

*Darstellende Geometrie*. Vol. II. By Theodor Schmid. Berlin and Leipzig, Vereinigung wissenschaftlicher Verleger, 1921. (Sammlung Schubert, XVI.) 315 pp., 156 figures.

The first volume of this work appeared in 1912, and was reviewed in this *BULLETIN*, vol. 21 (1914), pp. 204-205. A second edition appeared in 1919, containing slight changes (mentioned in the *BULLETIN*, vol. 27 (1921), p. 285). The second volume preserves the same general arrangement; the text is frequently interrupted by lists of unsolved exercises, and a useful historical and bibliographical note is added at the end of each chapter. The figures are well drawn and are usually clear, but in some of the more complicated ones, as numbers 107, 112, 118, 124, 126, the wealth of detail makes them difficult to follow.

The book begins with cavalier perspective, or oblique axonometry, and a shorter treatment of orthogonal axonometry. Besides a fairly full treatment of polyhedral figures, a shorter one on circles, spheres, cylinders and cones is added. The proofs are largely geometric, but footnotes use methods of analytic geometry and the calculus. The second chapter, that on central perspective, is particularly well written. The reader is introduced to the various steps and purposes of this method in a very attractive and easy manner. It might be hinted that the author became somewhat ambitious in treating singularities of plane and space curves, but there was a real temptation to complete the argument, and after all, the more complicated formulas appear only in the footnotes. In other respects the development is elementary. A wealth of important applications, including theater perspective, are treated in the sixty pages of this chapter.

The chapter on surfaces of revolution and on tubular surfaces is necessarily more mathematical. Contour, tangent planes, normal planes, parallel sections and principal meridians are treated. The application to quadrics of revolution is first to obtain the proper algebraic result, and then to interpret it graphically. But when shades and shadows are considered, the apparent contours from oblique infinite sources, or from a finite center, are too complicated to be interpreted from the equations, and here the method of the preceding chapter is extensively employed. In the discussion of cyclides of revolution both the algebraic and graphic methods of central perspective are employed. Later, more general tubular surfaces, together with their intersections, and their shadows, are considered.

The fourth chapter, of eighty-three pages, is devoted to helicoids and to non-developable ruled surfaces. It begins with an algebraic discussion of the simple helix, then of the ordinary helicoid, followed by certain graphic representations, such as tangent, indicatrix, and the intersection with a cone of revolution, each result being first derived analytically and then interpreted graphically. After a short discussion of parallel illumination, the more complicated problem of oblique generators is taken up, the surface generated being a quasi helicoid of high pitch. To this surface the same questions are applied as to the ordinary helicoid, and the results compared. Then comes the drawing of cylindrical and conical screws, with contours and plane projections. Finally, a number of particular

ruled surfaces are defined and described, the most attention being given to the cubic conoid. The intricate problems treated in this chapter are much simplified by the consistent use of the same method throughout; first an algebraic discussion, and then the graphical interpretation of the results obtained.

The last chapter contains a brief introduction to topological mapping, to the intersections of roofs, and to the principles of the Mercator map.

The press-work is good, and the proof-reading excellent. The book is not provided with an index.

VIRGIL SNYDER.

*Die Quantentheorie, ihr Ursprung und ihre Entwicklung.* By FRITZ REICHE. Berlin, Julius Springer, 1921. vi + 231 pages.

The theory of relativity and quantum theory are probably the greatest philosophical developments of modern physics. Both grew out of the failure of classical mechanics to give correct results when applied to radiant energy. Neither can be regarded as rigorously established on physical fact. Both are rather working hypotheses that have not been found inconsistent with fact. Of the two the theory of relativity is much more completely formulated. In fact there is in the minds of most physicists still considerable uncertainty as to just what quantum theory is, and concerning its cause views differ all the way from those of the extreme atomists, who consider radiant energy of a given frequency as capable of existing only in pieces of a certain size, to those of the older exponents of continuity, who still believe these curious results due to averaging. There is also the fascinating suggestion that we have here a consequence of sub-electronic structure and so have made a first step into the mysterious region beyond the electron. Because of all this uncertainty the subject has for the investigator an interest transcending that of more highly crystallized theories. For this reason we particularly welcome a book like that of Reiche which presents in simple form the theory and its principal applications.

The author disclaims any intention of writing a systematic textbook, yet he has produced as systematic a text as exists on the subject, and a very readable one. The first three chapters give Planck's hypothesis of energy quanta assumed in order to obtain a radiation formula agreeing with experiment, Einstein's hypothesis of light quanta with photo-electric application, and Planck and Sommerfeld's hypothesis of quanta of action. The remaining chapters treat the Einstein-Debye theory of specific heat of solids, the specific heat of gases, the Bohr type of atom with application to optical series, X-ray spectra, and some molecular models. The book should not be used as a substitute for Planck's *Heat Radiation* or Sommerfeld's magnificent *Atombau und Spektrallinien*, but as an introduction to the subject with which one may physically orient himself before taking up more complex discussions such as occur, for example, in the recent pamphlet of E. P. Adams published by the National Research Council.

H. B. PHILLIPS.