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EDITORIAL NOTICE.

The news issues of the Street Railway Journal are devoted primarily to the publication of street railway news and current happenings related to street railway interests. All information regarding changes of officers, new equipments, extensions, financial changes and new enterprises will be greatly appreciated for use in its columns.

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A Visit to the New Manhattan Power Station

On Saturday, Sept. 15, the Brooklyn Engineers' Club had a pleasant outing in the form of an inspection tour to the Manhattan Railway Company's power house, which is now in course of construction at Seventy-Fourth Street and East River, New York. The excursion was enjoyed by about thirty members of the club, the engineers in charge of the work giving them every facility to inspect the details of the construction. The genial secretary of the club, A. J. Provost, Jr., succeeded admirably in preventing the visitors from missing any of the interesting features, and the club is to be congratulated for having so able a guiding spirit.

A Serious Collision Near New York

About forty persons were injured in a head-on collision between two cars of the Yonkers Railroad, of Yonkers, N. Y., on Sept. 15. The collision occurred on the Yonkers Avenue line, about half a mile east of the Empire City Trotting Track and at the foot of Valentine hill. Both cars were filled with passengers—one coming from the race track, the other going to the track. Car No. 215, the down car, left the race track for Yonkers at about ten minutes to 6 o'clock, and proceeded to the Kimball Avenue switch without incident. The next car to be passed was on the Napperhan and Yonkers Avenues switch, and after proceeding for some distance car No. 143 suddenly hove in sight. Power was reversed and the brakes applied, but too late. The cars came together with a crash. Both were derailed and completely wrecked.

New Air Cars for Twenty-Third Street, New York

Two of the new air cars of the Compressed Air Company, of New York, were placed in service on the Twenty-Third Street line of the Metropolitan Street Railway Company, of New York, on Sept. 15. The line extends across town from the East to the North rivers, and the first car started with a starting pressure of 1950 lbs. After making two round trips the car returned to the charging station with 950 lbs. remaining, showing that when the cars are fully down to their bearings and limbered up they can easily make additional trips with one charge of air. The second car also made two trips. Both are now running regularly. The air is furnished by a small compressor, as it is not intended to start up the large compressor until more than ten cars are in actual service on Twenty-Third Street. As soon as fifteen cars are in service they will be transferred to Twenty-Eighth and Twenty-Ninth Street line, and the entire service on that line will then be performed by air cars. The old cars, which were used on Twenty-Eighth and Twenty-Ninth Street line, aside from their other objections, were only able to make one trip across town, starting with a higher initial pressure than is used in the new cars.

The Chicago Tunnel Question

James B. Galloway has submitted plans to the Chicago Street Railway Commission for the construction of a set of seven single tunnels under the river to replace those now being used by the car lines. The city is now trying to force the companies to lower the present tunnels, and the companies have taken the matter to the Circuit Court, claiming that the city has no jurisdiction in the matter. The city claims that the present tunnels are an obstruction, but this is denied by the companies. It is estimated that new tunnels could be built by Mr. Galloway's plans at a cost of \$1,500,000, and that they would obviate the necessity of lowering the present tunnels and would add to the efficiency of the street railway systems, while making La Salle Street a connecting link between the north and south side boulevards. It is advocated that the city build the tunnels. For the north side there are to be two tunnels for south-bound cars, in Wells and Clark streets, and one in Dearborn Street for north-bound cars, using Monroe Street, as now, for the southern boundary of the loop. The La Salle Street tunnel could be removed and a wide bascule bridge be placed over the river. It is further proposed that the street car tracks be taken up and the street made a boulevard from Jackson Boulevard to Lincoln Park. For the west side, east-bound tunnels would be in Van Buren and Madison streets, and west-bound tunnels in Adams and Washington streets; the temporary return of the Madison Street cars being through the Adams Street tunnel during the reconstruction of the old Washington Street tunnel. The places of approach would then provide outlets near the Union and Northwestern railway stations. The tunnels are to be 15 ft. in diameter, and are to be put 30 ft. below datum and with grades of 7.5 per cent, 8 per cent and 9.5 per cent.

The Convention of the New York Street Railway Association

The eighteenth annual meeting of the Street Railway Association of the State of New York was held at Buffalo on Tuesday and Wednesday, Sept. 18 and 19, with a large attendance. When the association was called to order by President Rogers at the Iroquois Hotel Tuesday morning, over one hundred delegates responded to the roll-call. Mayor Diehl welcomed the members of the association to Buffalo, after which President Rogers responded. He then delivered his annual address, which is given, in part, below:

PRESIDENT'S ADDRESS

Before the smaller cities and towns of our State can expect any very radical improvements in their street railway construction, or can render the service the public demands, the law requiring the street railways to pay for pavements must be amended. Much has been said and written upon this subject, and I believe that the public is aware of the unfair and unjust burden that is being placed on the small roads in these localities. It is the duty of the State of New York to rectify this serious error, which, in nearly every instance, means in the end a receiver, as has been illustrated throughout the State. The smaller cities try to impose the same burdens on street railways as do the larger cities upon their roads. What might not be a heavy burden to the one means destruction to the other. The suggestion has been made that each municipal body granting a franchise should be authorized by the statute to make a special contract with the applying corporation for either the construction or maintenance of pavements in the whole or different sections of the locality. The lack of elasticity in the present statute militates strongly against the best requirements of small cities for the joint interests of the roads and the public.

The Railroad Commissioners' report of 1899 shows that there are ninety-four electric roads in this State, and forty-one show a deficit while only fourteen declared a dividend. Of the latter, four were in the smaller cities, being operated partly as interurban roads. This report also shows a gain in the receipts of the surface roads over the previous year in this State of 7 1-10 per cent; also that the lines of greater New York carried 55 per cent of all the passengers in the State and their increase was 74 per cent of the total increase of the State.

It is a recognized fact that there is nothing that will more rapidly and permanently develop smaller cities than rapid transit, especially interurban service. Oftentimes the value of real estate in certain districts will advance upon the mention of an extension of a road in that direction. The people of provincial cities stand in their own light in not taking measures to have the above mentioned law changed. I am satisfied that the public is each year realizing more and more the benefits accruing from a well constructed, well equipped and carefully managed street railway in its midst.

The management of roads in the smaller cities make no mistake in taking the city authorities and the public into their confidence, appealing to their sense of justice and fairness. This course, if conscientiously and consistently followed, will result in much good. The sympathy and good-will of the people is necessary to the success of a street railway, and without it, especially in small cities, it is next to impossible to succeed.

The fate of the Ford franchise law, which was placed on the statute books two years ago, is yet to be determined. In my opinion there is but one result, and that is disappointment for the makers of the law, and the people, and dissatisfaction to the corporation which it affects. I would again call your attention to the injustice and unfairness of the law passed three years ago, taxing street surface railways 1 per cent on gross earnings, while other corporations (who are better able to pay the tax) are taxed 1/2 of 1 per cent. Nearly every legislator who has been consulted on the unfairness of this act admits that section 185 of the general tax law should be amended, thus leaving railway companies in the same situation as other public service corporations. It is our duty earnestly to take the matter up with the Legislature, and I believe that this serious injustice can be rectified.

Foreign street railways seem to be more fortunate than those of the United States in the matter of tax upon gross earnings. As an illustration—the British tramways are paying into the public treasury less than \$600,000 annually in a formal tax on gross receipts of \$25,000,000. The street railways of New York and Massachusetts alone are paying nearly \$2,500,000 on gross receipts of \$50,000,000.

The municipal ownership agitator is still active, but I think the fever has abated, at least it is working westward. No doubt some of these agitators are sincere and honest in their advocacy of the theory. If the craze is allowed to run its course, public opinion will in time desert it, especially after a few more illustrations of the

impracticability of the theory in America under American politics. Under municipal ownership the agitator claims the wages of the men will be increased. Incidentally, perhaps, the vote of the political party then in power will also be strengthened as well as the taxpayers' bill of expense; this is a phase of the question which every American taxpayer should study. The majority of the voters are not taxpayers, hence their liberality with other people's money.

Municipalities should not be allowed to mortgage the unborn generations to produce the construction or operation of public service industries to satisfy the theorist. They should only be allowed to secure funds for such indebtedness by mortgaging the property income of the undertaking, and the franchises themselves and the mortgage should stand or fall upon such merits. Such a mortgage, of course, would be subject to foreclosure by default the same as a mortgage given by a private corporation and without recourse to the taxpayer.

If the general impracticability of the theory of municipal ownership did not condemn it, another fact would, and that is that a business made up of detail and involving such close care and attention, could not be looked after successfully or profitably by municipalities, particularly with the present incomplete system of municipal accounting.

The work that was inaugurated at our last convention at Ithaca, with the object of further promoting a spirit of loyalty and good-will and of increasing the efficiency of employees, has resulted in much good. We should continue to educate our men in the duties they are to perform, treat them as men, and make them feel that by intelligent service and loyalty to the company they can better their position and gain promotion. This is important to the life and development of street railways. Our benefit associations are important factors in accomplishing this end. I understand that nearly every road in the State has its benefit association and that each has the hearty support of its respective road; in fact, this department is given quite as close attention as any other department connected with the service. The success of these associations is largely due to the intelligence of the employees who are operating our roads, the solid principles on which they are organized, and the opportunity it gives the management and the men to help one another. The many benefits derived from these organizations are a just inheritance, not a charity.

One-third of the invested wealth of the civilized nations is today invested in railways, and not an inconsiderable portion of that investment should be protected. It goes without saying that a perpetual or long-term franchise is better suited for investors than a short-term franchise, which can be annulled at will. Under a long-term franchise, better construction and improvements can be made which will inure to the comfort and convenience of the traveling public. In this State a large number of the roads have long term, and in some instances perpetual franchises, but on account of the heavy burdens imposed by taxation and the municipalities and State requirements, only a small portion of the roads are paying a dividend, and of these a large number are in Greater New York.

In financing a street railway, as large a portion of the bonds and stocks as possible should be disposed of to local investors, thereby insuring a local co-operation and interest that cannot fail to redound to the benefit of all concerned. It is very important for street railways to have as large a number of local stockholders as possible, thereby creating a common interest with the citizens in our properties. We must be frank and open with investors, which will result in securing and retaining the confidence and increasing the holdings and the number of holders.

A recent decision of the Appellate Court of this State and the decision of the lower courts in other States to the effect that cars designed to carry freight only are permissible on street railways is a decided gain for the roads which elect to engage in the freight and express business, which is becoming a matter of more importance every day, especially to interurban roads. Some very important express companies, I understand, are now in existence, operating entirely on trolley roads. The advantages of these companies in part consist of their quick service and ability to take freight from the farmer's door and transfer it through the various streets of the cities at frequent intervals. Freight and express service on the trolley roads seems to meet a much needed public requirement.

Stimulated pleasure riding and the establishment of parks and entertainments have proved to be a move in the right direction, and nearly all the roads have institutions of this kind, particularly those who are not confronted with the problem of providing efficient means of transportation for the large number who desire to ride.

There is no question but that the transfer privilege (with which we have been too generous) is being abused. There is no law obliging the roads of the State, excepting those recently built, to give transfers. If the transfer system of large roads could be so arranged that transfers were given only at points of any conse-

quence and to the passengers traveling in one general direction, and if it could be arranged that passengers could not secure transfers returning in the same general direction from which they came, it might eliminate some of the abuse.

The important suggestion that has been made, that the points of issuance of transfers should be limited and designated by the Board of Railroad Commissioners, will commend itself to all operating men.

Street railways have not, in my opinion, anything to fear from the competition of the horseless carriage. This vehicle may be used for carriage and cab purposes to some extent. The "loco" or "auto" is still the fad, however. We hope that the many inventors now working on the various vapor motors for the "auto" may produce something that will prove practicable and economical for street railway operation.

Much has been accomplished in the standardization of our accounts which will work out untold benefit to the roads; besides strengthening our securities, it will give confidence to the public, and afford us material for comparison. Our track system is also working out its own standard.

It is to be hoped that we will soon reach a standard in a permanent type of mechanical power, and it will be no longer necessary to discard costly apparatus because improvements have displaced them. As to equipment and rolling stock, we do not seem to accomplish much in standardization, except on the larger roads. This result is due to a combination of circumstances which I will not attempt to enumerate. If we could standardize our equipment it would be a saving in many directions.

The distance from New York to Boston of 257 miles is covered by electric railways, excepting about 52 miles, which illustrates the fact that street railways will soon connect the larger cities as well as the smaller ones. A story of a trip by trolley between New York and Boston has been recently published which is very interesting, and suggests that even a broader field than heretofore will be found for the trolley road.

It would be an oversight if some allusion were not made at this time to the wonderful development of the street railways of the State during the past year, particularly in cities of the first class. As a matter of fact, the improvement of the street railway service of New York, Brooklyn and Buffalo during the past twelve months has been almost startling in its character, and is an object lesson in rapid transit for the country at large.

Since the meeting of last year, the situation in the City of New York has expanded and developed with giant strides. The Metropolitan Street Railway company has pushed with great vigor the completion of the very important power house at Ninety-Sixth Street and East River. This plant has been laid out with reference to the interests of the entire street railway situation in the city. Its boiler capacity is remarkable, while the operation of the nine enormous vertical compound engines, remarkable for their accuracy and delicacy of operation, is a continuously interesting and instructive study. The plant, which will be completed during the coming year, is of primary importance in being the first station in the city of New York constructed for the development and distribution of the alternating current and the use of sub-stations with rotary converters and transformers.

The city is on the eve of another important improvement, to wit: The substitution of the electric current on about 25 miles of road now operated by cable. This work, involving millions of dollars in street construction and new equipment, is being pressed to a speedy completion and will undoubtedly result in great benefit to the traveling public. The passing of the cable roads brings to our attention the short life of the system. In the early '90's it was considered the motive power of the age, but a decade has seen its extinction for the movement of cars in cities. While the character of cable service has been raised to a high degree of perfection, the lack of elasticity in the convenient operation of car lines has been the chief cause for its extinction. The greater advantages in methods of operation furnished by electrically-propelled cars, or self-contained motors, will always commend these latter forms of operation to the minds of operating men.

The proposition of operating short crosstown lines in New York City is still subject to investigation and research. The great cost of the underground electrical construction, with its attendant expenditures for the removal of pipes and other property not belonging to the railway company, precludes the use of this character of equipment upon such short lines. At the date of my last address, the use of compressed air as a motive power was in apparently practical operation. While the type of motor then in use has not proved altogether successful, the test which is now being carried on by use of the Hardie motor will undoubtedly meet the requirements demanded of it.

Among the more important developments of the present day is the operation of the Thirty-Fourth Street crosstown lines by stor-

age battery. The complete equipment of that line by that form of motor, and its actual operation as a system and not as an experiment, will demonstrate finally the desirability of the use of batteries as motors. The preliminary operations, as I am advised, are altogether successful, and there seems little reason to doubt that the operation during the winter will demonstrate the perfection of the system. For many years but little attention has been given to the improvement of storage batteries for street car operation. The great extension, however, of the use of these motors for cab service and small delivery wagons in this city has proved the desirability and usefulness of the storage battery, and called attention to its adaptability for the operation of railway lines requiring the use of self-propelled cars.

With the extension of railway systems in the city of New York necessarily follows the greater increase in travel. For the last fiscal year the returns of the Metropolitan Company show that 452,761,158 passengers have availed themselves of the right to ride on the company's lines, of which 297,254,580 were cash passengers, with 155,506,578 transfer passengers. These returns show an increase over the preceding years of 61,000,000 passengers carried, of which 34,000,000 were cash passengers and 27,000,000 were transfers.

There is no better illustration of what a street railway system, properly conducted and operated, can do for a large city than is manifested by the Brooklyn Rapid Transit Company. They have acquired nearly all of the surface railways of the city and thoroughly re-equipped same. They control and operate all of the elevated railways of the city, the larger portion of which they have equipped with the third-rail electric system. They have also acquired and electrically equipped some steam railroads leading to Coney Island, all of which are operated in conjunction and under one management.

Owing to the liberal policy adopted by the surface railways of Brooklyn, the bridge fare has been dispensed with, as far as car riders are concerned. You can now take a car at the New York City Hall and go to almost any portion of Brooklyn for 5 cents. The excellent transportation facilities with which Brooklyn is provided have done much toward developing the numerous and rapidly growing suburban localities of that city.

The advancement and improvement of the excellent street railways of Buffalo and vicinity will undoubtedly be exhibited in a practical way by our host, the International Traction Company. I have no doubt you will all derive great pleasure from the general inspection of and the ride over the several lines which go to make up the splendid system for which the locality is so justly celebrated.

During the past year the record of this association has been one of progress and improvement. The fact that it is established on a sound basis is shown by our meetings which I am pleased to say are so generally attended by the street railway people of the State who are seriously studying the question of transportation and how they can improve its condition.

Papers were then read on "Accidents on Street Railways; Methods Employed in Handling Same and Preparing for Trial," by D. W. Patterson, of the legal department, Metropolitan Street Railway Company, New York; "How Can We Increase the Efficiency of Our Employees?" by E. G. Connette, vice-president and general manager of the Syracuse Rapid Transit Railway Company, of Syracuse; "Railway Power Transmission," by J. H. Armstrong, of the General Electric Company, Schenectady, and "The Use of Storage Batteries on Small Roads," by B. B. Nostrand, Jr., president of the Peekskill Electric Light and Power Company, of Peekskill. These papers are published elsewhere in this issue.

At the afternoon session papers were read by Superintendent Thomas Henning, of the Buffalo power house; Vice-President T. J. Nicholl, of the Rochester Railway Company, and Prof. Norris, of Cornell University. After the close of this session the delegates were taken to the Cold Spring power house of the Buffalo Railway Company. After thoroughly inspecting this plant they visited the Pan-American Exposition grounds at the special invitation of Director-General Buchanan. Much interest was expressed in the buildings for this important fair, which have now advanced quite far, and at the extent of the proposed exposition.

The annual banquet was held Tuesday evening at the Ellicott Club. There was an attendance of about 200. Mr. Rogers presided and Mr. Ely, president of the International Traction Company, was toastmaster. The gentlemen who occupied seats at the principal table were the Hon. W. Caryl Ely, H. H. Vreeland, the Hon. S. Fred Nixon, M. Nussbaum, P. F. Trainer, H. H. Littell, Alexander J. Porter, T. F. Thomson, the Hon. William I. Buchanan, W. B. Rankine, Herbert P. Bissell, the Hon. John G. Milburn, Charles J. Bissell, Henry A. Robinson, Bert Van Horne, Tracy Rogers, the Hon. Conrad Diehl, Henry M. Watson, Charles W. Wasson, James H. McGraw and Otis W. Cutler. The

speakers included Mayor Diehl, President Milburn and Director-General Buchanan, of the Pan-American Exposition; Charles Bissell, W. B. Rankine, Herbert B. Bissell, S. Fred Nixon and H. H. Vreeland.

A full report of the proceedings of the second day, the remaining papers and the discussions on the papers presented will be published next week. There were a number of exhibits, as follows:

EXHIBITORS AT THE CONVENTION

The Couch & Seeley Company, of Boston, made a very creditable exhibit, showing the iron box telephone and other telephonic apparatus manufactured by it for street railway service.

The G. P. Magann Air-Brake Company, of Detroit, had an equipment on one of the Main Street cars, which was in continual operation. It proved a most practical method of illustrating the air storage system of this company.

The National Carbon Company, of Cleveland, had on exhibition samples of its new process carbon brushes, also battery carbons and various carbon specialties.

The Central Brake Shoe Company, of Buffalo, N. Y., and Reading, Pa., showed samples of the well known Diamond S. brake shoes.

The Edison-Johnson Electrical Manufacturing Company, of New York, exhibited its new type of trolley hooks, which are guaranteed to keep the trolley from leaving the wire.

The Cutter Company, of Philadelphia, showed one of its popular I. T. E switches.

The Bierbaum & Merrick Metal Company, Buffalo, had on exhibition samples of the "Ideal" trolley wheel. This wheel is very novel in its construction, and seems to be all that its name implies. Judging from the repeated orders received the wheel is fast finding favor with street railway managers. The company also showed samples of car bearings made from Lumen bronze, another specialty of this company.

The R. Bliss Manufacturing Company, Pawtucket, R. I., showed a handsome model of its patent safety car gate.

The Speer Carbon Company, of St. Mary's, Pa., made quite a display of its well known carbon brushes.

The Morris Electric Company, New York, had an extensive exhibit of the goods manufactured by the company, and the specialties which it handles. It consisted of rail-bonds of all types and for all purposes, pneumatic rail-bond and wire-joint compressors, Monarch fare registers, National electric car heaters, the Potomac terra cotta conduit, etc.

The Keystone Electric Company, of Philadelphia, showed various types of its well known voltmeters and ammeters.

Chisholm & Moore, of Cleveland, had on exhibition various sections of the American Standard rail-joints, tie-plates, etc., and also a fine collection of India ink drawings of traveling cranes, chain hoists and other power house machinery made by this company.

The Atlas Railway Supply Company, Chicago, showed various samples of its joints for all types of rails, also a combined rail-brace and tie-plate.

The Gold Street Car Heating Company, New York, exhibited samples of the Gold improved electric heaters, panel pattern, for cars with longitudinal seats and standard pattern for cross-seated cars.

The Weber Rail-Joint Manufacturing Company, New York, showed handsome samples of the Weber rail-joint, as applied to both T and girder rail.

Harold P. Brown, New York, made a display of the Edison-Brown plastic bonds, showing the various types and applications of these bonds.

J. W. Gorman, Boston, showed a fine collection of large and handsome photographs, showing scenes in many of the beautiful street railway parks in New York and New England, most of which are embraced in his park circuit of attractions.

The Consolidated Car Heating Company, Albany, exhibited some of its various types of electric car heaters.

The Hale & Kilburn Manufacturing Company, Philadelphia, had samples of its cross-seats on exhibition.

The Compound Magnet Brake was shown and operated on one of the cars of the Buffalo Street Railway. The equipment was in charge of P. H. Alexander, of New York.

The H. W. Johns Company, New York, showed samples of the line material and other specialties manufactured by it.

Mayer & England, Philadelphia, exhibited several types of the "protected" rail-bond, and samples of some of the specialties made or handled by them.

Giles S. Allison, of New York, had on exhibition models of the new steel sectional pole for trolley-wire construction, known as the electric tripartite steel pole, and for which he is the general sales agent. Much interest was taken by the delegates in the

models of these poles, and several trial orders were placed. A number of roads on which poles of this kind are installed were represented at the convention, and the expressions in favor of the pole were quite pronounced.

How Can We Increase the Efficiency of Employees?*

BY E. G. CONNETTE

It is obvious that the interest of the employer is in the most faithful, intelligent and willing workmanship; the problem is, what method shall we pursue to secure a high standard of efficient employees. With skilled and willing men we are better able to effect a satisfactory service and more economical operation and a successful management of the interests entrusted to our care.

We will, therefore, discuss the subject upon the hypothesis that to secure an increase in the efficiency of employees, that they must be kindly treated, their willing co-operation must be secured and methods adopted for their education in the service.

I.—KIND TREATMENT

The employer has not discharged his duty in paying a laborer; he owes him also courtesy and friendly respect as a man. Men are naturally susceptible of kind treatment; even the wild instincts of barbaric races have been subdued by the kindness, forbearance and Christian charity of our missionaries. A dog that is kindly treated will wag his tail and give his master a cheerful welcome, while the cur that is beaten and knocked about will snarl and run off with his tail between his legs when his master approaches. All men have more or less pride, no matter what their position may be, and directing men in their work should be done in such a manner as not to humiliate them, but in such a way that they will obey orders cheerfully and manifest an interest which shows, that to obey orders is a pleasure as well as a duty. Sometimes foremen who are placed in charge of departments are incapable of properly directing the men under them, by being abusive, overbearing and humiliating, due in some cases to ignorance and incapacity, but generally by an abnormal case of "swelled head." Some men think that they can make their orders more effective if accompanied with profane language, but, in the opinion of the writer, this only tends to reduce the efficiency, as men who are abused, oppressed, or treated unkindly will resent it in one way or another—this is only natural. Men show their noble qualities—courage, fairness, generosity—to those who treat them well and expect their best. This is true of the horses and cattle, which do their best for the masters who treat them most kindly. Instructions or orders issued in a kind and courteous manner, at the same time with a firm and positive accent, that carries with it respect and loyalty, will attain a quicker and more cheerful obedience, and result in a more contented and satisfied condition of mind, and will induce an earnest desire to comply with the wishes of those in authority. The indulgence of a desire to treat employees kindly should not, however, extend to familiarity, as familiarity may breed contempt and a lack of respect of those in authority; and there should be no relaxation of discipline, but it should be administered with justice and right, always giving the accused the benefit of any doubt which may exist and a penalty fixed which is commensurate with the offense, but only after a full and thorough investigation. Decisions in haste, by those in authority, during spasms of wrath when a breach of discipline occurs, is liable to impress upon employees that "might makes right." Our vocabulary also should contain words of praise and encouragement as well as reproof. Reward of merit is also an incentive to increased efficiency in the service.

II.—CO-OPERATION

A Roman Emperor said: "We are made for co-operation like feet, like hands, like eyelids." It is not right to treat men like machines or as rivals, but we should work together in order to secure an orderly and prosperous state; this is essential to success in all large enterprises—hearty co-operation with both great and small, from the janitor to the manager. A co-operation of brains and brawn—brains to plan and brawn to execute—with that regard and esteem existing between the two that makes an irresistible foe to failure and insures success in every enterprise. A general may direct, but his success depends upon the fighting qualities of his soldiers and the execution of his orders. A hearty, cheerful co-operation between the men and the officers and between the various departments is a large factor in bringing a high state of efficiency among the men.

* Paper read before the New York State Street Railway Association Sept. 18, 1900.

III.—EDUCATION

When by kind and fair treatment the respect and confidence of the men have been secured to such an extent that there is a hearty and cheerful co-operation, the men are susceptible of being educated, and while all men are not born with the same number of talents, still with a state of good feeling existing, they are capable of absorbing instructions and becoming educated to the extent of their capacity; and when men are willing to learn and increase in knowledge, sometimes those who are not even gifted with ten talents become more proficient by reason of their willing disposition and diligent application than others who have a greater capacity, but from a lack of co-operation, kindly feeling and lack of interest, they are unwilling to improve the efficiency of their position. When men are in the proper state to be educated, every possible means should be provided to instruct them in their particular position; but the same method should be observed in giving instructions as is observed in any other method of education. Instructive paragraphs, issued either in bulletin form or printed, should be short, but comprehensive; no unnecessary words or large, incomprehensive phrases used where small words and simple phrases will answer the purpose.

By a concise and simple, yet comprehensive, system of instructions, carefully arranged and administered in digestive doses, it will increase the efficiency of men in their several vocations, and will result in better service, both to the company and to the public, and a more economical operation.

“Storage Battery—Its Use on Small Roads”*

BY B. B. VAN NOSTRAND

The application of storage batteries to the generating system of large electric roads has been described by many engineers in a variety of ways, so that an impression has been left upon many minds that it is only with these larger systems that the battery scheme is feasible. This idea is incorrect, and I think that the following description of the equipment and operation of the Peekskill Lighting & Railroad Company will bear me out in the statement. In the description of this road we shall see conditions that apply in a general way to most small lines.

This road was placed in operation in June, 1899, since which time it has been running without any interruption except momentary stops caused by the circuit breakers flying out. Beginning at the station of the New York Central Railroad, which is at the western edge of the town, near the Hudson River, the road proceeds in a practically straight line through the center of the town and on to Lake Mohegan—a total distance of 4¾ miles. The road is an exceptionally hilly one, in fact the fairly level portions are the exception, and are never more than 1600 ft. long. Beginning at the New York station terminus, the road, as far as grades are concerned, is about as follows: Starting into town, there is 1000 ft. of 7½ per cent grade—with a small portion (say 20 ft.), where it reaches 9 per cent. For a distance of about 4000 ft. beyond this, there is a gradual grade, varying from 5½ per cent to 2 per cent, terminated by 300 ft., of 5½ per cent to 7½ per cent. At the top of this is a short level, leading into a 2000-ft. 2 per cent incline, followed by 1600 ft., varying from 4¼ per cent to 8¾ per cent, which is in turn followed by 2000 ft. of 3¾ per cent up-grade. There is after this a depression, represented by 1400 ft. of down-grade, varying from 6.8 per cent to nothing, which, after passing into a short level, rises by 1400 ft. up-grade, with a maximum of 4.6 per cent, to another short level. Then follows another down-grade of about 1800 ft., varying between 8 per cent and 2 per cent. This is followed by 1600 ft. of level—terminated by 300 ft. of 8 per cent. After this is 1000 ft. of level, passing into a short down-grade of 6 per cent, 1300 ft. of level is after this, passing into 2000 ft. of 7½ per cent. The final portion to the end of the road is about 800 ft. level.

This entire line of single track, with four turnouts, 56-lb. T-rails are used throughout, these being laid in the usual manner.

There is a single-track branch 4000 ft. long, extending from the New York Central station north to the State Camp Ferry. This operates but one month of the year, at which time two cars are in service.

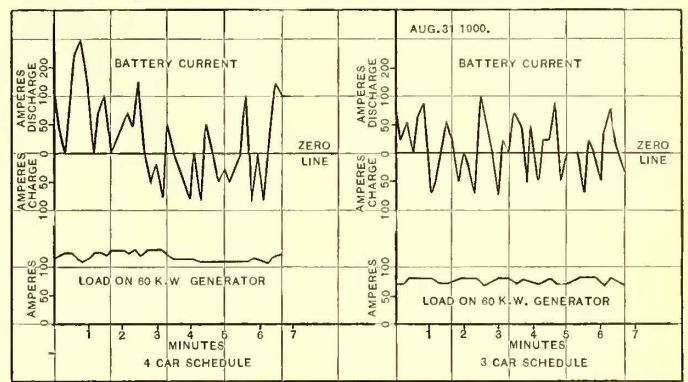
The overhead construction of the system is simple—consisting of 00 trolley throughout, with 0000 feeder, extending to within ½ mile of the lake end and 1000 ft. from the station end. The branch has no feeder. The 0000 feeder is tapped at regular distances throughout its length.

The apparatus for operating the road consists of one 60-kw Edison bipolar 575-volt, 880-r. p. m. generator, belted to a hori-

zontal 13-in. x 12-in. Armington & Sims simple engine, the horsepower of which is about 100, at 275 r. p. m. Belted to this same engine, in tandem with the dynamo, is a four-pole differential booster, which is used to render the charging and discharging of the battery automatic.

There is another unit consisting of a Westinghouse 120-kw multipolar 625-r. p. m. generator, belted to a vertical 14-in. and 24-in. x 14-in. Westinghouse compound engine of 200-hp capacity. It may be added here that this generator is rarely used, and that only when the road is unusually heavy—such as occur on holidays and warm Sunday afternoons. The same engine which operates this generator is also belted to one of the alternators for incandescent lighting. It may be well to note that in addition to the above engines there are three other engines which operate the remaining light machines. These, of course, have nothing to do with the railway system. In the boiler room are three 80-hp and 100-hp horizontal return tubular boilers, carrying steam at 105 lbs. pressure. During the summer months two of the 80-hp boilers are sufficient to run the entire plant—though three become necessary in winter.

The battery, which is in the simple wooden shed next the boiler



room, consists of 262 type-F-9 chloride accumulator cells. Each cell is comprised of nine plates, 10½ ins. square, suspended in glass jars of sufficient size to enable the capacity to be increased in future by the addition of more plates. Each cell is mounted upon a wooden tray, filled with sand, to ensure an even foundation for the jar. These trays rest in turn upon glass insulators, supported by a wooden battery rack. On full charge the battery has a maximum rated capacity of 160 amps. for short periods. As a matter of fact, however, it is often called upon to discharge at a considerably higher rate than this, 250 amps. being called for momentarily.

During the summer season three cars are run from 6 a. m. to 12 m. Two of these run through Peekskill as far as the car house at the eastern edge of the town. The other car runs through the town and on to Lake Mohegan. This gives a twelve-minute schedule in town, and forty-eight minutes through to the lake. In the afternoon and evening four cars are run, giving a twelve-minute schedule in town, and twenty-four minutes through to the lake. On holidays, etc., five cars are run, all going through—thus maintaining a twelve-minute schedule throughout the run.

Having gained a fair idea of the nature of the system, we will pass to the results obtained in the station.

The point of first importance is the remarkable constancy of the load upon the generator, and the correlated fact that the 60-kw machine is all that is necessary to operate the road, except when running the five-car schedule. The curve marked No. 1, in the engraving, will explain this. This shows the results of ten-second readings, taken upon the battery and generator during a short portion of a four-car run. The total line current is, of course, the summation of these two. It is seen that this total current fluctuates between 25 amps. and 310 amps., and that the generator runs along at practically full and constant load—the battery assuming the fluctuations above and below this. Curve No. 2 shows the same results for a three-car run. Here the average or generator load is lower (about 75 amps.), and the line fluctuations from 0 amps. to 170 amps. The practical good of this is evident. It means that a 60-kw machine is running instead of 180 kw, which would be required were the battery not in service. In other words, although the load fluctuates from almost nothing to 180 kw, the average is in the neighborhood of 60 kw, and it is this average only which falls upon the generator and engine. The remarkable evenness of the load upon the generator produced by the operation of a storage battery is shown very nicely by the fact that we are operating our 120-kw railway machine and one of the alternators for our electric lights from the same engine. Ordinarily this would produce a very serious flickering in the lights, but in our

* Paper read before the New York State Street Railway Association Sept. 18, 1900.

case it is impossible to detect the slightest change in the brilliancy of the lamps, although the railway may be fluctuating between its widest limits. I have not had an opportunity to test the coal saving produced by this arrangement, but I am confident from my observations that it is sufficient to pay a good return upon the battery investment over and above the interest and depreciation charges.

The increased economy of a small unit operating at a full and constant load above that of one three times the size, but doing the same work under highly fluctuating conditions, is such as to warrant this assumption.

It would be difficult to increase the simplicity of operation in this plant. After the original adjustment, the apparatus has worked together without the slightest difficulty. We have a generating unit operating under electric lighting conditions, due to the fact that the battery removes from the systems all sudden overloads, and the strain thus removed from the minds of those in charge is in its effect almost as valuable as this latter consideration.

In other ways the battery is valuable. A great many times it has been necessary to shut down the small engine suddenly from some mishap. During the eight or ten minutes necessary to get the other unit into operation the battery has carried the entire load.

Then, too, it is often desirable to run a car for some special occasion very late at night. At such times the generator is shut down and the battery thrown across the line.

In conclusion, I may state that the battery has given us absolutely no trouble since its installation, and the daily labor for its proper care does not average more than one-half hour. In fact about all the work required is that of taking voltmeter and hydrometer readings upon the individual cells once each week.

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Accidents and the Methods Employed in Handling Them *

BY D. W. PATTERSON

It is an old saying that accidents will happen in the best regulated families; likewise is it true that accidents will happen on the best regulated street railways. It is not in the happening of accidents or the facts surrounding them that the real struggle in a negligence case takes place, and in this human nature is well depicted, and often much more care is taken in the preparation of the case from the standpoint of injuries than it is from the standpoint of proving how the accident happened, and many an attorney's dreams of large fees have been frustrated because of his zeal in proving the seriousness of the injuries and neglecting definite information as to how the accident occurred. It is interesting to notice the development of specialists in the law and in medicine, resulting from the possibilities of large fees from such a class of cases. A few illustrations may not be without interest: In one case a man received a slight injury in the location of his spine. There was little question but that the accident occurred in such a manner that the plaintiff was entitled to something for his injuries, but knowing that they were entitled to something they at once became grasping. They not only wanted enough to compensate the plaintiff for his injuries, but the lawyers evidently wanted enough out of it on which to retire. So they procured a large array of medical experts and engaged special counsel, and from the bruise was evolved the most fearful human afflictions. The plaintiff was carried into court, and after this pitiful exhibition his experts went on the stand and testified that he was suffering from amyotrophic lateral spinal sclerosis implicating the motor nuclei of the medulla oblongata. The defendant also produced its experts, and at the conclusion of the trial, which lasted for six days, the jury were so impressed with the falsity of the plaintiff's claim that they brought in a clear verdict in favor of the defendant.

It is such accidents as the one just referred to that are most dreaded by a defendant; where the injury is visible and definite; where an arm is broken or where a leg is amputated, no matter how serious the physical disability may be, there is less danger of large verdicts than where there is opportunity from a slight injury, or mere bruise, to build up a clever claim of a nervous disorder. Accident cases divide themselves logically into three classes:

First.—Where the plaintiff wilfully and systematically perpetrates a fraud.

Second.—Where the plaintiffs themselves are the sufferers of their own delusions.

Third.—The comparatively small number of cases where the nervous conditions claimed are real.

As an illustration of the first, I remember a case where a man had his arm injured, and his attorney asked him how high he could raise his arm, and he indicated a very marked impairment of its use. The defendant's lawyer, after diverting the plaintiff's mind from this subject for a few moments, suddenly said: "How high could you raise your arm before the accident?" and immediately the plaintiff, taken unawares, raised it high above his head. The defendant's attorney asked no other questions, and, amid the laughter of the court room and the amusement of the jurors, the discomfited plaintiff left the stand. In a similar case, a young girl was injured, and the trial not taking place until two or three years after the accident, she claimed that she had been bedridden during the whole time, that her health had been destroyed and that she was absolutely incapacitated from physical exercise of any kind. Nevertheless, upon the trial, while plaintiff was in the court room on a stretcher, the defendant showed a series of photographs in which the plaintiff was depicted hanging out clothes, rowing a boat, climbing mountains and performing other feats requiring physical strength and agility. After she had displayed her pitiful condition and her awful suffering, these photographs were shown to her one by one by the defendant's attorneys, and with flushed face she was compelled to admit that these were correct photographs taken of her since the accident, and that they correctly portrayed her in the acts depicted. These cases illustrate the first class, namely, where all the parties concerned in the plaintiff's case are attempting to perpetrate a gross fraud. It is this class of cases more than any other that test the ability to obtain justice and fair dealing, because with unscrupulous persons, fraud and simulation are so easy and the way of unearthing it so difficult that there is every inducement to cover up the tracks as much as possible, and experience has taught such persons that they are almost beyond the clutch of the criminal law, for while evidence may be procured which would satisfy any reasonable man that fraud and deceit has been committed, it is very difficult to fasten it upon a single individual for the purpose of securing a criminal conviction. But in railways, as in all great enterprises, it is the care which is taken with the apparently minor details which brings present success and gives assurance of future stability, and it is in this case for detail that such cases as these are ferreted out. So that from the moment of an accident until the time it is finally disposed of it receives the closest investigation and preparation.

The second class of cases, so far as the results before a jury are concerned, are as disastrous to defendant as though the injuries were real. They are known to the medical fraternity as cases of hysteria. They result from mental aberrations and not from physical injuries. Remarkable cases of this nature are not uncommon. There is a thoroughly authenticated case in which a person imagined that she was blind, although there was absolutely no defect in any functional part of the eye. Other cases are recorded of where a person thought he was dumb, and one of nervous temperament often imagines that he or she has paralysis or some kindred ailment, and until the mental condition again assumes its normal state for all practical purposes the patient is as helpless as though the injury or disease were real. But, the remarkable part about these cases is that oftentimes the imaginary affliction leaves instantly, as the result of a sudden shock or of intense feeling. But it is of little satisfaction to the defendant to find that after a verdict of \$10,000, \$15,000 or \$20,000 for such imaginary ills that the plaintiff suddenly recovers.

When you consider that as there is all to win and nothing to lose in this class of litigation, it is not surprising with all the chances in favor of the individual and against the railway corporation, that a person who suffers real or imaginary injury from a railway accident very rarely fails to demand compensation from the company responsible, and if they are not responsible they are made so by the testimony of relatives or friends who "happened" in the neighborhood just in time to see it all. Mr. Lawrence Godkin, in Hamilton's System of Legal Medicine, states: "Probably half the jury cases in the courts of the State of New York alone in any one year are actions for personal injuries resulting from alleged negligence." This seems to be not only true, but, as everyone in the legal profession seems to be attracted to accident litigation at some time or other, it is increasing with alarming rapidity. For instance, during the year from October to June, 1895, the law department of the Metropolitan system tried about fifty cases in the county of New York. As against this it tried 233 cases involving \$2,500,000 during the year ending June, 1900, and the claims presented for adjustment have increased proportionately. Again, in 1895, there were no more than 500 actions pending against the company, while at the present time (excluding the new Third Avenue acquisition and its leased lines) there are about 1929 litigants, demanding \$16,000,000, awaiting

* Paper read before the New York State Street Railway Association Sept. 18, 1900.

trial. These figures indicate an increase entirely out of proportion to the number of accidents. What has done more than anything else to foster and increase accident litigation is the protection afforded attorneys by statutes in the enforcement and collection of contingent fees.

The attorney's fees in negligence cases are so large and the possibilities so great that there has been a systematic effort on the part of lawyers interested in this class of cases to procure legislation furthering their interests, and as this is a matter which has recently been before the Legislature and been defeated through our executive, it may not be amiss to refer to it here.

When a person is injured, no matter when, where or how, he is immediately deluged with pamphlets and cards and personal interviews by agents and runners termed in common parlance, "ambulance chasers," who solicit the injured person as a client for this, that or the other attorney. Oftentimes the first news a wife has of her husband's injury is from one of these lawyers coming to solicit her patronage and oftentimes the last person that a dying man gazes upon is the agent or runner of some of these lawyers. When one is successful in making an unfortunate victim of an accident his client, the agreement is at once presented, providing that the attorney shall get a percentage of the recovery together with all costs and disbursements and the percentage most usually inserted is 50 per cent. Long ago the influence of these attorneys was such as to secure legislation protecting such contracts and preventing the defendant from settling with the injured person without providing for the attorney also, but not satisfied with this, at the last session of the Legislature, a bill was passed which not only gave the attorney this lien upon his client's cause of action and which protected him against a settlement, but the new bill was directed toward absolutely prohibiting the party injured and the party causing the injury to settle their differences, and allowed the plaintiff's attorney, in case such settlement was made, to make a summary motion at Special Term and procure the same relief that he would have sought had the case been tried before a jury. As already said, the bill passed both Houses, but when it came to the Governor for signature, he withheld it and delivered the following memorandum:

"I withhold my signature from this bill because in my judgment it is thoroughly vicious. It provides that no settlement of any lawsuit shall be valid without the consent of the attorneys or without an application to the court upon notice to the attorneys. The code now provides all necessary security for an attorney in that it gives him a lien upon the cause of action. This bill would be of benefit chiefly to the very lawyers whom the honorable members of their profession least desire to see benefited—that is, to those who bring suits for damages on account of accidents and who wish to be in a position to mulct both their own clients and the defendants in ease of a settlement. In its first draft the bill applied only to negligence suits. As it was passed, it applies to all suits. An unscrupulous attorney might turn it to his advantage by bringing a blackmailing suit at the eve of any great commercial or railway consolidation, when it would be in his power to hold up a settlement involving great sums of money. In short, the possibilities for fraud which are afforded by this bill are so numerous that it is not entitled to any consideration."

The unconscionable contract alluded to also specifies that the plaintiff is to bear all costs and disbursements. These two words have a very broad and comprehensive meaning when used by attorneys. Under it, the plaintiff's attorneys will place all expenses incurred in the preparation and trial, and as it is beneath him to itemize, why a lump sum is named, and as lawyers never have been noted for the correctness of their accounts, it may be confidently said that these disbursements are never underestimated. But the great inroad upon the plaintiff's 50 per cent of the recovery is made by his medical experts. These gentlemen are in such demand that they readily command from \$150 to \$250 a day, and oftentimes in the trial of a case they are required to attend parts of several days, and not infrequently to attend upon retrial of the action, and, as in the law, parts of days are never counted, so in estimating the bill for their services parts of days are ignored, and whenever called upon to appear the charge is for a day.

Is it to be wondered at that nearly every accident results in a law suit. Is it to be wondered at that to this branch of the law many are attracted whose only attributes are shrewdness and cunning. But more than this, leaving out of consideration the third parties, is it to be wondered at that the injured person is willing to accept a comparatively small amount in settlement, where such amount is paid to the person injured without any deduction for attorney's fees.

Adverting to expert testimony, mention should be made to the expert motorman. If he finds himself in the witness chair before a court room full of people there seems to be an irresistible tendency for him to attempt to show off, and this most often takes

the form of claiming that he can stop a car in an incredibly short distance. It is a common occurrence if given the opportunity to testify, that he can stop a car within 5 ft. going 12 miles an hour. The highest appellate tribunal seems to have recognized the impossibility of this, for they have said that "This, upon its face, is untrue, for it takes one-half second to go 5 ft., a time not only manifestly insufficient to stop a car, but even to set the brake;" and here again the importance of having a motorman fully understand that by the question, within what distance can you stop your car, is meant not the distance a car goes after the brake is set, but means the distance the car goes from the time the object suddenly appears upon the track, and it is suggested that nothing can serve more profitably than for motormen to make practical experiments in stopping cars under similar circumstances to those under which they are called upon to testify. If this were done it would soon be appreciated that instead of stopping cars of many tons' weight within an incredibly short distance, that this distance might be doubled or even trebled, and if such experiments were conducted with sufficient frequency and publicity and made a matter of general notice, both the public from whom the jurors are drawn, and even judges who sit in review, would soon be in possession of undisputed facts, which would dispose of many cases which now serve as the means for furnishing a house for the client and a castle for the counsel. As a means of getting this matter before the public in such a way as to show its bona fide and reliability, it may be suggested that incentive be furnished to motormen by competitive prizes to be awarded for the best stopping.

It must have occurred to some that this subject of accidents has more to do with human nature than it has with the operation or management of street railways or with care or carelessness of the public. The number of actions brought to-day for personal injuries is out of all proportion to the number of actions brought in the recent past. It is not the result of a large percentage of injuries, but may be attributed largely, if not entirely, to the methods employed of appealing to human weaknesses and by arousing cupidity, throwing all else into the dim background. There is no remedy which can be suggested that is not too radical to be practiced.

The present condition is not due to chance or to the use of the term which served the subject of this paper "accident," it is the result of a system which is firmly established and is something which not cured must be endured.

Railway Power Transmission *

BY J. H. ARMSTRONG

In adopting 500 volts for railway service in the earlier days of the industry, it was thought that a sufficiently high potential had been chosen to make line losses a secondary consideration. The weight of cars and size of motors first used made it necessary to use much feeder copper in addition to the trolley wire, which, in most cases, had sufficient carrying capacity to move the cars at the extreme end of the road. The public were not very exacting in their requirements for rapid transit, and were satisfied with a service that would not be tolerated in our smallest systems of to-day.

The heavy cars, high schedule speeds and frequent stops of modern electric railway service have increased the car energy consumption to such an extent as to make the question of supplying a reasonably constant voltage over a large network one of the most important questions to be dealt with. Not only is this true of long-distant suburban roads extending 30 and 40 miles from the power house, but the large city systems have been so increased in extent by the consolidation of many small roads as to render almost inoperative the old system of 500-volt direct-current transmission from a single feeding point. The city system differs from its suburban offspring only in the more steady character of the station load, as the number of miles of track operated from a single generating station and the length of the longest feed in some of our large city systems is equal to or greater than any of our suburban roads now in operation.

The economical distribution of energy to the various units operating in a large railway system is, therefore, a question of as great importance and one to be treated along approximately the same lines in city service as in long-distant cross-country roads. This is especially true when we consider the advantages of locating a generating station in the outskirts of a large city where coal and water are available, facilities for removing ashes at hand, and

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real estate cheap, contrasted with the operation of one or more generating stations around which a growing city has spread itself, bringing up the fixed charges and operating expenses to a prohibitive limit.

In considering so large a question as the proper generation and distribution of power for railway service it will not be possible to enter into the many local details which will largely govern the system adopted in many cases, but various points common to all systems will be touched upon and some of the limitations of the various systems of operation brought out.

There are five recognized methods of distributing power which are applicable for railway work:

1.—500-volt direct-current distribution using the standard 500-volt to 600-volt direct-current railway apparatus.

2.—The operation of series-wound direct-current boosters in connection with 500-volt D. C. apparatus.

3.—The use of three-wire distribution using the track as a neutral.

4.—Alternating current distribution employing the use of alternating current generators of high potential, with step-down transformers and rotary converters suitably located.

5.—Alternating current generation and transmission with alternating current induction motors mounted upon the cars in place of the direct-current motors in the above four methods.

Excepting the last method of transmission—alternating current generation with induction motors—practically the same conditions govern the operation of large city and suburban roads. The design and operation of alternating current induction motors, however, depends entirely upon the character of the service which they are to perform, and their use will, therefore, be considered separately.

The first three methods of operation can be considered under the general head of:

DIRECT-CURRENT DISTRIBUTION

The advantages resulting from the concentration of generating apparatus in a single station have been demonstrated by the elimination of the various small generating stations when a number of small railway interests have been consolidated; operating expenses are reduced thereby partly on account of the reduced number of attendants required, less real estate carried on the books, and largely by the reduced coal consumption resulting from the more even load curve having small fluctuations.

In combining a number of 500-volt direct-current stations into one power house of their combined capacity, one of the most serious limitations of the direct-current system is immediately met with, that is, the limited area over which power can be transmitted economically with a reasonable amount of capital invested in feeder copper. If the generating station is located in the center of distribution of a closely congested district the copper investment will be comparatively small, but the price of real estate is high, and the location carries with it the probability of expensive water supply for condensing purposes and poor facilities for handling coal and ashes. The generating station also is likely to be hemmed in and little chance left for expansion, except at excessive cost of acquiring adjoining property. Hence although such a station operates at high efficiency as regards the transmission of power including interest on capital invested in copper, there are many fixed charges and operating expenses tending to bring up the total cost of generating power.

A generating station located in the heart of a city has to contend with the continual growth in the outskirts and the increased needs of heavier and more frequent car service, at what soon becomes a considerable distance from the center of distribution. It is also probable that parks and pleasure grounds will be located in the outskirts of the city at considerable distance from the power house, at which it is necessary to concentrate a large number of cars at very infrequent intervals.

The problem then becomes one of installing sufficient copper to take care of a service occurring but a few times during the year, during the remainder of which the copper investment is lying idle, or of installing series-wound boosters with a comparatively small booster feeder extending to the point of concentration of load. The booster in itself is expensive to operate, as it represents a dead loss of so many watts in the booster and feeder conner, but its operation for intermittent service of this character is fully warranted and preferable to the installation of a large amount of feeder copper carrying with it large interest charges, which are not warranted by the average traffic during the year.

The further increase in the growth of the town introduces new factors in the way of suburban connections which it is desirable to operate under the same management and from the same generating station as the city lines which feed them. The distance from a generating station centrally located for the congested

traffic is, perhaps, so great as to necessitate a capital investment in feeder copper whose interest charge offsets the profits from operating such suburban connections. It is true that a direct-current generating station can be located somewhat outside the center of distribution of city load and in the direction of probable suburban extensions, but this entails a transmission of the main bulk of the load some distance to the center of distribution, resulting in a cost for power which, added to the interest on copper invested, may offset the advantages otherwise accruing to a suburban location.

Boosters may be installed for permanent operation, but, while it is true that local conditions largely govern the use of boosters, it can be generally stated that it is not economical to operate them on continuous service, while for intermittent service to help out a poorly coppered line on some special occasion they are valuable and might well be included in the apparatus of a central station.

The three-wire system has been mentioned as a possible means of power transmission for railway work, but only a general reference can be given to such a system owing to the delicate nature of balancing the two sides of the circuit, which is almost entirely a matter for local consideration. Such a system must necessarily require more care in laying out and more careful attention during operation than straight 500-volt distribution, but it may in certain cases afford sufficient advantages to warrant its adoption. In heavy work on private right of way where no objection exists to the use of two third rails, a balanced three-wire system may be used in which unbalancing is overcome, but the conditions demanding the adoption of such a system are entirely local and call for special consideration.

Most of our large city railways and practically all of our suburban roads operate their cars upon a recognized schedule, which is being adhered to more and more as the public becomes accustomed to a time table on electric roads. Where the headway is very short, say, two or three minutes or less, it is not necessary to refer to any time table, but most systems operate on a longer headway, and in such roads it is of the greatest importance that favorable conditions exist for the maintenance of a predetermined schedule. The 500-volt direct-current system fed from a single generating station centrally located affords full station potential in the congested districts where it is least needed, and minimum potential in the outskirts where the highest speed running is called for. If suburban connections are provided, the line voltage over an extended route will fall considerably from the bus-bar potential, and a schedule that can be maintained satisfactorily during normal operation becomes inoperative with such a system of distribution during hours of maximum service, owing to the considerably increased feeder drop at such periods. As the headway of cars is not so short as to interfere with the maintenance of schedule speed in the outskirts or on suburban lines, the copper investment becomes the determining factor in the maintenance of the schedule and the overload capacity of the system. Many of our suburban roads parallel steam roads and depend for their existence upon their ability to make as good time with more frequent stops as their steam competitor. The ability of the electric cars on such roads to make high schedule speed depends upon the maintenance of a good average line voltage over the entire route, while the frequency of service being perhaps one-half hour between trains is not sufficient to warrant the very great feeder copper investment that may be demanded by 500-volt direct-current distribution from a single generating station.

The necessity of re-enforcing the trolley voltage at intervals along an extended route has led to the development and adoption of the alternating-current system of distribution, which will be discussed under the general head of:

ALTERNATING-CURRENT SYSTEM OF DISTRIBUTION

The alternating system consists in brief of a generating station containing alternators generating polyphase current of several thousand volts, or generating currents of low voltage, which are stepped up to the required line potential, and transmitting this energy over a high-tension transmission line to sub-stations suitably located. These sub-stations contain step-down transformers and rotary converters, but may contain motor generator sets with an alternating motor wound for receiving the high-tension voltage direct without any intermediate transforming devices.

The system, therefore, possesses the advantages of being able to transmit energy over large areas at high voltage with a consequent small copper investment and small loss, while it can be transformed to direct current of 500 or 600 volts where most needed.

Owing to the large area which it is possible to feed from a single station, any local fluctuations of load are smoothed out and the generating station load curve can be made comparatively free from momentary fluctuations, thus resulting in high coal economy.

Where the length of the transmission line is comparatively small and potentials of not more than 10,000 or 12,000 volts are required for economical distribution, it is possible to wind the alternating current generators for the line voltage, thus dispensing with step-up transformers, but these become necessary where transmission potentials of 20,000 volts or more are necessary to keep line losses small with a reasonable investment in transmission copper, as it is expensive to wind generators for such high potentials. Step-down transformers must always be used in sub-stations where rotary converters are employed, as the voltage of the alternating side of the rotary converter bears a fixed ratio of about 64 per cent of the direct-current voltage, being thus approximately 350 volts for a 550-volt direct-current converter of the three-phase type. Motor generator sets may, however, receive line voltages up to 10,000 volts, but the saving of step-down transformers in this case is offset by the extra cost of the motor generator set over the rotary converter.

The alternating system has to contend with the loss incurred by transforming high-tension alternating current to 500 volts direct current, this loss being approximately 8 per cent at full load of converters and transformers. There is added to this a transmission line drop of 4 per cent or 5 per cent making the total drop from alternating-current generators to the direct-current bus-bars of the sub-station probably $12\frac{1}{2}$ per cent at full load. In figuring upon the adoption of alternating current apparatus for railway work this loss of $12\frac{1}{2}$ per cent must be taken into consideration and balanced against extra interest charges of copper investment and larger direct-current feeder drops of the straight direct-current system. To be more exact, the cost of the energy lost in feeder copper and transforming devices should be added to the cost of the sub-station attendance and interest charges on feeder copper for the alternating system, and compared directly with the cost of power lost in feeders and track, and interest on copper investment of the straight direct-current system.

The cost of maintaining a rotary-converter sub-station becomes a comparatively small factor in the operating expenses, due to the fact that a large part of this expense can be charged up to other accounts. In suburban roads the sub-station attendant combines with his other duties that of ticket seller, train despatcher, etc., duties which would demand the service of a man if a sub-station were not located at that point. In large city systems, where sub-stations are of considerable size, a certain amount of attendance is required, but this expense is small, as the duties of a sub-station attendant are very light.

The alternating system possesses the great advantage of being perfectly flexible and adapted for future growth or extension of the system. The possibility of locating sub-stations in newly opened districts and operating them from the main station with a small line loss and small copper investment, gives the alternating system a distinct lead over the straight 500-volt direct-current system with its limited sphere of action.

In a large city system it is possible to inter-connect the 500-volt feeder network so that during light night loads the outlying sub-stations can be shut down and the entire load thrown upon one or more centrally located stations, thus operating some of the sub-stations with perhaps one shift of attendants.

Modern suburban cars operating at speeds between 40 miles and 50 miles per hour, consume nearly 100-kw average for a 25-ton car, but demand two or three times this amount while starting or on severe grades. A direct-current generating station, supplying nothing but a suburban system operating upon half-hour headway, must sustain very violent fluctuations in load, resulting in a coal consumption in the vicinity of 6 lbs. per kw-hour, when the same engines would probably run on $3\frac{1}{2}$ lbs. with a uniform load curve. The alternating current system, by combining the load of several isolated generating stations upon one set of engines, smooths out these violent fluctuations, thereby producing a load curve upon which engines and boilers will operate economically.

There are certain railway projects calling for intermittent running of very large units, demanding a large local consumption of power over an extended line. Trains may not follow each other at sufficiently frequent intervals to warrant the operation of rotary-converter sub-stations located at short distances apart, much less the installation of several isolated direct-current generating stations. Cheap water-power privileges may be in the vicinity of the line, offering an excellent reason for electrically equipping the system, provided the first cost of installation and labor expenses of operating can be kept reasonably low.

The alternating-current induction motor has been in commercial operation for several years, and is being manufactured in sizes of several hundred horse-power, starting with full-load torque or greater when used for such work as hoists, etc. The principles of its construction are well understood, and it can be accurately

designed for the work it has to do. A train propelled by induction motors presents some characteristics which are novel from a direct-current motor standpoint.

The speed of the train is fixed not by the voltage of the trolley, as in the direct-current system, but by the frequency of the source of supply, which offers a much surer guarantee of maintaining a fixed schedule speed than the variable voltage supply of the direct-current system. The induction motor also has no commutator, and offers certain advantages in the way of a better dissipation of losses than the direct-current motor, so that its adoption upon long trunk lines presents many advantages.

The main benefit secured by using induction motors on long lines having infrequent travel is the low cost of installation and of operation due to the use of one or more generating stations feeding step-down transformers located along the line which do not require more than casual inspection. The main transmission line may operate at 10,000 volts or 20,000 volts or higher, depending upon the bulk of power and the distance to which it is to be transmitted, while the trolley or third-rail voltage being no longer confined by the limitations of the direct-current commutator can be raised to several thousand volts if necessary, and, in fact, is only limited by the quality of line insulation. By raising the trolley voltage to several thousand volts it will not be necessary to install expensive third-rail construction, as the currents carried will be small, and can be taken from overhead construction.

The location of step-down transformers along the line is determined by their relative cost and the cost of trolley and feeder copper between them. As they are used for intermittent service only while a train is passing, the step-down transformers can be made of small thermal capacity, but of large momentary overload capacity, so that their cost being small they can be placed comparatively close together, keeping line drops low and raising the efficiency of transmission.

The alternating-current induction motor system thus offers a system where schedule speed can be maintained without respect to line drop or grades, which feature particularly recommends it for the equipment of suburban and trunk lines having no city connections where it will be necessary to operate cars over city streets.

The alternating system requires polyphase motors to insure good starting torque, and to prevent loading up the lines with lagging or useless currents, and three wires being required it is undesirable to operate with a double trolley through crowded city streets. Suburban cars which pick up their passengers through the city have the advantage of providing a continuous passage from the heart of the city to the terminus of the road, while the induction motor suburban road would require a transfer station at the outskirts of the city.

The induction-motor system, therefore, appears best adapted for the operation of long suburban roads having no city connections, and especially those roads where heavy trains operate at infrequent intervals. By emphasizing this latter kind of road it is not intended to convey the impression that the induction-motor system is not equally well adapted for frequent service, but short headway is warranted only in crowded districts where the operation of rotary converter sub-stations would perhaps offer advantages in the distribution of 500-volt direct-current power for local railways.

RECAPITULATION

In the foregoing discussion the attempt has been made to bring out the fact that the electric railway field has become so broad and includes so many different problems in railway engineering that no one system of distribution is adapted for all classes of service. A small congested system, having its lines within easy reach of the power house, which enjoys good coal and water facilities is distinctly a 500-volt direct-current system, or if it has suburban lines where the service is intermittently severe the station should include a series-wound booster in its equipment.

Larger systems, either city or suburban, where the power generated is large and must be transmitted over considerable areas, present the dividing line between the 500-volt direct-current system and the alternating-current sub-station system of distribution. Local details enter into the problem in so large a degree in the consideration of such roads it is only possible to make the general statement that that system of distribution is the better in which operating expenses added to interest on copper investment and fixed charges figure out the lowest.

Suburban roads operating considerable lengths of track over which run heavy cars of 25 tons or 30 tons at speeds of 40 miles and 50 miles per hour can usually find in the alternating system a cheaper method of operation and a considerably cheaper first investment than will be the case if a number of comparatively small isolated direct-current stations were installed, or the attempt made to feed from a single direct-current generating station. The use of

boosters in such direct-current stations for permanent operation must prove expensive, and their operation will contrast unsatisfactorily with the service secured from rotary-converter substations fed from a single generating station well located.

The next class of service into which electricity has been entering in the last two or three years, the equipment of existing steam lines for suburban work and finally for trunk lines, calls for requirements which the alternating rotary-converter system cannot fulfil in many cases, owing to the infrequency of the trains. It may not be advisable in such roads to spilt up the large heavy trains into a number of smaller, more frequent units, especially if these large trains carry freight, owing to the increase in the labor expense account.

The alternating induction-motor system can operate heavy trains as a whole without increasing the large labor account by substation attendance, and can further guarantee the maintenance of a fixed speed over an extended line independent of line voltage and grades, and irrespective of the number of trains moved, a feature which is the basis of the operation of such long-distance roads. Where the service is more frequent, the dividing line between the induction-motor system and the rotary-converter system becomes less sharp, and local considerations may enter as the deciding factor in the adoption of one system or the other.

The system of distribution, like the railway motor itself, must be adapted for the work in hand, and, although the field of the three main systems overlap each other, there are certain fundamental characteristics of each which particularly adapt them for the operation of their own specific class of service.

Mr. Davis' Paper

BOSTON, Mass., Sept. 18, 1900.

EDITORS STREET RAILWAY JOURNAL:

DEAR SIRs.—I beg to call your attention to a typographical error in the paper which I read before the New England Street Railway Club on Sept. 15. Near the end of the paper I am made to say: "The fluctuation in watts, or energy, demand on the dynamo does not increase in proportion to the drops." What I did say was: "The demand on the dynamo does not increase in proportion to the amperes, because at the moment of the pull the generator voltage drops."

I also note that in the discussion Mr. Spring is quoted as saying: "The presence of the battery enables him to start the rotaries from the alternating current end." What he did say was: "The battery enables him to dispense with starting the rotaries from the alternating current end."

PHILIP W. DAVIS.

Train to the Kansas City Convention

The committee on transportation to the Kansas City Convention has issued the following circular:

CIRCULAR

The committee beg to advise that they have arranged with the Boston & Albany and New York Central & Hudson River Railroads for the accommodation of delegates and others, attending the above convention, as follows:

Leave Boston,	B. & A.	10.45 A. M.	Sunday, Oct. 14th.
" Worcester,	" "	11.47 A. M.	" " "
" Springfield,	" "	1.08 P. M.	" " "
Arrive Albany,	" "	4.10 P. M.	" " "
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Leave New York,	N. Y. C.	1.00 P. M.	" " "
" Poughkeepsie,	" "	2.43 P. M.	" " "
Arrive Albany,	" "	4.15 P. M.	" " "
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Leave Albany,	N. Y. C.	4.30 P. M.	" " "
" Utica,	" "	6.48 P. M.	" " "
" Syracuse,	" "	8.15 P. M.	" " "
" Rochester,	" "	10.05 P. M.	" " "
Arrive Buffalo,	" "	11.55 P. M. (E. T.)	" " "
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Leave Buffalo,	L. S. M. S.	11.00 P. M. (C. T.)	" " "
" Cleveland,	Big Four	3.35 P. M.	Monday, Oct. 15th.
" Indianapolis,	" "	11.45 A. M.	" " "
Arrive St. Louis,	" "	6.45 P. M.	" " "
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Leave St. Louis,	Wabash,	10.15 P. M.	" " "
Arrive Kansas City,	" "	7.00 A. M.	Tuesday, Oct. 16th.

The train will consist of Pullman vestibuled drawing room sleeping cars, and dining car, serving meals through to Kansas

City. A special representative of the New York Central will accompany the party to Kansas City.

RATES OF FARE

Special rate of one and one-third fare on the certificate plan has been made, and delegates, when purchasing tickets, should ask ticket agent for certificate, which, on presentation at Kansas City, will secure one-third fare for the return trip. Sleeping cars at regular rates.

The committee in charge would respectfully urge that all who take the special train at New York, or stations on the New York Central & Hudson River Railroad Company, to communicate with Milton C. Roach, general Eastern passenger agent, New York Central & Hudson River Railroad, 1216 Broadway, New York, stating exact accommodations required, and from what point.

Fare from New York, one way, \$31.75. Sleeper, one way, \$7.50. Money can be remitted to Mr. Roach direct.

Those who will take the train at Boston and stations on the Boston & Albany Railroad should communicate with J. L. White, passenger agent, Boston & Albany Railroad, 366 Washington Street, Boston.

Reservations will be made in order as received, and prompt notification of assignment made to applicant.

The committee would respectfully suggest that delegates and their friends should make early arrangements. Applicants should address or call on ticket agent, Wabash Railroad, at Kansas City, for the return trip.

If the number will warrant, arrangements will be made for a special train from New York, Sunday morning about 10 o'clock, arriving at Kansas City Monday evening. The committee therefore earnestly requests all those who intend going to notify its members at once, so that, if possible, the necessary plans for the special may be made.

H. H. VREELAND, Chairman.
JAMES H. MCGRAW,
T. C. MARTIN,
CHARLES W. PRICE,
Committee for New York.

CHARLES S. CLARK,
Committee for Boston, 8 Oliver Street, Boston.

Street Railway Patents

[This department is conducted by W. A. Rosenbaum, patent attorney, 177 Times Building, New York.]

STREET RAILWAY PATENTS ISSUED SEPT. 10, 1900.

657,622. Ice-Removing Mechanism for Railroads; J. J. Shirkey, Chicago, Ill. App. filed April 30, 1900. A series of spring supported wheels adapted to crush, grind and brush aside ice and sleet on third rails.

657,668. Automatic Railroad Frog; C. W. McKinney, Butte, Mont. App. filed July 5, 1900. Details of construction.

657,669. Air-Brake; J. J. Nef, New York, N. Y. App. filed June 22, 1898. Comprises automatic pump governing and controlling devices and friction clutch controlled by pump governor to throw the pump into and out of operation.

657,690. Switch Operating Apparatus; M. W. Brown, E. A. Byrne and J. Gilsenan, Newark, N. J. App. filed May 24, 1900. A box located between the rails underground contains a pivoted lever which is adapted to throw the switch tongue in either direction. A pair of links extend from this lever and connect with plates located at the surface of the ground. Pressing upon either of these plates to throw the switch may be exerted from a passing car through suitable levers carried by the car.

657,746. Body Bolsters for Railway Cars; E. W. Palmquist, St. Louis, Mo. App. filed June 4, 1900. A cast body bolster consisting of sides having horizontally extending flanges, a bottom provided with center and side bearings, and webs that tie the sides together at the top.

657,751. Rail-Joint; W. J. Whitaker and S. M. Gruber, Dravosberg, Pa. App. filed June 26, 1900. The rails are provided with extending tread portions so that when the ends of the rail abut a recess will be formed beneath the tread. A block of a contour similar to the web and base of rail is fitted in the recess, and the joint then mounted between fish-plates, which are formed integrally with the chair for supporting the base.

657,811. Rail-Joint; T. C. Clarke, New York, N. Y. App. filed Feb. 21, 1900. Comprises a pair of base plates upon which the rails rest, each plate having clamping lips for engaging the flanges of the rail and a girder formed by bending the outer portions of the plate downwardly, so that a transverse bolt may pass through such bent portions and secure the two plates. The bolt lies beneath the rail.

657,870. Railway Rail and Joint; S. Hazard, Cincinnati, Ohio. App. filed July 27, 1899. A railway rail of the T type, having an eccentric head reduced in depth upon one side and its flanges bearing proportionately projected upon the opposite or gage side of the head.

657,888. Joint for Railway Rails; J. F. Scullen, Chicago, Ill. App. filed Feb. 26, 1900. The abutting ends of the rails are beveled, forming an obtuse angled opening into which a correspondingly shaped section rail is fitted; the latter bridging the joint and being bolted to both.

PERSONAL MENTION

MR. J. S. SYMINGTON, president of the Sarina Street Railway Company, of Sarina, Ont., died suddenly a few days ago.

MR. A. N. CONNETT, of the J. G. White Company, Ltd., of London, and recently chief engineer of the French Thomson-Houston Company, of Paris, has been awarded a gold medal by the authorities of the Paris Exposition for the best exhibit on trolley construction.

MR. J. R. WHARTON, manager of the Butte Consolidated Railway Company, of Butte, Mont., was recently tendered a banquet by his employees as a tribute of esteem and a mark of respect. The banquet hall was gorgeously decorated for the occasion, and covers were laid for thirty-six guests. A most excellent repast was enjoyed, after which Mr. Wharton was presented with a gold watch, chain and charm by his employees.

MR. A. L. PARKER has recently been appointed second vice-president of the Detroit, Rochester, Romeo & Lake Orion Railway Company, of Detroit, Mich. Mr. Parker was formerly general secretary of the Y. M. C. A. at Detroit, and a year ago associated himself with John Winter, Oliver H. Law and Frank C. Andrews in their electric railway enterprises. They are the promoters of the Detroit, Rochester, Romeo & Lake Orion Railway, and the appointment is made in recognition of the valuable service rendered by Mr. Parker in the projection of different lines in which they are interested.

ENGINEERING SOCIETIES

AMERICAN SOCIETY OF CIVIL ENGINEERS.—At a regular meeting of this society, held Sept. 19, L. C. Montony presented a paper entitled "The Ninety-Sixth Street Power Station of the Metropolitan Street Railway Company, of New York City."

NEWS NOTES

[News notes for this department are solicited.]

SAN FRANCISCO, CAL.—The Market Street Railway Athletic Club and Band gave an entertainment and dance at their new hall and clubroom at Valencia and Twenty-Eighth Streets on Aug. 31. An interesting programme of musical and athletic events was presented.

NEW HAVEN, CONN.—The Winchester Avenue Railroad Company is considering the equipment of its closed cars with vestibules.

DENVER, COL.—It is stated that J. Brisben Walker, of Irvington, N. Y., has become interested in the Denver, Boulder & Northern Railway, and that the construction of the line is now assured.

WASHINGTON, D. C.—It is said that the officials of the Washington Traction & Electric Company are considering a plan for hauling farm products from the adjacent country. Large quantities of milk and vegetables can be brought into the city, and it is thought that this would prove quite profitable.

WASHINGTON, D. C.—The officers and employees of the Washington Traction & Electric Company are planning to form a relief association for the benefit of the 950 men employed by the company. President F. C. Stevens has promised to give \$1,000 for the company as a nucleus for the fund. The monthly dues will be 50 cents or \$1, and there will be an assessment of 10 cents on the death of any member. It is said that the establishment of a loan branch is contemplated.

CHICAGO, ILL.—A misplaced switch caused a car of the Calumet Electric Street Railway Company to jump the track at Stony Island Avenue and Seventy-Ninth Street a few days ago. The car ran into a ditch. Five passengers were badly shaken up, but were uninjured.

EAST ST. LOUIS, ILL.—Mayor Mathews, of Collinsville, has vetoed the ordinance granting the Mississippi Valley Railroad Company an extension of time for the completion of its line. The company applied for a charter a couple of years ago, and offered to build a line from the northern limits of East St. Louis along the Collinsville Road to the city of Collinsville, on the

bluffs. Later the company applied for and was granted an extension in the matter of time for the completion of the line. The two years' extension was up a couple of months ago, and the company took another extension to Jan. 1, 1901. It was understood that the line could not be built by that time, and the company, by petition, applied for an extension of time at a recent meeting of the Council. The request was allowed after a fight in Council, but Mayor Mathews claims that the company has not kept its promise, and that he does not propose to let the road occupy the streets under the present ordinance, or even an extension of it.

CHICAGO, ILL.—The traffic report of the South Side Elevated Railroad Company for August shows that 1,908,267 persons were transported, as against 1,630,569 for August of 1899. The daily average for August, 1900, was 61,557, as against 52,599 for August, 1899. Below are given the traffic records so far this year, with comparison with those of last year:

	1899	1900
January	1,821,609	2,154,624
February	1,688,176	1,961,400
March	1,981,179	2,240,184
April	1,916,340	2,149,950
May	1,847,228	2,117,176
June	1,683,510	2,036,760
July	1,631,964	1,890,132
August	1,630,569	1,908,627

CHICAGO, ILL.—The traffic report of the Metropolitan Elevated Railroad Company shows that 2,432,167 passengers were transported in August, 1900, as against 2,110,170 for August, 1899. This year's traffic figures compare with those of last year as follows:

	1899	1900
January	2,242,490	2,756,135
February	2,109,632	2,593,304
March	2,456,533	2,929,748
April	2,323,920	2,712,900
May	2,352,590	2,674,928
June	2,172,990	2,466,180
July	2,093,338	2,287,490
August	2,110,170	2,432,167

BILOXI, LA.—Albert L. Covell, chief engineer and general manager of the Gulf Coast Electric Railway, is hopeful of beginning work on the new line in the near future. The road is to extend from Biloxi to Gulfport, with a branch to Handsboro.

DETROIT, MICH.—The People's Street Railway Company, a new line, is about to make application to the Council for a street railway franchise. Messrs. Stevenson, Merriam, Eldredge & Butzel are counsel for the company.

DETROIT, MICH.—There is talk of building a third electric railway from Detroit to Pontiac. Thomas W. Palmer is said to be behind the latest project.

DETROIT, MICH.—The Detroit, Rochester, Romeo & Lake Orion Railway Company has recently issued a beautiful brochure entitled "Scenics," descriptive of its line. It is printed on wood-cut paper, the reading being in red and the illustrations in green ink. The illustrations represent scenes along the line, and, from an artistic point, it is a fine specimen.

ST. LOUIS, MO.—The attorneys for the St. Louis Transit Company have filed a motion in the Supreme Court to quash the writ filed by the Attorney-General of the State to annul the transit franchise.

ST. LOUIS, MO.—The Suburban Railroad Company has applied to the Florissant Town Council for a franchise to extend its lines to the corner of St. Francis and Castelloe Avenues.

CAMDEN, N. J.—An ordinance granting the Camden & Suburban Railway Company a franchise for the construction of an electric railway through Riverton has been passed by the Riverton Council.

JERSEY CITY, N. J.—The North Jersey Street Railway Company will shortly make application to the Council of East Orange for a franchise for the construction of electric railway lines on Central and Springdale Avenues.

JERSEY CITY, N. J.—The North Jersey Street Railway Company and the Jersey City, Hoboken & Paterson Street Railway Company have completed arrangements with the postal authorities for transporting the mails between Jersey City, Hoboken, Bayonne and Union Hill.

CAMDEN, N. J.—The South Jersey Gas, Light & Traction Company, which recently completed a consolidation of Southern New Jersey gas, light and street railway companies, has elected officers as follows: Anthony R. Kuser, of Newark, president; William J. Bradley, of Camden, vice-president; Thomas N. McCarter, Jr., of Newark, treasurer. Directors: Uzal H. McCarter, Forrest F. Dryden, Chandler W. Riker, of Newark; Thomas A. Nevins, of East Orange; John L. Kuser, of Bordentown; William J. Thompson, of Gloucester; John J. Burleigh, of Camden; Herbert W. Johnson, of Merchantville; Charles Watson, of Camden; Barker Gummere, of Trenton; Frank Bergen, of Elizabeth; Thomas C. Barr, of Orange; Frank W. Montgomery and Maitland F. Griggs, of New York. The authorized capital stock of the company is \$6,000,000, of which \$3,389,000 has been issued. The company has authorized a mortgage in favor of the Fidelity Trust Company, of Newark, to secure an issue of \$6,000,000 5 per cent gold bonds. Of this issue, however, only \$3,160,000 are to be issued at present. The remainder will be held in the treasury for future needs. Among the companies included in the consolidation are: Camden Gas Light Company, Camden Gas & Fuel Company, Camden & Burlington Gas & Electric Company, Consumers' Gas Company, of Woodbury, East Side Gas Company, Gloucester Electric Company and the Camden, Gloucester & Woodbury Electric Railway Company.

PLAINFIELD, N. J.—A car of the Elizabeth & Westfield Street Railway jumped the track at the curve at the corner of Summit and South Avenues, a few days ago, and plunged 50 ft. across the street into a tree standing in the Central Railroad Station Park. The impact nearly split the car in two, and it was wrecked so that it will be impossible to repair it. The motorman, conductor and several passengers were injured.

AMSTERDAM, N. Y.—The Amsterdam & Hagaman Traction Company has made application to the Railroad Commissioners to construct its proposed electric line from Amsterdam to Rockton and Hagaman.

BUFFALO, N. Y.—The Buffalo, Niagara Falls & Rochester Railway Company has made application to the Town Board of Tonawanda for permission to construct and operate a street railway through the town.

BROOKLYN, N. Y.—A resolution to compel the Brooklyn Rapid Transit Company to put its trolley wires under ground was introduced at a meeting of the Board of Aldermen held Sept. 18. It was referred to the committee on railways.

BROOKLYN, N. Y.—Electric motor cars were run on the Lexington Avenue elevated line of the Brooklyn Rapid Transit during the rush hours for the first time on Sept. 5. The work of equipping the Broadway and Myrtle Avenue lines is progressing rapidly.

NEW YORK, N. Y.—The Manhattan Elevated Railway Company's escalator, now being put in by the Otis Company at Twenty-Third Street and Sixth Avenue, is unlike the moving incline plane at Fifty-Ninth Street and Third Avenue. This escalator is a moving stairway, or series of steps passing upward. A passenger may stand still on a step and be carried up, or if he desires to he may beat the stairs by walking constantly upward, as on an ordinary stairway.

NEW YORK, N. Y.—The Metropolitan Street Railway Company is now reconstructing its Park Row tracks opposite the Postoffice, so as to provide additional terminal facilities for the Fourth & Madison Avenue line, the Second Avenue line, and for a new branch of the Sixth & Amsterdam Avenue and the Eighth Avenue lines. The cars of the Sixth & Amsterdam and of the Eighth Avenue lines, which now have their terminal at Canal Street and Broadway, are to run through Canal Street to Centre, thence south to the Brooklyn Bridge and the Postoffice. The Metropolitan tracks and the Third Avenue tracks are to be connected with the Broadway line in front of the Postoffice.

LIMA, OHIO.—The employees of the Lima Railway Company are on strike.

AKRON, OHIO.—The Northern Ohio Traction Company has removed its general offices to a fine suite in the new Hamilton Building.

MANSFIELD, OHIO.—The Mansfield Railway Company has commenced work on a new car house on East Fourth Street.

CLEVELAND, OHIO.—The Northern Ohio Traction Company has made application to the Cuyahoga County Commissioners for permission to double track its road within the county limits. The entire road is to be double tracked.

MANSFIELD, OHIO.—It is stated that negotiations are under way for the sale of the franchise secured by T. Y. McCrary for an electric railway between Mansfield, Savannah and Wellington, to W. L. Elkins, of Philadelphia. Report has it that the terms will be \$50,000 in cash and a block of stock in the road.

SPRINGFIELD, OHIO.—At the annual meeting of the stockholders of the Springfield Railway Company, held here a few days ago, officers were elected as follows: Oscar T. Martin, president; H. J. Crowley, vice-president; C. L. S. Tingley, secretary and treasurer; Oscar T. Martin, H. J. Crowley, C. L. S. Tingley, S. G. De Coursey, W. H. Sheldermine, Silas W. Pettit, Theodore Troupe and John H. Miller, directors. A number of improvements will be made in the road, and Lansdowne Park will be opened up as a summer resort next spring.

TOLEDO, OHIO.—A misunderstanding of the new traffic arrangement between the Toledo, Bowling Green & Fremont Railway Company and the Maumee Valley Electric Railway Company, whereby the cars of the former are taken charge of at Perrysburg by employees of the latter and operated over a new belt line into the city, resulted in a collision between two Bowling Green cars on the first day the new arrangement went into effect. A dozen people were injured.

TOLEDO, OHIO.—The Toledo, Fremont & Norwalk Electric Railway carried over 5000 passengers Sunday, Sept. 9, which was the official opening of the road. The line will be in operation as far as Bellevue within two weeks, and to Norwalk by Nov. 15. Twenty-two cars are now in operation, and it is stated that a number of baggage-express cars are to be ordered in the near future.

COLUMBUS, OHIO.—The Columbus Railway Company has made application for a new twenty-five-year blanket franchise covering all the streets in the city now operated upon by the Columbus Railway Company, together with a franchise on South Parsons Avenue and on West Goodale Street. The ordinance provides that the city shall receive \$7,500 annually and a percentage on the gross earnings to be agreed upon later. Besides the extensions desired, the ordinance provides for the connection of the company's lines at several points on High Street and grants the same fares now in vogue, with transfers on all cash fares of 5 cents. A section provides that as rapidly as the requirements of the plant and the service demand during the life of the grant, it shall expend not less than \$750,000 in extensions, equipments and betterments. Another section provides that the company shall keep on deposit with the city at all times the sum of \$1,000 as an emergency fund, against which the city may draw for the cost and expense of any repairs made by the city which, by the terms of the ordinance, should have been made by the company and which the company has neglected to do.

COLUMBUS, OHIO.—The Columbus, London & Springfield Electric Railway Company is making arrangements for the lease of a building to be

used as a temporary power house. A permanent building will be erected at London. The three-phase system of distribution will be used, and a single power house will furnish current for the entire road.

HAMILTON, OHIO.—The annual meeting of the stockholders of the Southern Ohio Traction Company was held here last week. Directors were elected as follows: M. J. Mandelbaum, Jacob Mandelbaum, Will Christy, James D. Christy, A. E. Aikins, D. H. Kimberly, E. G. Tillotson, J. R. Nutt, Peter Schwab, G. A. Rentschler, F. T. Pomeroy and J. Lemprecht. Officers: Will Christy, president; M. J. Mandelbaum, first vice-president; Peter Schwab, second vice-president; F. Pomeroy, secretary and treasurer; Will Christy and M. J. Mandelbaum, executive committee. Reports of the treasurer showed the road to be in very prosperous condition. The question of improved service between Dayton and College Hill was decided upon, and will be adopted at once. The running time between the two towns will be reduced to three hours. The construction of new lines was discussed at the meeting.

READING, PA.—At the annual meeting of the Pottstown, Bayerstown & Reading Railway Company the following officers were elected: E. C. Watson, president; B. J. Woodward, vice-president; James M. Crawford, secretary; directors, E. E. Watson, B. J. Woodward, J. M. Crawford, of Philadelphia; M. G. Taylor, F. P. Esterly, of Reading. The company has a charter to construct an electric railway from Reading to Bayerstown, 18 miles, and thence to Pottstown, 8 miles.

BEAVER, PA.—At a special meeting of the directors of the Beaver Valley Traction Company held a few days ago, most of the members of the old board tendered their resignation and their positions were filled by the Philadelphia capitalists, who recently purchased the road. New officers have been elected as follows: Frederick Snyder, of Philadelphia, president; Walter Bilyeu, of Philadelphia, treasurer. W. P. McConnell will retain his present position as secretary. At the meeting large measures were taken for the building of the additional lines. The work of constructing the line to Monaco will be begun as soon as franchises are signed.

CLARKSVILLE, TENN.—The coupon ticket system has been adopted by the Clarksville Street Railway Company. The coupon books are used in four forms. One contains six green tickets, which sell for 25 cents; another, containing twenty-four white tickets, sells for \$1, each ticket good for one fare; another, containing twenty red tickets, sells for 50 cents, each ticket good for one fare for children twelve years of age or under, and another containing yellow tickets, which is issued to those who have passes. In this way a complete record can be kept of the exact number of passengers hauled each day. The company will allow a discount of 5 per cent on all sales amounting to \$5, and 10 per cent discount on sales amounting to \$10 or more.

SALT LAKE CITY, UTAH.—The construction of the proposed Salt Lake Valley Electric Railroad between Salt Lake and Ogden has been abandoned, for the present at least. The company was not prepared to begin work when the franchise stipulated, and the franchise has lapsed.

NORFOLK, VA.—There is talk here of passing a law to compel the street railway companies operating here to carry school children for 3 cents.

WHEELING, W. VA.—The Northern Ohio Electric Company, which is to build an electric railway from Wheeling to Wellsburg, has organized permanently. Howard Hazeltt has been elected president; John G. Welty, vice-president, and John Arbenz, secretary and treasurer. The company has already secured the right of way and has ample financial backing. The road will be 15 miles in length and will traverse a fine agricultural country.

MILWAUKEE, WIS.—The Council has passed, over the Mayor's veto, resolution to enter into a five-year contract with the Milwaukee Electric Railway & Light Company.

MILWAUKEE, WIS.—The Milwaukee Electric Railway & Light Company has had a street sprinkler built at its Kinnickinnic Avenue shops. The sprinkler will be used experimentally on the National Avenue line. It was built for special occasions only.

TWO RIVERS, WIS.—The petition presented by T. Higgins, of Neenah, for a franchise here calls for a fifty-year grant and right of way over some of the principal streets here, traversing the entire city. The promoters agree to have the line in operation within two years.

MILWAUKEE, WIS.—The Milwaukee Electric Railway & Light Company is now receiving bids for an addition to the boiler room of the River Street power house of the company, a distance of 140 ft. along the river front. The addition will be uniform with the new power house and will make the frontage 240 ft. on the river. The new boiler house will occupy about one-third of the depth between River Street and the river. It is estimated that the building will cost \$100,000. The old boiler house will be torn down and work commenced upon the new one just as soon as the contract for the new one has been awarded.

MANITOWOC, WIS.—The City Council is being flooded with petitions for street car franchises. Those asking the new franchises are all local men except two, and are Judge Craite, John Murphy, Henry Schmidt, Thos. Torrison, W. H. Walker, of Milwaukee, and J. M. Seamann, of Sheboygan. They want a thirty-five-year franchise and promise to construct an interurban line to Two Rivers. The terms of this franchise are very similar to those now before the Council. A committee has been appointed to examine both.

CANADIAN NOTE

NIAGARA FALLS, ONT.—The Niagara, St. Catherines & Toronto Electric Railway Company has been granted permission to cross the upper arch bridge into this city. It is now possible for a person to take a car in Buffalo and with one or more transfers ride direct to Toronto.