tus of special relativity is developed in a very complete treatment, and numerous applications of the special theory are given.

Unfortunately, the book could not contain an account of the recent work of Terrell and of Penrose[1] on the Lorentz–Fitzgerald contraction. A fast-moving object, it is well known, is contracted in the direction of its motion by a factor $(1-v^2/c^2)^{1/2}$. Thus, for example, a fast-moving cube becomes a rectangular parallelepiped with the shortest principal axis along the direction of motion. However, Terrell and Penrose have pointed out that this is not what an observer would see. For example, an observer at right angles to the line of flight of the cube would see the rear face of the cube as well as the face nearest to him. The result is that the cube appears to the observer to be rotated, but undistorted. (This is true provided the cube subtends a small angle at the observer.) The Lorentz contraction is nevertheless still valid. If (v/c) is close to unity, the face nearest the observer has shrunk to zero width, but the observer sees the rear face at full size.

The section on electromagnetism contains a rather formal treatment of Maxwell's theory; for example, the electrostatic properties of conductors are derived before there has been any discussion of the presence of electrons in conductors. Indeed, the main purpose of this section appears to be to emphasize that electromagnetic phenomena can be described entirely by fields rather than by action at a distance.

The final section is that on general relativity. Here there is a good mathematical treatment, with several interesting worked examples, and an adequate physical discussion. However, it is at this point that one would expect some discussion of fairly new ideas and developments. Some comment might be expected on whether we can hope to detect gravitational waves, what is the present status of theories of the expanding universe, whether we should expect there to be anti-galaxies, and whether the latter have reversed gravitational interaction with ordinary galaxies. Discussion of some of these topics might perhaps have been more rewarding than the account of the unified theories of gravitation and electromagnetism with which the book concludes.

J. Hamilton

[1] Penrose, R., *Proc. Camb. Phil. Soc.*, **55**, 137 (1959). Terrell, J., *Phys. Rev.*, **116**, 1041 (1959).

ESSENTIALS OF LOGISTICS

A Précis of Mathematical Logic

By J. M. Bocheński. Translated from the French and German editions by Otto Bird. (Synthese Library.) Pp. ix+100. (Dordrecht: D. Reidel Publishing Company, 1960.) 13.75 D. fl.

ONE of the most remarkable features of twentieth-century thought is the immense creative effort of Polish scholars in the field of mathematical logic. In this, of course, they are by no means alone, since (among others) Italy, Great Britain and the United States have contributed vital elements to the growing structure. Nevertheless, there is something intrinsically majestic about the Polish work, both in the profundity of research, and in the wide range of studies. Having enriched what they have touched, they have become scholars in analysis and artists in symbolism.

This means that, sooner or later, it becomes desirable to 'tidy up', that is, to tabulate with extreme formality the propositions and theorems which the power of the new 'logistik' has produced. The result is the slender volume before us, a masterpiece of condensation and taxonomy. A touch so appropriate to a book of this character is that the introduction starts with paragraph zero, so that "Fundamentals" begin with paragraph 1, and onwards; the decimal notation is correspondingly simplified throughout.

The arrangement is: (1) "General Principles"; (2) "The Logic of Sentences"; (3) "The Logic of Predicates and Classes"; (4) "The Logic of Relations"; (5) "Varia". At the end are a table of logical signs and an exceptionally full bibliography. This latter will be welcomed as a reinforcement of the literature listed from time to time in *The Journal of Symbolic Logic*.

A further aid to the student is a short summary, at the conclusion of each section, dealing with the history and literature of the particular aspect under discussion, for example, laws and rules, predicates, the theory of identity, syllogistics and so on. It is interesting to note that the first of these originated with Husserl's distinction; Aristotle thought of his theorems as laws, whereas to the stoics and scholastics they were rules.

There is a clear account of the newest branch of the subject, namely, the logic of relations, which is capable of extension over perhaps the whole of knowledge. Even at the present early stage of development its fundamental connexion with geometry begins to appear.

The value of this précis lies in its power to bring the main results of logistics into exact focus, so that they can be seen both in derivation from classical principles and in terms of contemporary notations. Denuded of verbiage, it is remarkable how many of them were known to the Greek philosophers and to medieval savants. Yet the modern discipline (including in particular the many-valued logics) is of incomparably greater force, as well as possessing enhanced importance in advanced mathematical education.

F. I. G. Rawlins

CATALYSIS

Catalysis, Vol. 7

Oxidation, Hydration, Dehydration and Cracking Catalysts. Edited by Paul H. Emmett. Pp. vi+378. (New York: Reinhold Publishing Corporation; London: Chapman and Hall, Ltd., 1960.) 108*s*. net.

THE publication of this final volume of a major work dealing mainly with industrial catalytic reactions will be welcomed by the many chemists who are interested in this rapidly moving field; and Prof. Emmett and the individual contributors are to be congratulated on making available, in a convenient form, summaries of the very large mass of material, having largely an industrial bias but relating also to some academic applications of catalysis, which lies scattered and difficult of access in the patent and journal literature.

In the first chapter of this volume, L. B. Ryland, M. W. Temele and J. N. Wilson, of Shell Development Co., deal with the use of modern fluidized and other finely divided catalysts for the cracking of crude petroleum into lighter oils. This is followed by a long section on catalytic hydration and dehydration, by M. E. Winfield, of the Commonwealth Scientific and