CHAPTER XII.

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

In Chapter XI, methods were discussed which may be employed to secure the pattern for an object as illustrated at Fig. 50, when it is presumed to occupy a position as shown at *C*, Fig. 51. In this Chapter methods are discussed which may be employed to secure identical results when the object is presumed to occupy a position as shown at *A*, Fig. 51.

It may be well to explain that the two demonstrations are for the purpose of illustrating the different positions the object may be assumed to occupy as regards the planes of projection, and yet secure the same results in the finished pattern. It should also be understood that these demonstrations are not for the purpose of recommending either. The pattern cutter must decide which he can best comprehend and employ. No doubt additional positions will be conceived by those who give the matter careful attention.

The elevation is first drawn as shown at *1 9 B A*, Fig. 53, and consists, as before, of a section of the object, although here the base line *A B* is parallel to *I L*.

The base line *A B* now becomes what may be looked upon as the edge elevation of a square surface whose length of side in this instance is 16 inches. The line *1 9* becomes the edge elevation of a circular surface whose diameter is 14 inches. Measurements as here given may be verified from the scale included in Fig. 53.

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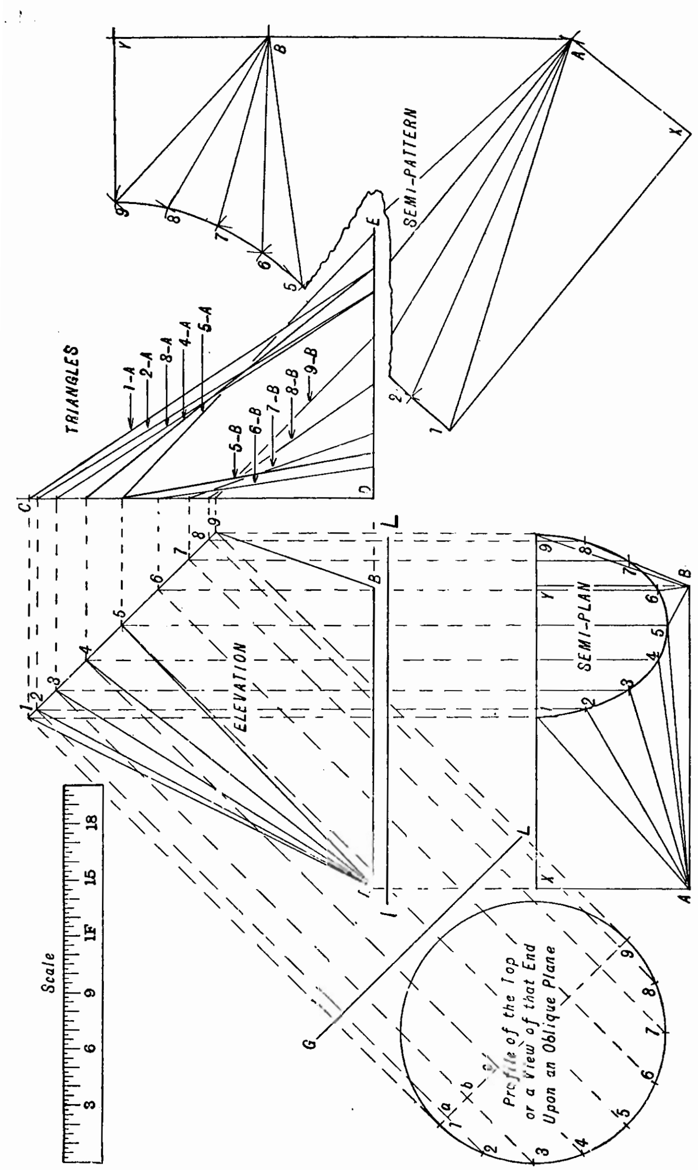

Fig. 53. *Diagrams Employed and the Pattern Secured in the Second Demonstration of Developing the Pattern for an Object as Shown at Fig.* 50.

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Upon referring to Fig. 52 in Chapter XI, it will be noted that these so-called surfaces occupy the same relative positions as there shown. Since the object consists of two equal but opposite halves, and either may be duplicated for the other, we shall only concern ourselves with one-half—i.e., that half nearest the eye.

Since the square end is parallel to the horizontal plane, the semi-plan of the base becomes a rectangle whose dimensions are 8 x 16 inches, as shown in plan at *X A B Y*. The semi-plan of the top or round end becomes a semi-ellipse, since the circular surface referred to above is oblique to the horizontal plane. To draw this ellipse, we assume an oblique supplementary plane parallel to the surface to be represented.

Thus in any convenient position, draw a line parallel to *1 9* of the elevation as *G L,* Fig. 53. This line becomes the intersecting line between a supplementary plane and the vertical plane of projection. Since the supplementary plane whose intersecting line is *G L* is parallel to the top or round end of the object, we may draw upon it, in a position as indicated by the oblique projectors *1 1, 2 2, 3 3,* etc., a circle whose diameter is equal to the round end, which in this instance is 14 inches.

Divide this circle into two equal parts by a line parallel to *G L.* Divide one half of this circle into an equal number of equal parts as shown at *1, 2, 3, 4,* etc., of the circle upon the oblique plane. Project these points of division to line *1 9* of the elevation, thereby locating points whose positions have previously been established upon the oblique plane. Points thus secured in elevation, with the exceptions of *1* and *9,* may be looked upon as the end elevations of lines which connect portions of the circle nearest the eye to points of the right line whose projection

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upon the oblique plane is *1 9*. Since these lines are represented in elevation by points, they must be perpendicular to the vertical plane, therefore parallel to the horizontal plane of projection. The plans of said lines will be found in lines let fall from points *1, 2, 3, 4,* etc., of the elevation, perpendicular to *I L*.

IMPORTANCE OF A KNOWLEDGE OF ORTHOGRAPHIC PROJECTION.

The question now presents itself, "What is the distance from that point to the point beyond?" This is a question which frequently arises in pattern development, and a correct answer is the solution of many problems. However an ability to answer all such questions can only be acquired by a knowledge of Orthographic Projection, the fundamental principles of which were discussed in Chapters IX and X.

Since we have confined ourselves to developing the pattern for one half of the object, we may look upon the line *X Y 9* of the semi-plan, Fig. 53, as a line which divides that diagram into two equal parts, and is, of course, farthest from the eye. Therefore we are chiefly concerned in determining the lengths of lines which connect these points of the round end nearest the eye, and terminate at *X Y 9*.

As previously stated, the plans of lines whose end elevations are in points *1, 2, 3, 4,* etc., of the elevation, are found in lines drawn from these points perpendicular to line *I L*, as *2 2*, *3 3*, *4 4*, etc. The intersections of said lines with line *X Y 9* must be the extremities of those lines which are farthest from the eye. Upon determining their lengths, their extremities nearest the eye may be located.

The line *1 9* of the profile divides that circle into equal parts, therefore the plan of point *1* is a point upon line

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X Y 9 as shown at *1* of the plan. The length of line *2*, whose end view is at *2* of the elevation, is shown at *2 a* of the profile, and this distance set off from line *X Y 9* gives us point *2* of the plan. The length of line *3* in plan is *3 b* of the profile, and *4* is *4 c* of the profile. In like manner the lengths of additional lines shown are set off from the line *X Y 9* of the plan to secure points through which the curve is traced. This is a plan of the top of the object.

Points thus located are used as points to which lines are drawn from the vertices of angles at *A* and *B*, to secure the plans of lines presumed to be upon the surface of the object, thus dividing said surface into triangles. The elevations of said lines are now drawn in the same general manner as was explained in the first demonstration, and here shown in the elevation, Fig. 53.

In this example as with the first, the true lengths of lines whose plans are *X 1* and *Y 9* are found in elevation in lines *1 A* and *9 B*. The true length of each remaining oblique line will be found in the hypothenuse of a right angled triangle whose base is equal in length to the plan of the line, and whose perpendicular is equal in length to the difference in hight of the extremities of that line from *I L*, as clearly shown in the diagram of triangles.

Upon examination of the diagram of triangles, Fig. 53, it will be noted that the lines *C D* and *D E* have been drawn at right angles to each other, and form two sides of the right angled triangle from which we secure the true lengths of lines. The hypothenuse of each is located by first setting off from *D* along the line *D E*, the length of the line in plan, and locating points along line *C D* equal in distance from *D* to the vertical hight of the line shown in elevation.

As for example, the length of line *A 1* in plan is set

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off as shown from *D* on the line *D E*. The vertical hight of line *A 1* shown in elevation is at *C*, and a line is drawn to said points as shown at *1 A* of the diagram of triangles. This line, as will be noted, is the true length of line *A 1* upon the surface of the object. It is only to be remembered that the true lengths of all remaining lines are secured in a similar manner, as clearly shown by construction lines in the diagram of triangles.

In transferring the lengths of lines, we may use the same general methods as explained in previous demonstrations. The first line to be placed upon the plane of development is *1 X*, whose true length is shown at *A 1* of the elevation. The lines *X A*, *A B*, and *B Y* are in their true lengths in plan, and the true length of line *1 A* is found in the diagram of triangles as above described. In fact the length of each line whose true length is not shown in plan or elevation is found in the diagram of triangles.

If it is remembered that the true distance between indicated points of the top is found between similar points upon the circle shown upon the supplementary plane, and as the diagrams have been drawn to the scale included, one should have little difficulty in securing a clear understanding of this, a second demonstration of developing the pattern for an object whose specifications were given in Chapter XI.

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