eral Water" Gooch's method for boric acid is given. Under "Fertilizers" the methods of the Association of Official Agricultural Chemists are quoted, and the Lewis-Thompson calorimeter is explained in determining the heating power of coal.

While to a professional analyst grammatical style may not seem of great importance, there can be no doubt about its importance to the student. He is frequently assured that accuracy of thought and lucidity of diction are characteristics of the truly scientific mind; but the vague, involved, and verbose style of more than a few of our chemical text-books cannot fail to make him doubt whether their authors possessed either accuracy or mental lucidity. In the present work, however, the clearness of the directions and the excellence of the grammatical style are worthy of commendation and imitation, while the printing and make-up of the book are creditable to the publisher. The new edition of the "Cairns-Waller Manual" will beyond a doubt be even more successful than the former one.

PETER TOWNSEND AUSTEN.

ENGINEERING CHEMISTRY: A Manual of Quantitative Chemical Analysis for the Use of Students, Chemists, and Engineers. BY THOMAS B. STILLMAN, M.Sc., PH.D., Professor of Analytical Chemistry in the Stevens Institute of Technology. With illustrations. Easton, Pa.: Chemical Publishing Co. 1897. xxiii + 523 pp. Price $4.50.

This volume will be found of great utility to the analytical chemist, and especially to him whose chief work comprises the examination of the materials of engineering. It contains a mass of most valuable data conveniently and compactly arranged, much of which is original and much of which was heretofore, for the most part, only to be found scattered through the files of periodical literature, or else in text-books relating to some special branch of the subject, and which has therefore only been available to the general analyst or to the chemical engineer as the result of more or less elaborate research.

Not only are described in detail nearly all of the conventional methods of analysis applicable to the various materials of engineering, such, for example, as the metals, alloys, cements, paints, oils, fuels, gases, water, etc., but many physical and mechanical tests in general use are clearly set forth, as, for instance, the mechanical testing of Portland cement, physical tests

of building stones, physical examination of lubricants, photometry, pyrometry, etc., and not the least valuable portions of this work are the elaborate examples which the author gives, showing methods of calculation whereby the results of analysis are utilized in practical work as, for example, in the calculation of blast-furnace charges, or in determining the heating power of fuels and gases.

While, as is to be expected, there is nothing particularly new in most of the processes given, many of them are more or less modified in some of their details which is doubtless due to the wide and varied experience of the author. It is to be regretted, however, that the description of some very valuable analytical methods which certainly should be included in a work of this character, are omitted, notably, for instance, the titration of iron salts with potassium permanganate, determination of Pb_3O_4 in red lead, and the determination of the well known "saponification equivalent" in the analysis of oils.

The value of the work as a text-book for the instruction of students is to a certain extent impaired by reason of the fact that *theoretical principles* upon which the analytical processes are based are not sufficiently elaborated. This defect is, however, common to nearly all systems of instruction in analytical chemistry, especially in quantitative analysis, but does not to any extent impair the value of this book to the working chemist, although the system, upon which the subjects treated of are arranged, is susceptible of considerable improvement. The arrangement of the more complex methods in the form of "schemes," although not especially new is particularly worthy of commendation.

The volume is profusely illustrated and is furnished with a very complete table of contents and index, besides copious footnotes referring to original publications, as well as a large number of extremely useful tables, many of which appear to be original.

This book should find a place as a standard of reference in the working library of every analytical chemist and chemical engineer, and should, as it deserves, go through many future editions when such minor defects as it now contains will doubtless be corrected. J. H. WAINWRIGHT.