The contents of the book are:

Chapters I. to IV., General Principles of Alternating Waves and Measurements.

Chapters V. to VII., Inductive Circuits, Parallel and Series Connection.

Chapters VIII. to XV., Alternators, Transformers, Synchronous Motors, Converters, Induction Motors, Transmission Lines.

The book is based on college experience and intended as a text-book for colleges, and fulfills this object admirably, better than any other book on these subjects that I know, not only by what it gives but also by what it omits. It does not give design of alternating apparatus except in a few isolated cases, which would preferably have been omitted also. The designing data and methods in the present state of the electrical industry form one of the most valuable assets of a few large manufacturing companies, and thus are practically inaccessible to the public, so that any book claiming to teach design of alternating apparatus can immediately be recognized as an intentional or unintentional fraud.

In electrical engineering, as in most branches of science, two methods of investigation exist. The *differential method* compounds the equations of the phenomena taking place in the time differential. It is the only exact method, and the method which has given broad results of universal importance in the hands of men such as Maxwell and Heavyside, but in the hands of anybody but a mathematical genius, this method is absolutely barren of results. In engineering practice to integrate the differential equations, such assumptions have to be made that ultimately the result, derived by excessive labor, applies to phantom apparatus only, as a hysteresis-less transformer, or an induction motor without self-induction, or any such monster.

In the *integral method*, the time differential and to a large extent, the time as variable has altogether disappeared, the alternating wave is represented by its quadratic mean and its phase, the E.M.F of self-induction finds its expression in a constant ohmic reactance, and even the hysteretic loop has disappeared and is represented by an angle of advance of the phase of magneto-motive force with regard to the magnetic flux.

This method is naturally an approximation only, and after the problem has been solved the results have to be discussed regarding their accuracy, and corrections applied to allow for secondary effects, as higher harmonics, etc., just as in astronomy the preliminary orbit of a comet has to be corrected for the disturbances caused by the planets.

But the integral method is the only method which is of practical utility, whether as graphical or trigometrical, or symbolic treatment in complex quantities.

Unfortunately in our colleges, usually, too much preponderance is still given to the differential method, starting from Green's theorem and leading into the nowhere, and further time wasted by spreading misinformation in the attempt to teach apparatus design, although, fortunately, a reaction is setting in now by replacing the teaching of apparatus design by that of a thorough understanding and study of the actions and internal reactions of the apparatus, and differential methods by engineering methods.

I believe, however, that these differential methods might better be dropped altogether from the curriculum of our colleges, and the time saved thereby distributed between the teaching of engineering methods, for which the above discussed book forms a very suitable text-book, and is especially intended, and differential calculus pure and simple, endeavoring in the latter to give the student a thorough understanding and intuition into the fundamental principles rather than to load his memory with a lot of useless, because immediately forgotten, formalism. There appears to me no branch of science more tedious than mathematical physics. Mathematically, it has neither the interest nor the elegance of pure mathematics, and physically, it is, with very few exceptions, barren of results.

CHAS. P. STEINMETZ.

Kinematics of Machinery. By JOHN H. BARR, M.S., M.M.E., Professor of Machine Design, in Sibley College, Cornell University. New York, Wiley & Sons. London, Chapman & Hall. 1899. 8vo., pp. v + 247, 213 illustrations, cloth. $2.50.

Professor Barr has placed within reach of the teachers of the subject a concise, yet, within its range, very complete and a very admirably planned and well-written, treatise on kinematics. The book is the outcome of a number of years experience in the methods of instruction adopted, and, privately printed, has been kept under revision until it was thought sufficiently well settled as to form and extent to justify its more general use. These years of experience in class-room work before publication insure the elimination of probably substantially all those inevitable errors of omission and of commission which mark a first edition of practically all works not thus first well pruned out in advance. The substance of the book consists of a clear and concise presentation of those main principles which find most frequent and general application in the work of the designing mechanical engineer; it is a work of application rather than an attempt at complete and purely scientific development.

The systems of treatment and application are standard with the engineer and follow the best authorities wherever practicable, and credit is frankly given to Willis, Rankine, Reuleaux, Kennedy and others, in all departments.

The discussions of fundamental concepts, methods of transmission of motion, gearing, cams, linkwork and wrapping connectors, are all excellent and the treatise gives internal evidence of preparation by an author practically as well as theoretically familiar with his subject. There is presented just such a combination of the purely scientific with the applied science of kinematics in mechanical engineering as is now in most general demand among the technical departments of our colleges and universities. At its close is appended a very useful collection of exercises and problems in illustration and application of the principles enunciated in the body of the text. Such a collection of examples has been much needed in this subject and its preparation reflects great credit upon Professor Brügel, who supplied the greater part of this division of the work, and entitles the author of the book to hardly less credit for his good judgment in making use of them.

The illustrations are well-chosen, well-made and well-printed, and the book, as a whole, is a very excellent piece of book-making and a credit alike to author and publishers.

R. H. Thurston.

Darwinism and Lamarckism, Old and New. By Frederick W. Hutton, F.R.S., etc. New York, G. P. Putnam's Sons.

This book embodies some four lectures, in which are discussed the general subject of evolution and, as indicated in the title, its Darwinian and Lamarckian aspects. Delivered at rather widely separated intervals from 1882 to 1898, they naturally lack somewhat in that continuity of thought and treatment desirable in a series of consecutive chapters. The author's apology for "adding to the already voluminous literature on Darwinism is that the subject is always advancing, and any attempt to convey that knowledge in simple language can hardly fail to do good, provided it be sufficiently clear to be understood at first reading, and sufficiently short to discourage skipping." His purpose is confessedly that of the expositor, and his treatment of the subject is generally directed to that end. At times, however, he assumes the attitude of the advocate, sparing no pains in using favorable evidence to the best possible advantage, and discounting that of an opposite character in corresponding measure.

A brief introductory chapter is devoted to the correction of certain misconceptions of Darwinism and answering objections urged against it, which, though old, are constantly being reiterated, as, for instance, the strictures of Lord Salisbury in his presidential address before the British Association in 1894. He also refers to evident advances which have taken place in biological thought within recent years, following his earlier lectures on the subject, notably the discussion of acquired characters, and to a less extent concerning social evolution. The concluding pages of this chapter he devotes to a discussion of 'The Objects of Evolution,' in which there are apparent certain teleological aspects and tendencies of a somewhat antiquated type; as, for instance, when he undertakes to show special design in the presence of gold, silver, lead, zinc, etc., which, but for the presence of man, could have had no place in the economy of nature! To say that "not only