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Photomograph

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These carbons are connected to a 110-volt circuit with a resistance of 5 to 10 ohms, more or less, in series. If now the gap between the upper ends of the carbons is momentarily bridged by another carbon rod, an arc will form and remain when the short-circuiting carbon rod is removed.

If alternating current is used the carbons burn down equally. On direct current the consumption of the positive carbon is more rapid than that of the negative. This effect may be offset in a measure by the use of carbons of different size, or in some cases by use of a reversing switch by means of which the polarity of the carbons may be changed from time to time.

VISIBLE PHASE RELATIONS IN AN A. C. CIRCUIT

L. B. SPINNEY

By connecting low wattage neon lamps in parallel with the different portions of an alternating current circuit the phase differences in these parts may be made visible by the rise and fall of the glow in the corresponding lamps.

The lamps used for this purpose are those in which the glow appears upon the lamp terminals or electrodes and the phase difference in the glow of the different lamps is made visible by viewing the lamps through radial slots in a revolving disc. If the speed of the disc is properly adjusted the phase differences are readily observed.

PHOTOMOGRAPH

L. B. SPINNEY

A photometer is arranged in such manner that the screen and the lamp tested are stationary, the standard lamp being adjusted in distance to effect a balance. If the standard is moved by means of a band running over a wheel conveniently near the screen this wheel will revolve through an angle proportional to the distance the standard is moved. A spiral may now be drawn upon the face of the wheel of the form $p = a\Theta^{-2}$, where p is the radius vector and Θ the angle through which the spiral-wheel turns, such that p at any point is proportional to the corresponding illumination of the screen and therefore also to the candle power of the tested lamp. A candle power scale of equal scale divisions may be placed opposite the spiral for reading off the candle power directly, or the spiral

formed of suitable material may be caused to actuate a recording point, resting on a disc of paper revolving at the same rate as the test lamp, thus drawing a distribution curve showing the variation in candle power of the test lamp in the plane of rotation.

IOWA STATE COLLEGE.

A NEW VALUE OF OPTIMUM THICKNESS FOR X-RAY SCATTERING

F. D. LEAMER

Using the general formula for the absorption of a homogeneous beam of x-rays,

$$I = I_o e^{-\mu t}$$

Hull has arrived at an expression which gives the total intensity of the scattered radiation that emerges from any scattering substance of thickness t. This total intensity becomes a maximum when

$$t = \frac{1}{\mu}$$

In our investigation of diffraction effects in liquids by photographic method it has become evident that such a thickness as predicted by the above formula does not give us a maximum of energy per unit area in the beam which is diffracted in accordance with the Bragg Law.

Our theory, which is verified by experiment, indicates that the thickness for which we will obtain maximum effect upon a photographic plate will be different than the optimum thickness for maximum scattering.

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THOMSON EFFECT IN SINGLE CRYSTALS OF ZINC

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Determinations of the Thomson coefficient of single crystals of zinc have been made by the method of Nettleton. For all orientations the coefficient increases with rising temperature (range 50-200°C). The variation of the coefficient for a single temperature (60°C) as a function of crystal orientation was discussed.

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