Abstracts of Recent Technical Papers from Bell System Sources

Complex Magnetization.[1] EUGENE PETERSON. Magnetization of silicon steel by two sinusoidal fields of differing frequencies. The energy loss W per cycle and the flux density B associated with each of the two frequencies were determined when the two sinusoidal magnetizing forces were simultaneously impressed on a toroidal silicon steel core built up of one-mil laminations. A null method was used which permitted suppression of the modulated currents and constancy of the impressed currents during manipulation for balance. The frequencies used were 400, 821 and 1582. Six sets of measurements were taken with fixed magnetizing forces ranging from 0.5 to 10 gilberts/cm and superposed forces up to 15 gilberts/cm. The results show that the effect of superposition depends upon the relative amplitudes and upon the frequency ratio R of the superposed frequency to the other. At low fixed fields W and B go through maxima as the superposed field is increased, the maximum value increasing with R. The maximum is less pronounced or absent for the higher fixed fields. In general B is smaller with a low than with a high value of R other things being equal. The effect on W is not as sharply defined; in general the effect of superposition is more pronounced the higher the superposed frequency. The amplitude effect and frequency ratio effect are shown to be in general agreement with conclusions drawn from mathematical treatment of somewhat simplified cases and it is concluded that the effects are not inconsistent with purely hysteretic phenomena.

Some Photographic Problems Encountered in the Transmission of Pictures by Electricity.[1] HERBERT E. IVES. This paper considers some of the problems of photographic tone reproduction, which arise upon the introduction of an electrical transmission system between a picture placed on sending apparatus in one place and the copy of the picture made by receiving apparatus in another place. Some of these problems arise because of limitations introduced by the use of the electrical transmission line; others arise because of opportunities for the control of picture quality which are not afforded by ordinary photographic methods. As an illustration of one of these limitations

[1] *Physical Review*, Vol. 27, pp. 318–328, March, 1926.

[2] *Journal of the Optical Society of America and Review of Scientific Instruments*, March, 1926, pp. 173–194.

may be mentioned the fact that the original picture, for instance a photographic negative, is not seen by the operator at the receiving end. He cannot, therefore, by using his photographic knowledge and experience, choose printing media and decide upon conditions of exposure and development. As an illustration of the opportunities introduced by an electrical picture transmission apparatus may be noted the possibility of so poling the electrical elements that the received picture may be either a positive or negative, irrespective of the nature of the original at the sending end.

While in other picture transmission systems other problems arise peculiar to these systems, it is believed that although the questions considered are those presented in commercial operation in the Bell System, they are, to a certain extent, common to all electrical picture transmission apparatus.

A Radio Field-Strength Measuring System for Frequencies up to Forty Megacycles.[3] H. T. FRIIS and E. BRUCE. In previous types of radio field strength measurement apparatus it is very difficult to reproduce accurately the small comparison voltages at very high frequencies, due to reactive effects in the attenuating networks. The "tube voltmeter" is practically the only reliable instrument available at high frequency measurement work. New measurement sets for very high frequency signals have, therefore, been developed. The apparatus is a double detection receiving set which is equipped with a calibrated intermediate frequency attenuator and a local signal comparison oscillator. The local signal is measured by means of the intermediate frequency detector which is calibrated as a tube voltmeter and all required attenuations are made at the relatively low and fixed intermediate frequency.

A New Mechanical Test for Rubber Insulation.[4] C. L. HIPPENSTEEL. This paper discusses the development of a rapid routine test which will numerically express the ability of the rubber insulation to resist cutting by the conductor at the points of support and to resist cracking at points of extreme flexure. Up to the present time no one test of that nature has been described.

[3] Presented at a meeting of the Institute of Radio Engineers, May 5, 1926.

[4] *Industrial and Engineering Chemistry*, April, 1926.