Der Kreisel. By R. Grammel. Braunschweig, Vieweg and Son, 1920. 10 + 350 pp.

The book opens with vector analysis and the mechanics of rigid bodies. The rotating body under no forces is handled with clarity and special consideration to physical concepts. There is then taken up the problem of a rotating body whose axis is forced to move along a given path. The 'gyroscopic couple' which is required in this case is used continually in the discussions in the remainder of the book. There are plentiful applications—to vehicles, ships, the gyroscopic compass and other stabilizing gyroscopes. The hanging and the stabilized monorail are both considered and the treatment of the aeroplane is full. There is even some reference to gyroscopic action in atoms.

Dr. Grammel believes that a reform is necessary to replace long-winded phrases by simple words, to correspond to the simplicity of the ideas expressed. There is room for an interesting discussion among American mathematical engineers on this topic; but the modern man uses many long technical terms quite naturally. Perhaps 'moment of momentum' and 'moment of inertia' might be discarded with advantage.

The book is to be highly recommended for its attention to basic principles. In studying the bicycle, for example, the theory of a riderless mechanism is omitted because it has no value. It is replaced by a statement as to the general mechanical properties. The book does not take the place of a complete mathematical treatise on rotating systems, but there is no diffidence in the use of mathematics as a hand-maid. The illustrations are striking and a valuable engineering course might be given with this book as a foundation.

P. J. DANIELL

Mathematica Delectans. By Dr. G. Kowalewski. Heft I. *Boss Puzzle und Verwandte Spiele.* Leipzig, Wilhelm Engelmann, 1921. 72 pp.

This little book is the first of a projected series on mathematical recreations and games which Professor Kowalewski proposes to publish. This first volume is concerned with the so-called boss puzzle or what is more familiarly known in this country as the fifteen puzzle. He finds that all possible configurations fall into two equal classes and that all the configurations of one class are equivalent under the allowable motions among themselves, but that no configuration of one class is equivalent to any configuration of the other. The latter part of the booklet is devoted to various generalizations of the boss puzzle in which the ideas previously introduced are effectively applied. The book is so elementary in character that it would hardly justify a notice in the BULLETIN were it not for the fact that the abstract ideas involved are of very general application and wide interest, especially as exhibited in the discussion towards the end of the booklet. The succeeding volumes of the proposed series will be awaited with much interest. The author has struck a new note and, I feel inclined to say, established a new standard regarding the treatment of problems ordinarily held to be outside the field of serious mathematical endeavor.

J. W. YOUNG