

The sections on the rectilinear propagation of light, and on the Fresnel and Fraunhofer diffraction phenomena follow lines which are on the whole familiar, but they gain greatly from the many excellent diagrams with which they are illustrated. Enough distinction is not, however, made between the diffraction curves giving intensity and amplitude. In several cases, for example in Fig. 83, the amplitude curve is shown as having minima of zero slope at the points of zero amplitude. The slope is as a matter of fact a maximum at these points, and the curve should strictly cross the axis.

About eighty pages are devoted to the diffraction grating, and this section contains much matter, particularly that dealing with the theory of errors of ruling, and of optical ghosts, which has not hitherto been available in a textbook.

One cannot help feeling that in the sections of the book dealing with the diffraction of X-rays and of electrons by crystals the author is less at home than he is with purely optical problems. The treatment so far as it goes is adequate, but the emphasis is not always that which a worker in the subject would have given, and opportunities for bringing out the analogies with optical problems seem sometimes to have been missed. The book, however, can with confidence be recommended to students of optics.

R. W. J.

#### A Treatise on Hydromechanics

Part 2: Hydrodynamics. By A. S. Ramsey. Fourth edition. Pp. xii+415. (London: G. Bell and Sons, Ltd., 1935.) 16s. net.

THE influence of aeronautics on the academic hydrodynamics of a 'classical fluid' shows itself in this fourth edition of Part 2 of Ramsey's "Hydro-mechanics". Thus a chapter on viscosity has been added, as well as a discussion on the relation between circulation and lift of an aerofoil. There is given also some of the work due to Prandtl, Joukowski, Glauert, Jeffreys and others. Although the use of vectors or tensors has been considered and rejected, it might have been wise to follow the example of Maxwell, who in his famous treatise on "Electricity" long ago stated his results in vector form so as to give a clearer physical picture of his mathematical formulæ.

### Technology

#### Principles of Phase Diagrams

By J. S. Marsh. (Alloys of Iron Research, Monograph Series.) (Published for the Engineering Foundation.) Pp. xv+193. (New York and London: McGraw-Hill Book Co., Inc., 1935.) 18s. net.

THE application of the phase rule to metallic systems sometimes presents difficulties, which, however, would be avoided if the principles laid down by Gibbs were strictly adhered to. A lax interpretation has become common, and it has been thought advisable to include, in a series of books devoted to the technical properties of the alloys of iron, an account of the principles on which phase diagrams are constructed and interpreted. The author has followed

Gibbs throughout, and has kept to a strictly thermodynamical treatment, ignoring all questions of atomic arrangement.

The work has been done thoroughly, and the author is at pains to be logical, even at the cost of making some of the chapters rather hard reading for the metallurgist. It is only at the end of the book that any concrete examples are given, and then the ternary system selected, that of iron-carbon-silicon, is an unfortunate one, having been very inadequately studied in the laboratory. The terminology of much writing on metallic phase diagrams being rather loose, the author has suggested one on strictly logical principles. No objection can be taken to it on this ground, but the number of new terms is so large as to make it unlikely that it will be widely adopted. A simpler treatment would have been more helpful, but a careful study of this book will repay itself. In the modern study of alloys, however, changes which can only be accounted for by movements of atoms fall to be considered, such as the ordered-disordered changes in solid solutions and the precipitation of ultra-microscopic particles in age-hardening, and it would be of interest to discuss how far these can be represented in any system of phases.

#### Liquid Fuels:

their Manufacture, Properties, Utilisation and Analysis; a Practical Treatise for Engineers and Chemists. By Harold Moore. Pp. viii+264+4 plates. (London: The Technical Press, Ltd., 1935.) 21s. net.

THE book is put forward as a manual for chemists and engineers interested, but not specialists, in the subject of liquid fuels. Mineral oils, shale, tar oil, benzole, alcohol and vegetable oils and their manufacture are briefly described. Their behaviour, singly and admixed, in internal combustion engines is treated in considerable detail, both for engines with spark and compression ignition. Then follows the preparation and use of heavier oils for external combustion, including domestic heating and lighting. The value of the section on analysis and testing is increased by the author's comments on the significance of results of the various tests.

On the technology of coal products, the book is less precise. The author does not indicate the rapid growth of benzole production by gas works now in progress. Indeed, he seems to imply that the practice ceased after the War. On p. 49 he states that the horizontal gas retort tar is the "main source of benzene". Although the 'inhibitor' process is revolutionising the refining of benzole, it does not appear in the index. 'Gas oil' is an important fraction of petroleum, but no indication is given of the requirements of a good oil for carburetting water gas, and its use for this purpose would appear to be subsidiary to that of domestic fuel.

Leaving aside such criticisms, there must be many users and potential users of liquid fuels who need the information in this book, and to them it may be heartily commended.

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