quadratic forms, the discussion not being completed until later in connection with the theory of quadratic numbers.

The author has developed the theories of quadratic forms and quadratic numbers in conjunction in Part 2, each supplementing the other and forming together a single theory. In this fact he finds his chief reason for calling his treatment "modern." The result is indeed "esthetically satisfying" (quotation from the preface). In view of the fact, however, that the book is professedly intended for beginners, it may perhaps be doubted whether this treatment is pedagogically desirable. There can be no manner of doubt that the beginner will find Part 2 hard reading; and it does not appear evident that the intermingling of forms and ideals, however beautiful the result, makes the reading any less difficult.

The book is remarkably free from typographical errors. Besides the single one noted in the corrigenda, the reviewer has noticed only two; one on page 36, 3d line from below, where *nr.* should read Nr.; and one on page 70, line 7, where the reference should be to Nr. 4 instead of to Nr. 3. In this connection we may note further that on page 25 the expression $\phi(1)$ must be defined as equal to unity, and on page 71 the condition $\Delta \neq 0$ should be added.

J. W. YOUNG.

The Axioms of Descriptive Geometry. By A. N. WHITEHEAD. Cambridge University Press, 1907. viii + 74 pp.

THIS little volume is No. 5 of the Cambridge Tracts in Mathematics and Mathematical Physics. It follows a previous tract (No. 4 of the same series) by the same author, on the Axioms of Projective Geometry, to which constant reference is made. The work begins with formulations of the axioms, those of Peano and Veblen being given in detail. Chapter II treats of the relation of projective space and the associated space obtained by taking a convex region of the projective space, such a convex region being shown to be a descriptive space. The development follows that of Bonola closely. Chapter III contains the development of ideal elements in a descriptive geometry, the work being drawn from Veblen, apparently. In Chapter IV a "General theory of correspondence" is introduced through the medium of projective coordinates, the ideas of continuous groups of projective transformations and their infinitesimal transformations being developed from analytic geometry. Chapters V–VII contain a logical analysis of the method of superposition as applied to geometrical proofs. After the axioms of congruence of Pasch, the development of congruence in terms of previous concepts is given, after Lie, by consideration of congruence groups and their subgroups. Metrical geometries are then treated with reference to the absolute, and the kind of a metrical geometry obtained from the congruence group is shown to depend upon an assumption concerning the nature of the absolute.

The proofs are usually only sketched and the reader is left to complete the details. The work could be improved by a more formal statement of the theorems and the exact group of axioms upon which each theorem depends. For the reader who has some knowledge of the general methods used and the point of view, the book should serve as a very useful compilation of results from many sources.

F. W. OWENS.

Lectures de Mécanique. Première Partie. By E. JOUGUET. Paris, Gauthier-Villars, 1908. x + 210 pp.

THIS book is based upon the idea that "it is very instructive for one who wishes to comprehend the nature of the principles and laws of mechanics to follow the history of their development." The subject matter is presented mainly by long quotations from the original authors, interspersed and followed by comments of the writer, who believes it is interesting to study the classic writers on mechanics as one studies the classic writers in literature. The quotations occupy about 163 of the 210 pages in the text. M. Jouguet has in view the physical aspect of the subject and limits himself to the fundamental principles and essential laws. The first part is devoted to the beginnings of mechanics. After a brief introduction on the mechanics of the ancients there are three chapters on statics and four on dynamics.

The chapters on statics are devoted to the lever, the parallelogram of forces, and the principle of virtual work. The conception of each physical law is traced in the problems which have suggested it, the final statement of the law being given in the words of the author who first formulated it definitely. For example the first suggestion of the principle of virtual work is found in Aristotle's treatment of the lever. The evolution of ideas leading to the statement of the principle is then