quantities and cosines of the angles, this equation may be readily converted into one in polar coördinates. Knowing D, the corresponding values of I may be obtained from Eq. (21).

Note 2.—A similar general study of circular and non-circular loci, although from a different point of view and by a different method, has been made by Dr. Hermann Pflieger-Haertel. See *Arch. f. Elekt.*, 1923, Vol. 12, p. 486; 1924, Vol. 13, p. 396; 1925, Vol. 14, p. 425.

Summary.—A general equation of the circle is deduced, using the Vector Analysis notation. Electromagnetic vectorial equations of a stationary circuit and of a revolving electrical machine, at a voltage E, are written, and it is shown how to eliminate one of the variables, v, and to reduce the resulting equation for the current I to that of a circle. The general criterion for a circle is shown to be of the form $E - IM = (IN + P)f(v)$, where M, N, P are complex quantities. The compensated repulsion motor is shown to be one of the types of machines for which the locus is not a circle.

[1] Bedell and Crehore, *Alternating Currents*, part on graphical treatment.

[2] E. Arnold, *Wechselstromtechnik*, **5**, part 2, p. 443.

[3] *Ibid.*, **5**, part 1, p. 80.

[4] V. Karapetoff, "The Use of the Scalar Product of Vectors in Locus Diagrams of Electrical Machinery," *Am. Inst. of Elec. Engrs., Journal*, **42**, 1181 (1923). In the forthcoming third edition of Vol. II of the author's "Experimental Electrical Engineering" this method is used in deriving some circle diagrams; see §953 and the references given therein.

POSTULATES FOR REVERSIBLE ORDER ON A CLOSED LINE (SEPARATION OF POINT-PAIRS)

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The type of order called "Reversible Order on a Closed Line"— that is, the type of order which characterizes the "straight line" of projective geometry—presents an exceptionally rich field for the cultivation of examples of pure deductive logic. A long paper which I presented to the American Mathematical Society on April 11, 1925, and which will appear later in one of the mathematical journals, contains the proofs of over two hundred fifty theorems, exhibiting all varieties of elementary logical processes. The paper starts with a list of seventeen basic properties, or postulates, which, though immediately suggested by geometric intuition, are strictly "abstract" in form, and the theorems referred to present an exhaustive account of the logical inter-relations which exist among these seventeen postulates. A study of these theorems for the purpose of eliminating all redundancies from the basic list leads to several shorter lists of "independent" postulates, any one of which might serve as the basis for a deductive development of the theory of order on a closed line.

The simplest of these sets of independent postulates is believed to be new, and since this set may be of service to working mathematicians apart from the elaborate logical discussion in the longer paper, it is here presented in separate form.

We are dealing with a class of elements, A, B, C, ..., which may be thought of as "points," and a tetradic relation, R(ABCD), or simply ABCD, which may be thought of as the relation of "order." To avoid trivialities, we assume once for all that the class contains at least four elements and that the letters A, B, C, D, in any tetrad ABCD, are distinct.

Concerning all the possible tetrads which automatically exist among the elements of the class, we state first a preliminary postulate, which serves merely to exclude obviously trivial cases:

POSTULATE 0. *At least one tetrad is true, say XYZW.*

The general properties of order on a closed line are then expressed in the following three postulates:

POSTULATE G. *If ABCD is true, then BCDA is true.* This is the fundamental property of "cyclicity."

POSTULATE H. *If ABCD is true, then ABDC is false.* This property may be called "homogeneity."

POSTULATE 10. *If ABCD is true, and X is any fifth element, then at least one of the relations, AXCD and ABCX, is true.* This property may be called "connexity," since it excludes the case of isolated or disconnected elements.

The following postulate serves to distinguish the reversible from the irreversible type of order on a closed line:

POSTULATE R′. *At least one true tetrad is reversible.* That is, if any tetrad is true, then at least one true tetrad, say XYZW, is such that WZYX is also true.

From the first four of these postulates, the following theorem, which has usually been assumed as a fundamental property, can be deduced.

THEOREM F. If A, B, C, D are any distinct elements, then at least one of the twenty-four permutations, ABCD, ABDC, ..., DCBA, will form a true tetrad ("Foursomeness").

It will be observed that Postulate 0 is a much weaker statement than Theorem F.

From the five postulates, 0, G, H, 10, and R′, it follows that *every* tetrad is reversible; that is, we have

THEOREM R. If ABCD is true, then DCBA is true.

The proofs of these two theorems are somewhat analogous to the proof of Theorem 203 in my paper on "A New Set of Postulates for Betweenness," *Transactions of the American Mathematical Society*, Volume 26, April, 1924, page 279.

Two other theorems which may be mentioned are the following:

THEOREM 11. If ABXC and ABCY, then ABXY.

THEOREM 14. If ABCX and ABCY are true, then at least one of the tetrads ABXY or ABYX will be true.

THEOREM 17. If ABCX and ABCY are true, then at least one of the tetrads ABXY or ACYX will be true.

Each of these theorems is readily verified from a figure. The main interest in this and similar theorems from the present point of view is not that they are "true," but that they are deducible in the abstract sense from the postulates stated without reference to a figure or to any other concrete interpretation of the symbols.

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*THE HYPOTHESIS OF INHIBITION BY DRAINAGE**

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Statement.—The drainage hypothesis assumes that there is in the nervous system and in each of its elements a definite amount of available neural energy which can be concentrated into specific neural paths and consequently drained from others. The inhibition of a process occurs when the energy that previously conditioned it is drained off into other channels. In the history of the theory of inhibition this hypothesis goes back to Herzen and Schiff[1] and to Setschenow.[2] It was developed at some length by Alexander James[3] and William James[4] but reached its completest statement and scientific justification in the presentation of William McDougall[5] to whom it is commonly credited. The hypothesis seems to fit a large number of physiological and psychological phenomena. McDougall believed it was confirmed by test experiments in the fields of contrast and biretinal rivalry.

Theoretical Difficulties.—Since the hypothesis was first elaborated there