

the subject of automatic temperature recording has received a great deal of attention, resulting in many new instruments.

In so far as practicable in the following pages, we have dwelt less upon particular types of instrument than on the principles underlying them. We have, however, consulted nearly all the manufacturers of pyrometers as to their practice, and have drawn very freely on the material they have been so kind as to put at our disposal, — material that in several instances is otherwise unpublished, and for which we express our obligation.

We have kept in mind three classes of readers: the student, to whom the historical aspect and fundamental principles are of prime interest; the engineer, who is interested mainly in adapting some method or instrument to his particular technical operation; and the investigator, who has an intensive interest in accurate methods of measurement and their adaptability to his needs. We realize that one book cannot meet satisfactorily all these requirements. If the wants of the investigator have been somewhat neglected, he has ready access to the literature, a summary of which is given in the Bibliography.

We are indebted to Dr. C. W. Waidner for many suggestions; to Dr. R. B. Sosman for reading the chapters on Gas and Thermoelectric Pyrometry; and especially to Dr. A. L. Day, from whose criticisms of the manuscript we have been able to profit greatly.

GEORGE K. BURGESS.

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BIBLIOTECA

HIGH TEMPERATURES

INTRODUCTION.

WEDGWOOD, the celebrated potter of Staffordshire, the inventor of fine earthenware and of fine china, was the first to occupy himself with the exact estimation of high temperatures. In an article published in 1782, in order to emphasize the importance of this question, he considered at length certain matters a study of which would be well worth while even to-day.

"The greater part of the products obtained by the action of fire have their beauty and their value considerably depreciated by the excess or lack of very small quantities of heat; often the artist can reap no benefit from his own experiments on account of the impossibility to duplicate the degree of heat which he has obtained before his eyes. Still less can he profit from the experiments of others, because it is even less easy to communicate the imperfect idea which each person makes for himself of these degrees of temperature."

Joining example to precept, Wedgwood made for his personal use a pyrometer utilizing the contraction of clay. This instrument, for nearly a century, was the only guide in researches at high temperatures. Replaced to-day by apparatus of a more scientific nature, it has been perhaps too readily forgotten.

Since Wedgwood, many have undertaken the measurement of high temperatures, but with varying success. Too indifferent to practical requirements, the early experimenters above all regarded the problem as a pretext for learned dissertations. The novelty and the originality of methods attracted them more than the precision of the results or the facility of the measurements. Also, up to the past few years, the confusion was on the

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