

Some verbal inaccuracies which had crept into the first translation have been corrected, and in every respect the editor may be congratulated on the work in its present form. It will be of the greatest use to students—especially, perhaps, to those who have to work alone.

D. H. S.

*Traité d'Optique.* Par M. E. Mascart. Tome I. (Paris: Gauthier-Villars, 1889.)

THIS is the first half of a very elaborate treatise on optics, the full scope of which we cannot tell till the second volume appears, as no hint is given of what is yet to come. This first volume begins with the fundamental principles of the wave-theory of light, deduces from them the elementary laws of geometrical optics, discusses the properties of a co-axial system of refracting surfaces, describes the structure of the eye, expounds the facts of colour-mixture, points out the conditions which determine the resolving power of a telescope, develops at great length the theories of diffraction and interference, with some of their principal applications, and devotes about 80 pages to polarization and double refraction. There is practically nothing about the microscope, and nothing at all about the paths of rays in media of continuously varying density.

The book is by no means easy reading, and the labour of perusing it is increased by the smallness of the reference letters (with their numerous accents and suffixes) which occur in the figures. The plan involves much specialization. For instance, the proof of the formula for retardation on which the theory of Newton's rings depends is not given in the sections devoted to Newton's rings and colours of thin plates, but some 370 pages earlier. In many cases, when the student has found a formula which appears to contain the information of which he is in quest, he has to search carefully through a long series of preceding pages before he can find the meaning of some symbol which occurs in it. The volume contains a vast store of information, but not generally in a form to suit hasty seekers after truth. It requires to be studied at leisure, and the time so spent will not be wasted. Great pains have obviously been taken to embody the latest information and present it in the clearest form. We may instance the spiral curves which illustrate the values of Fresnel's integrals, and the curve (to which a folding-plate is devoted) showing the relations of the colours of diffraction fringes to the three primary colours. There is an excellent discussion of the theory of concave gratings, both for reflection and refraction. The least attractive chapter is that entitled "Properties of Vibrations." It is a discussion of the composition of simple harmonic motions, and occupies 40 pages bristling with elaborate formulæ. We think a more moderate display of mathematics under this head would have sufficed.

The order of arrangement adopted in the volume is rather peculiar, and baffles all *a priori* conjecture. For instance, the discussion on colour-mixtures occurs in a chapter on "Interferences," and the investigation of the conditions which determine the resolving power of a telescope is given in the introductory chapter under the head of "Preliminaries."

The book is essentially a mathematical treatise, all experimental descriptions being reduced to the narrowest possible limits.

The preface states that the work is addressed mainly to "pupils of the Faculties and Schools of higher instruction," but we think its principal use in this country will be as a book of reference for teachers. Its value for this purpose will be greatly increased if a good alphabetical index is added at the end of the second volume.

J. D. EVERETT.

*Bibliothèque photographique: Le Cylindrographe, Appareil panoramique.* Par P. Moëssard, Commandant du Génie breveté, attaché au Service géographique de l'Armée. (Paris: Gauthier-Villars, 1889.)

THIS is a description of a photographic camera invented by Colonel Moëssard, in which the lens is pivoted on an axis, and the sensitive film is arranged in a cylindrical form about this axis, on a radius equal to the focal length of the lens. By this means a panoramic view of angular breadth up to  $170^\circ$  can be taken. The camera being fixed in position, the lens is uncapped, and then rotated quickly or slowly, according to the speed of the plate, and the intensity of light in any direction. The author claims for the instrument useful employment in surveying, either in the carefully detailed plans of an ordnance survey, or in the rapid views useful for warlike purposes, which the instrument can afford. Two photographs taken with the aid of the instrument illustrate very favourably its powers, especially for architectural purposes.

*A Hand-book of Modern Explosives.* By M. Eissler. (London: Crosby Lockwood and Son, 1889.)

IN this book the author of "Modern High Explosives" has collected much useful information about the various explosives now in use. The greater part of the work is devoted to nitro-compounds, but short accounts of the other types of explosives now being manufactured are added. The manufactures of gun-cotton and nitroglycerine receive full treatment, together with the modifications introduced in the various large factories both of America and Europe. The important subject of the use of explosives in fiery mines has a chapter to itself. The description of the tests of flameless powders is of especial interest; in fact, the official reports of the tests of many of the most important explosives are perhaps the most instructive portions of the book. The chapter dealing with the practical application of explosives should be useful not only to the miner, but also to officers of both services to whom blasting and the use of explosives generally may at any time become a necessary auxiliary. An interesting account of the history and trials of the Lalinsky gun, together with the manufacture and use of gun-cotton shells, is also well worthy of their perusal. Little is said on the use of explosives below water, especially on the subject of the removal of wrecks, which would stand far fuller treatment. Four appendices are added, two dealing with the analysis and determination of stability of explosives, and one containing abstracts from the principal provisions of the Explosive Act of 1875. Although there is much that is necessarily old, still this is a book that will be read with interest by most who are accustomed to work with high explosives. The illustrations are well executed, and the whole wonderfully free from printer's errors.

#### LETTERS TO THE EDITOR.

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#### The Peltier Effect, and Contact E.M.F.

WITHOUT any further reference to the heading of a letter on p. 102, signed "The Reviewer," I wish to discuss an interesting argument therein propounded as proving that a true electromotive force at contact between two metals cannot be the cause or sole cause of the Peltier effect, unless the latter be simply proportional to absolute temperature. The argument is very like one that I indistinctly remember to have heard suggested some time ago by Prof. Schuster, and it struck me at the time as ingenious and not easily answerable.