

## REVIEWS

**Prism and Lens Making: A Text-Book for Optical Glass Workers.** By F. Twynman. (Adam Hilger, Ltd., London), 1942. Pp. 178. Figs. 63. Price 15 sh. (postage 5d. extra).

Optical manufacture is a highly specialised industry, the success of which depends on the combination of a thorough knowledge of optical principles and the development of carefully worked out processes for the selection of raw materials and for the grinding, polishing, figuring and testing of the desired products. No authoritative book exists so far giving working details of the industry, as the few optical firms who hold the world monopoly, carefully guard their methods as 'trade secrets'. The publication of the book under review by the Managing Director of the reputed optical manufacturers of Great Britain, should, therefore, be considered as a blessing by instrument technologists and students of optics alike. The book is divided into eleven chapters. After a brief historical introduction in chapter I, the author deals with the elements of single lens grinding in Chapter II. Chapter III gives a suggestive summary of the physical nature of grinding and polishing. The working details of trueing tools, measuring instruments, abrasives, and polishers are given in Chapter IV. The technique and machinery connected with the mass production of lenses and prisms are described in Chapter V. Chapters VI and VII deal with the finishing and balsaming of lenses and prisms singly and in batches, and Chapter VIII gives the essential details of equipment and the methods employed for testing of the finished products. The last two chapters touch upon the manufacture of microscope objectives and the testing of optical glass respectively. In four appendices, much useful information is collected together on light sources, reflecting surfaces, physical properties of glass, pitch, etc., and technical terms used in manufacture. The book is well-illustrated by diagrams and photographs.

The success in the production of optical instruments depends solely on the skill of the individual workman and it is a matter of deep gratification to notice that the author has given unreservedly the minutest details of the prevailing practices in the Hilger Optical Workshop. Difficulties in working, which are several, are specially mentioned in appropriate places and the remedies are suggested. The claim put forward by the author in the Preface that 'these methods and machines will enable even an unskilled workman, after a short period of training under competent supervision, to produce work of first quality' is none too exaggerated.

The volume would, however, have a wider appeal if it includes a few more chapters on the production of (1) optical flats and plane parallel plates, e.g., Lummer plates, (2) telescope lenses and mirrors, and (3) prisms and lenses with materials other than glass or quartz, e.g., calcite, rocksalt and fluorite.

The book will be received with special interest in India. Some preliminary attempts have already been made for the manufacture of optical instruments by Dr. H. Parameswaran and his co-workers. The publication of the present book by Prof. Twyman should give further stimulus to the advancement of optical industry in India.

C. S. VENKATESWARAN.

**Radio Receiver Design—Part I. Radio Frequency Amplification and Detection.** By K. R. Sturley. (Chapman and Hall, Ltd., London), 1943. Pp. 435. Price 28 sh. net.

THE present work by Dr. Sturley of the Marconi School of Wireless Communication contributes an important volume to the fairly wide list of text-books on Radio Engineering. However it confines itself exclusively to the detailed considerations of the principles involved in the field of modern receiver design which are rather cursorily dealt with in general texts. As such, a lot of new material has been brought together on the subject for which previously recourse had to be taken to various wireless journals.

The volume under review forms Part I of the projected two parts and is divided into eight chapters. The order of treatment is reverse of that found in the usual books on Radio Engineering. This has been rather inevitable due to the choice of the subject-matter where the treatment is made to follow step by step the design procedure of receivers. Thus the first two chapters on general considerations and valves are followed by detailed chapters on receiving aerials and aerial coupling circuits, radio-frequency amplification, frequency conversion, oscillators for superheterodyne reception, intermediate frequency amplification and detection in the order mentioned. "Part II will deal with audio-frequency amplification, power supplies, receiver measurements, television and frequency modulated receiver design, etc." Possible criticism against the adoption of such a method of treatment may be advanced from purely pedagogical point of view; for instance, considerations on LC circuits and coupled circuits are given piecemeal in their applications in three separate chapters instead of a unified treatment of the same at one place. Nevertheless it can be said that it has served here to bring out the essential differences in the design features in each case.

Besides the descriptions of various types of receiving aerials such as the Vertical, Inverted L-type, T-aerial, the Dipole and the Frame aerial, and their terminal impedances, Chapter 3 gives generalized formulæ for transfer voltage, selectivity and mistune ratios and capacitance correction over the tuning range. Chapter 4 on r.f. amplification includes discussion on design principles for shortwave and ultra-shortwave amplification. About sixty pages of the text, comprising Chapter 5, are devoted to frequency changing where a

thorough treatment of this aspect of the design is given, both analytically and graphically. Special valves developed for this purpose—the triode-pentode, triode-hexode, pentagrid, etc.,—and various circuits employing them are described in some detail. Theoretical treatment on conversion conductance and methods of its measurement as well as the problem of image signal interference in all its aspects including construction of interference charts and suppression circuits are described at length. The treatment on oscillators in Chapter 6 is similar to what is generally found elsewhere except that the emphasis is on those designed for heterodyne reception. A useful feature of this chapter is the discussion on ganging problem showing a graphical construction for the determination of the padding and trimming capacitances; approximate expressions for ganged oscillator circuit components for different intermediate frequencies are also derived. The important features of Chapter 7 on i.f. amplification are the design of i.f. transformers, generalised selectivity curves for mutual inductance coupling and for cathode feedback. The final chapter on detection describes the main three types of detectors, viz., diode type, cumulative grid and power grid types and anode bend type.

Analytical methods are freely used everywhere in the book and there are hardly a few pages where there is not any algebra or curves showing the analytical relationship of circuit parameters. Two small appendices at the end are usefully devoted to complex notation and Fourier Series method as applied to Radio Engineering problems. At the end of each chapter is given a bibliography of appropriate references to various wireless journals.

The only complaint that the reviewer feels obliged to make is that the author in giving an idea of atomic structure in the chapter on valves has based his statements on the old theory of the nucleus. For a book published in 1943 the atomic weight does not equal the gross positive charge on the nucleus for the latter has no electrons inside it—not even for a book on receiver design.

A minor slip in algebra occurs on page 37. Equation 2.5 e where  $E_0 = I_m E_{pk} Z_0$  should be read instead of  $E_0 = I_m E_{pk}$ .

The book is to be heartily recommended to all those interested in Radio Engineering; the students and teachers alike will find it an important addition to their books for study and reference. It is indispensable to those whose interests lie in the field of modern receiver design.

N. B. BHATT.

**Elementary Physical Chemistry.** By Merle Randall and Leon Eether Young. (Randall and Sons, 2512, Etna Street, Berkeley, California), 1942. Pp. xiv + 455. Price \$4.50.

One of the principal defects of the older methods of teaching Physical Chemistry has been to treat the subject as a distinct branch of Chemistry, isolated from other branches, so that its value in practical applications was not fully appreciated. This unfortunate circumstance is overcome in this new text-book, where the older abstruse handling of the subject is eminently replaced by one that treats Physi-

cal Chemistry as the very basis, or as the grammar, of the whole of Chemistry. This is achieved largely through the application of the practical experiments performed by students in the elementary organic and analytical laboratories to establish the fundamental physico-chemical principles. The laws of Physical Chemistry are no longer set in verbose enunciations, but are explained with practical illustrations and examples. The practical inseparability of Physical Chemistry from any other branch of Chemistry is thus emphasised most satisfactorily.

The arrangement of material is more stimulating to the student than the traditional order, in that the more immediate applications to his every-day experience are presented earlier in the book. In the opening chapter, a brief account of the modern concept of Chemistry is given. The succeeding chapters deal with the most familiar case of change of state, viz., the vaporisation of liquids and solids. Then follow a few introductory chapters on the properties of electrolytes, with a view to bring out the principles of acid-base titrations. The elementary principles of thermodynamics are introduced in small doses from the very beginning, so that when the subject is elaborated in the latter part of the book the student finds it void of the usual hyper-mathematical presentation and appreciates fully its value in practical applications. The more advanced treatment of electro-chemistry is taken up only after the chapters devoted exclusively to Thermodynamics. Of particular interest to students of Chemical Engineering is a chapter on Flow of Fluids. Numerous references to original papers and more advanced treatises of Physico-chemical subjects have been included in this work.

The book is by no means elementary in treatment, for it has something to say on practically every aspect of Physical Chemistry. The matter is too highly compressed into a small volume to appeal to the junior student. It can, however, be recommended to the teacher, who can advantageously adopt the newer methods of teaching and can also draw upon the numerous practical illustrations, exercises and references given in the book. The work can aptly be described as a broad, if not ambitious, survey of modernized classical physical chemistry, which would enable those who have already studied the subject to appreciate the practical worth of their learning.

M. V. C. SASTRI.

**Indian Mining: A Concise Handbook for Laymen and Specialists.** By J. A. Dunn. (The Mining, Geological and Metallurgical Institute of India, Calcutta), 1943. Pp. xi + 262. Price Rs. 10, postage extra; Rs. 5 for members of the Institute.

In India, as in most countries, the vast and growing mineral industry forms the foundation of all other industries. Much of this is of a highly technical nature, and many of its workers are necessarily specialists along certain limited channels. The object of this book is to supply a general picture of this industry as a whole, so as to be at once useful to the layman and the several specialists in the different aspects of this vast subject. Therefore,