

**ELEMENTS OF DESCRIPTIVE
GEOMETRY: WITH APPLICATIONS
TO ISOMETRICAL DRAWING AND
CAVALIER PROJECTION**

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Elements of Descriptive Geometry: With Applications to Isometrical Drawing and Cavalier Projection by Charles William MacCord

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CHARLES WILLIAM MACCORD

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GEOMETRY: WITH APPLICATIONS
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CAVALIER PROJECTION**

Charles S. Johnson

ELEMENTS

OF

DESCRIPTIVE GEOMETRY.

WITH APPLICATIONS TO

ISOMETRICAL DRAWING AND CAVALIER PROJECTION.

BY

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PREFACE.

HAVING been convinced, by a class-room experience of many years at the Stevens Institute of Technology, of the desirability of a text-book on Descriptive Geometry different in some respects from any previously existing, I have endeavored to produce a work suitable for use in colleges and scientific schools, and also by those who may wish to acquire some knowledge of the subject without the aid of an instructor. In the course of that experience many points have arisen, leading to original work embodied in this treatise; in the preparation of which, however, much benefit has been derived from reference to the works of Olivier, Jullien, Church, Warren, Watson, and others.

The study of Descriptive Geometry is not usually begun, nor should it ever be, until some familiarity with the ordinary operations of Mechanical Drawing has been attained. But when the former is taken up its identity with the latter should never be lost sight of, as it too often is: for this reason a departure has been made from the stereotyped methods of treatment, which in fact tend rather to conceal than to exhibit that identity.

At the outset considerable difficulty is often experienced in forming clear conceptions of the relations between abstract things, such as lines and planes, by the aid of orthographic projections only. The power of doing so is of course essential; and it is believed that the pictorial representations which have been introduced will be of assistance in acquiring it. But that power will be best developed, and greatly increased, by the instrumental construction of the problems—which indeed is absolutely necessary to the

attainment of such a mastery of the principles and processes as alone would be of any practical value.

As a hint to those who may choose to dispense with an instructor, it may be stated that at the Stevens Institute of Technology it is required that the diagrams shall be drawn with care, but not required that they shall be drawn in ink. Nor is the latter recommended; the time required to ink in one diagram can be better occupied in drawing another; moreover, work of this description affords the best of practice in neat, effective, and accurate pencilling,—an accomplishment which is becoming more and more important to the practical draughtsman.

C. W. MACCORD.

HOBOKEN, NEW JERSEY, *September 23, 1895.*

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DESCRIPTIVE GEOMETRY.

CHAPTER I.

DEFINITIONS.—THE PRINCIPAL PLANES OF PROJECTION.—THE FOUR DIHEDRAL ANGLES.—THE PROFILE PLANE.—REPRESENTATION OF THE POINT, OF THE RIGHT LINE, AND OF THE PLANE.—GEOMETRICAL PRINCIPLES AND DEDUCTIONS.—REVOLUTION AND COUNTER-REVOLUTION.—SEPARATE CONSTRUCTION OF THE HORIZONTAL AND VERTICAL PROJECTIONS.—SUPPLEMENTARY PLANES AND PROJECTIONS.

1. DESCRIPTIVE GEOMETRY treats of the methods of making, with mathematical exactness, drawings for the representation not only of **geometrical magnitudes**, but of the **solutions** of problems relating to them.

2. This branch of science does not deal with the phenomena of binocular vision, and for its purposes the **eye** is regarded as a single point.

The **surface** upon which a drawing is made may be of any form, as cylindrical, in panoramic painting, or spherical, in decorating the interior of a dome. But in order to make correct drawings upon such surfaces, it is necessary to be thoroughly familiar with the methods of making them upon **planes**, which are usually employed; and to these our attention will be confined.

3. The **object** to be drawn may be placed between the eye and the plane, or the plane may be placed between the eye and the object. In either case, light is reflected from any point of the object to the eye in a right line; and the point in which that line, produced if necessary, pierces the plane, is the representation of