

men of no great education; that the learned receive these discoveries at first with shrugs of the shoulders, and prove that there is nothing in them; but after the discoverer has persevered, and even come to success through a kind of contempt for science, then the learned demonstrate the possibility of success.

“And it is often partially true; bold undertakings are frequently due to those who are free from dizziness, and to prevent dizziness one must not see too clearly. Of these adventurers only the successful are counted, not those who break their necks.

“Not the less true is it that modern industrial development, considered as a whole, would have been impossible but for the advance of science. The unlearned live daily in an environment created by science, and unconsciously receive the benefit. It is science that gives a form to their dreams, which in other centuries would have been very different. Many bring to their applications ideas of scientific origin, but which their discoverer looked upon as only the mind’s play, and impractical, because he foresaw a thousand difficulties. Every inventor has had predecessors whose great merit was the fact that they did not halt at difficulties, which they did not perceive simultaneously, but conquered one at a time.”

There are thirty-seven pages of notes by H. Weber. These consist of explanatory remarks, historical notes on the original text, and some philosophical considerations. They will be particularly useful to the general reader. The last note closes with a quotation ascribed to Novalis:

“The life of the Gods is mathematics. All divine messengers must be mathematicians. Pure mathematics is religion. Mathematicians are the only fortunate ones. The mathematician is naturally an enthusiast. Without enthusiasm no mathematics.”

JAMES BYRNIE SHAW.

Spezielle Flächen und Theorie der Strahlensysteme. Von Rektor Dr. V. KOMMERELL und Prof. Dr. K. KOMMERELL. Sammlung Schubert LXII. Leipzig, Göschen, 1911. vi+171 pages.

DURING the preparation of the second edition of the authors' *Allgemeine Theorie der Raumkurven und Flächen*,* it was

* Sammlung Schubert, XXIX and XLIV. First edition 1903; second edition 1910-11.

found that, in the process of revising and adding desirable new material, the second volume was becoming too large. At the suggestion of the publishers this volume was divided and the second part appears as a separate book. In comparing this new edition with the old, it is to be noted that the general character of the text has not been changed. It is still a first introduction to differential geometry, aiming to present the fundamental facts and principles in a simple and concise manner. Brevity, however, is no longer a striking feature, for there are 531 pages in the three volumes of the new edition.

The American student beginning the study of differential geometry now will probably not use this second edition so frequently as his predecessor employed the first one. When the latter appeared, four years after the German edition of Bianchi's book, there was no text in the English language. But now we have Professor Eisenhart's excellent work.

In the present volume the first 90 pages are devoted to the "special surfaces," including W -surfaces, minimal surfaces, surfaces of constant curvature, ruled surfaces, and triply orthogonal systems of surfaces. Here there are various minor alterations and additions, especially under the first three headings. But the greatest changes are to be found in the next 60 pages, which deal with rectilinear congruences. The sections on isotropic congruences are perhaps the most noteworthy, not only because of the fact that the treatment here is fuller than in most of the texts; but, also, because these ten pages contain material from a recent article* by one of the authors. Of especial interest are the remarkably simple formulæ for the middle surface of the most general isotropic congruence.

The book is concluded by a collection of thirty-one problems.

E. B. COWLEY.

Einführung in die Theorie der partiellen Differentialgleichungen.

Von Dr. J. HORN, Professor an der Technischen Hochschule zu Darmstadt. Leipzig, Göschen, 1910. vii+360 pp.

THIS work may be considered as the third volume of the course in differential equations published in the "Sammlung Schubert." The first volume is the well known work by Schlesinger, *Einführung in die Theorie der Differentialgleich-*

* *Math. Annalen*, vol. 70, pp. 143-160.