torque and efficiency at all loads can be found very simply by constructing a certain circle and drawing various lines.

Theory shows that the torque developed when switching one of these motors into circuit is greatly increased by increasing the resistance of the rotating circuits. Many inventions have been devised, so that the resistance of the rotor circuits automatically diminishes as the speed increases, thus securing high initial torque with economic working. It is interesting to learn that in the rotors of the two-phase motors used in the U.S. battleship *New Mexico* there are two windings. The outer is made of a high-resistance alloy and the inner has low resistance. The outer winding produces the initial torque, but the inner produces the greater torque at normal speed.

The author defines the leakage factor of a motor as $L_1L_2/M^2 - 1$, where L_1, L_2 are the inductances of a stator and rotor winding respectively and M is the mutual inductance between them. We much prefer Behn-Eschenburg's definition, namely, $1 - M^2/L_1L_2$. The latter is always a fraction lying in value between 0 and 1. The former varies between 0 and infinity. We also think it better to talk about motors being "in cascade" rather than "in concatenation." We regard this book as an important contribution to the practical theory of alternating current machinery.

A. RUSSELL.

Our Bookshelf.

Memoirs of the Geological Survey. Special Reports on the Mineral Resources of Great Britain. Vol. xxiii.: *Lead and Zinc Ores in the Pre-Carboniferous Rocks of West Shropshire and North Wales.* Part 1, West Shropshire. By B. Smith. Part 2, North Wales. By H. Dewey and B. Smith. Pp. iv+95. (Southampton: Ordnance Survey Office; London: E. Stanford, Ltd., 1922.) 3*s.* net.

REPORTS on the lead and zinc ores of Scotland, of Cornwall, Devon and Somerset, of the Lake District, and of the carboniferous rocks of North Wales have already appeared, and the three remaining volumes of the series, dealing with British lead and zinc ores in the remainder of the country, are promised shortly. It is of the utmost importance in the interests of economic geology that this work should be done now, before it is too late; but unfortunately it is becoming only too clear that the interest is a purely academic one, and that the industry of lead and zinc mining in Britain is in a moribund condition. It is obviously impossible that our relatively small deposits, some of which have probably been worked for 2000 years, can compete in the world's markets against the vast masses of mineral, the development of which is of quite recent date, which are to be found in the United States, Australasia, Burma, etc., and it must be regretfully admitted that it is impossible to bolster up an industry that has to contend with such crushing disadvantages, both natural and artificial. For reasons that are well known to all students of mineral deposits, our veins of lead ore were richer and more easily worked at the outcrops than they are to-day; we are far indeed from the days of Pliny, according to whom lead was found in Britain near the surface of the ground in such abundance that it was found necessary to limit strictly the output.

The volume before us describes the occurrences of lead and zinc in two districts, which have probably been thus grouped together on account of their marked geological similarity, the ores in both occupying fault fissures in the older rocks of Cambrian, Ordovician and Silurian age. The individual mines are described accurately and minutely, and the description is in many cases supplemented by sections taken from the actual mine plans. It is only to be regretted that more attention has not been paid to the introductory chapters dealing with the districts as a whole, particularly as regards the statistical portion. No summary of district statistics is given for North Wales, and that for Shropshire is indicated only by means of a small graph, which shows the general features of its rise and fall, but from which it is impossible to obtain exact figures.

H. L.

Elementary Chemical Microscopy. By Prof. E. M. Chamot. Second edition, partly rewritten and enlarged. Pp. xvi+479. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1921.) 25*s.* net.

THE first edition of this work was reviewed at some length in NATURE in 1915 (vol. 96, p. 84) shortly after its appearance. The subject of chemical microscopy, however, received a great impetus during the war, many new applications revealing themselves in the special war industries, which resulted in a more extensive use of the microscope in applied chemistry than at any time during the last quarter of a century. Hence, a new edition of this book was found necessary in America, and it is somewhat disappointing to find that practically no new methods or processes, and but little new apparatus, are described. The lack of photomicrographs of typical microscope fields of characteristic crystals produced in the tests described is still very obvious, but the author on the one hand promises a second book to make good this deficiency, and on the other states that this present book is primarily intended as a text-book (especially for the students of Cornell University), and not as a book of reference, and that the method of instruction in the Cornell course is intentionally one which leads to the best results when the student is encouraged to discover for himself (under guidance) the characteristic morphology of the materials studied.

The same more or less antiquated crystallography is retained, in which such terms as "optical elasticity," "hemihedral," and "tetartohedral" constantly occur, and the confusion between trigonal and hexagonal crystals is so complete that the former term is not even mentioned.

This second edition is, however, an improvement, for several obscure portions of the first edition have been