than it has in the last three years. It is by no means impossible that a somewhat smaller annual percentage increase in the visible gold supply or even the present high rate may not be required for the proper opening up of new territory, for the increasing business and population of the earth, for the modernization of the civilization of such a country as China, and especially for the imperative fortification of the gold reserves of our own and other countries.* It may well happen that 1907 and not some later year will ultimately be compared with 1857 as containing a great panic due to gold inflation. If the fact that gold is depreciating is widely recognized and allowed to influence speculation and prices according to sane economic laws, the disastrous effects which would follow ignorance will be much mitigated.

In closing this review we would express the hope that not only economists and mathematicians and business men may read these volumes — it is almost essential to read both, so closely are they interrelated — but that those of our actual or would-be legislators who may be interested in something more than holding their ears to the ground to catch a rumble that will indicate some wild popularistic "vital" issue upon which they can conduct a campaign at least orally successful, will take the pains to study Fisher's work in detail, that they may legislate with as much wisdom as possible; we are in great need of a decent currency system.

EDWIN BIDWELL WILSON

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON, MASS., *October*, 1908.

SHORTER NOTICES.

Vorlesungen aus der analytischen Geometrie der geraden Linie, des Punktes und des Kreises in der Ebene. By OTTO HESSE. Vierte Auflage, revidiert und ergänzt von S. GUNDELFINGER. Leipzig, Teubner, 1906. 8vo. viii + 251 pp.

THIS little book of the great geometer is so well known that it would seem almost absurd to review it at any length. For a generation it has been considered a model of elegance, and the

*On the question of the gold supply reference may be made to Thomas Gibson's special market letters on "The Increasing Gold Supply," New York, 1908. Of the contributors to this symposium, Muhleman alone seems to regard the present supply as possible of absorption without serious inflational effects.

new edition is, except for very minor changes, a reprint of the old. The editor has however added a number of notes, covering twenty-two pages, in which certain of the more difficult points find a fuller explanation. Special attention is paid in the notes to the matter of signs. One of them amplifies in a very desirable way the admirable treatment of involution given by the author. Most of the others will also be found to add materially to the usefulness of the book.

One finds scattered throughout these lectures little side remarks which merit special attention. For instance in the second lecture the author shows how by means of the method of abridged notation certain theorems about lines determined by triangles may be proved without any calculation. He compares this method with the elementary but laborious methods which make no use of special devices, but proceed upon the basis of the general principles alone. He then says: "Man braucht aber nur einmal solche Rechnungen mit den allgemeinen Prinzipien durchzuführen, um die Lust an weiteren Versuchen zu verlieren." He continues as follows: "The general principles, to be sure, indicate the path which is certain to lead to the desired result, but not the simpler way which one ought to choose in a given case. The amount of mechanical labor required by the general principles becomes greater as the theory grows more extensive and comes to include a larger circle of problems. It becomes necessary therefore to build up special theories within the general theory, each of these special theories being especially adapted for a certain class of problems. It is to these special theories that these lectures are devoted."

One other remark made by the author is characteristic of the book. He finds himself discussing, for the third time, the problem of orthogonal substitutions, using on this occasion a purely algebraic method. He says: "There can be no doubt that the purely algebraic problem gives rise to difficulties which did not present themselves in the previous methods of solution. This makes it so much the more important to accomplish the algebraic solution of the problem which from another point of view is already solved. It is precisely problems of this sort which lead to the most fruitful investigations." The perfectly symmetrical character of the book, in which the geometrical and algebraic problems are treated with equal care and so as to completely elucidate each other, is the main charm of Hesse's work.

I cannot close these remarks without expressing a bit of scepticism upon one point. The preface begins with these words: "The present treatise is intended as an aid to the study of geometry in school as well as at the university." It does not seem possible to me, even with the most generous concessions as to the superior abilities of the German schoolboy, to think of Hesse's book as a text for a beginner in analytic geometry. To be sure it requires no prerequisites other than those which the beginner in this subject is likely to have, but it does require a mathematician of some maturity to read it appreciatively. Certainly the contrast between this book and our present-day textbooks for beginners is great.

E. J. WILCZYNSKI.

A Bibliography of the Works of Sir Isaac Newton Together with a List of Books illustrating his Works, with Notes, by GEORGE J. GRAY. Cambridge, Bowes and Bowes, 1907. 8vo. viii + 80 pp. 1 plate. Second edition, revised and enlarged.

IT is now some twenty years since Mr. Gray issued the first edition of this work, but as only a hundred and twenty copies were then printed it was never generally known to scholars, save by name. In a way this has not been without its good results, since the very fact of its rarity has led to the preparation of this new and enlarged edition, containing information now published for the first time.

The work contains four hundred and twelve titles arranged under ten heads: Collected editions of works, the Principia, Optics and optical lectures, Fluxions, Arithmetica universalis, Minor works, Chronological, theological and miscellaneous works, Reports on coinage, Works edited by Newton, Memoirs. The bibliography is preceded by an analytic table of contents, and followed by an index of names. There is also a reproduction of Mackensie's drawing of Roubiliac's statue in Trinity College, from Le Keux's engraving.

Only one who has worked in the bibliography of mathematics can appreciate fully the extent of Mr. Gray's labors and sympathize with his errors and omissions. Such a work is easily conceived and can be pursued with little difficulty to a vaguely defined point, after which titles and editions become exceedingly elusive. It is like collecting portraits of Newton; the first fifty can be found with little trouble; the second fifty