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MODERN MAGNETISM

by

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SECOND EDITION
(Revised and Enlarged)

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PREFACE

Experience as a university teacher has firmly convinced me that the average student finds far more difficulty in acquiring a satisfactory knowledge of magnetism than of any other branch of physics. In my view this is almost entirely because the subject is usually treated far too much from a strict theoretical standpoint and far too little from an experimental one. It is no exaggeration to state that some of the most important experiments whose results have been used very many times in theoretical discussions have not been adequately described in English. An attempt has been made to remedy this state of affairs by writing this book, in which prominence is given to the description of fundamental experiments. At the same time, a strong endeavour has been made to present an account of modern magnetic theory which, it is hoped, will be readily understood by students of physics and also followed without undue difficulty by more general readers. The opportunity has been taken of including a large body of experimental work, much of foreign origin, which is of importance to all interested in industrial applications of magnetic materials. It is obvious that, in order to keep the book to a reasonable size, I have been compelled to make an arbitrary selection of material to some extent, but care has been taken to include accounts of all essential matter which a student cannot readily find elsewhere. It has been thought best, however, to exclude galvanomagnetic and most magneto-optic phenomena.

I wish to acknowledge my indebtedness to Stoner's *Magnetism and Matter* and his many research publications, to Van Vleck's *Electric and Magnetic Susceptibilities* and to Klemm's *Magnetochemie*. I have also made considerable use of the theses published by the University of Strasbourg and the technical publications of the Bell Telephone System. I desire to express my very warm thanks to all who have so kindly allowed me to use illustrations from their published papers, and it is hoped that proper acknowledgement is made in the text. My thanks are especially due to Dr W. Sucksmith

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with whom I had the pleasure of much happy discussion in the early stages of the work, to Mr B. Lloyd-Evans and Mr S. S. Watts who made many drawings for me, to Mr N. Davy and Mr J. C. Weston who assisted me in checking the manuscript and proofs, and, finally, to Mr J. A. Ratcliffe for his kind interest and advice on behalf of the Cambridge University Press. In addition, I have to record my debt to the late Dr A. P. Chattock, who first introduced me to the study of magnetism, and to whose memory this book is dedicated.

Nottingham L. F. BATES
January, 1939

PREFACE TO THE SECOND EDITION

In preparing this edition I wished to incorporate much new material in the text, but the difficulties of the times made large-scale alterations of the existing pages impracticable. Fortunately, the first edition was still so modern that it was not necessary to remove much of its printed matter, and I have, in my opinion, been able to bring the new edition reasonably up-to-date by the addition of new chapters and a few supplementary notes. I am much indebted to many colleagues and students for helpful criticisms and suggestions in the preparation of these additions.

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