to two articles in the March, 1907, and April, 1907, numbers of the same periodical by Mr. Clarence P. Fowler, and Messrs. Chas. F. Scott and C. P. Fowler, respectively, of the latter of which two articles liberal use has been here made.

The essential part of the present paper consists of the four plates annexed and designated Diagrams 1 and 2, and Tables I and II. The diagrams were originally intended for use by the firm with which the writer is connected, where they were found so useful that it has been thought well to embody them with the tables in a short paper for the convenience of other members of the engineering profession. They have been derived, as described below, from modifications of the wiring formulæ brought out some time ago by the General Electric Company,* and these diagrams with the $\frac{\text{Reactance}}{\text{Resistance}}$ tables (Table I) and the list of drop factors following (Table II) may be used in quickly solving the conductors for almost any transmission line.

The process of development of the curves may be readily traced, but it has been thought advisable to show the steps taken in attaining the results, and in this connection it should be carefully kept in mind that in alternating current transmission at power factors of load other than unity, the loss of volts and drop of volts are by no means synonymous—the first referring to a CR loss, and the second to a CR loss multiplied by a factor; and that the % watts loss and % volts loss are not the same by any means, and neither agree with the % drop, which latter determines the regulation.

Proceeding with the derivation of the diagrams, the following equations should be noted:

On the basis of watts loss, for any conductor, the following formulæ are universal for all systems of transmission when suitable constants are used.

$$\text{Area in circular mils} = \frac{D \times W \times K^1}{P \times E^2} \quad (1)$$

$$\text{and, total wt. of copper in line} = \frac{D^2 \times W \times K^1 \times A}{P \times E^2 \times 10^6} \quad (2)$$

where D = distance one way in feet along line.
W = total watts delivered at receiver end of line.
P = per cent. of loss of power W.
E = line voltage at receiver end.
K^1 = a constant = 1080 for three-phase 100% power factor.
A = a constant = 9.06 for three-phase all power factors.

* See Foster's "Electrical Engineer's Pocket Book," pp. 124-126, and Crocker's "Electric Lighting," vol. ii., pp. 232 *et seq.*