paraphrased. The conscientious reader will be well equipped to understand such interesting new instruments as the Shaw ratio pyrometer, although this and other specific devices are not mentioned.

The last third of the work consists largely of tables and charts which will meet most users' needs. Although temperature is probably the most important process variable, there are surprisingly few books devoted to its measurement. A good one like this is welcome.

Direct Conversion of Heat to Electricity. Edited by Joseph Kaye and John A. Welsh. 356 pp. John Wiley & Sons, Inc., New York, 1960. $8.75. *Reviewed by H. A. Liebhafsky, General Electric Research Laboratory.*

WE are seeing a rapid expansion of research into energy conversion by old methods not yet practical enough for widespread application. And this expansion comes in an era when the conversion of matter into energy by fission and by fusion became the object of an even greater research effort that continues on a large scale. Population growth, the increasing complexity of our civilization, and the depletion of our fossil fuels are all obvious factors in the situation, but they are scarcely new. Perhaps there is material here for the scientific historian.

The book under review is a collection of 23 valuable papers presented in 1959 at a Special Summer Program offered by the Department of Mechanical Engineering, Massachusetts Institute of Technology. They are concerned with four methods of energy conversion: thermionic (11 papers); magnetohydrodynamic (2 papers); thermoelectric (9 papers); and electrochemical via the fuel cell (1 paper).

The book was compiled rather than edited. This reviewer would have welcomed the critical approach, and the combination and reorganization of the individual papers, which the preface disavows. As it is, repetition is unavoidable; the "box-with-no-moving-parts" motif (energy in, electricity out), for example, loses its appeal.

More thorough editing might have alleviated troubles with language such as a facile oversimplification (mainly in the preface) and an unnecessarily diversified (and hence confusing) nomenclature.

The lead sentence for the book is: "The age-old dream of devising a box, with no moving parts, which converts heat directly into electricity has become a reality in the laboratory." Note, however: (1) The first thermoelectric generator was constructed by Seebeck in 1821 and is estimated presently to have been capable of converting heat into electricity with an efficiency of 3% (page 15–1). Grove in 1839 used fuel cells of low power output to decompose water (page 23–2). These realities are not new. (2) Magnetohydrodynamics (Chapters 12 and 13), by its very name, falls outside the province of the lead sentence. (3) Most important to this reviewer, so does the fuel cell (Chapter 23), which is not even covered by the title of the book. A fuel cell does not convert heat into electricity; it

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As to the nomenclature. In Sections A and B, Thermionic Engines, we find: thermionic engines, thermionic power conversion, heat-to-electrical-power transducers (in which the transducer has to accomplish a dimensional change), a thermoelectron engine, a thermionic energy converter, a gas-filled thermionic converter, a cesium plasma diode, a plasma thermocouple (not, however a plasma heat engine, for which we must go to Section C, Magnetohydrodynamics) and an energy converter using low-pressure cesium. Who would guess that all these thermionic devices rest upon a common principle?

Is not Semiconductor Devices too broad and vague a name for Section D, which deals with thermoelectricity and thermoelectric generators?

Unfortunately, such use of language is confined neither to this book nor to this field. But it is more likely to occur in compilations than in books carefully edited.

A chemist is likely to feel there is much mathematics in the book and (Section D excepted) little about materials. And yet, hot cesium continues to be reactive; the composition of compounds is not easily susceptible of precise control; and high temperature will long bedevil those responsible for specifying materials of construction.

The book is well made. Because the subject is of first importance, compilation and publication of the material in book form are easy to justify even though much of the information can be found elsewhere. Purchase of the book is recommended.

Incompressible Aerodynamics: An Account of the Theory and Observation of the Steady Flow of Incompressible Fluid Past Aerofoils, Wings, and Other Bodies. Edited by Bryan Thwaites. 636 pp. Oxford U. Press, New York, 1960. $12.00. *Reviewed by R. E. Street, University of Washington.*

THIS is the first volume in a new series of surveys in fluid mechanics which is to be known as the Fluid Motion Memoirs. The aim is to copy the highly successful *Modern Developments in Fluid Dynamics,* edited by S. Goldstein, which appeared in 1938. Not too many years ago, an additional two volumes on compressible flow entitled *High Speed Flow,* edited by L. Howarth, were published as an addendum to Goldstein. Now we have a volume on incompressible nonviscous fluid flow with additional volumes on laminar flow and turbulence to follow later.

The editor also lists 16 different authors, all English and all well known as contributors of note in the field. The book is right up to date and includes, besides the usual topics which can be found in almost any good book on the subject, a great number of unusual topics not found in any other book, such as the airfoil theories of Goldstein, Lighthill, and Thwaites, boundary layer control, Multhopp's theory of wings, wing-body inter-