

Abstracts of Technical Articles from Bell System Sources

*The Orientation of Crystals in Silicon Iron.*¹ RICHARD M. BOZORTH. X-ray examination of silicon iron prepared by N. P. Goss shows that the component crystals are oriented so that a [001] direction is parallel to the direction of rolling and a (110) plane lies in the rolling plane. This is contrary to the result reported by Goss in his paper "New Development in Electrical Strip Steels Characterized by Fine Grain Structure Approaching the Properties of a Single Crystal," published in *Transactions of the American Society for Metals*, Volume 23, June, 1935, page 511. The differences in the magnetic properties in different directions in the sheet are explained in terms of the properties of the single crystals.

*Eddy Currents in Composite Laminations.*² E. PETERSON and L. R. WRATHALL. The familiar theory of eddy current shielding leads to an expression for the impedance of a ferromagnetic core inductance coil in terms of the initial permeability and resistivity of the core material, the core geometry, and the measuring frequency. Measurements on a number of different core materials over a wide frequency range have revealed sizeable deviations from the theory in some cases. The discrepancies are especially marked in some specimens of chromium permalloy, the measured inductance over a certain frequency range being of the order of one tenth that specified by the theory.

It appears that discrepancies arise when the laminations are not homogeneous, a condition contrary to an assumption of the simple theory. The inhomogeneity takes the form of a thin surface layer which has a permeability much less than that of the interior. By etching off these surface layers, the initial permeability is increased, and discrepancies between the measured variations of impedance with frequency and those calculated for a homogeneous sheet are removed almost completely.

The theory has been extended to take account of the surface layers, and agrees well with measurements on the original unetched laminations when plausible assumptions are made regarding the properties of the surface layer.

¹ *Transactions, Amer. Soc. for Metals*, December, 1935.

² *Proc. I. R. E.*, February, 1936.

*Applications of X-Ray Photography in Industrial Development Work.*³ J. R. TOWNSEND and L. E. ABBOTT. The fundamentals of X-ray technic as applied in developmental work of the telephone industry are outlined. A brief description is presented of the physics of X-rays, of the methods used to produce usable X-ray radiation, and of a typical industrial X-ray laboratory. Results are given of investigations at the Bell Telephone Laboratories to determine the sensitivity of X-ray methods of revealing internal defects in metals. Numerous examples illustrating the application of X-rays in telephone work are included, as well as a description of the use of gamma rays for industrial application.

*Principles of Measurements of Room Acoustics.*⁴ E. C. WENTE. The acoustic characteristics of a room can in great part be evaluated from a knowledge of the rate with which sound in the room dies down when emission from the source ceases. The physical principles underlying the relationship are briefly discussed. It is shown by specific examples that we can obtain valuable additional information about acoustics of a room by recording the sound level at one or more points in the room when the frequency of the sound is continuously varied.

*Visual Accompaniment.*⁵ R. WOLF. The principles of producing "Visual Accompaniments" to musical renditions for the theater are briefly described, as follows: (1) natural scenes for portraying the "musical mood" of the musical composition; (2) the changing and blending of beautiful paintings to interpret the mood, known as the Savage Method; and (3) the use of abstract color forms as a means of interpretation. The technic followed in applying the two latter methods is described in detail.

³ Presented at the Fall 1934 mtg. of S. M. P. E., New York, N. Y.; published in somewhat condensed form in *Metal Progress*, February, 1936, under the title "Some Applications of X-Rays to Industrial Problems."

⁴ *Jour. S. M. P. E.*, February, 1936.

⁵ *Jour. S. M. P. E.*, February, 1936.