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# A New Form of Carbon Arc

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## UBI FACIT IBI EST

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Where a thing acts there it is. In place of the old dogma of Descartes, "Cogito ergo sum," the modern pragmatist says that a thing exists if it affects us; we have an objective rather than subjective philosophy.

The classical electron may be thought of as existing in its field of force rather than in the charge. Where it acts there it is; in the usual theory we do not think of the electron as being in the field where it acts but rather in the charge and acting at a distance on other charges. Only in the case of light where there is no charge do we think of the light as being in the mass field itself; in the case of light there is never action at a distance; where the light pressure acts there it is.

Localizing the physical entity which we call the electron in its mass field, it becomes a cloudlike body more and more attenuated as we go further from the charge. In physical problems we find one of these electrons at rest approached by another of somewhat heavier mass in motion. The second stops, the first moves off carrying with it the excess mass of the other. Another way of accelerating an electron is to reflect from it a light quant (Compton effect). A stratified mass field approaches the cloudlike electron; the strata are reflected but are somewhat further apart; the electron moves off carrying with it the mass lost by the light. How does the electron vibrate after these events? This seems to be the problem of present day physics.

In one very important sense the electron does not act (according to the usual theory) as we should expect this extended thing described to act. It moves in any case only after the charge moves; may we not ask whether this concept is true? May not the motion of an electron be propagated from outside to in rather than vice versa; may it not be propagated just as are the motions in any other elastic body?

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## A NEW FORM OF CARBON ARC

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A convenient form of carbon arc for experimental and other work may be constructed at small cost in the following manner. Two straight arc-carbons of suitable size are mounted vertically side by side and parallel and separated by two or three millimeters.

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

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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

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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 $\Theta$ 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