was made that the publication of a series of 'Scientific Memoirs' would shortly be commenced by Harper & Brothers, under the editorial direction of Professor Ames, of Johns Hopkins University. They were to relate mostly to physical science, and were to include only memoirs of first importance, and generally only such as are not very easy of access, or which are found only in some language other than English, or in a form otherwise inconvenient. Professor Ames has secured the editorial assistance of a number of well-known students of physical science, and it is gratifying to know that in the near future many of the most important memoirs relating to this great department of human knowledge, many of which have marked epochs in the history of science, will be available in a convenient and comparatively inexpensive form.

The plan will now be better understood after an examination of the first volume of the series, which bears the title given above and is edited by Professor Ames himself. It is a very attractive-looking octavo of about one hundred pages. A preface of one page is followed by Gay-Lussac's paper, read at the Institute on September 15, 1807, on a 'First Attempt to Determine the Changes in Temperature which Gases experience owing to Changes of Density, and Considerations on their Capacity for Heat.' This is an extremely interesting and important memoir, not hitherto easily accessible, although it was reprinted in Leipzig in 1896. Its principal interest is in the evidence of Gay-Lussac's anticipation of some of the most important conclusions of Joule and Thomson, which they worked out with great skill and originality nearly half a century later. Twenty years ago and earlier there was much bitter controversy over the credit due Mayer for his share in the development of the principle of the Conservation of Energy. The importance of his work is greatly enhanced by the recognition of his acquaintance with Gay-Lussac's experiments, which, says Professor Ames, is now generally admitted.

This memoir is followed by a paper upon the same subject, published in 1845, and by several others on the Thermal Effects of Fluids in Motion, the joint work of Joule and Thomson. These constitute the most important literature on the subject and have been the foundation of the modern thermodynamics.

The editor, while adhering closely to the original, has found condensation necessary and possible in portions of the reproduction. Brief biographical sketches of Gay-Lussac and Joule are given, and, when the interest which always attaches to the personality of men who do great things is considered, it seems a pity that a page or two was not given to each of these, instead of a brief paragraph. The mere dates of birth and death, and such like, are not usually the most interesting facts relating to a human life.

This and other volumes of the series soon to appear will undoubtedly meet with a hearty welcome, for they will make it easy for all students to possess the essence of what is of the very highest importance in the literature of exact science, either current or classic.

M.

Thermodynamics of the Steam-Engine and Other Heat-Engines. By Cecil H. Peabody, Professor of Marine Engineering and Naval Architecture, Massachusetts Institute of Technology, Boston, Massachusetts. New York, J. Wiley & Sons; London, Chapman & Hall. 4th ed. Rewritten and reset 8vo. Pp. 522. Price, $5.00.

This is a new and revised, rearranged and extended issue of the well-known work of Professor Peabody, now ten years old. The book has been carefully and completely revised, to bring it up to date in theory and in current practice. Considerable new matter has been introduced and the whole has been reconstructed in such a manner as to make it substantially such as its author would have prepared as a new treatise on its subject at the present time. It is an excellent piece of technical work and undoubtedly will more than sustain the reputation which it has already acquired. This volume is a standard treatise on Clausiusian thermodynamics in our technical schools and among engineers, and, so far as the reviewer is informed, the only treatise of that school which presents any satisfactory discussion of applied thermodynamics having value for the engineer engaged in professional work relating to the heat-en-

gines. It is a practitioner's and student's text-book in that system, as Wood's Thermodynamics is the representative for the same classes of readers of the Rankinian method.

In the new book a considerable addition has been made to the discussion of the gas-engines, which includes the latest information regarding producer-gas and the oil-engines, and closes with a discussion of the Diesel motor, now attracting, deservedly, much attention among members of the engineering profession as having attained unusual results by an exceptionally successful attempt to reproduce ideal thermodynamic conditions in an approximation to the Carnot cycle. Its best work is reported at 223 grms. of petroleum per hour for 19.2 horse-power, equal to three-fourths of a pound of coal per horse-power-hour. The best steam-engines, even of many times this power, consume seldom less than double this figure. The latter half of book is devoted mainly to the subjects of steam-engine testing, compound and other multiple-cylinder engines, the influence of the cooling effect of cylinder-walls and steam-engine economy generally. Considerable new matter appears in these sections. The latest investigations, as those of Hall, and of Callendar and Nicholson, are detailed, with admirable success in condensation. Recent and notable reports on steam-engine trials, as of the famous engines of Leavitt and of Sulzer, of Schmidt and of Rockwood, and of the steam-turbines, are summarized and the data are tabulated. The more elaborate scientific tests of the 'experimental engines' of the Massachusetts Institute of Technology and of Sibley College at Cornell University are presented in their essential details, while the discussions exhibiting the ideal and the real effects of the operations of compounding, of superheating and of jacketing, as influencing efficiency and economy of steam, heat and fuel, are most instructive and valuable. The final chapters are devoted to brief discussions of compressed-air machines and apparatus of refrigeration.

This book is a rarely good work and is excellently published. It is one which no member of the engineering profession dealing with the heat-engines can safely leave out of the list of his working library, and no student desiring more than a superficial knowledge of its subject should fail to read with special care.

R. H. THURSTON.

Prismoidal Formulæ and Earthwork. By THOMAS U. TAYLOR, Professor of Applied Mathematics in the University of Texas. New York, John Wiley & Sons. 8vo. Pp. 102 and one plate. Price, $1.50.

The historical and theoretical discussions of this volume will be of especial interest and value to civil engineers on account of the extensive use of the prismoidal formula made by them in earthwork calculations and because the engineering handbooks generally avoid such discussions. There are probably few engineers who know that the prismoidal formula is applicable to the volume of a sphere, or to any segment of a sphere, as also to ellipsoids and paraboloids. The author shows that its application is wider even than this, and that the volume of any prismoid whose sectional area can be expressed by a cubic function of its distance from any reference section is found by adding the areas of the two bases to four times the area of the mid-section and multiplying this sum by one-sixth of the length. He also gives demonstrations of the two-term prismoidal formulas of Koppe, Hirsch and Echols, and discusses their limitations and uses in a very interesting manner. Although these two-term formulas involve but two sections instead of three, it does not appear that they are more convenient in practice than the common formula.

The author attributes to Newton the honor of the discovery of the prismoidal formula, and states that it is given in the Methodus Differentialis, 1711. An examination of this paper of Newton fails, however, to substantiate this statement, and it is to be regretted that the author did not quote the words in which he claims that the theorem was announced. His reference to Simpson is also unsatisfactory, although he points out that Simpson's rule for the quadrature of a curve from three ordinates is the same in form as the prismoidal formula. With these exceptions the historical matter of the volume is more complete than can be easily found elsewhere. Over one-half of the book is devoted