are historical details not easily attainable elsewhere. There is a valuable annotated list of minerals and an excellent bibliography. There is some need for the author to take greater care to attain a form of expression which may be grasped by those not necessarily widely read in the science. Unusual words such as femic, salic, crenitic and the like might best be omitted. In the stratigraphical table, page 5, if Carboniferous is replaced by Carbonic, why not use also Cambric, Siluric, Devonic and Cretacic. In the treatment of the stratigraphy of Manhattan Island, it is far simpler and clearer to take up the Fordham gneiss, the Inwood limestone and the Manhattan schist, than to treat merely of gneiss, limestone and schist, with minor varieties. If, when a fourth edition is called for, the author will place himself in the attitude of a reader not of profound attainments in geology and, thus grasping his or her point of view, will put the facts of the local strata in simple and clear language, and will add an index, a work already serviceable and of value will be made still more so.

J. F. Kemp

An Elementary Treatment of the Theory of Spinning Tops and Gyroscopic Motion. By Harold Crabtree. Pp. xii + 140. New York, Longmans, Green & Co. 1909.

This is a very satisfactory book for one who wishes to gain a clear understanding of gyroscopic action. It contains a good discussion of Schlick's method of steadying vessels at sea and of Brennan's gyroscopic mechanism for balancing a monorail car.

The introductory chapter describes a number of curious and interesting forms of tops and gyroscopes. Chapter I. discusses rotation about a fixed axis, Chapter II. discusses precession and Chapter III. is a discussion of the phenomena described in the introductory chapter.

The starting of precession and gyroscope oscillations are discussed in Chapter IV., and the remainder of the book, Chapters V., VI., VII., VIII. and IX., discuss the more elaborate aspects of the theory of gyroscopic action.

The curious behavior of the stone implement known as the celt which is described on pages 7 and 54 may be observed with an ordinary pocket-knife with a rounded back. When such a knife is twirled on a smooth table the reaction of the table due to its vibratory motion causes its direction of spin to be reversed and if the knife is set rocking about a horizontal axis the reaction of the table due to the vibratory motion produces a slight spin about a vertical axis.

Altogether the book is a welcome and valuable addition to the literature of rotatory motion.

W. S. Franklin

SPECIAL ARTICLES

A SIMPLE CLOUD APPARATUS

The celebrated experiment on the production of clouds by C. T. R. Wilson forms an instructive lecture table demonstration. This need not necessarily be a difficult experiment. It is common observation that clouds of greater or less density are often seen upon the first few strokes of the pump when evacuating a vessel containing some moisture. The apparatus as Wilson constructed it was of necessity rather elaborate. That it may be of exceedingly simple and inexpensive construction and yet capable of giving quantitative results of a fair degree of accuracy is the object of this paper.

The apparatus consists of a glass bulb having two openings. To one, the larger, is attached a stiff rubber bulb, to the other a nipple for the introduction of the gases, etc., to be investigated. For qualitative results the glass vessel is blown in the form of a hooded bulb *B*, as shown in Fig. 1. This bulb should have a volume of about 75 c.c., while the hand bulb *HB* may be the stiff bulb that comes with an hydrometer syringe for testing electrolytes. The volume of this bulb should be about 250 c.c. The nipple *n* is closed by a rubber tube and a screw pinch-cock at *p*. It is well to insert a short glass tube extension beyond *p*. To operate, draw into the bulb *B* two or three cubic centimeters of water. This will be caught by the annulus or trough in *B*, thus keeping the gas in the bulb in contact with