where the mains are laid only six inches below the surface, and in some cases actually exposed above ground, or placed immediately under the sidewalk, there was not a single case of freezing, though the thermometer registered 50 degrees below zero on one or two occasions. The mains were opened three times last winter to lay new connections, but the pipes were found to be "dry as punk," to use the words of the manager. This, of course, means a considerable saving in the cost of laying pipes, as well as in the convenience of taking them up or laying new connections. In laying the mains here a sheet iron "drip box," about 12 inches long and 6 or 8 inches deep, is, however, put in wherever there is a depression in the level of the main, which is led through the box near its top and provided with a cock to let off any condensation that may develop.

The second advantage for a small town is the smaller cost of installation. An acetylene plant for a town the size of North Bay will cost about $12,000, whereas the cost of a coal gas plant would be about $60,000.

The third advantage of acetylene is the small cost of maintenance, as before shown, and the relatively small cost of extensions, this difference applying not only to extensions at the generating stations, but extensions of main and service pipes.

The fourth advantage of acetylene over coal or water gas—and it is an important one—is that it is infinitely less poisonous. In 10 hours not more than about 5 feet of acetylene would pass through an ordinary burner, and if the peculiar smell of acetylene did not disclose itself to the occupant of a room it would at least fall short of fatal effects, whereas fifty feet of coal or water gas would pass through a burner in the same time, and the frequent items in the daily papers tell with what effect.

Fifth, naked acetylene lights do not flicker as coal gas lights do, and are therefore not so trying to the eyes.

Sixth, acetylene lights of corresponding power do not vitiate the air to the same degree as coal gas lights.

For the operator of the acetylene plant, as well as for the operator of the coal gas plant, there are by-products, as the refuse carbide affords a serviceable quality of slack-lime for plasterers' use and for fertilizing purposes, being sold for these purposes at $5 a ton.

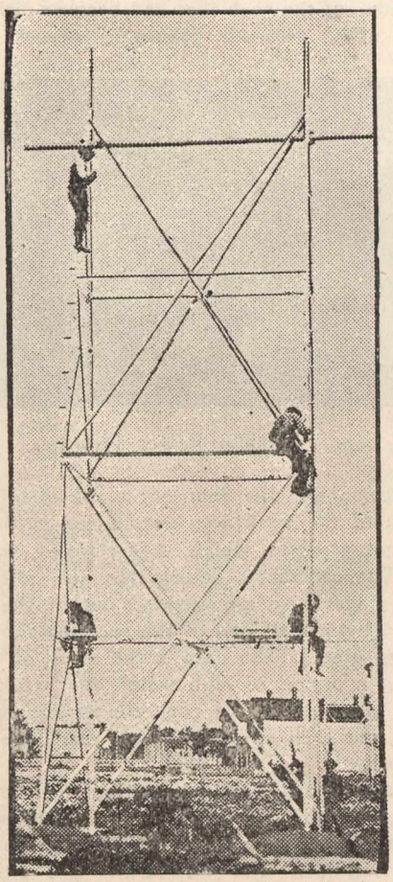
THE TORONTO NIAGARA POWER CO'S. TRANSMISSION LINE.

The transmission line which is to carry power from the generating station at Niagara Falls to the distributing station in Toronto is now under construction. The terminal station in the north-west of Toronto is being erected, and conduits are being laid from that point to sub-stations of customers of the company. Everything is being got ready for the advent of the "juice," which, it is expected, will reach the city in the course of a few months.

The transmission line is of interest, as it is the first of its kind in Canada. Experience with similar undertakings in Mexico and elsewhere is being put to service in the construction of the Canadian line, with adaptations to local conditions as necessary.

The right of way (the route of which was shown in a cut published in the June number of the Canadian Engineer) has an average width of eighty feet, and will be flanked by two lines of steel towers carrying the conductors. The line consists of four three-phase circuits, to be operated at 60,000 volts, two circuits being carried by each line of towers. The towers are constructed of galvanized steel angles bolted together with bracing similar to the usual design of windmill towers. They will be forty-six feet high, having a base fourteen feet by twelve feet. Lengthwise of the line each tower will have a uniform width of fourteen feet from bottom to top, but crosswise the width of twelve feet at the bottom will diminish, the sides coming together at the top. A steel pipe will form a cross-bar, carrying four steel pins, on which insulators will be placed. The other two insulators will be placed on vertical steel pipes, so that the conductors of each circuit form an equilateral triangle, with a horizontal base of six feet. The towers will be sunk about six feet in the ground, each foot resting on a cedar block, and braced with other blocks, upon which the earth will be solidly rammed. Wherever the nature of the soil demands it, a concrete foundation will be used. Towers will be bolted together in a horizontal position and raised to the vertical by means of a derrick.

The above is the description of the typical tower, which is designed to withstand a side strain of 10,000 pounds applied to the top. The towers will be spaced 400 feet apart, and about 1,200 of them will be used, a large part of which quantity is being furnished by the Canada Foundry Co. Where unusual conditions exist, special towers will be provided. At curves the towers will be placed at shorter intervals, and so constructed that they will be equal to the strain without guys. At the crossing of the Welland Canal towers will be erected of special height to allow the passage of ships below the conductors, and the same will be done at the Hamilton Bay Gap. With few exceptions the line passes through a practically level country and presents few difficulties in construction.



Steel Tower used in transmission line of the Toronto & Niagara Power Co.

The insulators will be glazed brown porcelain, in three or four parts. The parts making up the insulator will be cemented together and the insulator cemented to the steel pin. The insulator will be about fourteen inches in diameter of top umbrella, and about fourteen inches high over all.

The conductor will be composed of six strands No. 6 copper wire wound about a hemp core. The combined area of the strands is 190,000 circular mills, and a high conductivity with a high tensile strength and elasticity is obtained. Tests with this cable show that an elastic limit exceeding 35,000 pounds per square inch can be obtained with an ultimate tensile strength of 55,000 pounds per square inch. The cable, which will be supplied by the manufacturer in lengths of 3,000 feet, will be joined by twisted copper sleeves unsoldered, and copper tie wires will be used. Low temperature, wind, sleet, etc., have been provided for in the spacing of the towers and the amount of sag to be allowed. Lightning arresters of ample capacity will be placed at various points on each circuit, each arrester being provided with a knife-switch for disconnecting it from the transmission line.