

IN THE FIELD OF ELECTRICITY

International Trolley Lines.

C D. HYATT of Lincoln, during a recent trip through the middle states, paid particular attention to the trolley systems of interurban communication in operation in Ohio, Indiana and Illinois. Of his experiences and observations he writes to the Lincoln Journal as follows:

"Having occasion to visit a town situated in central Ohio, I determined to enjoy the novelty of traveling as much as possible of the distance by means of the interurban trolley lines, which I had heard were continuous over a portion of the distance. Accordingly on arriving at Indianapolis I obtained more definite information regarding the route, and soon afterward boarded a car of the interurban system and entered upon my new experience in long distance travel.

"I found that the cars which would seat forty to fifty passengers were propelled by the overhead trolley system. Outside the cities and towns the line usually, but not always, follow the public roads and consequently the directions would not vary much from the points of the compass. Only one row of poles carry the wires, it being on the side of the track farthest from the wagon road, the poles being planted near the roadside fences, and the wires were suspended from brackets or arms extending over the track. There were occasional sidings upon which we would stop to allow a car to pass from the opposite direction, but the delays were short.

"Sometimes the conductor would step from a the car to a telephone booth on the trackside to communicate with a station. I observed that the motorman seldom sounded a gong, but he would more frequently pull a string, when a rather wheezy and not very penetrating whistle would be emitted. This surprised me, as I had been accustomed to whistles only where steam was used. Upon inquiry I found that compressed air was used to operate the brakes and that the whistle was a compressed air whistle. The only kind of freight I saw taken aboard was milk cans. These had been tagged and left on platforms at the trackside, about the level of the car floor, and the cans were quickly passed to the front platform of the car by the conductor and motorman, the conductor detaching a coupon from the tag or label of each can. At destination they were lifted to the consignee's hand truck run alongside. As to grades, they do not vary much from those of the wagon roads.

"Summing up my impressions gathered from this single trip I can say that I was pleased with the change. Here was a means of not only interurban but interstate transit. Comfortable coaches in charge of two employes and with ample accommodations for hand baggage. I very soon noticed the absence of flying cinders and suffocating fumes given off by locomotives. The only dust encountered would be from an occasional team on the adjoining wagon road which was quickly left behind. It was evident also that the lines traversed the most fertile and populous sections of the country, rendering the scenery and incidents of travel both pleasing and instructive. The passengers changed cars quite often, and tolls were collected between the large towns.

"I made a very enjoyable daylight trip in the manner described above over the entire distance between Indianapolis and Newark, O. When I footed up the fares paid from time to time I found I had paid \$3.65, which was only a few cents more than I was told it would be—the difference was so trifling that I did not try to find out how the misunderstanding arose.

"The traveler or the party of travelers encumbered by much luggage and whose only interest in travel is to be transported

swiftly from place to place, will prefer the steam routes, but those who enjoy rural scenery, much of it beautiful and park-like, with woody odors, and an occasional scent of new mown hay, instead of the grimy smoke from a locomotive, will be pleased with the interurban service. Although apparently not thoroughly organized it seems evident that the system has a promising future. Whatever may be the perils of interurban travel, one does not experience that sense of impending danger which is sometimes felt on the steam trains."

Municipal Electric Light.

Chicago's electric light plant, according to the annual report of Edward B. Elliott, now in preparation, furnishes nearly 5,000 arc lights to the city for 50 per cent of what the lights would cost if furnished by private corporations at market rates.

The total cost to the city for the 4,827 average number of lights in 1904 was \$28,454, according to Mr. Elliott, or \$54.50 per light. Adding charges not shown in the account for the year brings the total cost up to \$262,888, and a comparison of this amount with the \$259,936 that the lights would cost if furnished by corporations shows a saving to the city annually of \$27,952.

Wages paid were 15 to 31 per cent higher than were paid by private corporations and were higher than those paid in any other city from which records could be obtained.

In sixteen years of municipal ownership and operation the city has spent for construction and operation of electric lighting system \$3,720,000.

To have rented the number of lights in use each year with the rent at that year's rate would have amounted in the aggregate to \$3,255,812. In other words, Mr. Elliott says that by municipal ownership the city has spent a smaller amount for the same quantity of light and has the whole lighting system to show as an asset.

Each year has shown a steady growth in the number of lamps in operation, which increased from 105 in 1887 to 5,007 on December 31, 1903.

The total cost for all kinds of city lighting is much less now than in 1895, though the candle power furnished has been largely increased.

The increase is accounted for by more efficient lights now used in gas and gasoline lamps and the great increase in the municipal electric lighting system. There were 12,970 gas lamps, with plain burners, 10,959 gas lamps with mantles, and 6,900 gasoline lamps with mantles in use in 1903, besides the electric lights, of which 670 were rented.

In 1895 city lighting cost \$1,098,550 and light equal to 3,964,000 candle power was furnished. By 1903 the cost had fallen to \$919,161 and the candle power risen to 9,513,400. In 1895 the cost was only \$916,212, and the lamps of all kinds were giving out 12,369,000 candle power light.

This cost includes in the cost for gas lamps \$303,333 for gas furnished to city lamps, an item \$48,956 less than for 1902.—Record-Herald.

The Electrical Farm.

The automobile plow, the gigantic harvesters which cut, bind, thresh and measure the wheat in one continuous operation, the various self-propelling traction machines which do the work of many horses, the hay-loaders, the mechanical milkers and the endless variety of ingenious and costly devices which now beckon to the farmer and assault his pocketbook, may have led him to think that perhaps the limit has been reached; for he has no hope that the greatest genius will be able to produce an electrical farm hand, which is his greatest need. Not so; the farmer of the future, if enthusiasts say true, may be independent

even of the sun; he may stand at his switchboard in the farm offices and throw out the electricity to the potatoes, send along a generous voltage to the beans, electrify the cabbages and wake them up to their duty, and send a vivifying thrill through the homely but hygienic beef.

A Belgian scientist, Prof. Guarini, says that electricity is the life of plants. This electricity is supplied in the atmosphere, but sometimes the supply is not generous enough. It is a mistake to think, he says, that light alone will nourish plants. Scientists have shown these forty years that artificial light is a great stimulus to plant life, and that if electric light be applied at night in the right strength and for the right length of time the results in larger and more vigorous crops and plants will be very startling. Prof. Guarini shows in a simple experiment that it is not the light alone which does the work; it is the electric radiation combined with the light, whether the electric radiation come from the sun and its rays or from the arc lamp. He surrounds a plant, for instance, with a metal cage through which the sunlight streams freely, but the cage acts as a conductor for the atmospheric electricity, and behold! the plant withers and becomes anemic.

On the other hand, a plant may be put in the dark and then given intelligent electrical treatment. The professor recommends the use of the high tension continuous current, which, our farmers would perhaps like to know, may be obtained the most economically and efficiently from three dynamos, each capable of giving a current of 23,000 volts, the three to be coupled together, so that the maximum current of 69,000 volts may be sent out to the vegetables. By this method the carbonic acid in the chlorophyll is decomposed, producing carbon and oxygen; the chemicals in the soil are also decomposed, and the nourishing elements rush to the aid of the plant. By this method many fine crops could be raised in a season, and the expenditure on a large operation would in time be justified. In a greenhouse, where the conditions are just right for the control and expenditure of the electrical energy without wastage in the open air, there is, according to the professor, no doubt of success.

We cite these scientific experiments in order to keep abreast of scientific endeavor, but we do it timorously, because when the farmers hear of Prof. Guarini and his volts they will have something harsh to say about this scientific farming.—New York Times.

Utility of the Hewitt Light.

A series of remarkable moving pictures has recently been secured at the plant of a prominent Pittsburg machine company by the American Microscope and Biograph company with the aid of the Cooper Hewitt light. These pictures were taken for exhibition in St. Louis in the private auditorium of the company on the fair grounds. When "moving pictures" of the Jeffries-Sharkey heavyweight contest at Coney Island were taken the scene was an arena interior. The ring was cut down to twenty feet and 400 arc lamps were strung above it, the heat from which caused the combatants much discomfort. In several of the pictures in question the entire length of a quarter-mile aisle is shown, and at no time were more than sixty-four of the mercury vapor tubes used. The camera was placed on a platform fifteen feet from the ground, suspended from an electric traveling crane. The crane was moved slowly down the long aisle about fifty feet in the rear of the Cooper Hewitt lamps, the latter being also suspended from a traveling crane, moving at equal speed. So far as possible in the taking of these

pictures, any sunlight through the glass skylights of shops was taken advantage of, but it is not safe to depend very much upon the help of the sun in a moving picture which is four or five minutes in taking. The sixty-four lamp tubes were hung in sets of eight, in eight frames. They required only thirty or forty kilowatts, or about one-fifth of the energy consumed by the 400 arc lamps referred to above. The camera made fifteen exposures a second, or 90 to the minute. Among the more interesting pictures are the welding of a ten-foot ring for an electric generator, the railway motor aisle, the forging of a ten-ton steel crank-shaft by a thirty-ton steam hammer, one of the eight main quarter-mile aisles devoted to the construction of big power types and a six-minute view of an employe leaving one of the shops in East Pittsburg.

Wireless Telegraphy in Forestry.

The bureau of forestry of the Department of Agriculture at Washington is moving on the forestry problem from three angles. In Illinois planted timber will be made the subject of careful examination to determine what kinds of trees make the most rapid growth, what kinds are most valuable commercially, and what kinds are best suited to shelter belts.

In the Dakotas the growth of planted trees will be studied to ascertain what species of trees can be most profitably planted in that soil and climate. The methods of planting will be investigated with a view to the improvement of methods and lessening the cost. While the experts are at work in Illinois and the Dakotas, Professor Moore will go to the Black Hills reservation to report on the possibility of establishing a wireless telegraph system of fire alarms in the various forest reserves under the control of the government.

Undoubtedly there has been much useless tree planting in Illinois and other prairie states. For a good many years tree planting was regarded as a fad or something that called for neither thought nor experience. The question was not studied at all, and the results of early tree planting for shelter belts were discouraging. The same haphazard methods were used later in planting larger groves, and unsatisfactory results were put forward as an argument against forest culture in any of the prairie states. If the farmers know from experiment or experience what kind of trees to plant for special purposes or for profit, substantial progress will be made in forestation.

In the Dakotas the conditions are different from those in Illinois, and the investigation will determine whether mistakes have been made in the selection of the trees that have been planted. In the arid districts experiments will be made to determine the kinds of trees best suited to lands that call for irrigation.

All this is in the line of forest production. Quite as important, however, is the plan to prevent forest fires by an automatic service of wireless telegraphy, which will give the alarm when contact is made with flame or excessive heat. Fire has been the worst enemy of forest preservation in great stretches of wooded land in the west. The dispatches from Portland, Seattle and Kalispell show that it is still an agent of destruction in forest districts.

The difficulty has been to discover the fire in remote districts in time to prevent spreading. If a system of wireless telegraphy can be adapted to the giving of alarms in case of fire, a most perplexing problem in forest preservation will be solved. It is as important to save the forests we have as to plant new ones, and while we study the question of forestation we must study also the question of forest preservation.—Chicago Inter Ocean.

