminus, but the new branch will not be begun this year. It is figured that the cost will be about $1,000,000, which will be covered by a new bond issue. There is no doubt in the minds of those who have planned the transaction that the new line will bring enough fresh traffic to pay interest on the new bonds from the start. Chicago Union Traction preferred recovered two points during the week to 54½, but the common was heavy, declining on light trading from 19¾ to 18¾. No sales were reported in City Railway, but the bid quotation has been raised a point.

Other Traction Securities

Another week of heavy trading in Massachusetts Electric common on the Boston Stock Exchange has developed fresh discussion as to the future prospects of this property. The best information is that while the rise is mainly manipulative insiders and their friends have been picking up the stock on every occasion of weakness. There is not the slightest possibility of any early payment of dividends, but the company is steadily increasing its holdings in the shares of its subsidiary lines, and when this is done and these sub-companies increase their dividends from 6 to 8 per cent, there will be plenty of room for the full 4 per cent on Massachusetts shares. No sales are recorded this week in Boston Elevated. On the Baltimore Exchange some further buying was noticed in United Railways incomes, which was of a sufficiently strong character to lend color to the report that the coupons on this issue, due next month, will be paid. Little or nothing has been done in United Railways stock. The securities interested in the consolidation deal at Newport News, Norfolk and Portsmouth have been moderately active, but without any noticeable change in price. The syndicate promoting this deal have issued a circular

which shows that the amount of securities to be issued will amount to $9,000,000, divided into mortgage bonds, income bonds and stock. Sales are reported in Norfolk Railways & Light common stock at 13¼, and in the 5 per cent bonds at 94. Other transactions in Baltimore comprise Charleston Consolidated Railway 5s at 98¾, Lexington Railway 5s at 102¾, Atlanta Street Railway 5s at 107@107¼, and Toledo Traction 5s at 104. North Jersey Street Railway stock is reported a point higher in the bid price, at 29½, but there have been no dealings during the week. No change is recorded in Columbus Street Railway or in St. Louis Transit. Bids for Louisville Street Railway common at 125 still fail to attract offers. The rise in New Orleans securities has apparently ceased for the present, the bids for the preferred being a point and a quarter lower, at 110¾, and for the common a half point lower at 33¼. San Francisco securities have been a leading feature in the New York curb dealings. The preferred stock, which sold at 59¼ ten days ago, advanced on heavy buying to 64, the common went up from 24 to 25½, and the subscription privileges from 102 to 103⅞. The bonds have sold at 91½ and interest as against 90, their opening price. This sudden spurt of activity is generally regarded as an attempt to create a wider market for the securities in the interest of the promoters of the San Francisco consolidation. Elgin, Aurora & Southern rose sharply on the Cleveland Stock Exchange, under transactions of over 1000 shares. Five hundred shares sold at 40½, an advance of 3½ points. Detroit United was active and strong on reports that the Everett-Moore interests had been satisfactorily distributed among other parties. One thousand shares were sold at an advance from 70 to 72⅞. Two small blocks of Southern Ohio Traction sold at 66, and a small lot of Western Ohio at 20. Cleveland Electric Railway shares, after selling at 80, jumped up to 82½ for a small lot. One parcel of $10,000 Detroit Citizens first mortgage 5s changed hands at 106¼.

Security Quotations

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

	Closing Bid	
	May 20	May 27
American Railways Company	46	45½
Boston Elevated	163	164
Brooklyn R. T.	65⅝	66⅞
Chicago City	206	207
Chicago Union Tr. (common)	18¾	18¾
Chicago Union Tr. (preferred)	52	53½
Cleveland City	..	..
Cleveland & Eastern	a30	a33
Cleveland Electric	..	a83
Columbus (common)	52¾	52¾
Columbus (preferred)	107½	107½
Consolidated Traction of N. J.	69½	69
Consolidated Traction of N. J. 5s	111¾	111⅞
Detroit United	70½	72½
Electric-People's Traction (Philadelphia) 4s	98½	98⅝
Elgin, Aurora & Southern	38	40
Indianapolis Street Railway 4s	86½	88½
Lake Street Elevated	12¾	12⅜
Manhattan Ry.	131⅝	132⅛
Massachusetts Elec. Cos. (common)	44	44¼
Massachusetts Elec. Cos. (preferred)	97	96¾
Metropolitan Elevated, Chicago (common)	38½	38
Metropolitan Elevated, Chicago	89½	89
Metropolitan Street	148⅛	147¾
New Orleans (common)	33	33¼
New Orleans (preferred)	112	110¾
North American	120	121¾
Northern Ohio Traction (common)	30	30
Northern Ohio Traction (preferred)	a85	a85
North Jersey	28	29½
Northwestern Elevated, Chicago (common)	a38	37½
Northwestern Elevated, Chicago (preferred)	..	..
Philadelphia Traction	97¾	97½
St. Louis Transit Co. (common)	31½	31
South Side Elevated (Chicago)	a115	112
Southern Ohio Traction	65½	a67
Syracuse (common)	22	22
Syracuse (preferred)	64	64
Third Ave.	130	130
Toledo Railway & Light	18	20
Twin City, Minneapolis (common)	118	122¼
United Railways, St. Louis (preferred)	84¼	83½
United Railways, St. Louis, 4s	87⅝	87½
Union Traction (Philadelphia)	b41	40⅝
Western Ohio Ry.	a22	18

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

Iron and Steel

The iron trade situation at the moment continues very strong in all quarters, but there are various elements of doubt which make the future hard to forecast. One of these, and unquestionably the most important, is the effects of the anthracite coal strike, more particularly in view of the possibility that it may be extended to the bituminous mines. If this were to occur, it would be a serious blow to the iron as well as to many other industries. Already there is some curtailment of pig and foundry iron output on account of the strike, and this has emphasized the already extraordinary shortage in current supplies. Meanwhile imports of ferromanganese, and of foreign steel, beams and structural material are on the increase. Some heavy orders of steel rails have been booked during the week, but it is not believed that they will be ready for delivery before next year. Quotations are as follows: Bessemer pig iron $21.50, steel billets $33, steel rails $28 nominal, girder rails $33.

Metal

Quotations for the leading metals are as follows: Copper 12.55 cents, tin 30 cents, lead 4⅛ cents, spelter 4¾ cents.

BOSTON, MASS.—The Boston News Bureau says: "The trustees of the Massachusetts Electric Company are asking their shareholders to authorize the issue of $5,500,000, par value, of new preferred shares, proceeds of which will be invested in the securities of the companies in which the Massachusetts Electric Companies are already shareholders, and will be applied by those companies to the carrying out of the programme, which is somewhat as follows: (It should be stated that a portion of the expenditure mentioned below has already been made, and a part of the funds arising from the sale of the new shares will be devoted to taking up the floating debt now existing of the various street railway companies. No part of the money, however, will be used to retire the existing coupon notes of the Massachusetts Electric Companies, as all of it will be appropriated to increasing the facilities and business, and therefore the earnings of the operating companies. The programme is as follows: The Middleton & Danvers Street Railway will be completed through to Lawrence, thus furnishing a direct line from Lawrence and the Merrimac Valley to Salem and the seacoast. The Haverhill & Andover, and Reading, Wakefield & Lynnfield lines will also be built, the total cost of these three new lines being estimated at $1,000,000, round numbers. In addition to this, the Old Colony Street Railway Company and the Boston & Northern Street Railway Company are spending, or will spend shortly, about $950,000 in new track construction, and $1,100,000 for new cars and their equipment, besides $600,000 for power stations and machinery, and a considerable sum for new land, buildings, overhead equipment, etc.

BOSTON, MASS.—Governor Crane has signed the bill authorizing the Haverhill, Plaistow & Newton Street Railway Company to lease its property to the Exeter, Hampton & Amesbury Street Railway Company.

SPRINGFIELD, MASS.—The Railroad Commissioners have authorized the Berkshire Street Railway Company to issue $500,000 5 per cent mortgage bonds to fund floating indebtedness.

BOSTON, MASS.—The Boston & Northern Street Railway Company has withdrawn its petition to the Railroad Commissioners for authority to issue $400,000 new stock.

BOSTON, MASS.—There are now appearing in the papers of this city advertisements calling special meetings of the Union Railroad Company, the Pawtucket Street Railway Company and the Rhode Island Suburban Railway Company, to be held June 24 to take action authorizing the lease of the different companies to the Rhode Island Company.

LONG ISLAND CITY, N. Y.—The Queens Railway Company, capitalized at $2,500,000, has been incorporated with the Secretary of State as the successor of the New York & North Shore Railway, sold under foreclosure recently. The directors of the company are: E. Clarence Miller, Francis Rawle, William H. Shelmerdine and James M. Gregg, of Philadelphia; William E. Stewart and George F. Hickey, of New York; Frank P. Maize and J. R. Beetem, of Long Island City, and Clarence D. Simpson, of Scranton, Pa.

SYRACUSE, N. Y.—The hearing on the application for the appointment of a receiver for the Marcellus Electric Railroad Company has been adjourned to June 7. It has been stated by one of the attorneys that the adjournment was at the request of the Merchants' National Bank, of Philadelphia. The bank, it was said, has had a representative here looking over the property with the view of acquiring a majority of the bonds and completing the work of construction. This will result in a discontinuance of the mortgage foreclosure proceedings and avoid the necessity of a receiver.

STATEN ISLAND, N. Y.—The reorganization of the Staten Island Electric Railway, the New York & Staten Island Electric Company, the Richmond County Power Company, and the New Jersey & Staten Island Ferry Company will be accomplished by the formation of a new company, which will authorize $2,500,000 first and collateral trust mortgage 4 per cent fifty-year bonds and $3,000,000 capital stock represented by a five years' voting trust, the trustees to be H. H. Rogers, Walter G. Oakman and William L. Bull. The cash working capital to be raised is $438,880.

CANTON, OHIO.—Directors of the Canton-Massillon Railway Company and the Canton-Akron Railway Company will meet June 19 for the purpose of furthering plans for the consolidation of the two roads. The properties are owned by the same interests.

PADUCAH, TENN.—The Paducah Street Railway Company, capitalized at $300,000, has filed articles of incorporation with the Secretary of State. The principal stockholders are: William L. Hayes, of Cleveland, Ohio; A. L. Rich, of Cincinnati, and Clarence Hallam, of Louisville. The company will absorb the Paducah Railway & Light Company, of which it really is a reorganization.

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.

Company	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Available for Dividends
AKRON, O.						
Northern Ohio Tr. Co.	1 m., Apl. '02	49,425	28,527	20,898	12,829	8,069
	1 " " '01	39,618	25,477	14,142	------	------
	4 " " '02	190,559	114,862	75,697	50,579	25,118
	4 " " '01	162,271	104,034	58,237	41,988	16,249
	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
ALBANY, N. Y.						
United Traction Co.	1 m., Apl. '02	117,072	81,527	35,545	23,603	11,941
	1 " " '01	109,838	75,982	33,856	19,901	13,955
	10 " " '02	1,215,771	837,766	378,005	215,823	162,181
	10 " " '01	1,141,026	775,467	365,559	199,433	166,126
BINGHAMTON, N. Y.						
Binghamton St. Ry. Co.	1 m., Apl. '02	14,843	9,841	5,002	------	------
	1 " " '01	13,994	9,220	4,774	------	------
	9 " " '02	155,621	85,026	70,595	48,498	22,097
	9 " " '01	140,084	75,794	64,290	44,384	19,906
BOSTON, MASS.						
Boston Elev. Ry. Co.	12 m., Sept. '01	10,869,496	7,336,597	3,532,899	2,896,359	636,539
	12 " " '00	10,236,994	6,828,110	3,408,884	2,932,839	476,044
Massachusetts Elec. Cos	12 m., Sept. '01	5,778,133	3,915,486	1,862,648	937,206	925,442
	12 " " '00	5,518,837	3,659,337	1,859,500	994,294	865,206
BROOKLYN, N. Y.						
Brooklyn R. T. Co.	1 m., Mar. '02	1,030,917	*768,347	262,570	------	------
	1 " " '01	955,503	*714,044	241,459	------	------
	9 " " 02	9,426,365	*6784899	2,641,466	------	------
	9 " " '01	8,854,604	*5864450	2,990,154	------	------
	12 " June '01	12,135,559	*7216008	4,919,551	4,341,748	577,803
	12 " " '00	11,768,550	*7106373	4,662,177	4,135,405	526,772
BUFFALO, N. Y.						
International Tr. Co.	1 m., Feb. '02	230,744	132,920	97,824	94,276	3,548
	1 " " '01	235,021	118,273	116,748	84,411	32,338
	8 " " '02	3,519,491	1,664,285	1,855,206	789,124	1,066,081
	8 " " '01	1,998,050	972,319	1,025,731	641,057	384,674
CHICAGO, ILL.						
Chicago & Milwaukee Elec. Ry. Co.	1 m., Apl. '02	13,057	5,899	7,159	------	------
	1 " " '01	10,443	5,584	4,859	------	------
	4 " " '02	44,749	23,603	21,146	------	------
	4 " " '01	34,041	22,614	11,428	------	------
Lake Street Elevated	12 m., Dec. '01	786,462	388,799	397,663	------	------
	12 " " '00	757,954	378,661	379,293	------	------
CLEVELAND, O.						
Cleveland & Chagrin Falls	1 m., Feb. '02	3,454	2,255	1,199	------	------
	1 " " '01	2,435	3,016	† 581	------	------
	12 " Dec. '01	47,976	*32,002	15,974	13,023	2,951
	12 " " '00	49,646	*33,272	16,374	13,294	3,080
Cleveland & Eastern	1 m., Feb. '02	4,916	3,616	1,300	------	------
	1 " " '01	3,525	4,037	† 512	------	------
	12 " Dec. '01	90,390	52,022	38,368	43,678	† 4,310
	12 " " '00	62,893	36,672	26,221	36,148	† 9,927
Cleveland El. Ry. Co.	1 m., Feb. '02	168,462	97,446	71,016	22,170	48,846
	1 " " '01	151,805	90,251	61,554	18,875	42,679
	2 " " '02	356,544	203,452	153,092	43,945	109,146
	2 " " '01	318,537	189,514	129,023	37,851	91,172
	12 " Dec. '01	2,296,898	1,265,953	1,030,945	244,231	786,714
	12 " " '00	2,061,505	1,121,037	940,467	258,483	681,984
Cleveland, Elyria & Western	1 m., Apl. '02	21,065	13,022	8,043	------	------
	1 " " '01	17,054	9,508	7,546	------	------
	4 " " '02	78,149	51,391	26,757	------	------
	4 " " '01	64,084	43,382	20,702	------	------
	12 " Dec. '01	249,260	136,865	112,394	57,023	55,371
	12 " " '00	179,698	102,393	77,304	34,562	42,742
Cleveland, Painesville & Eastern	1 m., Apl. '02	12,696	6,934	5,762	------	------
	1 " " '01	10,184	5,935	4,249	------	------
	4 " " '02	44,682	26,141	18,541	------	------
	4 " " '01	36,203	21,610	14,592	------	------
	12 " Dec. '01	164,971	* 87,102	77,869	72,500	5,369
	12 " " '00	141,112	* 89,592	71,520	72,500	† 980
DENVER, COL.						
Denver City Tramway Co.	1 m., Apl. '02	124,516	66,533	57,983	32,865	26,119
	1 " " '01	116,357	62,866	53,490	31,304	22,186
	4 " " '02	481,348	261,118	220,230	131,259	88,972
	4 " " '01	435,297	236,915	198,382	125,622	72,759
	12 " Dec. '01	1,507,293	818,321	688,965	383,180	305,785
	12 " " '00	1,302,290	722,458	579,839	374,291	205,548
DETROIT, MICH.						
Detroit United Ry.	1 m., Apl. '02	259,776	150,719	109,057	66,402	42,655
	1 " " '01	228,597	131,888	96,709	57,360	39,349
	4 " " '02	1,015,407	586,374	429,033	260,155	168,878
	4 " " '01	878,865	497 630	381 235	229,425	151,810
	12 " Dec. '01	2,919,171	*1596765	1,322,046	652,277	670,129
	12 " " '00	2,575,277	*1439058	1,136,219	616,468	519,751
Detroit and Port Huron Shore Line (Rapid Ry. System)	1 m., Apl. '02	29,611	18,392	11,219	10,568	651
	1 " " 01	28,877	18,062	10,816	9,692	1,124
DULUTH, MINN.						
Duluth-Superior Tr.	1 m., Mar. '02	41,140	23,947	17,193	9,612	7,581
	1 " " '01	33,212	21,238	11,974	9,105	2,869
	3 " " '02	111,261	67,886	43,375	28,839	14,536
	3 " " '01	94,763	59,623	35,141	27,286	7,854
ELGIN, ILL.						
Elgin, Aurora & Southern Tr.	1 m., Apl. '02	29,642	19,595	10,047	8,333	1,713
	1 " " '01	26,613	18,285	8,328	8,333	† 5
	11 " " '02	344,136	195,674	148,462	91,667	56,795
	11 " " '01	300,962	192,726	108,236	91,667	16,569
HAMILTON, O.						
Southern Ohio Tr. Co.	1 m., Apl. '02	27,774	15,245	12,529	7,500	5,029
	1 " " '01	23,530	14,405	9,125	7,500	1,625
	12 " " '02	353,144	186,365	166,779	90,000	76,779
	12 " " '01	303,704	166,757	136,946	90,000	46,946
LONDON, ONT.						
London St. Ry. Co.	1 m., Apl. '02	9,942	6,395	3,547	2,335	1,211
	1 " " '01	9,496	5,999	3,497	1,998	1,499
	4 " " '02	39,188	26,723	12,465	8,896	3,569
	4 " " '01	36,192	25,186	11,056	7,807	3,249
MILWAUKEE, WIS.						
Milwaukee El. Ry. & Lt. Co.	1 m., Apl. '02	206,049	99,154	106,893	64,108	42,785
	1 " " '01	184,210	96,099	88,111	60,483	27,629
	4 " " '02	833,547	401,276	432,271	257,901	174,370
	4 " " '01	728,683	397,530	331,152	241,163	89,989
MINNEAPOLIS, MINN.						
Twin City R. T. Co.	1 m. Apl. '02	263,243	131,388	131,854	58,516	73,338
	1 " " '01	232,243	111,741	120,502	56,667	63,834
	4 " " '02	1,059,565	512,040	547,525	234,066	313,458
	4 " " '01	926,311	449,323	476,988	216,460	260,527
MONTREAL, CAN.						
Montreal St. Ry. Co.	1 m., Mar. '02	154,390	83,850	70,540	15,848	54,692
	1 " " '01	144,794	93,272	51,521	9,288	42,234
	7 " " '02	1,079,110	679,459	399,652	106,234	293,418
	7 " " '01	1,012,816	652,921	359,895	64,363	295,532
NEW YORK CITY.						
Manhattan Ry. Co.	3 m., Dec. '01	3,038,435	1,404,971	1,633,465	753,135	880,329
	3 " " '00	2,728,598	1,349,696	1,387,902	749,857	638,045
	12 " Sept. 01	10,455,872	5,328,649	5,127,223	2,682,132	2,444,091
	12 " " '00	9,950,735	5,195,312	4,755,423	2,688,644	2,066,779
Metropolitan St. Ry.	3 m., Dec. '01	3,887,936	1,723,972	2,143,964	1,151,140	992,824
	3 " " '00	3,786,030	1,699,649	2,086,381	1,138,467	947,914
	12 " June '01	14,720,767	6,755,131	7,965,636	4,534,068	3,431,567
	12 " " '00	14,437,134	6,631,254	7,805,880	4,445,720	3,360,160
OLEAN, N. Y.						
Olean St. Ry. Co.	1 m., Mar. '02	3,994	2,411	1,584	1,146	438
	1 " " '01	3,835	2,043	1,792	1,187	604
	9 " " '02	41,735	21,611	20,124	12,343	7,781
	9 " " '01	39,270	19,276	19,994	11,068	8,925
PITTSBURG, PA.						
Consolidated Traction	1 m., Dec. '01	304,669	140,941	163,728	91,548	72,180
	1 " " '00	277,439	109,069	168,370	89,807	78,563
	9 " " '01	2,649,656	1,145,651	1,503,905	807,667	694,238
	9 " " '00	2,471,696	1,013,240	1,458,456	799,704	658,752
PHILADELPHIA, PA.						
American Railways	1 m., Apl. '02	79,619	------	------	------	------
	1 " " '01	64,339	------	------	------	------
	10 " " '02	810,663	------	------	------	------
	10 " " '01	691,399	------	------	------	------
RICHMOND, VA.						
Richmond Trac. Co.	1 m., Sept. '01	20,991	15,669	5,322	3,196	2,126
	1 " " '00	20,727	10,770	9,957	3,843	6,115
	12 " " '01	218,569	139,542	79,027	38,618	40,410
	12 " " '00	203,057	108,198	94,859	37,608	57,250
ROCHESTER, N. Y.						
Rochester Ry.	1 m., Apl. '02	86,183	45,491	39,192	24,730	14,462
	1 " " '01	82,778	51,910	30,867	23,574	7,293
	4 " " '02	350,343	193,423	156,919	99,104	57,815
	4 " " '01	328,832	213,788	115,045	96,268	18,777
SCRANTON, PA.						
Scranton Ry. Co.	1 m., Oct. '01	2,638	29,300	adf26661	------	------
	1 " " '00	48,781	34,787	13,993	------	------
	10 " " '01	507,989	295,079	212,910	------	------
	10 " " '00	504,852	298,122	206,730	------	------
SCHENECTADY, N. Y.						
Schenectady Ry. Co.	3 m., Dec. '01	84,061	46,949	37,112	13,454	23,658
	3 " " '00	30,876	14,517	16,359	6,087	10,272
SYRACUSE, N. Y.						
Syracuse R. T. Co.	1 m., Apl. '02	56,008	31,349	24,659	19,025	5,634
	1 " " '01	52,416	28,470	23,946	18,683	5,263
	10 " " '02	574,652	316,908	257,744	190,196	67,548
	10 " " '01	512,389	280,907	231,482	186,288	45,194
TOLEDO, O.						
Toledo Ry. & Lt. Co.	1 m., Mar. '02	111,174	53,151	58,024	37,833	20,189
	1 " " '01	98,749	46,047	52,701	24,271	28,431
	3 " " '02	325,238	163,442	161,796	113,494	48,302
	3 " " '01	288,960	141,628	147,333	72,813	74,520
	12 " Dec. '01	1,311,084	* 636,407	674,677	415,168	259,509
	12 " " '00	1,182,517	* 616,945	565,572	409,051	156,521
W. NEW BRIGHTON, S. I.						
Staten Island Ry.	3 m., Mar. '02	38,189	46,906	† 8,717	8,778	†17,495
	3 " " '01	35,897	38,288	† 2,391	8,217	†10,608