ELECTRIC ARCS: EXPERIMENTS UPON ARCS BETWEEN DIFFERENT ELECTRODES IN VARIOUS ENVIRONMENTS AND THEIR EXPLANATION

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EXPERIMENTS UPON ARCS BETWEEN DIFFERENT ELECTRODES IN VARIOUS ENVIRONMENTS AND THEIR EXPLANATION

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PREFACE.

WHILE the electric arc is one of the most common things of modern life, an understanding of it is not common. This is largely due to the difficulty of becoming familiar with the investigations which have been made on this subject. There have indeed been many articles published concerning it, but they are scattered through many publications, and the data given by different experimenters are not consistent with each other, and none of the explanations are entirely satisfactory.

"The Electric Arc," by Mrs. Hertha Ayrton, gave an account of the experiments which were performed prior to 1898, but very little investigation had been made at that time of any arc except the open carbon arc, and none of the explanations based on the ionic theory had been given, so that by far the greater part of what is now known concerning the arc could not then be described. An excellent work in German, "Der elektrische Lichtbogen" by Berthold Monash, has more recently appeared, but this deals but briefly with the theoretical side and does not meet the requirements of those who would read English rather than German.

It, therefore, seemed desirable to offer another discussion of the electric arc, giving especial attention to the explanation of the phenomena and to those investigations which have been made since the publication of Mrs.

Ayrton's book. A rather full account has, accordingly, been given to such experiments as those on the mercury arc, and to a discussion of the more recent theories.

The use of the arc in commercial ways has already been ably discussed in such books as those on Electric Lighting, Photometry and Wireless Telephony. Accordingly, these topics have received less attention here.

A few pages, however, are given to photometry and to the whistling arc, since these are of interest from a scientific as well as from an industrial standpoint. No account has been given concerning the use of the arc in chemical and metallurgical processes, since its function there appears to be merely to produce a high temperature and a study of these phenomena would give us no knowledge concerning the arc itself.

I have endeavored to keep in mind the needs of those who may wish to make investigations in the future. An effort has, therefore, been made to give references to all the important articles on this subject, excepting those which relate only to the commercial side or to those concerning investigations in which the arc was merely a means for studying some other phenomenon, as when used to produce the spectrum of a metal.

It would often have made much simpler and more satisfactory reading, if I could have given a brief and definite statement of the laws governing the action of the arc, instead of producing so extended a review of what different experimenters have thought about these laws, but in the majority of cases it is not yet known what the laws are and the only available method is to discuss the results of those who have endeavored to find them. Not only is there this uncertainty concerning the laws, but the expla-

nations often raise more questions than they settle. This, however, is not an unusual condition and the explanations may, at least, serve in helping others to make complete that which is lacking.

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