PROJECTION DRAWING: SECOND BOOK

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Projection Drawing: second book by John Daniel Walters

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JOHN DANIEL WALTERS

PROJECTION DRAWING: SECOND BOOK

Trieste

WALTERS' ELEMENTARY GRAPHICS.

SECOND BOOK.

PROJECTION DRAWING.

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MERCURY PUBLISHING HOUSE,
Manhattan, Kansas.
1894.

"A place should also be found in the school or college course for at least the elements of the modern synthetic or projective geometry. It is astonishing that the subject should be so generally ignored, for mathematics offers nothing more attractive. It possesses the concreteness of the ancient geometry without the tedious particularity, and the power of analytical geometry without the reckoning, and by the beauty of its ideas and methods, illustrates the esthetic quality which is the charm of the higher mathematics, but which the elementary mathematics in general lacks."—From the report of the committee on Secondary Studies, appointed at the meeting of the National Educational Association, July 9, 1892.

PREFACE.

This course in Elementary Graphics consists of four separate text-books, each of which is intended to furnish daily work for a term of from six to twelve weeks, or its equivalent. It includes the subjects of

1. Geometrical Drawing,
2. Projection Drawing,
3. Elements of Descriptive Geometry,
4. Linear Perspective,

and was originally prepared for the classes of the Kansas State Agricultural (and Mechanical) College, but has been arranged here so that the different volumes may be used separately and under varying conditions. It is intended, however, that Geometrical Drawing should precede, and Projection Drawing should follow the study of Plane and Solid Geometry.

J. D. WALTERS.

Manhattan, Kansas, October, 1894.

GLOSSARY

OF MATHEMATICAL AND TECHNICAL TERMS.

The Numbers Refer to the Paragraphs Containing Definitions or Descriptive Statements.

PART I.

Definitions, Problems and Exercises.

INTRODUCTION.

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1. Projective Geometry.

The objects of projective geometry are:

(1.) To represent, by drawings, geometrical magnitudes in space.

(2.) To solve problems on forms in space by construction in a plane, and to demonstrate by the method of projections the properties of form and position.

Accordingly the subject matter of the science may be divided into

(1.) Projection Drawing

(2.) Descriptive Geometry.

2. Projection Drawing.

Projection drawing is the art of representing space forms upon plain surfaces, so as to show their real dimensions and relations.

Conceptions of the form of solids or objects having three dimensions, are at first obtained with difficulty from drawings. Especially is this the case when the drawings are not perspectives and lack shading. (Working drawings.) The systematic study of projection drawing is therefore a matter of great importance to everyone intending to follow an industrial, engineering or artistic pursuit. For the same reason, the study of descriptive geometry is usually preceded by a course upon the methods of representing objects having three dimensions. It is evident that the student must learn to read and draw the language of space forms before he can expect to make progress in the analysis or such forms, just as he had to learn reading and writing before he could commence the study of rhetoric or literature.

3. Different Methods of Projection.

There are at least four scientific methods of projection drawing:

(1.) Orthographic projection.

(2.) Axonometric projection.

(3.) Conical projection.

(4.) Spherical projection.

Each of these has characteristics that make it suitable for certain kinds of scientific or practical work. In mathematical and engineering drawing, the first, or orthographic method, is commonly used. This book treats orthographic and axonometric projection.

4. Method of Work.

Experience has proved that a series of problems of progressive difficulty, which, taken in their logical order, the student can master alone, or with little assistance on the part of the teacher, will accomplish the desired ends better than any other.

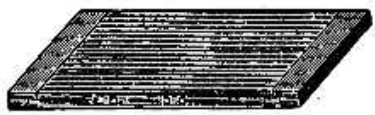
Some of the work in projection drawing offers better opportunity for artistic efforts, requires larger sheets of paper, and should be done under the eye of the teacher, while a majority of the problems may be solved on smaller sheets, simply with triangle and compasses. For this reason, this book, like Book 1, has been divided into two parts:

Part I.—Definitions, problems and exercises.

Part II.—Shading and draughting.

The first part contains the subject matter of the home work, and the second part that for the class room work. The study of both parts should be commenced at the same time, and should be carried on together. One day should be given to discussions and illustrations of new principles and to blackboard recitations by the class; the next day should be devoted to draughting in the class room.

FIG. 1.



All home work in projection drawing should be done in ink and should be finished uniformly, so as to permit binding at the close of the term. Each plate should be drawn with a heavy border line inclosing a surface of 6½ by 9 inches. Only one side of the paper should be used. The sheet should not be rolled, but ought to be carried "flat" in a large book or a portfolio. "What is worth doing at all is worth doing well!"

5. Tools and Materials.

The tools required for the home work in projection drawing are:

(1.) A pencil of rich quality and hardness that it will take and hold a fine point.

(2.) An eraser.

(3.) A pair of solid white metal compasses with pencil and pen attachment.

(4.) A drawing pen.

(5.) A drawing board, 12 to 14 inches by 20 to 22 inches, (see illustration.)

(6.) A small T-square.
(7.) A right angled isosceles triangle having sides of about 6 inches.
(8.) Four small white metal thumb tacks.

Of materials, will be needed a bottle of jet black writing ink—not writing fluid, as this would corrode the drawing pen—and about three dozen sheets of best American drawing paper, size 8½ by 11 inches. This paper is usually sold in sheets measuring 17 by 22 inches and has to be folded and cut. If the finished work is to be bound, larger sheets should be provided and the additional margin should be arranged for on the left side of each plate. Good grades of French linen paper will also be serviceable.

The additional tools and materials needed in shading and draughting are described in the Introduction of Part II of this book.

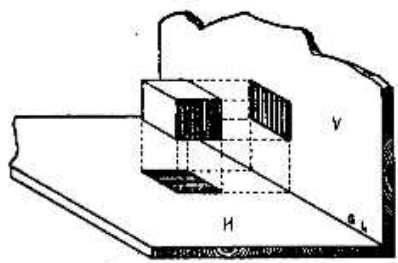
DIVISION B.

GENERAL PRINCIPLES.

6. The Planes of Projection.

The solid or object to be drawn is supposed to be placed above a horizontal and in front or a vertical plane. These planes are called the *planes of projection*.

FIG. 2.



Perpendiculars, named *projectors*, are then supposed to be dropped from every corner or conspicuous point of the solid to both planes of projection. By connecting the ends of those projectors upon the planes of projections by lines that represent the edges or outlines of the solid, two pictures are obtained.