Leçons de Mécanique Rationnelle. By François Bouny. Volume I. Paris, A. Blanchard, and Mons, Librairie Leich. viii + 600 pp.

This is the first volume of a course on theoretical mechanics given to students at the École des Mines et de Métallurgie du Hainaut, and extending throughout the first two years. As indicated in the title, it is a course in theoretical mechanics. As such it can be read by the non-technical student quite as well as by the prospective engineer. The subjects considered are explained very fully, and as a result the author has produced a book which is easy to read. A particularly valuable feature is the large number of exercises which are given at the end of each chapter. It is stated in the preface that the solution of a large number of exercises is an important part of the course, and an essential for the clear understanding of the theory. This opinion undoubtedly will be shared by all who have had experience in teaching the subject.

The opening chapter takes up the parts of vector analysis that are needed for the chapters on kinematics and statics. Plückers line coordinates are introduced very neatly by writing the condition that a certain vector product should be zero. The properties of a system of localized vectors or strokes are also developed. This is a natural thing to do because both forces and angular velocities are represented by localized vectors, and any theorem regarding a system of localized vectors leads at once to a corresponding theorem in kinematics and statics. The four following chapters are devoted to kinematics. In Chapter III, page 125, it seems that it would have been better to have used $\overline{\omega}_1$, and $-\overline{\omega}_1$, for the two components of a couple of rotations. Although the article is headed *Couples de rotations*, when it is stated that a body S has a constant angular velocity $\overline{\omega}_1$, with respect to a system S_1, and S_1 has a constant angular velocity $\overline{\omega}_2$ with respect to a fixed reference system, we can infer only from what follows that $\overline{\omega}_1$ and $\overline{\omega}_2$ are to form a couple.

Part two contains four chapters on statics which include the graphical and analytical determination of the stresses in a framework, and also the equilibrium of strings. In § 218 the centroid of a homogeneous volume bounded by the three planes of reference and the surface of a sphere whose center is at the origin is determined. It may be noted that this result is already known from the last equation in § 209, which gives the position of the centroid of a spherical segment of one base. The fifth chapter is a continuation of the study of vector analysis. It takes up such concepts as *div*, *grad*, *curl*, and the linear vector function. The div, grad, and curl are each defined with reference to a set of axes, and it is shown later that they are independent of the reference system. Although some writers on vector analysis object to this method, it is only a question of individual taste. The final chapters treat of work, the theory of the potential, the method of virtual velocities, simple machines, theory of friction, homogeneity and similitude.

There are a number of misprints, but practically all of them are of the kind that do not cause any difficulty. Although the figures are good, some of them have been reduced so much that it is an effort to read the lettering. We should congratulate engineering students who get so thorough a training in theoretical mechanics.

PETER FIELD.

Projective Geometry with Applications to Engineering. By Peter Field. New York, D. Van Nostrand Company, 1923. viii + 98 pp.

The purpose of this text book is concisely stated in the preface:

"In most American universities the course in descriptive geometry is purely a course in drawing. On the other hand, writers on technical mechanics frequently assume their readers have a knowledge of the fundamental theorems of projective geometry. It therefore seems there is a good opportunity for the mathematical departments in the technical colleges to offer an elective course in projective geometry which emphasises the technical applications."

Professor Field's projective geometry covers the subject matter of such a course given by him at the University of Michigan.

"No attempt has been made to give references. The authors most frequently consulted in working up the course were Cremona, Veblen and Young, Emch, Föppl, Mohr, Ritter, Culmann, and Koenigs."

The reader who is familiar with the works of these authors may therefore approximately surmise what a treatise in which the applications are emphasised must contain. There are altogether ten chapters, comprising definitions and fundamental forms, plane homology, linkages, the complete quadrangle and quadrilateral, the cross ratio, ranges and pencils, the hexagon, involution, pole and polar, and the null system. A course of this sort in technical colleges and universities with colleges of engineering is certainly very desirable. One of the most effective methods of reinforced concrete arch-construction, for example, depends largely upon projective geometry and projective properties of conics. The only reason why these methods are not taught is the lack of preparation in projective geometry of most of the teachers as well as the students of this branch of engineering.

Professor Field's attempt to remedy such defects is therefore very commendable and his little book will be welcomed by all, teachers and students, who seek information along the line of technical applications of projective geometry. The null system is of such importance that the reviewer should have liked to see a much more extended treatment and range of applications of this chapter.

ARNOLD EMCH