IN THE FIELD OF ELECTRICITY

Distributing Electricity.

IN THE current issue of Cassier's Magazine, which is devoted exclusively to electric power, much valuable information is supplied concerning the art of transmitting the latter. It was long ago established that the distance to which electricity could be sent economically depended mainly upon the voltage or pressure employed. The higher this is, the further the current will go and the smaller will be the "line losses" with a conductor of a given size. At present there are two transmission lines in America on which 55,000 volts are used successfully. One, sixty-five miles long, is in Montana. The other, eighty miles in length, is in Canada. Some of the great transmission systems in California are equipped with three sets of transformers, one capable of raising the pressure to 60,000 volts, and the others working at a lower voltage. For reasons which are not given, the maximum pressure has not thus far been adopted on the Pacific coast, but it is said that a Mexican line 101 miles long has begun to work at 60,000 volts. The difficulties of insulation are so great that anything higher may not be witnessed soon. However, further advances are probable. Speaking of a plan to transmit electric power from the Alps to Paris, a distance of 300 miles, Paul M. Lincoln says that it is not feasible today, but the feat may yet be attempted, when pressures that are "within the bounds of reason" may be safely handled.

Other improvements bearing on transmission have been effected in the last few years. Some of these relate to the dynamo, but that machine is now so nearly perfect that a better one is scarcely possible. Great gains have been made in insulation, as has already been pointed out, and also in line construction. A trifling change in the arrangement of the three conducting cables of a system like that between Niagara and Buffalo has materially diminished the opportunity for mischievous interference by the small boy. In at least one particular European practice is ahead of that of the United States. Electric power cables are often supported by steel towers on the other side of the Atlantic, while here the chief, if not the sole, reliance is the wooden pole. Steel costs more than wood, but it is more durable. It will pay better in the long run. Success in the distribution of electricity has been still further promoted by the increased capacity of switches.

A movement of much significance in England is the application for charters for generating plants large enough to furnish current to a number of adjacent communities. Something of the sort is already accomplished in America, where the source of power is water. The British idea is to use coal. The relative cost of hydraulic and steam power varies with locality. In some places one will be cheaper, and in some the other. Whatever be the means employed to drive the dynamo, though, wholesale production is less expensive than manufacturing on a small scale. It has been estimated, for instance, that if a plant be established which would be able to supply all the towns within a radius of fifty miles, only one-third as much fuel would be needed as would be consumed if each community had its own lighting and power station.

This is not all. Concentration would effect still another economy. Mr. Stillwell, electrical engineer for the New York Rapid Transit Commission, says that a central station having a capacity of only 50,000 horsepower would rarely fail to do the work previously performed by separate plants whose output amounted to 75,000 horsepower, and that the difference might be even greater. In equipping isolated stations it is customary to provide machinery that will meet the maximum demand made upon it. The load usually varies between wide limits in the course of a day. Hence, by substituting one plant for the many, the total consumption would become more regular, and the maximum would never rise far above the average, especially if the uses to which the current was put were dissimilar.—New York Tribune.

Developments in Faraway Lands.

The most interesting and the most remarkable feature of present electrical development is the invasion of far-away, semi-civilized lands by telephone, traction and power transmission systems and other agencies for the application of electrical forces to the uses of mankind. And not the least interesting phase of this invasion of benighted lands is the difficulties that are encountered by the engineers who have in hand the practical work of blazing the way for the march of electrical science.

In Abyssinia nearly 900 miles of telephone wires are already erected and about a thousand miles are in course of construction. The first difficulty encountered was the white ant. The poles were devoured so rapidly by this pest that it was soon necessary to substitute iron poles. These were so attractive to the natives that they began tearing them out and converting them into tools, a practice that was finally stopped by meting out severe punishment to the offenders. Elephants and monkeys now constitute the principal source of trouble. The elephants use the poles as scratching posts and the monkeys find that the wires make good swings.

In far away India electrical development is progressing with wonderful rapidity in spite of the many obstacles that are presented. In the current number of The Electrical Review, a correspondent writing from Sivasamudram, India, describes many important electrical projects about to be inaugurated. The Mysore state government has sanctioned the proposal to supply electric light and power to the city of Bangalore from the generating station at the Cauvery Falls. There is already a ninety-two mile transmission line from the Falls power plant to the Kolar gold fields. It is also proposed to supply the city of Mysore with light and power from these falls.

A 1,000-horse power steam-electric plant is being constructed on the Kolar gold fields for operating hoists and for lighting the entire fields. A project is also on foot to electrify the Kolar gold fields railway. Minor installations in other provinces of India are being proposed, among them being an electric power and lighting plant near Srinagar, Kashmir, in the northern part of India, power for which will be taken from the falls in the Sind river.

The chief difficulty with which the engineers have had to contend in India is the fondness of the natives for copper wire, which they fashion into jewelry and ornaments. To keep them from appropriating the telephone wires it is necessary to carry a very high voltage, which is suspended automatically when a person who desires to talk gives the signal.—Chicago Record-Herald.

Trackless Railway in Prussia.

A trackless railway is being erected by the community of Monnheim, which will be the first of its kind in Prussia. It will run from Monnheim to Langenfeld and will be about two and one-half miles long, with two short branches intended for freighting purposes. The main line will serve for the transportation of persons, baggage, mail and freight. An extension is possible at both ends. The roadway from Monnheim to Langenfeld is about twenty-three feet wide, with a good bassaltic cover about fifteen feet in width, running almost in an air line, with the exception of a few curves. A special contrivance for coupling is provided in order to keep an exact rut of all the cars, which takes the place of wheel flanges in ordinary rail trains. The buildings to be erected for use of the railway are a power house, car barns, repair shop and offices. For the running of the railway a current of about 550 volts will be furnished. The power will be conducted to and from the cars, which are provided with electromotors, by means of two rotary poles, placed on the top of the cars, and sliding blocks enabling the train to give way from ten to twelve feet. The wiring will consist of two hard copper wires, with hard rubber insulators, carried by iron poles about eighteen feet above the middle of the road. For entering farmyards lying close to the road there will be used, instead of the regular wire, a connector and flexible cable fifty to seventy feet in length, by means of which the current will be transmitted to the motor car. Ordinary electric cars have but one pole and the second pole of these railless cars serves for conducting back the current which is otherwise done through the rails. When these trains pass each other one will remain standing under the wires and disconnect its current until the other has passed. The trains will consist of an electric locomotive for drawing two or three cars, driven by two electric motors of from twenty-five to forty horse power, and will be furnished with the necessary illuminating apparatus and brakes. The conducting crew has its place on the locomotive. The cars for carrying freight have a capacity of about five tons. These cars will be coupled in such a manner that the wheels of the car following run alongside the rut of the forward one, thus making a wide rut and avoiding the damaging of the road on wet days. Some of the cars will be open and some closed and all will be fitted with the necessary brakes. Farmers' wagons can be attached to the end of the train, provided the ordinary tongues are replaced by shorter coupling tongues. For the passenger service a motor omnibus, having a seating capacity of sixteen and standing room for eight, is provided. In case of an increased passenger traffic a similar car, but of lighter construbtion than the motor omnibus, will be added. Five or six double trips at the rate of eight to ten miles per hour will be made on schedule time. For the accommodation of the working men, in the morning and evening, two labor trains, consisting of motor car and one or two passenger cars, will be added. Freight will be carried on week days only, as conditions may require, and during the intervals between passenger trains. The fare for the entire trip will be 6 cents. For carrying freight the charge will be $2.38 per carload of ten tons. Subscribers and parties doing a large freight business will be allowed a discount.

Electricity on the New York Central.

Of the two methods of using electric power which the New York Central is preparing to adopt, that which will be witnessed in its suburban service possesses no novelty. It is practically identical with the system already in vogue on the elevated roads in various cities. Several of the cars composing a train will be equipped with their own motive machinery, and the motorman in charge will occupy a compartment in what happens to be the foremost coach. The through traffic will be handled in a different fashion. Special electric engines will be attached to trains for Chatham, Pittsfield, Albany and the west before departure from the Grand Central station. When White Plains, on the Harlem division, and Croton, on the Hudson river division, have been reached these engines will be detached and steam locomotives will be substituted. The procedure will be reversed at the same places with southbound expresses.

One important feature of these machines is that they will run equally well in either direction, both ends being alike. Hence no time need be wasted by the use of a turntable when a trip is finished. An engine will be ready to start back immediately, since it will be unnecessary to stop for supplies of coal or water. It will also be observed that two or more of the new electric engines can be coupled together and separated as one, under the direction of a single motorman. Provision for such combinations was made a year or more ago with the latest motors employed by the Baltimore & Ohio company in hauling trains through the Baltimore tunnel. The first electric engines built for that service were not so designed. In external appearance the motors for the New York Central resemble the latest ones built for the Baltimore & Ohio, but they look cleaner and will probably encounter less atmospheric resistance when running at high speeds. Again, they are expected to generate a little more power than the Baltimore engines, the normal capacity being 2,200 horse power and the maximum 2,800 horse power, capacity of two in combination being 2,000, whereas those now on duty in Baltimore develop only 1,300. Finally, while they may not be permitted to travel faster than forty five or fifty miles an hour, it is announced that they will be capable of going fully seventy-five miles an hour when the condition of the track renders such a velocity safe.

The new locomotive has two great novelties in its design. Its motors will have only two magnetic poles instead of four, which is at present the usual number on all railway motors. The armature of each of these motors, instead of working through gearing, will be pressed solidly on the axle, having been previously assembled on a quill for this purpose. The bi-polar construction of the fixed magnets makes an engine which is exceedingly compact and easy to handle in case of its needing repairs. These poles will be open at the bottom and will be attached at the top to the frame of the locomotive, the frame itself completing the magnetic circuit. When it is desired to remove the armature for any cause, all that is necessary to do is either to drop the pair of wheels with the attached armature down, or to lift up the frame of the locomotive and roll the wheels out. Sufficient clearance is left between the poles and the armature so that the poles cannot touch the armature, though they are riding on springs and the armature is not. Provision is also made so that if a spring should break the armature would not be injured. The total weight of one of these locomotives, of which between thirty and fifty have been ordered, will be 190,000 pounds, or eighty-five tons. Each of the driving wheels, of which there are eight, arranged in four pairs, will carry a weight of 17,000 pounds. This weight has been frequently exceeded in steam locomotives without counting the strain of the thrusts of the reciprocating parts. In the electric locomotive there is a perfect rotative balance, and it does not require any counterbalancing. The length of the new electric locomotive will be thirty-seven feet over all, of which the rigid wheel base will occupy thirteen feet, the total wheel base being twenty-seven feet. The journal boxes and axles of the four pairs of motor wheels will have sufficient lateral play to enable the locomotive to pass easily around curves of 230 feet radius. The diameter of the driving wheels is forty-four inches, and of the pony truck wheels thirty-six inches. The locomotives will have a cab, made of steel, with fire proof doors and windows. The end windows of this cab will command a clear view of the track. There will be two controllers in the cab, so that the motorman will have one immediately under his hand, according to the direction in which he is going. There will also be a bell, a whistle, incandescent lamps for the interior of the cab, electric headlights, an electric air pump for the brakes and sanders, and an electric heating coil.