is never lost sight of, although no pains are spared to bring out desired artistic effects. The purely theoretical development is followed by a description of various devices to aid in drawing, including parallel rulers, Nicholson's centrolinead, Schilling's three-bar ruler, and a number of linkages. The final chapter contains an elaborate application of the method to the representation of curves and surfaces, including arches, trusses, etc.; a few pages are given to explaining the meaning and uses of photogrammetry.

The book is provided with a full index, and a list of all the authors cited.   VIRGIL SNYDER.

The Method of Least Squares with Applications (third edition) By DANA P. BARTLETT. A. D. Maclachlan, 502 Boylston St., Boston, 1915. 143 + xi pp. Price $2.25.

FOR clear, concise statement in readable form and for systematic treatment of the whole range of ordinary applications of the method, we have not found the equal of this text by Professor Bartlett, of the Massachusetts Institute of Technology. These qualities have led the reviewer to adopt it for use covering this phase of the course with his students in "the mathematics of statistics."

The author has avoided making provision for special lines of work in which the method is applied, and so the instructor is free in the development when such special applications are needed. A well chosen example with complete solution follows every important development of the theory, but the 155 well graded examples are arranged like the punctuation marks in a certain school-boy's composition, which had none in the body of it but an ample supply of all sorts that might be needed at the close with the instruction "Put them in where you may wish."

The appendix gives the elements of the theory of probability, a bibliography, and three tables useful in applying the method. Throughout the text, references are made to more extended treatments in standard texts.   CHARLES C. GROVE.

Text-Book of Mechanics. Vol. VI. *Thermodynamics.* By LOUIS A. MARTIN, JR. New York, Wiley, 1916.

THIS book, which is the sixth volume of a series of texts on mechanics, is a remarkably compact and comprehensive

theoretical treatment of the mechanics of gases and vapors.

The first part deals with the laws of ideal gases, including a very thorough discussion of the fundamental equation $pv = RT$ and its graphical representation on the pv plane, as well as the representation of polytropic curves on log-log paper.

The first of the applications which follow is a brief chapter on compressors. The various cycles of hot air and internal combustion engines are then analyzed, although in view of the increasing importance of the latter a great deal more space might well have been devoted to a discussion of the Otto and Diesel cycles, especially in relation to the conditions under which their efficiencies approach a maximum.

This first part then concludes with a chapter on the two fundamental laws of thermodynamics, namely the law of the conservation of energy and of the flow of heat, including a discussion of Carnot's principle and Kelvin's absolute scale of temperature, and lastly a chapter on entropy and temperature-entropy diagrams.

The second part on vapors follows practically the same order of treatment as that on gases. The general properties of vapors are first discussed, followed by the properties peculiar to dry, wet, and superheated vapors. This is followed in order by chapters on the entropy of vapors, changes of state of vapors, and vapor cycles.

The third part is essentially a supplement on the flow of fluids, including the effect of throttling, the use of Venturi meters, etc., while the last chapter takes up very briefly the fundamental differential equations of thermodynamics.

An important feature of the book is a collection of 382 numerical problems.

The book is well printed and illustrated, and carefully written, and altogether is an admirable elementary presentation of the theoretical side of the subject. This subject is of such importance, especially at the present time, that an up-to-date treatment like that under discussion is a valuable addition to technical literature. As mentioned above, however, a more extended discussion of the practical applications of the subject would have added materially to the interest and usefulness of the book.

S. E. SLOCUM.