

to be congratulated on having been the immediate causes of the publication of three such works as the Gifford lectures of Profs. Ward, Royce and James. There have been few equally important additions to English philosophical speculation in recent years. A. E. TAYLOR.

THE PARALLEL RUNNING OF ALTERNATORS.

Der Parallelbetrieb von Wechselstrommaschinen. By Dr. Gustav Benischke. Pp. 55. (Brunswick: Friedrich Vieweg und Sohn, 1902.) Price M. 1.20.

THE second volume of "Elektrotechnik in Einzel-Darstellungen," of which the first was mentioned in these columns some time ago, appears in the above form and fully sustains, if it does not surpass, the excellent character of the first volume. Besides the general normal parallel running of alternators, including, of course, polyphase machines, the disturbing influences which make parallel running difficult or impossible are discussed. To the mathematically inclined, the theoretical explanation of the phenomena met with in the parallel running of alternating-current machinery offers exceptional opportunity for a fine display of mathematical calculations and formulæ. Fortunately, Dr. Benischke is not so inclined, and in his preface declares that the physical explanation of the phenomena appeals more directly to one's intelligence than the mathematical, and that, in the cases under consideration, the swinging and falling out of step of alternators, the mathematical method is not much good, as it is not possible thereby to prophesy whether two machines will run in parallel or not. This is, of course, what has been found in practice, and it is now usual in the construction of alternators to so design them that means for the prevention of swinging (Le Blanc's damping rings) can be placed in position should it prove necessary. The author is to be particularly congratulated on chapters x. and xi., in which these matters are discussed, for the very clear and logical manner in which he has put them.

As an introduction, the first three chapters of the book deal with the parallel running of continuous-current machinery, and the question of motor current and division of the load between the parallel sets. With continuous-current generators, the division of the load between the machines is a question for the switchboard attendant, who simply has to regulate the exciting currents, the steam-engine governors doing the rest. With alternators, the task becomes more difficult, for not only have we the additional necessity of the machines being in synchronism one with the other, but also the proper division of the load between the generators can only be attained by concurrent adjustment of both the exciting current and the steam admission. This is due to the fact that increase of the excitation of the unloaded machine is not followed by a diminution in speed due to current flowing, followed by a greater admission of steam, as in a direct-current machine, as the alternator is kept at the same speed always, being in synchronism. The proper division of the load between the alternators becomes, therefore, largely the work of the engine-driver, acting under the instructions received from the switchboard attendant,

while the latter has to see that the wattless current given by the machines is kept at a minimum by the proper regulation of the exciting currents. In accordance with German practice, the author recommends the use of an indicating wattmeter or power-factor indicator on each machine to control the power factor. This has not been the usual practice in England, as the matter can just as well be done by regulating to minimum current on the machine ammeters. To-day, recording power-factor indicators are being demanded in England; this is presumably to enable the engineer to have a check on his assistants. They are also, so far as we are aware, only for use on circuits off which synchronous substation machinery is running, where the question of power factor is of greater importance than in the case now considered.

We can now only refer to the other chapters in the book, which treat of the influence of the shape of the current and electromotive-force curves, the electrical connections for parallel running with diagrams, synchronisers, under which we did not find a description of the Lincoln synchroniser, which we think is an omission, parallel running of machines situated on the same axil, and of alternators driven by gas engines. We can warmly recommend the book to all who seek trustworthy and detailed information on this important engineering subject.

C. C. G.

OUR BOOK SHELF.

Hand- und Hilfsbuch zur Ausführung physiko-chemischer Messungen. By W. Ostwald und R. Luther. Zweite Auflage. Pp. xii + 492. (Leipzig: W. Engelmann.) Price 15s. net.

THE second edition of this well-known work will undoubtedly be welcomed by a large circle of students and teachers, the more so since for some time the first edition has been out of print. The cooperation of the original author with Dr. Luther in the production of the second edition has resulted in a considerable number of changes being made in the book; a new work is, in fact, the result. Dr. Luther's long experience as demonstrator and later as subdirector of the Physico-chemical Institute at Leipzig has made him specially fitted for this collaboration, and the value of the book is greatly enhanced by the results of his daily contact with the practical difficulties of students engaged in physico-chemical work.

In the new edition, the headings of the first fifteen chapters agree with those of the first issue. Considerable changes have, however, been made in detail by the introduction of new matter. The sixteenth chapter of the original edition is represented by five chapters in the present one, the headings of which are respectively electrical measurements, electromotive force, conductivity of electrolytes (dielectric constant), quantity of electricity and transport number and finally electrical measurement of temperature. In this portion of the book, the chief work of reconstruction has been performed. The twentieth chapter deals with chemical dynamics, and a new chapter has been added on the application of physico-chemical methods to chemical questions.

Noteworthy alterations in detail are the introduction of a number of new tables of useful data, the use of the new unit for the expression of conductivity values and the inclusion of copious references to original papers dealing with the subject-matter in hand. Special forms of apparatus and details of manipulation which cannot be included in a practical text-book of anything like modest