CHAPTER XI.

THE PATTERN FOR A FITTING WHOSE ENDS ARE NOT IN PARALLEL PLANES.

The difference in appearance of diagrams used by different operators to secure the pattern for one and the same object is due absolutely to the position each in-

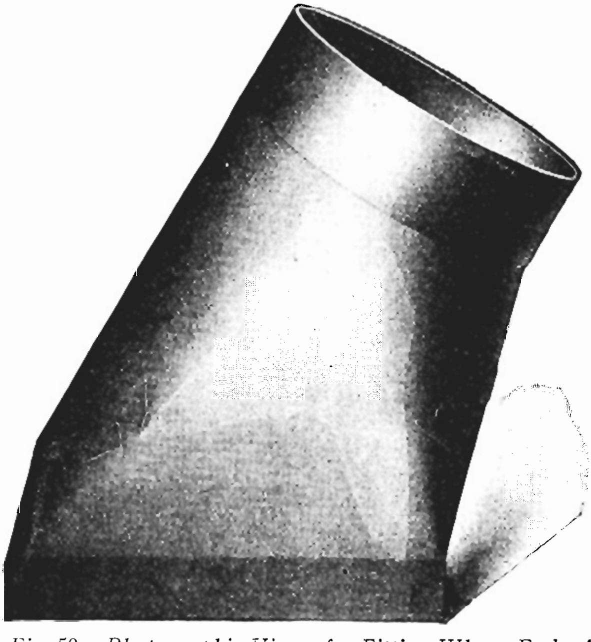

Fig. 50. Photographic View of a Fitting Whose Ends Are Not in Parallel Planes.

dividual assumes the object to occupy as regards the planes of projection. It is hardly to be expected that all will conceive it as being in the same position, therefore there is variation.

In looking over a considerable number of demonstrations, the writer finds but slight if any reference to the planes of projection. As has been stated, an object can only be located as regards the planes of projection; this being true, it would seem important that the pattern cutter should understand the use and value of said planes.

Upon referring to Fig. 51, the reader will note three pictorial representations of the irregular portion of one form as illustrated at Fig. 50, but occupying different positions as regards the surface upon which said form is represented as resting.

When the pattern is required for a fitting of this class, at least two views will be necessary to enable us to determine the true lengths of lines presumed to be upon its surface. To simplify the problem rests upon our ability to assume the object to be in such positions as to allow the simplest of these diagrams to represent it in plan and elevation.

Should we assume the object to occupy a position as shown at A, Fig. 51, the plan of the top will then be an ellipse. To draw this ellipse in its correct form and dimensions, we may assume a supplementary oblique plane, which is not a particularly difficult operation. However, since this involves the use of an additional plane, perhaps the problem will be simplified by revolving it about a horizontal axis until the plane of the round end becomes parallel to the horizontal plane of projection, as shown at either *B* or *C*, Fig. 51.

It may be here explained that the plan of the object when presumed to be in positions as shown at *B* or *C*, Fig. 51, will be similar, and that the only variation which will exist will be in the position of the elevation as regards the intersecting line.

In an endeavor to explain the principles involved in problems of this nature, a position of the object as shown at *C*, Fig. 51, is first assumed. As a second example, the same object will be assumed to occupy a position as shown at *A*, Fig. 51, and the plan and elevation drawn, with its pattern developed, thereby illustrating the use of the

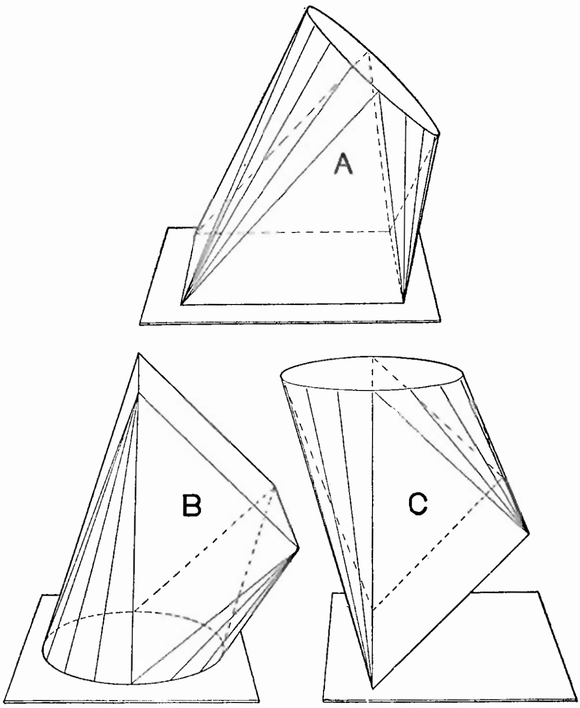

Fig. 51. *Scenographic Representation of One Irregular Form Occupying Different Positions.*

oblique supplementary plane. This will clearly show how two patterns which finish the same may be developed from two sets of diagrams presenting a wide variation in appearance. These diagrams are, in fact, the representations of the original object, which simply occupies different positions as regards the principal planes of projection.

To Develop the Pattern for an Object as Illustrated at Fig. 50, Presumed to Be in a Position as Shown at *C*, Fig. 51.

For convenience in verifying measurements, a scale has been included in Fig. 52. It has been presumed that the object has dimensions as follows: base, square with a length of side of 16 inches; top, round and 14 inches in diameter; vertical hight of the shortest side, 8¼ inches; overhang of the shortest side, 3 inches; inclination of the planes within which the top and base are presumed to be situated, 45 degrees.

The first step is to draw diagrams which will correctly represent the object in plan and elevation. In this instance the elevation is first drawn, since it may be completed without reference to other diagrams. It is in reality a section of the object.

To secure this elevation, we may draw at a suitable distance above the line *I L,* Fig. 52, and parallel thereto, an indefinite right line as *1 9 F.* From some point upon this line, as at *m,* draw a line at an angle of 45 degrees to *I L,* as *A B m,* then will the elevations of the top and base of the object lie in some portions of these lines.

Since the vertical hight is 8¼ inches upon the shortest side, we may employ the steel square to locate point *9* of the top by allowing one edge of the blade to lie parallel to the line *A B m,* and with the 8¼ inch mark of the tongue intersecting the line *1 9 m,* draw a line as *9 k.* As the top overhangs 3 inches upon this side, we lay off 3 inches from point *k* as shown at *B.* We are now enabled to locate point *A,* since we know it must be 16 inches from *B* along line *A B,* and as the top is 14 inches in diameter, we can also locate point *1* in like manner. Upon drawing lines *A 1* and *9 B,* the elevation is completed.

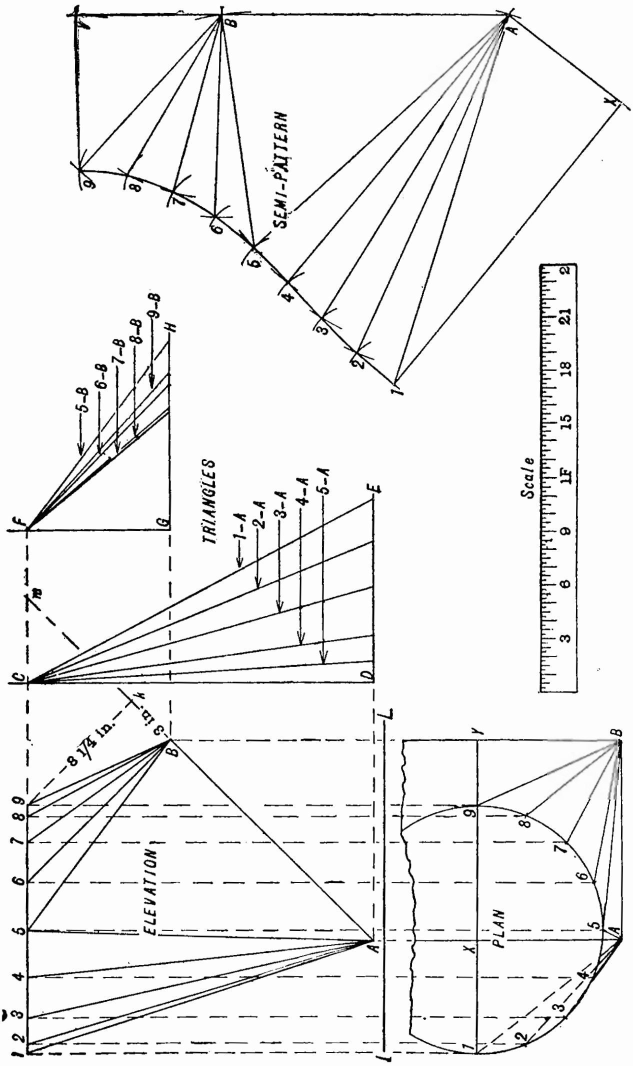

Fig. 52. *Plan, Elevation, Diagram of Triangles and Pattern of a Form as Shown at Fig.* 50.

The Plan.

The top is round and parallel to the horizontal plane, therefore a circle whose diameter is equal to the diameter of the top will represent that end in plan, its position being determined as clearly shown by construction lines. The object being composed of equal and opposite halves, we shall only concern ourselves with one half, or that portion of the plan shown below line *1 X 9 Y*.

Two sides of the base may be represented in plan by drawing lines from points *A* and *B* of the elevation perpendicular to the line *I L*. In other words, points *A* and *B* of the elevation are in reality the end elevations of lines which are perpendicular to the vertical plane of projection, and as the specification supplies their length, i.e., 16 inches, it only becomes a question of locating their extremities in plan. Since the line *1 X 9 Y* represents the center of the object, these lines may be made 8 inches in length from points *X* and *Y*, thereby locating points *A* and *B* upon the horizontal plane as shown in plan, where line *A B* is drawn to complete this view.

Locating Lines Which Divide the Surface of the Object Into Triangles.

With the plan and elevation completed, we are now in a position to locate lines which will divide the surface into triangles. This may be accomplished by dividing the semi-circle *1 5 9*, Fig. 52, into a number of equal parts, thereby locating a point as *5*, which divides the semicircle into two equal parts. From point *A* of the plan draw lines to each of the points of division in one part, as shown at *1 A*, *2 A*, *3 A*, *4 A*, and *5 A*. From point *B* draw lines to each of the points of division in the remaining part as *5 B, 6 B,* etc. This, as will be noted, divides the whole surface of one half of the object into triangles.

The elevations of points upon the round end may be secured, as is clearly shown by the vertical projectors, i.e., lines *1 1, 2 2, 3 3,* etc. All lines radiating from point *A* in plan connect points of the semi-circle from *1* to *5,* and all lines radiating from point *B* connect points from *5* to *9,* therefore to secure elevations of these lines is but a simple matter.

The True Lengths of Lines.

It may be here explained that these lines are the plans and elevations of lines presumed to be upon the surface of the object, and do not represent their true lengths except in two instances, i.e., *1 X* and *9 Y* of the plan. Here, as will be noted, *1 A* and *9 B* of the elevation supply those lengths, since lines represented in plan at *1 X* and *9 Y* are parallel to the vertical plane. All others are at an angle to the planes of projection, therefore the right angled triangle is employed to secure their true lengths; as for example, the distance from point *A* to each of the several points *1, 2, 3, 4* and *5* of the circle, also from *B* to *5, 6, 7, 8* and *9,* represent the length of base of a right angled triangle whose hypothenuse will furnish the true length of the line. Therefore we draw in any convenient position lines at right angles to each other, as *C D* and *D E,* also *F G* and *G H* of the diagram of triangles, Fig. 52. Set off from points *D* and *G* along lines *D E* and *G H,* distances found in plan, as is clearly shown.

Vertical Hight of Triangles.

The vertical hight of each triangle is governed by the difference in hight of the extremities of the line for which the triangle is constructed. Upon examination we find that in this example the difference in hight of the extremities of those lines can be represented in two distances. Since those lines radiating from point *A* of the elevation all terminate in a line which is parallel to *I L,* we use one vertical hight for all triangles employed to secure the true lengths of lines radiating from point *A* of the plan or elevation, as shown at *C* of the diagram of triangles. As will be noted, similar conditions prevail in the case of all lines radiating from point *B,* therefore the distance from *G* to *F* of the diagram of triangles is the vertical hight of all triangles employed to secure the true lengths of lines radiating from point *B.* Upon drawing lines as shown, i.e., from the points of division upon the base lines *D E* and *G H* to points *C* and *F,* the true lengths of these lines are determined.

The Pattern.

Having located a number of right lines which may be presumed to be upon the surface of the object, and having determined their true lengths, we are now in a position to place those lines upon the plane of development in their correct relative positions.

Beginning with line *1 X* of the plan, we find its true length is *1 A* of the elevation. Therefore we draw a line of this length upon the plane of development, as shown at *1 X* of the pattern. We note that line *1 A* of the plan radiates from point *1* and terminates at point *A* at the base of the object. The distance from *X* to *A* at the base of the object is equal to the distance between points *X* and *A* of the plan, therefore we may set our compasses to a span equal to the distance between *X* and *A* of the plan, and placing one point at *X* of the pattern, describe a small arc as at *A.*

Since the line *1 A* radiates from point *1,* and its true length is as shown in the diagram of triangles, we use that length as radius, and with point *1* of the pattern as center, to describe a second small arc at *A* of the pattern, thereby locating that point. We note that lines *A 1, A 2, A 3, A 4* and *A 5* all radiate from point *A* upon the surface of the object, therefore we use point *A* of the pattern as center, and the true lengths of these lines as radii in rotation to draw small arcs as shown at *2, 3, 4* and *5* of the pattern. The upper extremities of said lines must lie in these arcs, and at distances from each other equal to the distance between points of division of the circles shown in plan, since in this example the circle in plan is the true form and size of that end of the object.

Using these spaces, and beginning at point *1* of the pattern, the second small arcs are drawn, thereby locating points as shown at *2, 3, 4* and *5* of the pattern. Line *5 B* radiates from point *5* in plan and elevation, and as the true distance between points *A* and *B* is shown in the elevation, which is 16 inches, it is but a simple matter to locate point *B* of the pattern. The remaining work of completing the semi-pattern is but a repetition of the earlier operations, using the true length of each line in rotation, and should hardly need further explanation.

The following chapter is devoted to a second demonstration wherein identical results are obtained by the use of diagrams whose appearance may, at times, lead the novice to believe that entirely different methods were employed to secure the pattern for a form as shown at Fig. 50.

However, upon devoting some attention to each chapter, it will be noted that the different appearance is due to the changed position assumed for the object.