

the occasional introduction of an equation, which makes the theorems much clearer. In this regard, most of the treatment is less formal but more easily understood than the corresponding part of Reye's treatise.

Since the author holds strictly to the traditions of the Steiner school (though never advocated by Steiner), no figures appear in the book. In many cases the explanations are sufficiently clear without this help, but in discussions of pencils of collineations, products of involutions, and similar subjects, the text could be made much briefer by the addition of appropriate figures.

The fifteen pages devoted to the twisted cubic curve contain a large number of results, skilfully arranged. The chapter on trilinearity is much more systematic than the treatment given this important subject in other places. A number of equations are used to establish the existence of neutral pairs, singular elements, and principal points, but much of the discussion is synthetic. The theory of the cubic surface follows easily from the elementary principles of trilinearity.

Nearly a hundred pages are occupied with the so-called problem of projectivity, *i. e.*, given a series of arbitrary points A_k , and their associates B_k , for any point P to find the corresponding point Q such that the pencil QB_k is projective with PA_k . The problem has no meaning if the number of arbitrary points is less than four, and becomes impossible when it is greater than seven. In particular, the Cremona transformation of degree five having six distinct base points results from five points A_k . The corresponding problem in space includes the discussion of the tetrahedral complex, and some surfaces belonging to it.

Some birational transformations are found in space which are believed to be new.

The later volumes are to contain the theory of collineations in space of two and of three dimensions, including the singular or degraded forms, and the theory of Cremona transformations and multiple correspondences.

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Beiträge zur Theorie der linearen Transformationen als Einleitung in die algebraische Invariantentheorie. By W. SCHEIBNER. Leipzig, B. G. Teubner, 1907. 250 pp.

THE contents of most of this book appeared in the *Sächsische Berichte* from 1903 to 1907. The author explicitly declares