

of coal. Many who have considered the problem with great care are in favour of electrification. This book is written for engineers and contains much valuable data from the point of view of the economics of the problem, but we think that the author could have made out a stronger case for electrification. There are not many cases—we know of none—where a railway once electrified has gone back to steam locomotives, but we do know that the electrical staff on most of the English railways is in ludicrous disproportion to the mechanical engineering staff. In Chapter ii. the author states that it can be proved mathematically that the best site for a power house from the point of view of transmission costs is the centre of gravity of the load. This theorem has been recently proved to be erroneous. It requires the unwarrantable assumption that the percentage loss of power in the minimum case is the same for all the distributing mains.

#### MISCELLANEOUS.

*Animal Nutrition.* By Prof. T. B. Wood. Pp. viii + 226. (London: University Tutorial Press, Ltd., 1924.) 4s. 6d.

THE issue of a text-book on animal nutrition from the Cambridge Research Institute marks a new era in the application of science to the feeding of live-stock in Great Britain. For so many years have we been in thrall to German and American literature that to be in possession at last of an authoritative work of native origin, however modest its scope and pretensions, induces feelings so pleasurable as largely to disarm criticism. We hope that the present modest volume may be regarded as but the forerunner of the more ambitious and comprehensive works that should follow in due course from the Cambridge workers.

It is a companion volume to Prof. Wood's "Chemistry of Crop Production," these works being admittedly of elementary character, and although designed to meet the needs of the elementary student, bear obvious signs that the possibility of a circulation amongst advanced farmers has not been entirely outside the mind of the writer. This dual aim would seem to have a strong fascination for the agricultural writer—or does the pressure come more from the side of the publisher?—and the result is rarely entirely satisfactory to either class of reader. Few writers possess the genius of Prof. Wood for this class of work, but we venture to think that even he has only attained his end through some sacrifice of the interests of each class of reader. Had he been writing solely for the student, who is assumed to have some knowledge of chemistry, he would doubtless have given a rather more advanced treatment of the subject matter of his introductory chapters, whilst a great deal of the detailed experimental work that is embodied in the text might also have been more usefully collected into an appendix or a separate practical manual. For the farmer reader, on the other hand, much of this experimental work must necessarily be unintelligible and consequently redundant. These criticisms, however, in no way preclude a very favourable opinion upon the treatment of the subject. In his later chapters, in which he turns to practical applications, Prof. Wood is excellent, and this part of his book will be read and used by a far

wider circle of readers than that for which it is primarily intended. Special reference may be made to his extension to fattening animals of the system of "rationing by performance," which is proving so successful in the case of dairy cows. This is a very real advance, for which all concerned with the difficult task of giving advice on practical feeding problems will be grateful.

The book is well produced and issued at a low price, and may be warmly commended to all agricultural students and others concerned with the feeding of live-stock.

*Clockmaking, Past and Present.* With which is incorporated the more important portions of "Clocks, Watches and Bells," by the late Lord Grimthorpe, relating to Turret Clocks and Gravity Escapements. By G. F. C. Gordon. Pp. viii + 232 + 35 plates. (London: Crosby Lockwood and Son, 1925.) 16s. net.

To the makers and lovers of clocks this volume will be a welcome addition to their bookshelves. Though not intended to be a complete treatise on the subject, the author deals systematically with the materials, tools and mechanisms of clock-making and gives much excellent advice. The plates are a notable feature of the book, and though naturally most of them are devoted to various forms of clocks and clock cases, not the least interesting are those illustrating wheel-cutting machines, pinions and their collets, new and old screws, and the clock hands of various periods. There is one omission that should be pointed out. On p. 58, when dealing with compensation balances, it would have been well to explain that the necessity for compensation arises mainly through the change in the elasticity of the spring of the balance due to alteration in temperature, and not through the variation in the dimensions of the balance.

There is a good chapter on the question of restoration and repairs to clocks and clock cases. In a short note on British clocks for export, the author offers some criticism of clocks sent abroad, and suggests that if the British Horological Institute were to issue designs and detailed specifications for three or four types of clocks, it would confer a great benefit on all concerned. A bibliography is given containing some 80 or 90 books and pamphlets on clocks published since the appearance of Derham's "The Artificial Clockmaker" of 1696.

*Around the Horn to the Sandwich Islands and California, 1845-1850.* Being a Personal Record kept by Prof. Chester S. Lyman. Edited by Prof. F. J. Teggart. Pp. xviii + 328 + 16 plates. (New Haven: Yale University Press; London: Oxford University Press, 1924.) 16s. net.

PROF. C. S. LYMAN was connected with Yale University for thirty-two years as professor of physics and astronomy and director of the observatory. He died in 1890 at the age of seventy-six. This book is the diary which he kept as a young man during several years in the Sandwich Islands and California. The long sea voyage round Cape Horn occupies only a few pages. His observations on the people of the Sandwich Islands are of value as a record of past conditions, and there is a good account of the volcano of Kilauea. Most of the diary has little scientific interest, though some of the descriptive matter is vivid. There are many interesting illustrations taken from old prints.