STREET RAILWAY JOURNAL

WEEKLY NEWS ISSUE

SATURDAY, SEPTEMBER 15 1900.

PUBLISHED WEEKLY BY
THE STREET RAILWAY PUBLISHING COMPANY

MAIN OFFICE:
NEW YORK, BEARD BUILDING, 120 LIBERTY STREET.

BRANCH OFFICES:
CHICAGO.....Monadnock Block
PHILADELPHIA.....929 Chestnut Street
LONDON.....Hastings House, Norfolk Street, Strand
Correspondents in other Principal Cities of the World.

Long Distance Telephone, "New York, 4044 Cortlandt."
Cable Address, "Stryjourn, New York."—Lieber's Code used.

TERMS OF SUBSCRIPTION.

In the United States and Canada.....$4.00 per annum
In all Foreign Countries, per annum.....$6.00 / 25/ / 31fr.

Subscriptions payable always in advance, by check (preferred), money order or postal note, to order of C. E. WHITTLESEY, Treasurer.

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

EDITORIAL NOTICE.

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.

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

Address all communications to

THE STREET RAILWAY PUBLISHING CO.
120 Liberty Street, New York.

Contents of this Issue

St. Louis Strike Called Off

In a mass meeting held Sept. 12 the striking street-car employees of the St. Louis Transit Company adopted resolutions calling off the strike and boycott against the company, and furthermore declared that any member of the union applying for work to the transit company would not endanger his membership thereby. The strike was ordered May 8, and called off on July 2. A week later it was reordered and the boycott imposed.

Electrical Equipment of New York Elevated Roads Delayed

The non-arrival of materials at expected times has seriously interfered with the work of electrically equipping the lines of the Manhattan Railway Company, and it is not known definitely when a trial of the system can be made on the Second Avenue line, on which work is most advanced. The work will be pushed with all possible speed, and a trial made at the earliest moment.

Yerkes Will Build a Road in London

A cablegram from London announced that Charles T. Yerkes, of Chicago, has purchased the franchises and all the rights of the Charing Cross, Euston & Hampstead Railroad, and that an American syndicate is to be formed to build a tunnel road under the streets from Charing Cross, in the heart of London, to Hampstead Heath, 4½ miles, and also an extension of 2 miles from Camden road to Kentish town. It is estimated that it will cost $12,000,000 to build the road. There is a large tract of land surrounding the suburban terminus of the new line, which has never been developed, and between this and the city is a high plateau over which no surface road has yet been built. The new road, as projected, is to pass under the plateau and emerge on the level track beyond, bringing this section within easy reach of the center of London. Electricity is to be used as motive power, and it is said that four tracks will be laid, two for express and two for local trains. Ten stations will be built. D. H. Louderbach, who was associated with Mr. Yerkes in his Chicago enterprises, and Henry C. Davis assisted Mr. Yerkes in completing the deal.

Street Railway Suggestions Officially Invited by the Chicago Street Railway Commission

The Chicago Street Railway Commission has made public a list of questions regarding the traction situation in that city on which it desires to receive suggestions from the residents of the city. This plan of submitting the questions to the public has previously been mentioned in the STREET RAILWAY JOURNAL, and in our last issue mention was made of the decision of the Commission to submit the question to the public. The people are asked:

"If public interests require the consolidation of all street railway lines under one management.

"If it should be the policy of the city to treat the street railway business as a monopoly.

"If franchises granted hereafter should contain a provision giving the city the right to take over the property at an appraised valuation.

"If they would prefer continuous car routes, passing through the heart of the city, in preference to the present system of down-town terminals.

"If they favor city ownership of tracks without city ownership of power plants or rolling stock and with city operation, or if they favor the policy of municipal operation either in the near future or ultimately.

"If the city, in granting franchises, should prescribe a minimum wage or a maximum working day for employees, and, if so, what they should be.

"If the city, in granting franchises, should require the traction companies to submit labor disputes to arbitration to avoid interruption in service.

"If they favor a system of subways or underground roads in the down-town district, making possible the removal of all cars from the surface."

The Commission requests that the views of the writer in each case be set forth in his own language, and be not confined to yes or no answers to the questions. It is not expected that every person will attempt to answer all the questions. The compilation, which will be made of the answers received, will be used both in measures recommended to the Council by the Commission and in bills which will be prepared for the Legislature. It is the intention to frame two measures for the General Assembly, one a grant of power relating to franchises and the other to the subway.

The Convention of the New York State Street Railway Association

As previously announced in this paper, the eighteenth annual meeting of the Street Railway Association of the State of New York will be held at Buffalo on Tuesday and Wednesday, Sept. 18 and 19. The meeting will be held at the Iroquois Hotel, and the following programme, which has been made up by President Rogers, has been decided upon:

TUESDAY, SEPT. 18

9:30 a. m.—Meeting of the Executive Committee.
10:30 a. m.—Meeting of the Association.
1. Call of the roll.
2. Approval of the minutes.
3. Address of the President.
4. Report of the Executive Committee.
5. Minutes of the special meeting of the Executive Committee.
6. Report of the Treasurer.
7. Reading of papers on practical street railway questions by well known gentlemen, names and subjects to be announced.
8. Discussion ensuing.
9. General business.
a. Appointment of Nominating Committee.
b. Nomination of officers.
c. Election of officers.
d. Selection of place of next meeting.

The entertainment of the attendants in the afternoon has been arranged for by the local committee, and includes a visit to the Pan-American Exposition grounds, by special invitation of William I. Buchanan, director general, and an inspection of the transforming storage battery stations of the Buffalo Railway Company. At 8 p. m. the annual banquet will be held at the Iroquois Hotel.

WEDNESDAY, SEPT. 19

9:30 a. m.—Second session of convention.
1. Unfinished business.
2. Reading of papers and discussion ensuing.
11:30 a. m.—Entertainment as arranged by local committee. This will include a trip by special cars of the International Traction Company, Buffalo and Lockport division, from the Iroquois Hotel, over the Buffalo division, Main Street line and the Buffalo and Lockport division, to North Tonawanda. The regular running time from Buffalo to North Tonawanda is at the rate of 50 miles per hour. At North Tonawanda an inspection will be made of a 35-ton electric locomotive drawing freight trains. Thence the party will proceed over the Niagara Falls division of the International Traction Company to Niagara Falls, where an inspection will be made of the power house (50,000 ehp) of the Niagara Falls Power Company, by special invitation of the power company. At this power house will be seen the transforming station from which high and low tension currents are transmitted for local manufacturing and smelting purposes, and 15,000 ehp at 11,000 volts, is transmitted to Buffalo. The party will then go by special cars across the upper steel arch bridge of the International Traction Company and over this company's Canadian division to visit Table Rock and the Dufferin Islands, by special invitation of James Wilson, superintendent of Queen Victoria Niagara Falls Park.

At 2 p. m. luncheon will be served at Dufferin Café.

At 3 p. m. the party will proceed by special cars over the Canadian division of the International Traction Company to Brock's Monument to visit the battlefield of Queenstown Heights, and will return to the American side over the International Traction Company's suspension bridge at Lewiston. The cars will then run over the Great Gorge route to Niagara Falls; thence over the Niagara Falls division of the International Traction Company to Buffalo, returning to Buffalo in time to take evening trains for New York and other eastern points. By special invitation of Godfrey Morgan, general manager of the Great Gorge route, a special searchlight expedition to Whirlpool Rapids has also been arranged for delegates and guests on this evening.

It is expected that some ten or twelve papers will be prepared and read, treating everyday, practical street railway subjects of vital importance and interest to street railway men generally. The exhibit feature promises to be larger and more pretentious than ever before, and the attendance of supply men much greater then at previous conventions. The following are the papers, together with their authors, definitely decided upon at this time:

"Power Distribution in Buffalo," by C. K. Marshall, electrical engineer of the Buffalo Railway Company.

"Rotary Transformers," by R. E. Danforth, superintendent of the Buffalo Railway Company.

"Storage Batteries," by Thomas Henning, superintendent of the power house, Buffalo Railway Company.

"Test of the Buffalo Railway Power House," by Prof. Norris, of Cornell University.

"Practical Expericnce in the Operation of Combined Public Franchises by One Company—Its Advantages to the Public and the Corporation," by C. E. Uebelacker, general manager of the Elmira Municipal Improvement Company.

"The Storage Battery—Its Use on Smaller Roads," by B. B. Nostrand, Jr., president Peekskill Electric Light & Power Company, Peekskill, N. Y.

It is also expected that papers will be prepared and read by representatives of the Metropolitan Street Railway Company, Brooklyn Rapid Transit Company, and by other prominent street railway gentlemen from various parts of the State, but the subjects of these papers have not yet been announced. The following topics for discussion or papers have, however, been decided upon:

Track Bonding.
The Third Rail.
The Repair Shop.
Induction Motors.
Care of Dynamos.
Car Mileage Record.
Indemnity Insurance.
Municipal Ownership.
"The Metallic Circuit."
Store Room Accounting.
The Three-Phase System.
Street Railways vs. State.
Loss of Current in Returns.
General Track Construction.
Employes' Benefit Associations.
"Receipts from Other Sources."
Transfers—Their Use and Abuse.
Street Railways vs. Automobiles.
Points on Overhead Construction.
Rotary Transformers. (Allotted.)
Long Distance Power Transmission.
Low Joints—How to Prevent Them.
Suggestions on Financial Organization.
Maintenance and Repair of Car Bodies.
Pleasure Resorts as Traffic Stimulators.
Signal Systems for Single Track Roads.
Air and Power Brakes for Electric Cars.
Reading and Club Rooms for Employees.
Care and Inspection of Wheels and Axles.
Power Distribution in Buffalo. (Allotted.)
Why Rates of Fare Should Not be Reduced.
The Selection and Management of Employees.
Care and Inspection of Motors and Equipment.
Amusements and Special Attractions for Parks.
The Power Station, from an Economic Standpoint.
How Can We Increase the Efficiency of Employees?
The Best Methods for the Prevention of Accidents.
The Relations of Municipalities vs. Street Railways.
Hints on Making Small Electric Railways Profitable.
Compressed and Liquid Air for Street Car Operation.
Storage Battery—Its Use on Small Roads. (Allotted.)
Mail, Freight and Express Service on Electric Railways.
Electrically Welded Joints in Actual Operation. (Allotted.)
Practical Experience with Double-Deck and Convertible Cars.
Removal of Snow and Ice—The Most Economical and Efficient Methods.
Single and Double Trucks—Their Relative Advantages and Disadvantages.
Practical Experience in the Operation of Combined Public Franchises by One Company—Its Advantages to the Public and the Corporation. (Allotted.)

Ample space has been arranged for at the Iroquois Hotel for exhibits, for the benefit of those manufacturers who desire to make them, and the president and executive committee of the association wish it generally understood that a most cordial invitation is tendered to all manufacturers of street railway apparatus and their representatives to attend the convention, whether they make exhibits or not.

In this connection it may not be amiss to refer to the admirable record made by the association during recent years. That this record, which has been followed by a greatly increased growth and influence, is due largely to the untiring efforts and ability of President Rogers and Secretary Robinson, is a fact generally recognized by those who have been closely following the history and acts of the association. It is a body which is exercising a great benefit to all the street railway companies of the State, and should have the cordial co-operation of all. This is shown not only by the admirable programmes which have been arranged for the different annual meetings, but by hard and persistent work during the year, in which the interests of the street railway companies are conserved in a way only possible by concerted action.

Meeting of the New England Street Railway Club

The New England Street Railway Club held its first regular meeting at the Pathfinder Meeting Rooms, 67 Federal Street, Boston, Wednesday evening, Sept. 5.

The meeting was called to order by President H. E. Bradford, of Marlboro, who spoke as follows: "This is the first meeting of the New England Street Railway Club, which was formed a short time ago at Young's Hotel, Boston. We met there in a social way, but the outcome of the meeting was the formation of the club. I was appointed president, and possibly a mistake was made by the club in choosing me as its first president.

"I think the necessity of such a club will be accepted by all street railway men, as it can do much for the operating man, especially to subordinates, by interchanging ideas. The officials in the transportation department of the Boston Elevated Railway Company, Boston, meet once a week and exchange ideas of operation, and it must be evident that this plan, if followed out, is beneficial. We are not very strong, but all associations in existence started in this feeble way; it is a case where we must put our shoulders to the wheel.

"We were in hopes to have E. C. Foster, vice-president and general manager of the Lynn & Boston Railroad Company, with us to-night, and regret his inability to attend, as he would be a very desirable speaker. However, as we are a little late in getting started it seems advisable that Mr. Stone, of the Electric Storage Battery Company, address the meeting first on 'The Demands for Chloride Accumulators by Street Railways.' There are some who would like to catch trains, and at the same time would be disappointed if they did not hear his remarks."

The Demand for "Chloride Accumulators" by Electric Railways

BY FRANK J. STONE

It is our pleasure this evening, in response to a request from the executive committee of this club, to present to you a few facts and figures relative to the demand for "chloride accumulators" by electric railways. Mr. Davis has prepared for us curves and data which we felt confident would be interesting and instructive, as they will not only explain why the demand for "chloride accumulators" has been so great, but will, I feel satisfied, enlighten you regarding problems which you may possibly have before you at this very time. The very best evidence to enable you to verify these figures and to confirm our statements is that to be secured directly from those who have the battery in operation on their systems, and it is with this end in view that I shall this evening call to your attention the results of our work in actual practice.

Looking back twelve years, when first entering the storage-battery field, and thinking of our early struggles, I cannot but compare our methods and results of that time with what we are achieving at the present day, and I feel deeply gratified with the reward of patient effort. We have all of us, without doubt, I believe, felt the full force and effect of that harsh, but thorough, teacher, experience, and as a result of her teaching we have learned what has hitherto been lacking to increase the efficiency and reliability of the trolley system, and I am proud to say that the Electric Storage Battery Company stands to-day in a position to supply the much-needed type of apparatus.

It would appear, then, that our interests are mutual, and I am glad of this opportunity to give expression to our views as to the value of the chloride accumulator in electric street railway practice, which views you will find are those freely expressed by our patrons. You have but to look upon the countenances of those among you who have become users of the storage battery, and consequently strong advocates of the system, to appreciate the good results that have been attained. For the battery serves well in more ways, perhaps, than in attaining those special ends for which it is designed. While its purchase may be made only with a view to saving fuel or to avoiding the purchase of other apparatus, which at times of light load would be operated under very uneconomical conditions, or to replace copper investment, in addition to these and its many other material advantages, the battery system offers something which cannot be shown in dollars and cents. What I refer to is the advantage of having on hand at all times a reserve supply, and while it would be, of course, impossible for any of us to say what is the value of this, it would be hard to find a user of the battery who has not something of a most favorable nature to say on this point based upon his own experience. We know that interruption to street railway service on Sundays and holidays especially means as a usual thing a heavy loss both in money and prestige. It may not, perhaps, pay to install a plant with this end alone in view, but it is a feature of the system that appeals strongly to all. There is in it a sense of security; you have something laid up for a rainy day; it is always there between your engines and your load, between you and the public; it is a guarantee of the efficiency and reliability of your road.

It is but natural for us to desire to profit by the experience of our neighbors, and to that end also I am bringing to your attention this evening some of the attractive features of such of our installations as I felt would be of interest to you, with some remarks on the experience of their owners. I might say in this connection that in addition to over fifty large Edison central lighting installations we have now in operation more than one hundred street railway plants, the greater number of which have been installed within the past few years. The total capacity of these batteries is approximately 160,000 kw-hours. The railway systems in connection with which they are installed operate over 3000 miles of road.

The Union Traction Company, of Philadelphia, has now in operation six chloride accumulator installations, the first of which is now in its fifth year of service. With this battery you are all no doubt somewhat familiar, from the description given by Charles Hewitt, electrical engineer of the Union Traction Company, in his paper read before the American Street Railway Association in 1897. In this he goes very fully into the subject of the value of the installation to his road. The five other batteries on the road have been installed within a year and remain a standing testimonial to the battery system. The case is simply one where, after having one battery in operation for several years, the traction company has called upon us to install five others, making the aggregate capacity about fifteen times that of the first. It may be interesting to mention that no renewals whatever have been made in any of these plants.

The Woonsocket Electric Machine & Power Company contracted in 1896 for a battery of 400 amps. capacity at the one-hour rate, designed for service on the trolley road, and also for carrying the load of the Edison three-wire system in case of emergency, in the latter case the battery being thrown into two sections in parallel, with the proper controlling devices. In the railway service the battery acts simply as a regulator, taking the place of all generating apparatus that would be required to furnish current above the average demand, and keeping a practically constant load upon the generators in operation by instantaneously responding to the sudden demands incident to the service. The voltage fluctuations at the power house rarely exceed 2 per cent. Although the battery is rated for a discharge of only 400 amps., it is frequently discharged at as high a rate as 600 amps., and at times at over 800 amps. As a reserve, the battery has frequently demonstrated its value. During a breakdown at the station, when it was found necessary to shut down the machinery, the battery carried the entire railway load for some three and one-half hours. No renewals whatever have been made, and the plates are to-day in apparently perfect condition. We have a written statement from L. C. Lincoln, manager of the company, to the effect that during the first year of operation the battery netted them a saving in coal of about 30 per cent, and in labor of $600.

A very novel installation is one that we have recently made for the Brooklyn Heights Railway Company, consisting of 248 cells of type 27-G, weighing approximately 300,000 lbs., and installed in two rows, with an aisle between, upon seven freight cars, six cars having thirty-six cells each, and one car has thirty-two cells and the switchboard. This is for operation at Sheepshead Bay, upon the Coney Island line, and in summer the battery is run out near the end of a long feeder line, and at this point connected up. As the heavy traffic, however, does not last more than three or four months of the year, the battery is hauled back at the season's end to the most advantageous point on the elevated system of the company. This is a case where the battery serves a remarkably good turn, in view of the extraordinarily heavy loads upon the line, with insufficient copper for the maximum during the summer season only. The movable battery solves this difficult problem and saves the interest upon the otherwise necessary investment and the maintenance of either additional feeder or stationary battery for eight or nine months of the year. In operation, it will be seen that the copper as at present installed is amply sufficient with the aid of the battery, this being due to the fact that the battery takes the fluctuations, so that the current upon the line is reduced to the average.

On the system of the Worcester & Suburban Street Railway Company we have installed two chloride accumulator batteries, one at the power house at Leicester, having a capacity of 400 amps. at the hour rate of discharge, with space in the tanks for increasing its capacity by the addition of plates to the extent of 50 per cent. This is a typical station battery, which serves to equalize the load, thus enabling them to shut down one large generating unit, which would otherwise be operating under uneconomical conditions. The other battery is located at Worcester, some 12

miles from the power station, and serves to keep up the potential on the line in that vicinity. The benefit of the battery system in all its force is felt and appreciated in this case, but I will at this time merely call your attention to the improvement in the service on the road which has been experienced since the installations were made. Owing to higher voltage, better speed, closer connections and greater comfort are obtained, and with the finer equipment which it has been found possible to operate, the riding has increased distinctly, and, consequently, the revenue.

On the Woronoco Street Railway system, at Westfield, Mass., we have a station battery in operation which is proving itself a fuel and labor saver. Its use renders possible the shutting down of one engine and the operation of the entire plant, comprising the engines, boilers and battery, by one man, excepting on Sundays and gala days.

The following is a list of the roads in New England using chloride accumulators:

Maine—Sanford & Cape Porpoise Railway Co.; Biddeford & Saco Railroad Co.; Waterville & Fairfield Street Railway Co.

New Hampshire—Union Electric Railway Co., Dover; Laconia Street Railway Co.; Boston & Maine Railroad Co., Portsmouth; Portsmouth, Kittery & York Street Railway Co.; Keene Electric Railway Co.

Vermont—Barre & Montpelier Traction & Power Co.; Bellows Falls & Saxton River Railway Co.; Springfield Street Railway Co.

Massachusetts—Worcester & Suburban Street Railway Co.; Norfolk Western Street Railway Co., Westwood; No. Abington Light & Power Co.; Framingham Electric Railway Co.; Woronoco Street Railway Co., Westfield; Newton & Boston Street Railway Co., Newtonville; Boston Elevated Railroad Co., Chestnut Hill Reservoir.

Rhode Island—Pawtucket Electric Co.; Union Railroad Co., Pawtucket; Pawtuxet Valley Street Railway Co., Riverpoint; Woonsocket Electric Machine & Power Co.; Rhode Island Suburban Railway Co., Riverview; Seaview Railroad Co., Wickford; N. Y., N. H. & H. R. R. Co., E. Providence and Brayton, Mass.

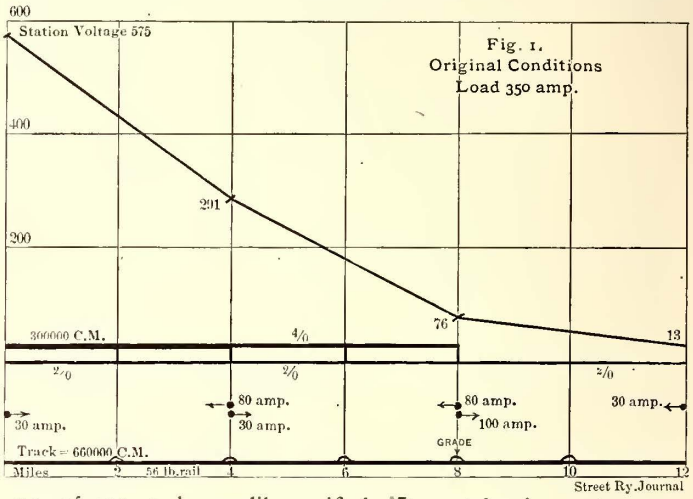
Connecticut—N. Y., N. H. & H. R. R. Co., Hartford and Forestville.

Besides these, many of the principal street railway companies in other parts of the country are using these batteries.

It is rather surprising to me sometimes to hear the company criticised for owning and controlling the exclusive right to manufacture storage batteries, after it has purchased the same (the purchases covering, I believe, over 425 patents). The criticism is a most unjust one, as the Electric Storage Battery Company, by the expenditure of large sums of money and the untiring efforts of its staff, has succeeded in giving to the electrical world a much-needed and very valuable type of apparatus in the form of a commercially successful storage battery, and that at a very remarkable reduction in price. In explanation, I would say that in the chloride accumulator we find a storage battery capable of enduring a discharge rate sufficiently high to totally discharge it in one hour. With the earlier forms, owing to the inability of the battery to discharge at high rates without injury, the purchaser, or rather the inquirer, discovered that he would be obliged to purchase a battery based upon the ten-hour rate, to meet his requirements. For example, if he wanted a battery capable of discharging at the rate of 400 amps., in taking care of the fluctuations on his railway circuit, he would be obliged to purchase one rated for a discharge of 400 amps. for a period of ten hours, or a 4000-amp.-hour battery, which would make the price five times what it need be now. In this regard alone it is plain to be seen what the Electric Storage Battery Company has accomplished in reducing the price to such a figure as to permit of commercial use, and this is one reason why so many chloride accumulator installations are being made at the present day. Aside from this, it must be very comforting when purchasing apparatus to know that you are buying not only the best thing that could be produced in your own country, but the best that the world can afford, for, owing to the existence of an alliance with the largest manufacturers of storage batteries in England, France and Germany, the Electric Storage Battery Company secures the benefit of all past and future improvements.

The plates of the chloride accumulator derive their great advantages over former types from certain remarkable details of form. The conducting grid is made up, not of lead, but of an alloy, which is not in any way acted upon by the acid solution. One result of this is at once apparent, and that is the doing away forever with the troublesome "buckling." The positive plates are so constructed that the effects of the expansion and contraction of the active material are reduced to a minimum, while at the same time this active material is very intimately connected with the conducting grid, and affords a large area to be acted upon without resistance between it and the support. The same structural strength is found in the negative, obtained practically in the same way, while the active material is so prepared as to possess the necessary porosity to a most remarkable degree.

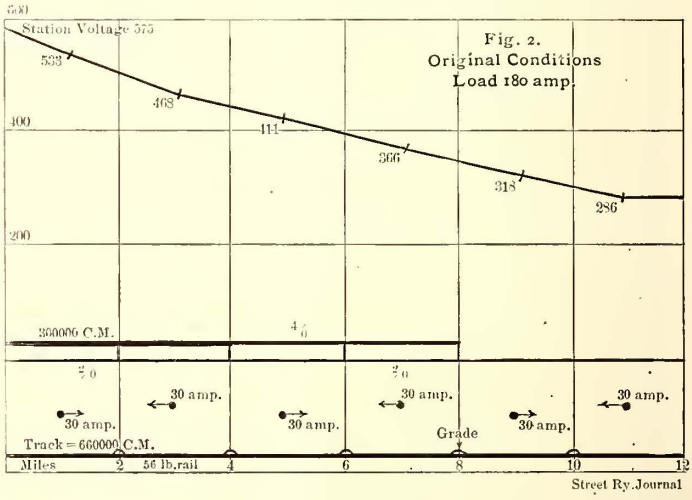
It is the policy of the company in its negotiations with a prospective customer to have the engineer assigned to the case make his report purely from the standpoint of a consulting engineer, and for that purpose I do not hesitate to say that I believe they have selected as able and conscientious a staff as can be found among the fraternity. The report is based upon actual facts as they are found to exist in the situation under investigation, and these facts



can, of course, be readily verified. It contains in most cases a very conservative estimate of the saving to be created and through what sources, with reference also to the other advantages which may be obtained by the application of the battery. There are very few cases where a battery cannot show a saving, especially in street railway work. Regardless of this, however, we are always pleased to be called upon to make an investigation and report, and further, you will please remember that you have all of you a standing invitation to accompany us on a tour of inspection of any or all of our installations, severally or collectively, as may suit your convenience.

Paper by Philip W. Davis, Engineer

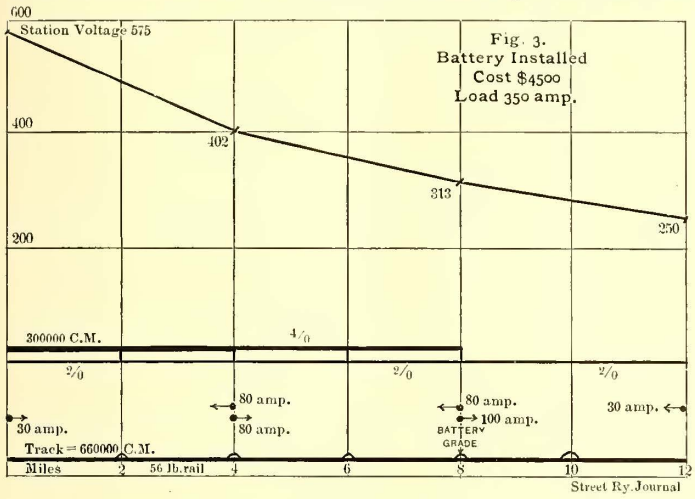
I have always found the strect railway man of an inquiring turn of mind. Necessity has made him careful, and he does not always



confine himself to the question, "does it pay?" he is interested in knowing "why." It is this side of the question that Mr. Stone has bidden me pursue, and I will try to do it without being unpleasantly technical, but I trust you will excuse me if I introduce a few figures.

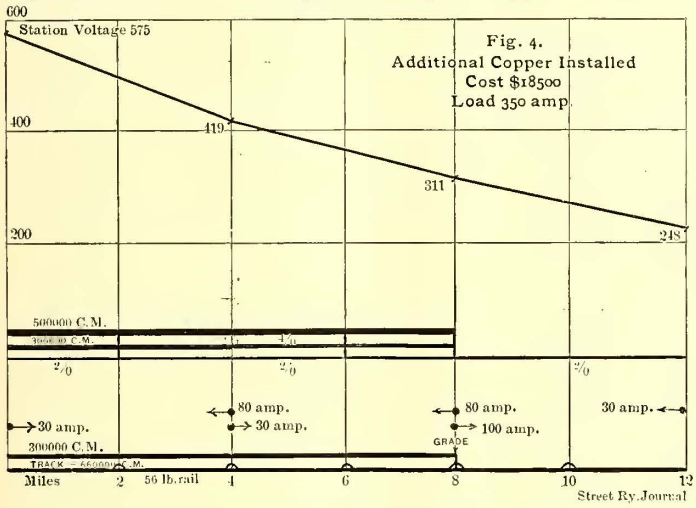
With a view of avoiding the want of exactness which usually accompanies a general statement, I have figured out the solution of a railway transmission problem by three different methods and have presented it in a graphical form so that the results may be easily compared. While this problem is a special case of a line battery, still I think it illustrates fairly well the value of a storage battery in all its phases. The diagrams represent at the bottom a single track with turnouts, marked by loops, 2 miles apart. It is supposed that 8 miles from the power station is a rather long and steep grade, reaching perhaps as high as 8 per cent. The track is 56-lb. rail, and is equivalent to about 660,000 circ. mils of copper. The line consists of a 00 trolley throughout, a 300,000 feeder running out from the station for 4 miles, and a 0000 continuing to the grade,

4 miles more. The cars are shown as dots, with arrows indicating their direction. The line voltage for the instant under consideration is indicated above the copper. The load with six cars operating is found to average about 180 amps., and to have fluctuations reaching to 350 amps., occasionally a little higher. The line voltage has been calculated for two instants, the instant of average load, as shown in Figs. 2, 5 and 7, and the instant of maximum load, shown in Figs. 1, 3, 4 and 6. The road originally was 10 miles long and operated five cars, and there were, of course, four turnouts, not counting those at the ends. The lowest voltage encountered on the line at the time of heavy pulls was 220 at the grade. It was just possible to operate. But when it becomes desirable to add the extra 2 miles shown in the diagrams to the road



and operate six cars, the lowest voltage on the line at the moment of maximum pull will become, as you see on Fig. 1, 13 volts at the end of the line and 76 volts at the grade. Evidently this situation needs help.

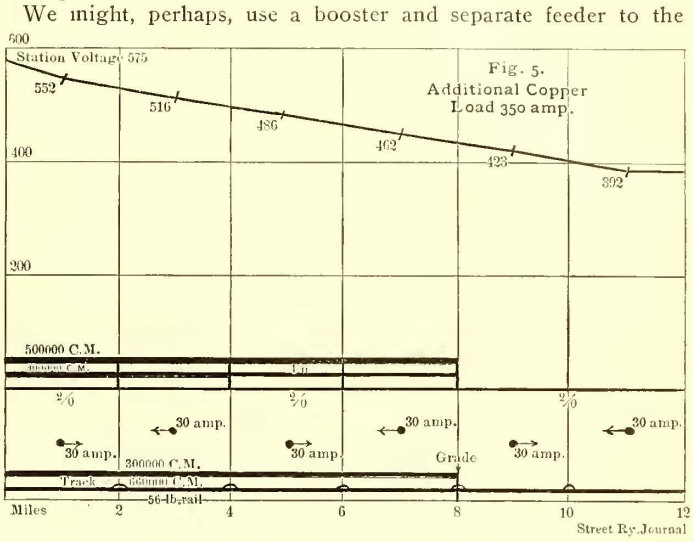
Now let us apply a battery to this road without in any way altering the copper. In the first place, where shall it be put? The heavy grade is a source of much of the trouble, it is there that the heaviest pulls come. In addition, at the foot of the grade is a car house. If the battery is put there it will be an easy matter to give it what little attendance it needs. The next step is to determine what voltage the battery must be capable of. The battery is to be operated as a regulator, alternately charging and discharging; its voltage then must be the same as the average voltage maintained at the battery location by the copper. If the volt-



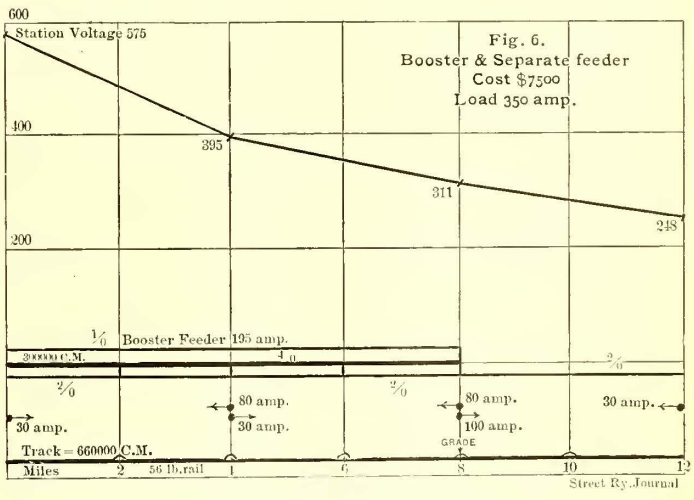
age of the battery were any higher it would discharge more than it charged, while if it were lower it would become overcharged. This voltage is about 340 volts, as shown by Fig. 2, and will require 163 cells. The next thing to be decided is the capacity of the battery. Evidently it must be large enough to take everything which the station cannot take. When discharging at its maximum rate the pressure at its terminals will fall about 27 volts, bringing the line voltage at the grade to 313 volts (see Fig. 2). This limits the drop between the station and the grade to 262 volts. With this drop the station can only supply 195 amps., and the battery then will be called upon for 125 amps. The nearest thing to this capacity is an E-13, rated at 120 amps., at the hour rate, and 163 cells of E-13 installed, with a switchboard mounting a circuit-breaker, an ammeter, a voltmeter and a switch, and making an allowance for the construction of a room or battery house, would cost about $4,500. In return for the investment the line voltage at the grade has been raised 237 volts, and is now sufficiently high to permit of very satisfactory operation of the road. In addition, the station has been relieved of 125 amps., or nearly 36 per cent of the load at the time of maximum pull.

Had copper been installed, as shown in diagrams Nos. 5 and 6, to give the same line voltage at the grade it would have required 8 miles of 500,000 feeder in the overhead line and 8 miles of 300,000 circ. mil feeder in the track, or over 102,000 lbs. of copper, which, at 17½ cents per pound, and allowing something for erection, would cost about $18,500, or about four times the cost of the battery.

We might, perhaps, use a booster and separate feeder to the



grade, as shown in diagrams Nos. 6 and 7. The less the investment in copper for this feeder the higher will be its resistance and the greater the voltage necessary to force current over it; therefore, the greater the cost of the booster. For the sake of avoiding the construction of special machinery it is also desirable to keep the voltage of the booster down to the limits of standard apparatus. A 0 wire and a 125-kw, 750-volt, motor-driven machine, series wound for 3.67 volts per ampere of load, is a combination that will give about the lowest first cost. The machine will cost about $5,000, and the copper, erected, about $2,500, making an investment of $7,500. Nor is this the end of the story: the ground drop is greater without the battery than it is with the battery, because, without the battery all the current to supply the demand must go out from the station and return to it at all times,

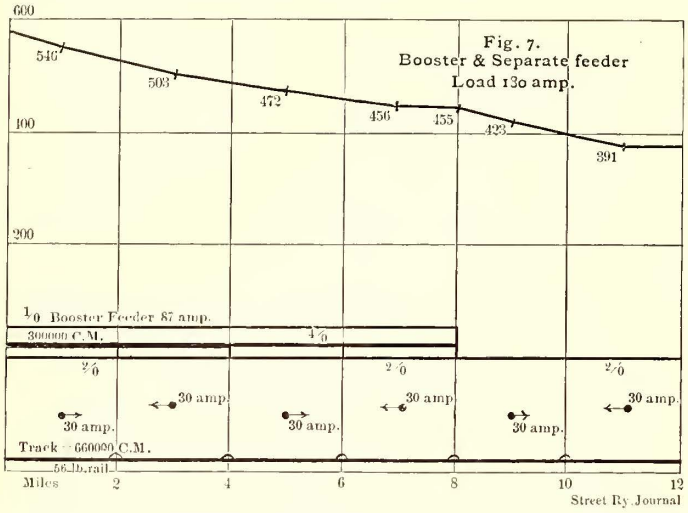


while with the battery, during the heavy pull, part of the current returns to the battery instead of to the station. As a result, the booster is called on to feed 195 amps. through the special feeder, while the existing copper only carries 125 amps. To force this load through 8 miles of 0 feeder requires 793 volts, of which 716 volts will be furnished by the booster, the remaining 77 volts being found as drop in the existing copper. This means an increase in the demand for power of 140 kw, being an increase of 70 per cent. If the booster has an efficiency of 65 per cent the demand on the generator will be increased from 70 per cent to over 100 per cent owing to the losses in the booster itself. It is evident then that the installation of a booster will more than double the maximum fluctuations and will add to the size of the machinery which must be in operation in the station, and also the coal bills. The extra power required does not maintain the same proportion at all loads,

thus at average load 87 amps. at 319 volts, or allowing for the booster losses, 42 kw is the extra power demanded, and is an increase of 42 per cent.

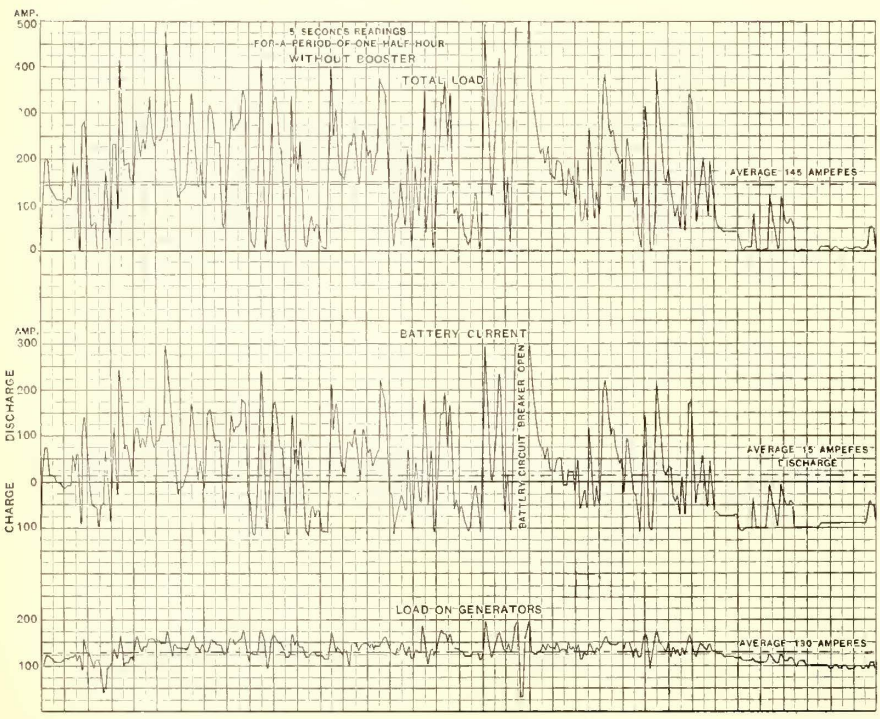
In view of the losses back of the generator, and the decreased load factor for machinery operated, it is probably a conservative estimate to say that if this booster was installed the coal bill for the year would be increased between 50 per cent and 60 per cent. A station of this size would burn perhaps 2000 tons of coal per year, which, at $3.50 per ton, would be $7,000 per year, so that an increase in the coal of 55 per cent would mean an increased yearly

Fig. 7.
Booster & Separate feeder
Load 130 amp.



expenditure of $3,500. It is interesting to compare the operation of the station machinery under the two systems. The original station load averaging 103 kw, with fluctuations reaching 200 kw, could be operated with machinery of 150-kw capacity at a load factor of 69 per cent. With the battery the fluctuations come down to 130 kw, and the station could be operated with machinery of 100-kw capacity at a load factor of 100 per cent. The booster, on the other hand, brings the fluctuations up to 400 kw and requires the station machinery to be of at least 250-kw capacity, operating at an average load of about 140 kw, or 56 per cent load factor. The

Fig. 8



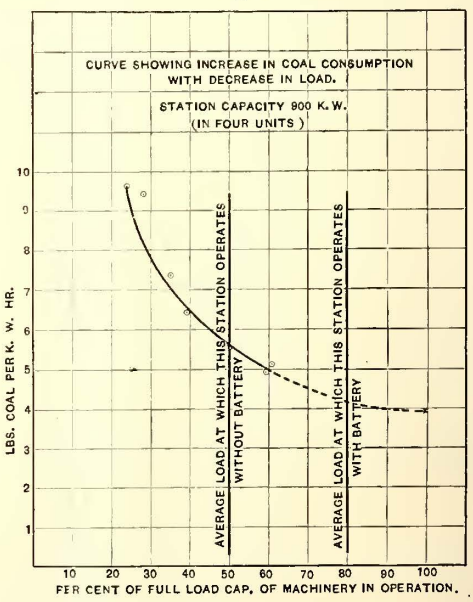
battery adds one other advantage not possessed by machinery, that of twenty-four-hour power on the line, for emergency work, lights for repairs, night operation, etc., and this without the operation of any machinery in the station.

When placed in the power station a battery cannot, of course, have any influence on the copper question, but it is then in the most favorable position to act as a regulator and maintain a steady load on the machinery which operates, thereby preventing the necessity of operating any more units than are just enough to take care of the average load. The electrical transportation of passengers by direct-current apparatus has long ago demonstrated its right to exist as an industry. It has passed the stage of a new enterprise and it has reached the point where future improvement will take the form of refinements in methods of operation. The storage battery offers the most inviting improvement in station operation that has come up since the beginning of the industry.

A glance at any diagram of a railway load is all that is needed to show the value of storage of power in a railway generating station. I have here a load curve (see Fig. 8) taken from a small railway where, as you see, without a battery it would be necessary to have in operation machinery capable of developing 290 kw or 500 amps. at 575 volts, which would be carrying an average load equivalent to only 75 kw, or 130 amps. A battery was installed in this station and the result is shown very clearly by the three curves indicating respectively line load, battery load and generator load. It will be interesting, I think, to lay before you in this connection the reasons that underlie the want of economy in an engine operated under light load. It proceeds from two causes—engine friction and cylinder condensation.

In the absence of exact data concerning the power required to overcome friction in an engine, 10 per cent of the rated capacity is a safe figure to assume. Thus, take the case of a 200-hp engine, it requires 20 hp to keep it moving; if it is running light or without load all the coal burned to produce the necessary 20 hp is wasted. If the load averages 20 hp half of the coal burned is wasted. If it be necessary to operate a 200-hp engine in order to care for a load averaging 60 hp on account of the fluctuations of the load it is necessary to burn sufficient coal to produce 80 hp; whereas, if it be possible to take care of this load with an engine whose full load is 60 hp the friction loss is only 6 hp, and it is only necessary to burn coal to produce 66 hp, a clear gain of 14 hp, or 17 per cent on friction reduction alone. The second factor, or cylinder condensation, proceeds from the property which steam has in common with all gases of cooling as it expands. As you all know, steam is admitted to the cylinder at boiler pressure for a portion of the stroke only. After that it is allowed to expand. If the engine were a simple, non-condensing engine the steam would enter the cylinder at perhaps 100 lbs. pressure, and expand down to 20 lbs. Steam at 100 lbs. pressure has a temperature of 328 degs., while steam at 20 lbs. has a temperature of 228 degs. It follows then that when steam at boiler pressure is admitted to a cylinder which has just exhausted steam at 20 lbs. pressure it finds the cylinder walls 100 degs. lower in temperature than itself. To the steam this is a good deal like going into an ice box, and so enough steam will instantly condense on the walls of the cylinder to bring their temperature up to that of boiler steam. On this account considerably more steam has to be supplied to the cylinder than that required simply

Fig. 9

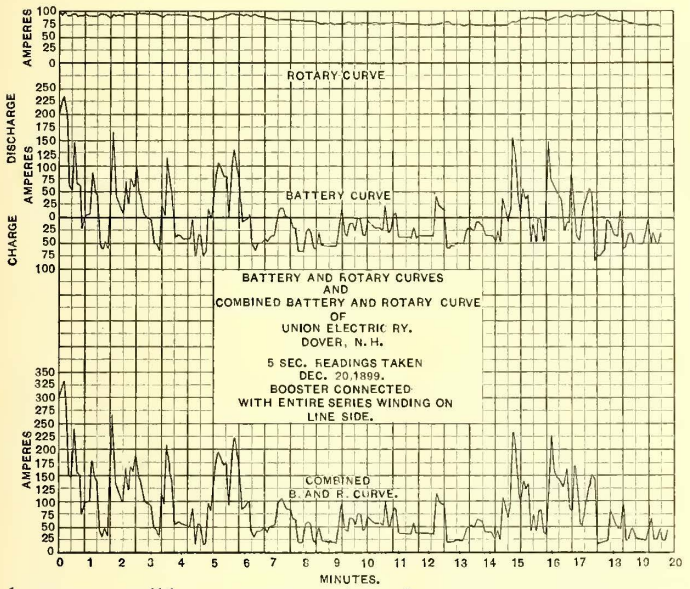


to fill the space behind the piston. This condensed steam, of course, does no work, but requires just as much coal to produce it as if it did. Now, an engine working under light load cuts off earlier than under heavy load, and therefore its steam expands more, with the result that the cooling of the cylinder walls is carried further and more steam is condensed to warm them up. This action may be noted and measured by weighing the exhaust steam which comes from an engine, and comparing it with the quantity of steam called for from the indictor cards. The discrepancy is sometimes startling.

However, what interests you is how much these combined

effects enter into the cost of production of power in such plants as the average railway operates. Here is a curve (see Fig. 9) taken from the records of a power station containing four high-speed compound engines belted to four 225-kw generators. The loads on this station vary very widely on different days, and the curve represents the pounds of coal burned to produce a kw-hour of energy under conditions averaging from heavy load to light load on the machines that were operated. The curve shows that on certain days the machinery that operated did not average a load of more than 25 per cent, and that under such circumstances it took 9½ lbs. of coal to produce every kw-hour of energy. Of course these days were very infrequent. This station averages a load equal to about one-half the capacity of the machinery which is in operation, and its coal economy is 5½ lbs. per kw-hour. The type of machinery operated here is capable of doing 4 lbs. when operated steadily at full load. By the installation of a battery it

Fig. 10



becomes possible to average at least 80 per cent load factor and 4½ lbs. of coal per kw-hour, a clear saving of 1¼ lbs. of coal on 5½ lbs. for every kilowatt produced, or a reduction of 22¾ per cent in the coal bill.

A very interesting application of the storage battery is found in connection with the rotary converter and polyphase transmission for long-distance work. A road operating rotary sub-stations with batteries is in a position to obtain as much benefit from the batteries as if they were located in the station. The machinery, including the alternating-current line and the rotary converter, need only be designed for the average load, and can be operated at an approximately steady load. It is also a marked advantage to be able to start the rotary from the direct-current end with the aid of the battery. When a rotary is started from the alternating-current end it demands a very heavy current; this current is out of phase with the e. m. f., and does not represent as much energy as it would in direct-current work, but its heating capabilities are just as great, and there is not a little danger of burning out some of the apparatus. Sometimes in rotary plants, where the starting is to be done from the alternating-current end, a small induction motor is added to the rotary to be used in starting. This means an extra piece of apparatus and an increase in the investment which lies idle. The presence of a battery is also of value in preventing pumping between rotaries and their generators by preventing the fluctuations of load, which tend to start the action. Where other apparatus is operated from the line which feeds the rotary the battery has a value as a regulator, as it prevents the continual change of phase relations between current and e. m. f., accompanied by the production of wattless currents and the consequent useless heating and surging of the effective voltage, which would ensue if the fluctuations of the railway load were allowed to fall on the alternating-current line.

I do not wish to leave this subject without touching on the question of the booster for use with batteries as a voltage compensator. The operation of a storage battery, that is, its charge and discharge, cannot take place without a change of voltage at the terminals of the battery. When a battery is placed on the line there is always sufficient change in voltage to permit it to operate. In the station, however, this is not always the case. Sometimes it is desirable to have the bus-bar voltage maintained very steady, in which case a booster becomes a necessity. It is at all times a useful piece of apparatus, as it adds flexibility to the system by bringing the battery absolutely under control, so that a turn of the wrist enables the station attendant to force either charge or discharge independently of the conditions of voltage and load that may be present in the station at the time. While the booster is an expensive machine per kilowatt, its energy capacity is small. It may be capable of carrying 400 amps., and yet its capacity would not exceed 16 kw.

Owing to the change of voltage at the terminals of the battery, a small portion of the fluctuations will fall on the generators unless a booster is used. If it is really desirable to eliminate the entire fluctuation, a booster must be used. The first curve that I brought to your attention is an example of battery regulation without a booster.

Fig. 10 is an example of a rotary station with battery and booster where the load fluctuations are practically eliminated from the load of the rotary. Three curves taken from the plant of the Woonsocket Electric Machine & Power Company show what may be accomplished with a booster in the way of voltage regulation, the maximum variation being within 2 per cent, or 10 volts. On small roads, however, the booster is usually a needless refinement. There is no need of keeping the voltage at the bus-bars down to a variation of ten volts, a variation of 50 volts is often not too great to be tolerated. Moreover, it should be borne in mind that a small fluctuation in the generator load does not mean much change in the steam distribution in the engine, owing to the effect of the fly-wheel, and again, the fluctuation in watts or energy demand on the dynamo does not increase in proportion to the drops. Perhaps the strongest point in favor of a booster in a railway plant is the desire of the railway manager who decides to purchase a battery to see among other improvements a higher average voltage at his station bus-bars; accordingly he calls for a sufficient number of cells to equal the desired voltage. It happens sometimes that after the installation of the battery it is discovered that the generators are not able to maintain an average voltage equal to that of the battery, and the result is that it is impossible to keep the battery properly charged. If the voltage of the generators cannot be raised, the remedy is to cut out of circuit enough cells to bring the battery voltage down to a level with the generators. If the extra voltage is really desirable it can only be obtained by the addition of a booster to the plant.

DISCUSSION

A short discussion followed the reading of the papers. Mr. Davis was asked if the proportion of load due to friction was usually greater or less than 10 per cent. He replied that this varied from 6 per cent to 12 per cent, and was undoubtedly very much less in large machines than in small ones. Mr. Davis also stated, in answer to inquiry, that in the first case described in his paper no copper whatever had been added. He also explained that the battery was figured for the average potential at the point of installation, and to take care of the demand above the average.

Mr. Stone was asked to make a few remarks concerning the durability of the storage battery. He replied that the best evidence as to the durability of the battery was to be derived from the experience of the users of the same. In the case of the Woonsocket plant and in many others, among which might be mentioned the Union Traction Company, of Philadelphia, the wear and tear after a period of several years' service had been found to be practically nothing. In street railway regulating batteries especially, the wear and tear is found to be very slight indeed. This is due to the fact that the battery is rarely, if ever, totally discharged, and therefore the chemical action under the usual conditions of momentary charge and discharge is but very slight. On a visit of a prospective purchaser to the Woonsocket plant, Mr. Lincoln, the manager of the company, was asked, in Mr. Stone's presence, whether he would repeat the installation of the battery under the same circumstances as those under which their battery was first installed, and Mr. Lincoln replied that he certainly would.

E. C. Spring, of the Norfolk Western Street Railway, was asked by Mr. Bradford, the president, what he had to say in regard to the storage batteries in operation on his road. He then spoke as follows:

"While I did not come here to advertise the Electric Storage Battery Company, a little incident happened about a month ago, which will illustrate what the battery system does in our case. About one-half of our road is operated from a direct-current machine at the power station, and the other half from rotary converters at Westwood, on the triphase system. The engine that was running the direct-current machine at Medfield went to pieces, thus shutting down the direct-current end of the line. All that was operating then was the three-phase system from Medfield to Dedham. The belt in the power station gave way and the road was then shut down on either end. I called up the car house by

telephone, and told the foreman that both ends of the line were shut down, when, to my surprise, he replied that everything was all right there, and there must be some mistake, as the cars were running on regular schedule time. 'Go in and see if the rotaries are not shut down,' I answered. He did so, and found the rotaries running as usual. This simply shows that the battery was backing up on the rotaries, and running the road at the same time. We think a great deal of the battery. Its operation is perfect. It enables us to start the rotaries from the alternating current end, and is especially useful in night work."

President.—I think it advisable to take up the business of the evening. I understand that some members of the Massachusetts Street Railway Association favor us uniting with them. In the first place the ordinary street railway man is not eligible to membership in that association. The street railway companies are members of the association, and each company is entitled to appoint a representative in the following manner, which I think is correct. A company with a capital stock of $100,000 is entitled to one representative, $100,000 to $200,000 two representatives, and all over $200,000 three representatives. This association is composed of the higher officers of the different companies, and the ordinary superintendent as well as other practical street railway men would not feel at home at these meetings. Although we are at all times willing to carry out any suggestions which the street railway associations of New England may offer, we do feel that this club of ours will enable us all to meet and discuss the practical operations of the different roads.

The minutes of the formation of the club were read, as were also the by-laws and constitution of the club, and were referred to the next meeting of the club.

Mr. Whitaker, general manager of the Portland & Yarmouth Street Railway Company, Portland, Me.—I did not come here with the intention of speaking, but simply came to listen and get all the information I could. I think the idea of a club of this kind is desirable, and it is certainly a necessity for the benefit of all who have anything to do with the practical operation of a road. The variety of subjects that can come up for economical management is a fruitful source of interest to all superintendents and railways. I am an outsider practically, although it is my intention to join the club.

Mr. Pastell, electrical engineer of the Lynn & Boston Railroad Company.—I have been a member of the New England Railroad Club for some three years, and attended most of its meetings, and I think there were only two meetings that were of interest to a street railway man. I think this is an excellent scheme, and I would suggest that a special meeting be called for two weeks from to-night, Sept. 19, in order that the constitution and by-laws be accepted and sub-committees appointed, especially a committee on publication. Every street railway man will be interested in the papers read before this club, and there ought to be some means devised whereby those who are unable to attend may have an opportunity to read them.

Mr. Henderson, of the Newton Street Railway Company.—I think the papers read to-night should be published in some magazine, and I, for one, will certainly favor that something be done in that direction.

Secretary.—I think I am safe in saying that the Street Railway Journal would be very glad to publish in its weekly editions the proceedings and papers read before the club, but I have no assurance of it. I will write the publishers and see what they say. If they do not feel disposed to publish these papers I think the club ought to do it. The New England Railroad publishes a magazine every month containing the minutes of each meeting and the papers read, together with illustrations, and it has proved a success.

Mr. Granger, of the Boston Car Wheel Company, Boston.—I have been very much interested in the progress of the New England Street Railway Club, and have made it my business to talk to all my friends, not only those interested in the operation of street railways, but also in the supply business, and every time I have made mention of it the parties I have spoken to have been anxious to join. I have a list of friends who are, by the way, street railway men, who would like to become members, and have asked me to submit their names, and if the committee will accept them for membership, and send them their notice of being elected to membership they would be very glad to attend the meetings. Parties in New York and Boston would be glad to become members.

President.—I would suggest that Mr. Granger leave his list with the secretary, and the same will be taken up at the next meeting of the executive committee.

President.—I have been on a small road for some years, and it has been impossible for me to keep up with the larger roads, regarding new devices, etc., and I would like to know something about the rotary snow plow.

Mr. Spring, of the Norfolk, Western Street Railway Company.—I would suggest that the executive committee get someone to speak on the snow plow question at the next meeting, for the subject will be very interesting, especially to suburban lines, where they encounter considerable difficulty during the winter months in keeping the snow clear from the tracks.

(It was voted that the committee act on these suggestions.)

Voted: That a vote of thanks be tendered Messrs. Stone and Davis for their interesting papers.

Voted: That a vote of thanks be tendered to the Rand Avery Supply Company for the free use of its rooms for this meeting, and for the cigars which the members seemed to enjoy.

Mr. Henderson.—I think we ought to combine all our efforts to get a large number present at the next meeting of the club, which will be two weeks from to-night. I think if we make a strong effort we can get a very large crowd.

At this point the meeting adjourned.

Retirement of C. K. Durbin

After a long and successful term of service as superintendent of the Denver City Tramway Company, Denver, Col., Charles K. Durbin has resigned his position, and will engage in a private business enterprise. Mr. Durbin was held in the highest esteem by the company, and the directors with regret lose his services. His successor has not yet been appointed, and probably will not be named for several weeks. As a mark of regard, the company presented Mr. Durbin with a gold watch, suitably engraved, and adopted resolutions, given below, testifying to its appreciation of his work. The employees also presented Mr. Durbin with a handsome diamond ring and a set of link cuff buttons with diamond settings.

C. K. DURBIN

Mr. Durbin's connection with the company that has developed into the present Denver City Tramway Company commenced in June, 1888, when he was appointed auditor. In November of the following year he became superintendent. His term of service began when the development in street railway work had just started. The company was experimenting with the underground electric system on Fifteenth Street, and expended considerable money in endeavoring to make the system practicable. At the present time the system of the company covering the city of Denver is operated by the trolley. During the years of his superintendency Mr. Durbin has had experience with horses, steam dummies, the cable and electricity. During this same period the two most marked features of the company's system were introduced. First was the method of dispatching cars following the practice on steam railroads. This innovation has been adopted in Portland and Los Angeles, and has been found extremely serviceable in the operation of cars. The second feature was the method of paying the men. Each night the conductor pays the day's wages to the motorman and himself. This plan works admirably in practice. The office is required to handle a quarter less money; less work is required in the bookkeeping department, and the men like the arrangement far better.

Mr. Durbin has been successful in dealing with the employees in a marked degree. He has followed the policy of making the service lucrative and attractive to the men, so that they have been glad to hold their places. The schedule of wages was arranged with this idea in view. The first year the car men are paid 17½ cents per hour; the next two years, 20 cents; 21 cents the fourth and fifth years, and 22 cents after that. After five years' service the men have the right to wear one star on their coats, and after ten years they wear two stars. After ten years' service the employees are given uniforms by the company as presents. Last year ninety men received donations of this kind and 60 per cent of the present force have been in the company's employ more than five years. Mr. Durbin has had no trouble with the men, though he is a thorough believer in good discipline.

The resolutions which the board of directors adopted are as follows:

"Whereas, For upwards of fifteen years last past, Mr. Charles K. Durbin has been closely and prominently identified with the street railway enterprises in Denver, having served the Denver City Tramway Company and its predecessor companies during that period of time as superintendent, and

"Whereas, The untiring service rendered by Mr. Durbin has contributed materially to the upbuilding of the system of street railways in Denver in which we all justly take so much pride, and

"Whereas, Mr. Durbin is about to sever his official relationship with our company, for the purpose of entering upon private business; now, therefore, be it

"Resolved, That we, the board of directors of the Denver City Tramway Company, hereby express our deep appreciation of the earnest effort, absorbing interest and rare intelligence which have always characterized the official connection of Mr. Charles K. Durbin with our company, and

"Resolved, That his determination to withdraw from the position which he has so long and so capably occupied is a source of regret to each of us personally and as officers of the Denver City Tramway Company, and

"Resolved, That we hereby tender to Mr. Durbin our sincere thanks for the uniform courtesy, zeal and faithfulness displayed by him, in winter and summer, in storm and sunshine, during the hours of vicissitude as well as in prosperity, while acting as the superintendent of the Denver City Tramway Company and the companies which preceded it, and that we hereby extend to him the assurance of our best wishes for his future prosperity and happiness in whatever walk of life he may select, and

"Resolved, That a copy of these resolutions be presented to Mr. Durbin."

W. F. McCLELLAND, WILLIAM U. BYERS,
RODNEY CURTIS, WILLIAM G. EVANS,
G. E. ROSS-LEWIN, JAMES H. BLOOD,
S. M. PERRY, THOMAS KEELY,
GEORGE H. HOLT.

Annual and Quarterly Metropolitan Reports

The Metropolitan Street Railway Company, of New York, reports earnings as follows for quarter and the fiscal year ending June 30, 1900:

Quarter ending June 30	1899	1900
Gross receipts	$3,665,946	$3,849,354
Operating expenses	1,765,671	1,825,690
Earnings from operation	$1,900,275	$2,023,664
Receipts from other sources	77,768	79,245
Net income	$1,978,043	$2,102,909
Fixed charges	1,125,657	1,175,400
Net earnings	$852,386	$927,509

Year ending June 30	1899	1900
Gross receipts	$13,158,630	$14,721,550
Operating expenses	6,408,711	7,104,607
Earnings from operation	$6,749,919	$7,616,943
Receipts from other sources	366,893	351,985
Net income	$7,116,812	$7,968,928
Fixed charges	4,477,757	4,608,768
Net earnings	$2,639,055	$3,360,160
Dividends paid	2,471,675	3,145,891
Surplus	$167,380	$214,269

The balance sheet of June 30 shows:

ASSETS

Cost of road and equipment	$35,682,169
Stocks and bonds	21,644,457
Supplies on hand	103,778
New cons. on lines owned and leased to be distributed	18,068,359
Office furniture	18,304
Improvements, additions and betterments charged to leased lines	2,776,065
Bills receivable	271,886
Cash on hand	12,489,276
Open accounts	37,291
Total	$91,091,587

LIABILITIES

Capital stock, common	$44,960,900
Funded debt	21,750,000
Bills payable	8,756,736
Interest accrued	401,275
Dividends unpaid	786,815
Open accounts	374,280
Third Avenue R. R. Co. lessor construction account	11,419,834
Rentals and taxes accrued	621,830
Profit and loss surplus	2,019,915
Total	$91,091,587

PERSONAL MENTION

MR. BENJAMIN W. PORTER, formerly general manager of the Derby Street Railway Company, of Derby, Conn., was recently presented with a handsome set of Johnson's Encyclopedia in token of the esteem in which he is held by his former employees. There are eight volumes in the set, and they are bound in morocco.

MR. H. S. COOPER, whose resignation as general manager of the Ithaca Street Railway Company, of Ithaca, N. Y., was announced last month, has been engaged by a syndicate of capitalists as a street railway and operating expert. The plan is to undertake the reorganization or revamping of poorly paying roads, where there is a chance of improving their condition and placing them on a paying basis. The work will be carried on largely in the West and Middle West.

MR. L. B. STILLWELL has resigned as electrical director of the Niagara Falls Power Company, and will remove to New York City, where he will open an office as consulting electrical engineer. Mr. Stillwell has been connected with the Niagara Falls Power Company's electrical interests practically since their inception, the electrical machinery now in operation in the great 50,000-hp plant having been designed and constructed by the Westinghouse Electric & Manufacturing Company under his supervision while electrical engineer and assistant manager of that company, while as electrical director of the Niagara Falls Power Company he has directed the installation and operation of the plant since March, 1897. For the past two years Mr. Stillwell has given a large part of his attention to consulting work for other electrical enterprises, notably the equipment of the elevated railways of the Manhattan Railway Company in New York City, which is proceeding under his direction. Harold Winthrop Buck has been appointed electrical engineer for the Niagara Falls Power Company and its allied interests, including the Buffalo and Tonawanda companies, as successor to Mr. Stillwell. Mr. Buck is a graduate of the Sheffield Scientific School, and received his degree of electrical engineer from Columbia University. For the past five years he has held an important position on the engineering staff of the General Electric Company at Schenectady, N. Y. Philip P. Barton and Paul M. Lincoln, assistant superintendents, have been promoted, Mr. Barton having been appointed superintendent of the operating department of the Power Company, and Mr. Lincoln resident electrician.

L. B. STILLWELL

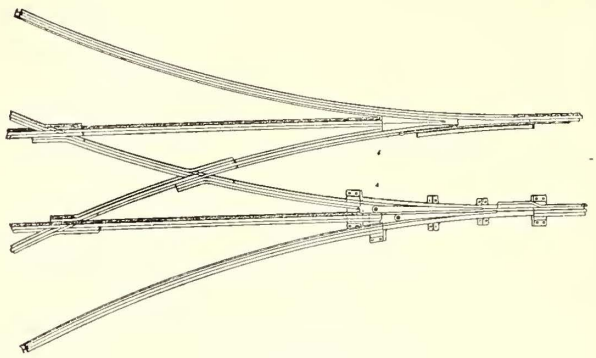
Street Railway Patents

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

ELECTRIC RAILWAY PATENTS ISSUED SEPT. 4, 1900

657,099. Railway Switch; G. H. Fairchild, San Francisco, Cal. App. filed June 22, 1900. A double switch for three way tracks consisting of a main or straight track and right and left branch tracks leading therefrom at about the same point, with two inde-

pendent switch tongues, one in the outside rail of one branch, and the other in the inside rail of the other branch, each tongue having



PATENT NO. 657,099

a suitable and correspondingly located mate in the opposite sides of said branches.

657,123. Car Wheels; H. W. Libbey, Boston, Mass. App. filed July 27, 1899. The invention consists in forming the car wheel in two parts, the rear portion being formed with a number of recesses and having an elastic tread around its periphery. The elastic tread is formed with ears of projections that fit into the recesses in the rear portion of the wheel.

657,154. Sill for Underframe of Cars; W. P. Bettendorf, Davenport, Ia. App. filed March 15, 1899. The sill consits of two continuous beams (or equivalents) arranged one above the other and extending from end to end of the car, and above the car bolsters, the beams being separated between the bolsters to form a truss, then brought into direct contact and union at points above the bolsters and again separated beyond such bolsters.

657,180. Car Fender; R. F. Preusser, Washington, D. C. App. filed Nov. 20, 1899. Structural details on a combined fender and wheel guard, the fender being adapted to be folded back against the dashboard out of way of coupler when not in use.

657,198. Striker Arm for Car Seats; J. S. Johnston, Newport, N. Y. App. filed Jan. 20, 1900. Structural details which allow the back to be reversed in position and at the same time furnish stops which limit movement of the parts.

657,445. Anti-Friction Bearing for Car Trucks; J. A. Patten, Baltimore, Md. App. filed Jan. 19, 1900. Each ball lies in a separate socket so that they are maintained in proper working position. Portions of casing are made so as to readily wear away as balls and other parts wear, so that weight will always be on the balls.

657,480. Car Seat; T. B. Cann, Wakefield, Mass. App. filed April 25, 1900. Details which provide means whereby the reversal of the back causes also a reversal of the position of the foot-rest frame and seat.

657,481. Car Seat; T. B. Cann. Wakefield, Mass. App. filed April 15, 1900. Modification of preceding patent.

657,490. Car Seat; D. M. Houston, Wakefield, Mass. App. filed April 15, 1900. Modification of preceding patent.

657,492. Railroad Tie; E. A. W. Jeffries, Detroit, Mich. App. filed May 24, 1900. An elastic railroad tie. The body or main portion of the tie is formed of concrete or artificial stone.

NEWS NOTES

[News notes for this department are solicited.]

ATLANTA, GA.—Transfers are now granted from the lines of the Atlanta Railway Company, which run out McDaniel Street to McPherson Barracks and also out Cooper Street to Grant Park, to those of the Atlanta Railway & Power Company, of which the former company is a part. Transfers are given to all lines at the point of contact with the tracks of the Atlanta Railway Company.

JACKSON, GA.—A stock company headed by Capt. W. F. Smith, of Flovilla, has just purchased the Thomas shoals, on the Ocmulgee River. It is said that the deal is of considerable importance, and that the company intends utilizing all the power of these shoals and furnishing electricity in Jackson, Flovilla and Indian Springs. It is said that the company also contemplates changing the Flovilla & Indian Spring Railroad into an electric line and extending it to Jackson.

EAST ST. LOUIS, ILL.—The employees on the Day line and the Suburban line running between East St. Louis and Belleville and the local street railway lines in Belleville went on strike Sept. 5. No cars are running.