Volume 23. Toronto, Oct. 10, 1912

Contents of this issue on page 583

The Canadian Engineer

An Engineering Weekly

STEEL TOWERS FOR OVERHEAD TRANSMISSION LINES.

By ALFRED STILL, M.Inst.E.E., M.Am.Inst.E.E. *

It cannot be said that there is at the present time a standard type of steel structure for supporting the conductors of overhead transmission lines; neither is it likely that one particular design will ever be found suitable for all countries, climates and voltages. Any kind of supporting structure which will economically fulfil the necessary requirements will answer the purpose of the transmission line engineer, who merely requires a durable mechanical structure to carry a variable number of insulators at a height above ground, and with a spacing between them, depending upon the voltage of transmission and the length of span.

As a substitute for wood poles, steel tubes have been used, either in one piece, or built up of a number of pieces of different sizes in order to economize material and give a large diameter at the bottom where the bending moment is greatest, and a small diameter at the top where the bending moment is negligible. Steel poles of considerable height, suitable for longer spans, may be built up of three or four vertical tubes of comparatively small diameter jointed and braced together at suitable intervals to give stiffness to the structure. It is doubtful whether, in the long run, such composite tubular structures will hold their own against the latticed steel masts built up of standard sections of rolled steel, as used extensively on the continent of Europe, and, to a relatively smaller extent, in America. The term "tower" is applied mainly to the light steel structures in which the spacing between the main upright members, at ground leved, is large compared with the height of the structure; the usual proportion—which will generally be found to be the most economical in material—being 1 to 4; that is to say, if the base is square, the side of this square will be about one-quarter of the distance from the point of measurement to the top of the tower. If the towers are large, the footings are usually separate pieces which are correctly set in the ground by means of a templet, and to which the legs of the tower proper are afterwards bolted. A good example of large steel towers is to be found in the 100,000-volt transmission line of the Great Western Power Co. of California. Two three-phase circuits are carried on these towers, the vertical spacing between the cross-arms being ten feet. There are three cross-arms, each carrying two conductors—one at each end. The horizontal spacing between wires is 17 feet on the two upper cross-arms are 18 feet on the lower cross-arm, which is 51 feet above ground level. No conductor is closer than 6 ft. 5 in. to the steel structures, this being the minimum clearance in the horizontal direction. The average distance between towers is 750 feet, and they are joined at the top by a grounded guard wire 5 feet above the bottom of the highest cross-arm. The base of the tower measures 17 feet square, the parts under ground being separate pieces of steel, buried to a depth of 6 feet, to which the tower proper is bolted after being assembled and erected on site.

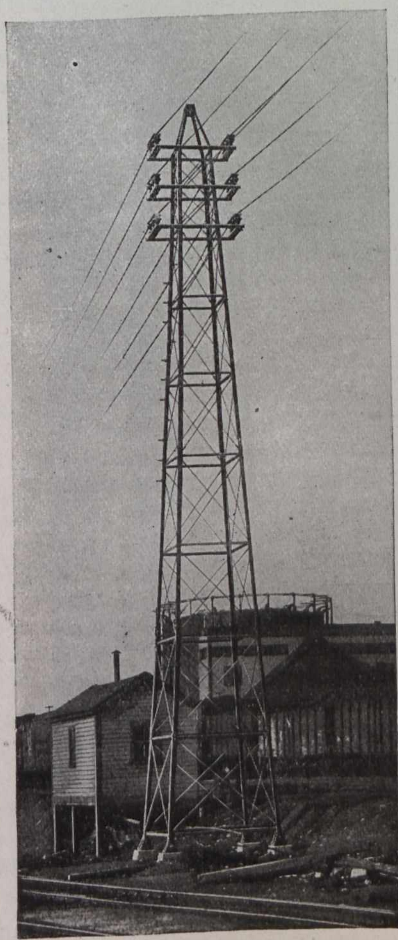

Fig. 1.

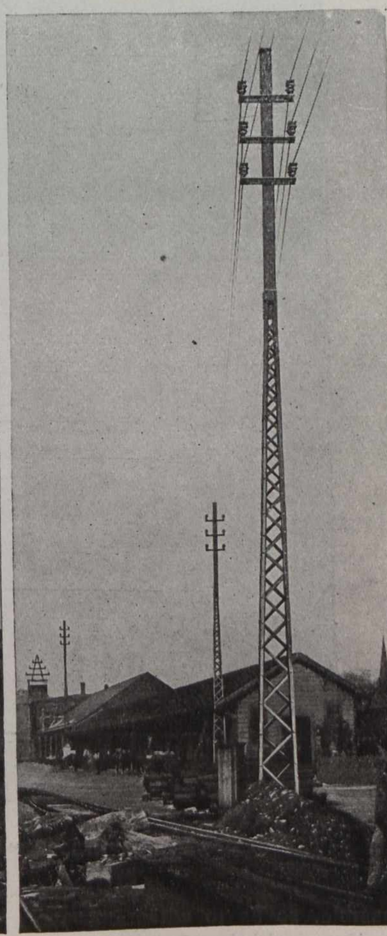

Fig. 2.

Fig. 2 shows the lighter form of latticed steel mast, while Fig. 1 is a corner tower on the same transmission

*Chief Electrical Engineer, mining department, Algoma Steel Corporation.