# Glancing Ahead Into the Immediate Future of Electrical Development

**Electric Locomotion.**

IN considering the possibilities of electric locomotion one would be justified in saying they are unlimited. In the present state of industrial prosperity transportation is one of the greatest factors in the commercial world.

To illustrate the possibilities of electric locomotion for city traffic one might mention the Union elevated railroad of Chicago, popularly known as the Union Loop, where 1,600 trains, ranging from two to five cars each in length, pass daily. During the time of maximum congestion on this line the average time between trains is 19.5 seconds. Since this service does not take care of the traffic the local transportation committee of the Chicago city council appointed a commission to report on the possibility of increasing the capacity of the Union Loop, and in a recent report this commission recommended a plan whereby the capacity of this loop could be increased 25 per cent. These results can only be obtained through the use of the electric motor, since the motors are mounted on car axles and if necessary every axle in a train may be made a driving axle. This is not the usual practice, however, as the possibilities of rapid acceleration are not limited by the available power, but rather by the comfort of the passenger, and a five-car train is generally made up of three motor cars and two coaches.

In the eastern and central states for the past five years the city lines have been extending to the suburbs and neighboring towns and the past year has seen many of these great networks of traction lines connected, and through limited service established between connecting lines. It is now possible to travel hundreds of miles through the states of Indiana, Michigan, Ohio and Pennsylvania without resorting to the steam roads, and in cars rivaling those of the Pullman company. Bearing the same relation to the electrics that the Pullman company does to the steam roads, we have the Holland Palace Car company, offering composite sleeping and parlor cars, buffet and chair cars and observation cars for the comfort of the public. These cars weigh nearly fifty tons and are capable of making seventy-five miles per hour. A 150 horsepower motor is mounted on each axle, making a total of 600 horsepower, or about one-fourth that of our heaviest passenger locomotive.

At present the longest possible continuous trip that can be taken on electric cars is about 480 miles, but when projected lines are completed it will be possible to travel from 800 to 1,000 miles. These facts will show that the electric road has not only successfully rivaled the steam lines for local traffic, but is gradually encroaching on their through service.

The advent of the electric locomotive in the field of heavy traction has necessarily been very slow; as all of our steam roads were in the hands of mechanical rather than electrical engineers; and in the mind of the practical railroad man an electrical machine is a mysterious affair, possibly adapted to city or interurban traffic, but not to be considered for heavy or long hauls.

The work at Zossen, Germany, during the past year has demonstrated that the electric locomotive is capable of obtaining higher speed than has yet been attempted by any steam machine. The electric locomotive has been adopted by the New York Central Terminal company, where the requirements are exceptionally severe, and the competitive tests between the first locomotive built for this service and the best steam locomotive showed the great superiority of the electric over the steam machine. In this test the electric locomotive was able to accelerate faster and maintain a higher speed than its steam rival with 70 per cent greater weight. These results may be accounted for by the fact that 70 per cent of the total weight of the electric locomotive is on the driving wheels, whereas only 41 per cent of the total weight of the steam locomotive is carried on the drivers.

Although these results are very gratifying to the electrical engineer, it is very doubtful if it is feasible to generate and transmit the enormous current that would be necessary to operate our great trunk lines, using a locomotive of the New York Central type; since these are direct current machines limited to 600 to 650 volts. The past two years has witnessed the perfection of an alternating current motor known as the single phase series motor, well adapted for traction purposes, and future progress will undoubtedly be made along this line. We now have several lines in operation using a trolley voltage of from 2,300 to 6,600 and some engineers advocate a trolley voltage of 15,000. If the future proves these motors in large sizes to be a success, and we have reason to believe they will, the possibility of electric locomotion will be indeed unlimited, and a few years will witness the passing of the steam locomotive.

H. B. NOYES,
Electrician Omaha and Council Bluffs Street Railway Company.

**The Telephone.**

IN 1876 the first telephones were installed in Omaha by Messrs. L. H. Korty and J. J. Dickey. They were of the crudest sort, transmitter and receiver being in one piece, making it necessary to shift the instrument from in front of the mouth when through talking to the ear in order to hear the reply. No one at that time looked upon the telephone as of practical use in a business or social way.

A little later an exchange was started on a very small scale, using an instrument composed of a receiver and transmitter; this change from the one-piece instrument having been made for convenience. The exchange grew slowly but steadily in number of subscribers, though for years all of the subscribers looked upon their telephones as luxuries. Improvements in the instruments, giving them greater efficiency, and in the switchboards, allowing faster operating and with greater economy, followed one on the other very rapidly. This enabled the telephone company to gradually reduce rates and thus popularize the telephone to a considerable extent.

The high potential circuits of the electric light and street railway companies gave the telephone companies a serious setback, inasmuch as they made necessary the change from the grounded to the metallic circuit system, which change means that the telephone company must double the amount of wire they have strung and change instruments to accommodate their existing subscribers, not only for local but also for long-distance service.

During the last five years the telephone has grown in popular favor and use until at present it is an absolute necessity to the business man and very nearly so to the residences.

Notwithstanding the fact that the telephone is looked upon by the general public as now almost perfect, it is to the telephone engineer still sadly lacking and more work, time and money are now being spent to perfect the apparatus used than ever before. One of the most important and latest inventions is that of a telephone repeater which is now being successfully used between New York and Chicago, and which it is hoped may make possible a conversation from New York to San Francisco or London.

It is safe to predict that the next five years will show a greater growth in the use of the telephone and greater efficiency from the apparatus than any like period of the past.

The telephone today is the greatest medium of quick commercial transactions, both local and long distance, in existence, and will undoubtedly continue to lead in the future, always growing more comprehensive in scope.

G. H. PRATT,
Nebraska Telephone Company.

**The Electric Telegraph.**

DEVELOPMENTS and inventions in all branches where electricity is a factor, are coming so quick and fast that almost any prediction for the future is liable to be upon us at any time. Its development was never so rapid. It would seem that the achievements to be attained by the use of electricity are almost unlimited.

This is perhaps more true as regards electrical engineering, lighting, power and heating than in the telegraph field. The matter of electricity for heating purposes on a large scale at present is impractical, on account, largely, of the cost of production. It is safe to say, however, that the future will overcome this.

For years past various methods of mechanical telegraphy have come and gone, leaving the Morse system still in the lead. It is the "old reliable," and there is no getting around it. Every once in awhile some inventive genius, usually without a practical knowledge of telegraphing in general, has spent much time and more or less of his own and other people's money in trying to develop a system that would down good old Prof. Morse and throw a good portion of the operators of the country out of their positions. Practically all of these attempts have been failures.

The quadruplex, which permits of the sending of four messages over one wire at the same time, is the limit of the multiplex system in this country. The sextuplex has been used to a certain extent in Europe, but this is largely on short circuits. It is possible in Europe on account of the close proximity of one commercial center to another.

The latest invention in telegraphic apparatus is the system known as the Barclay printing telegraph, for which great claims are made for the future, and which has been successfully worked between New York and Buffalo for several months. It is at the present time being tried between Chicago and New York. A good description of this system was recently published in the Telegraph Age of New York City.

In the face of all we hear about the wireless telegraph, the great cable companies are contracting for additional cables across the ocean right along. As these cables cost several millions of dollars each, it is plain to be seen that capital does not fear the wireless system, even for interoceanic communication. By this I do not mean to say that the wireless system will not have a field, but it certainly will be limited. This is even more the case on land than at sea.

No doubt the longest telegraph circuit in the world is that worked by the Western Union Telegraph company between New York and San Francisco. This is a duplex circuit and is in use twenty-four hours a day. It has been established during the last couple of years. Of course, Chicago has direct circuits to Salt Lake City, to Portland, to San Francisco and to Los Angeles, while New York works with Galveston and New Orleans, but the circuit from Chicago to San Francisco beats them all.

It will probable be of interest to know that dynamos have practically superseded the old-style batteries at all principal points. Much better results have, of course, been obtained by these changes. Our Omaha office alone, previous to the change to dynamos, had over 12,000 cells of Callaud battery. The dynamos only occupy about one-twentieth of the space required for the Callaud battery.

W. W. UMSTED,
Manager Western Union Telegraph Co.

**Electric Lighting and Illumination.**

SO MUCH space is regularly given in the press to the description of new electrical discoveries and developments that few people not directly connected with the electrical industry realise the enormous strides that are being made in the older and more important applications of electricity. In no branch of the industry is this more marked than in electric lighting. The demands made by the public upon the service of the companies supplying electricity all over the country have never been so great as at the present time, nor have they ever been increasing at such a rapid rate. This constantly increasing demand for more light and better light comes not only from stores and factories, where improvements of this kind are a simple matter of economics, but from the homes of all classes, where the comfort obtained from the use of electricity for lighting, the operation of small motors for running sewing machines, fans, pumps and the like, for the operation of flatirons and various cooking utensils, is only beginning to be appreciated. The use of electric light for purposes of display and advertising has increased until our business streets nightly present a more brilliant appearance than they did during carnival times but a few years ago. More than 15,000 incandescent lamps have been installed in Omaha since the first of the year.

The companies supplying electricity frequently find great difficulty in enlarging their plants fast enough to meet the demands for their service. Here in Omaha the electric light company installed three dynamos of 400 horsepower each, that is, each capable of furnishing electric current for about 6,000 incandescent lamps, just before the Transmississippi exposition. These machines were installed to replace a number of small dynamos and were considered at that time to be very large machines. Two years later it was again necessary to enlarge the plant and one dynamo of 670 horsepower capacity was added, and the following year another machine of double this capacity was added. These machines furnished electric light and power for Omaha, South Omaha and Council Bluffs until last year, when the capacity of the plant was again taxed to the utmost and it was necessary to consign one of the dynamos and engines installed in 1898 to the scrap pile, not because it was in any way worn out, but simply to make room for a more powerful machine. This new machine is a dynamo of 2,000 horsepower capacity, capable of furnishing current for over 30,000 incandescent lamps and is driven by a steam turbine, in place of the ordinary steam engine.

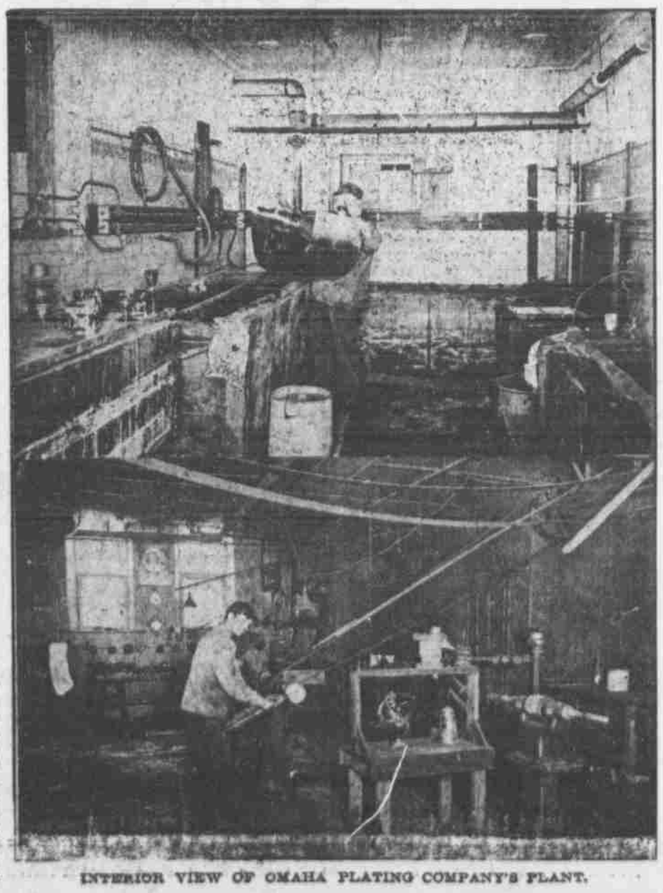
Extensions are by no means confined to the power generating portion of the plant. The plant for distributing the current generated must keep pace with the dynamos and engines. Something over seventy miles of underground conduit, in which is installed about fifty miles of wire, is now in use in the downtown district, and is being increased this year by nearly thirty miles of conduit and a proportional amount of wire.

Many causes, of course, contribute to this phenomenal growth, not the least among which is the more general understanding of the proper arrangement of electric lamps. Until recently electric lamps have been only too commonly installed in such a manner that their rays shone into the eyes of the people who wished to use them rather than upon the things to be illuminated. A man who would not think of using an oil lamp without a shade would have an electric lamp of twice the power so installed as to throw its light directly into his face as he attempted to read. Marked improvements have also been made in the lamps themselves. To most people the incandescent lamp of today looks about as its great-grandfather of ten years ago appeared, but in reality it uses about one-third less current for the same amount of light, while certain special forms of high power incandescent lamps use less than half the current that was formerly required for the same amount of light and still better things are promised for the near future by the lamp manufacturers.

H. A. HOLDREGE,
General Manager Omaha Electric Light and Power Company.

**Novel Electric Truck.**

Recently a large publishing house in New York, which has a government mail clerk constantly on duty for weighing and dispatching its mails, tried the experiment of making use of a novel electric truck driven by all four wheels. This truck, says the Scientific American, carried a four-ton load of mailbags a distance of two and one-half miles and returned empty—thus covering a distance of five miles—in fifty-eight minutes running time. It cut in half the time taken by horse-drawn vehicles, while the cost for current at 6 cents per kilowatt was about 1 cent per ton-mile of load carried. The truck itself weighed about four tons, hence, including this weight, eight tons were moved at a cost for electricity of only half of 1 cent per ton-mile.



INTERIOR VIEW OF OMAHA PLATING COMPANY'S PLANT.

## Electricity Utilized in Plating

While electricity is now being utilized in many different forms, the one which is probably the most complicated and perhaps requires the greatest amount of skill is the art of electro-plating. This process is one which could not be easily explained, as a person would have to be familiar with it in order to understand it. However, the Omaha Plating Co., of which Mr. Louis Slavin is proprietor, has the best and most thoroughly equipped plant in the west, and the public is invited to inspect it at any time. This firm is making giant strides and is keeping pace with the growth Omaha is enjoying at the present time. Although several other similar concerns have been started in the past in Omaha, the Omaha Plating Co. is the only institution of the kind which has made a success of the business in this city. Beginning eight years ago on lower Farnam street, Mr. Slavin then moved into the basement of The Bee building, and when he had outgrown these quarters he moved into his present location at 1508 Harney street, where he has more room for the numerous baths and wheels required in the various departments of this expanding business.

A specialty is made of electro-plating in gold, silver, nickel, copper and brass, and also in oxidizing and lacquering. Mr. Slavin is an expert in his line and had a large and varied experience in some of the largest houses in the country before coming to Omaha.

Serving for eighteen years at his trade before moving to this city, Mr. Slavin has mastered all branches, and no work is either too small or too complex for him to handle, as he is equipped with the facilities for handling all classes of work. Physicians' instruments which have become worn are made to look as new, and household silverware is rejuvenated.

The electric plating department varies as to the class of work. Separate baths are maintained for nickel, copper, gold, silver and brass. The nickel bath alone is valued at $1,100 and is large enough to accommodate any sized piece of work. As a low voltage is required for this work, Mr. Slavin has his own dynamo, which generates seven volts with a high amperage.

Each bath contains a chemical solution, which contains as one of its elements metal in which the article is to be plated. The effect of the electric current is to cause a dissolution of the chemical element on the article to be plated, which is immersed in the bath.

The polishing department is distinct from the electric department, and here all sorts of metals are made to shine as they did when they were first sent from the factory.

A large variety of wheels are required for polishing the different kinds of metals, some of them very expensive. Solid emery wheels are used for certain kinds of work and solid felt for another. Canvas is the best for some and bull neck two and one-half inches thick does better service for others. Other more delicate wheels will put a satin finish upon the finest silverware.

Mr. Slavin has a large clientage, which includes nearly all the metal workers and users of fine and polished metal in the city. The telephone company has a large quantity of business which must be replated. All of the silverware and dining car services of the Union Pacific and Oregon Short Line are sent to the Omaha Plating Co. for repairs and replating. The electric light company has most of its work done by Mr. Slavin and the street railway company sends in large orders, which must be filled. The latest from this company was for 8,000 brass handles for the new system for ringing fares. Besides this the Omaha Plating Co. is polishing and lacquering all of the brass castings for the new cars which are coming in. The electric supply houses also furnish a great deal of plating work and polishing, in the way of switches and connections. The plumbers also have a large quantity of work, as well as the gas fitting houses.

Private individuals are fast learning that this house reburnishes all sorts of brass work, such as gas fixtures, irons, stoves and all sorts of metals. Fancy clocks are made to look as new, and nothing is too delicate or complex to be handled by this firm of experts.