find applications to the construction of roof-shaped surfaces, of sun-dials, of regular polyhedrons and crystal-forms, of ellipses and of moment-ellipses in graphic statics. The second chapter, which deals with parallel-projection upon a single plane, includes sections on cavalier-perspective, shadows under parallel light-rays, affinity and its applications, on the foundations of general axonometry (including, of course, Pohlke's famous theorem), on the theory of involution and its applications to the polar properties of the circle and the ellipse. In the third chapter we find the customary orthographic projection upon two or more planes of projection, including a valuable section on conics. Whenever possible, full use is made of the advantages which the application of projective properties of conics and the principle of affinity afford in the graphic representation of geometric forms.

The second volume contains two chapters on perspective and various applications. Chapter IV, on central projection, treats of fundamental concepts, so-called restricted perspective, construction of shadows in perspective, invariance of cross ratio, involutory perspective, applications of perspective, perspective of circle and sphere, properties of conic sections and their applications, including Pascal's and Brianchon's theorems, and so-called free perspective.

Various applications and supplementary topics, such as plane curves, surface-ornaments, topographical surfaces, surfaces of revolution, helical and cycloidal curves and surfaces, ruled surfaces, interpenetrations and shadows, and finally a brief account of relief-perspective, form the contents of the concluding fifth chapter.

The level upon which Scheffers proceeds may be judged from the fact that even a discussion of Peano's surface is included, to show the student the danger of hasty generalizations. Peano's original surface has the form $z = (y^2 - 2px)(y^2 - 2qx)$ in which p and q are positive real integers. For the sake of convenient constructive treatment, Scheffers discusses the projectively equivalent surface

$$z = -\frac{1}{10}(x^2 - 5y)(x^2 - y).$$

Every plane through the z-axis cuts the surface in a quartic which has a maximum at the origin, so that one might expect a maximum for the surface at that point. Still it is possible to trace curves on the surface passing through O having a minimum at O.

The whole treatise is carefully written and is typographically faultless. It may be heartily recommended to teachers as well as to students of descriptive geometry.

ARNOLD EMCH.

Girolamo Saccheri's Euclides Vindicatus, edited and translated by George Bruce Halsted. Chicago, The Open Court Publishing Company, 1920. 30 + 246 pp.

The original title of Saccheri's now famous work is: Euclides ab omni naevo vindicatus, . . ., which appeared in Milan in 1733, and which Halsted translates as "Euclid freed of every fleck." In English *fleck* sounds rather Teutonic, and the reviewer suspects that *flaw*, or *blemish* would sound better to the American ear. It is highly commendable that