

### The Analysis of Engineering Structures

By Dr. A. J. S. Pippard and Dr. J. F. Baker. Third edition. Pp. xii+564. (London: Edward Arnold (Publishers), Ltd., 1957.) 60s. net.

THE first edition of this useful work appeared more than twenty years ago, and weathered the storms of a second edition to war economy standards. It now appears in its third edition, very largely rearranged and re-written. Some readers may consider it surprising that subjects which have developed rapidly in recent years should have a shorter rather than a longer treatment in the new edition. The authors have, however, written, separately and recently, much more exhaustive treatises on such topics as the design of steel frames, and the plastic theory. Such subjects have, therefore, been given a much briefer treatment here. Classical matter—such as the study of influence lines—is repeated with no alteration but other chapters have been completely re-cast. The work on bow girders, for example, is freshly presented, but a worked example in this chapter tends to give the impression that the evaluation of stresses in non-circular sections in torsion is a routine matter. In the treatment of reinforced concrete and masonry dams—to take only two examples—the authors give space to the determination of stresses, but, somewhat inconsistently, avoid this issue in beams curved in plan. The advance which has been made in soil mechanics is recognized by the provision of a new chapter on earth-retaining structures. This chapter is the result of the collaboration of the authors with Dr. A. W. Bishop, whose reputation in soil mechanics is well established. The new edition is a noteworthy advance on the previous printing and gives readable and authoritative discussions of the more advanced and interesting problems of modern structural analysis. W. F. CASSE

### Non-Ferrous Metal Industry in India

A Symposium held at the National Metallurgical Laboratory on February 1, 2, 3, 1954. Edited by Dr. B. R. Nijhawan and Dr. A. B. Chatterjea. Pp. xxvi+297.

Industrial Failure of Engineering Metals and Alloys  
A Symposium organized by the National Metallurgical Laboratory, February 5, 6 and 7, 1953. Edited by Dr. B. R. Nijhawan. Pp. viii+347.

(Jamshedpur: Council of Scientific and Industrial Research.) n.p.

THAT India has had a non-ferrous metal industry from time immemorial is evidenced by the coins and other metallic articles which exist in such numbers. It was not, however, until comparatively recently that these industries, the iron and steel industry excluded, began to be developed on a modern commercial scale. It is therefore a matter of considerable interest to have this account of the present position attained and of future potentialities. Among the papers which bear on this problem may be mentioned that by P. K. Chatterjee on the non-ferrous mineral resources from the geological point of view, and a survey of the non-ferrous industry in India by B. R. Nijhawan and E. H. Bucknall; taken together these give a very clear general picture of the state of affairs. The great importance of manganese is the justification for the four papers dealing with this metal. India is the second among the manganese-producing countries in the world, and the latest figures indicate the export of more than a million tons of ore per year.

Leaving aside iron and manganese, India's resources of bauxite, magnesite and ilmenite may also be classed as of world importance. Considerable secondary supplies of copper, chromite and vanadium are also available. Lead, zinc, copper, silver, tin, tungsten, nickel, cobalt and mercury are relatively scarce, though it is clear that as a result of the, as yet, inadequate geological exploration of the subcontinent, further discoveries of considerable significance may easily be made. Gold, of which relatively large amounts have been obtained for thousands of years, is found mainly in Mysore, the total output of this metal during 1952 being approximately a quarter of a million ounces.

Coal, though irregularly distributed and mainly found in Bihar and West Bengal, exists in smaller amounts in other localities, and on the supply of this fuel the location of present and future metallurgical plant largely depends.

The symposium on industrial failure consists of twenty-nine papers, all of which bear more or less directly on service failures of engineering parts, the authors being drawn from all parts of the world. A very wide field has been harvested, and although nothing fundamentally new is contained in these papers, they do provide for the design and maintenance engineer the fruits of a large amount of practical experience and some theoretical treatment. From the failure of chilled iron rolls to those due to corrosion, from the photo-elastic methods of stress analysis to failures of machine parts, there are few important sources of trouble to the engineer which are not discussed. F. C. THOMPSON

### Electrical Discharges in Gases

By F. M. Penning. Pp. viii+78. (Eindhoven: N. V. Philips Gloeilampenfabrieken; London: Cleaver-Hume Press, Ltd., 1957.) 15s.

DR. PENNING'S little book is a masterpiece of clear exposition. The collision processes which take place between electrons, positive ions and gas atoms in a weakly ionized gas are discussed in some detail and contrasted with conduction phenomena in metals. After discussing the non-self-sustained type of discharge, including the arc discharge with a thermionic cathode, Penning treats the Townsend-type discharge in which electron emission processes at the cathode electrode play an essential part. The next short chapter is devoted to sparks and lightning. The importance of the space charge effects is pointed out. It is these effects which distinguish the spark discharge from the 'multiple process mechanism' or Townsend-type breakdown.

The last three chapters are devoted to the steady glow and arc discharge. First, the cathode processes and various dark spaces in a glow discharge are discussed, followed, in the last chapter, with a short analysis of the positive column based on Schottky's diffusion theory. Finally, the properties of the high-pressure mercury arc are summarized.

The reader is left with the remarkable impression that electrical gas discharges are, after all, relatively simple to understand. To have achieved this, in so complex a subject, is a tribute to the author's power of expression, and reflects his many and valued contributions. This book is to be commended both to the student and the expert—to the student as an invaluable introduction to the subject, and to the expert as an authoritative survey of the whole field of partially ionized gases. P. C. THONEMANN