CHAPTER V.

A Twisted Transitional Fitting.

Attention is here directed to a form as illustrated at Fig. 23, which is an excellent example for practise, since it may be represented by a comparatively few lines.

It may be here remarked that it requires far more study to conceive the forms whose patterns may be de-

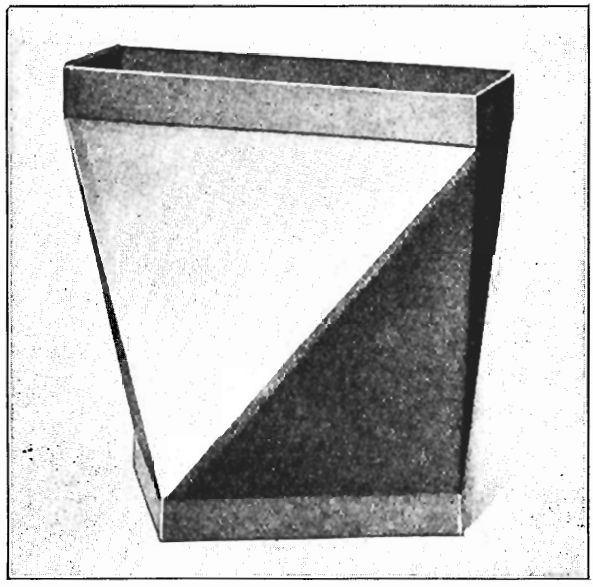


Fig. 23. The View of a Fitting whose Form is Somewhat Unusual.

veloped by triangulation, than to secure an understanding of the few principles involved after the form has been conceived. Therefore the best advice to be given to those who desire to secure a clear understanding of this branch of pattern cutting is to give the unusual form

the same careful attention that they may devote to the more common ones. The fitting, as illustrated at Fig. 23, is in reality the connection between two rectangular pipes whose forms of cross-section are not identical yet of approximately the same area. It will be noted that the sides of said pipes are not parallel, i. e., the fitting performs a twist.

Fig. 24 is a perspective view of a fitting of this description and its plan. This has been introduced for the pur-

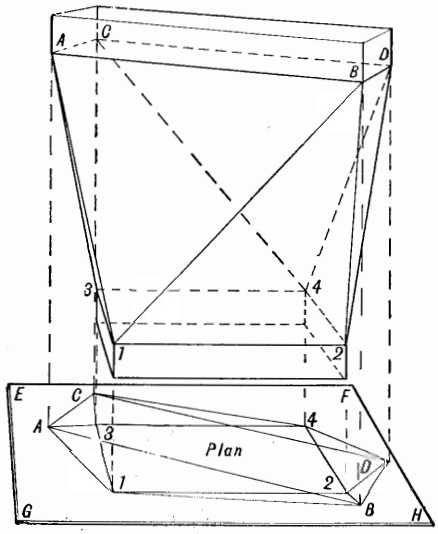


Fig. 24. The Fitting and Its Plan, Shown in Perspective.

pose of enabling the student to secure an understanding of the relation the plan bears to the object itself, since it may be somewhat difficult to form a conception of the object from its plan, Fig. 25.

Principles Which Govern the Work of Drawing a Plan.

It should be remembered that Fig. 25 is a geometrical representation, and the one which must be employed to

secure the pattern, while Fig. 24 is a perspective view of the object which is presumed to be suspended directly above the horizontal surface *E F G H*. As will be noted, vertical lines have been dropped from points of the object to intersect this surface, thereby illustrating the principles which govern the work of drawing a plan as shown at Fig. 25.

From the above, and by the aid of Fig. 24, the student will readily understand that the rectangles, *1 2 3 4* and

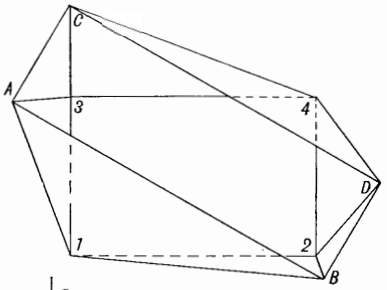
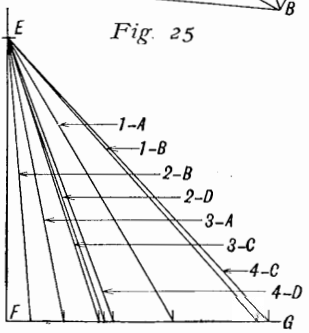


Fig. 25



Figs. 25 and 26. 25, A Plan of Fitting; 26, Diagram of Triangles.

A B C D, are the cross-sections of pipes to be connected. These have been placed in the same relative positions that said pipes or collars would occupy if the object was viewed from above, and with the point of sight moving in such a manner as to bring every point viewed in a line perpendicular to the horizontal surface upon which the plan is supposed to be drawn.

It may be remarked that only the irregular portion is being considered, since the collars at each end are here looked upon as separate and independent parts, whose patterns do not involve triangulation.

The Surface of the Fitting.

We note that the surface of the fitting is made up of eight triangles. These triangles, when combined and placed in their correct relative positions upon a flat surface, will constitute the pattern, therefore their true form and dimensions must be determined. This, as will be noted, makes the plan an important factor in the solution of the problem.

The plan of each triangle of which the surface of the object is composed, is secured by drawing lines from each angle of the rectangle *A B C D*, to two adjacent angles of the rectangle *1 2 3 4*, or conversely, from each angle of the rectangle *1 2 3 4* to two adjacent angles of the rectangle *A B C D*. Thus a plan of the fitting is completed, as shown at Fig. 25.

It will be noted that points *1 2 3 4* are at the base, and points *A B C D* are at the top of the object, therefore lines as *A 1*, *A 3*, *B 2*, etc., are the plans of lines which connect points of the base to points of the top, and are oblique to the planes within which the top and base are situated. However, since we know the vertical hight of the object, we know the vertical distance between the extremities of those lines. This distance is the length of one side of all triangles which it becomes necessary to construct to secure the true length of lines connecting points of the base with points of the top, which are the boundaries of triangles upon the surface of the fitting.

Size and Form of Triangles.

If the true form, size, and relative positions of said triangles can be determined, they may be placed upon a flat surface in those sizes and positions to complete a pattern. The dimensions of said triangles will be determined in the same manner as has been previously explained, i. e., the lengths of those lines which form sides of the above spoken of triangles, and connecting points of the base to points of the top, are found by the use of the right angled triangle, as shown at Fig. 26. Here the lines *E F* and *F G* are drawn at right angles to each other, intersecting at the point *F*. The vertical hight

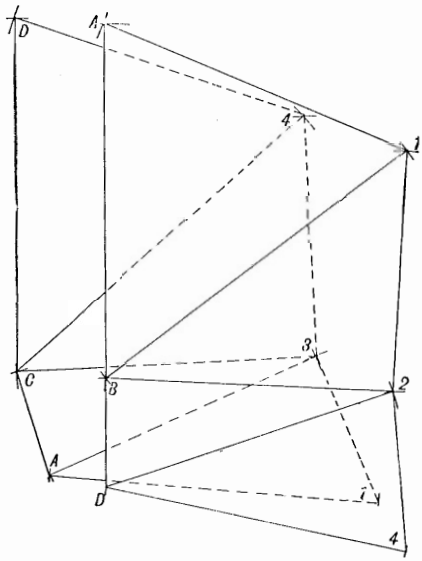


Fig. 27. Pattern.

of the object is set off from point *F* upon the line *F E*, as at *E*.

The lengths of lines shown in plan as *1 A, 3 A, 3 C, 4 D*, etc., are set off upon line *F G* from point *F*, as shown. Lines are drawn from said points to point *E* to

supply the true lengths of lines shown in plan, or those lines which connect points of the base to points of the top. The lengths of those sides of the triangles which form the base or top of the fitting, are found in their true lengths in plan, since the true forms of pipes to be connected are there shown.

The Pattern.

With these lengths determined, the pattern is secured as shown at Fig. 27, where, to economize space, it is shown in two parts, a portion of one part being represented by dotted lines. The student who has given attention to the above will note that points *A B C* and *D* are at angles of the top, and shown in each view, i. e., if the pattern was wrapped about the object, these points would occupy positions as represented in the several views.

On Dividing Diagrams which Represent the Ends of the Object.

When each end of the object for which a pattern is required can be represented by rectilinear diagrams, there is no necessity of dividing said diagrams into parts, since the vertices of their angles are used as points of division. However, when one or both of its ends must be represented by a curvilinear diagram, said diagram must be divided into parts.

Here the student should recognize the fact that these points of division are in reality, points upon the end of the object, to which lines are presumed to be drawn from points upon the opposite end. Since these lines are considered as straight lines, they should be so located as to allow them to be straight when placed upon the object. If this is not accomplished some error must exist in the

pattern, and if there is considerable variation in these lines, i. e., if they are presumed to be straight and are so located as to cause them to be considerably curved, there must be some distortion in the fitting when made from the pattern. It is quite possible to so locate these

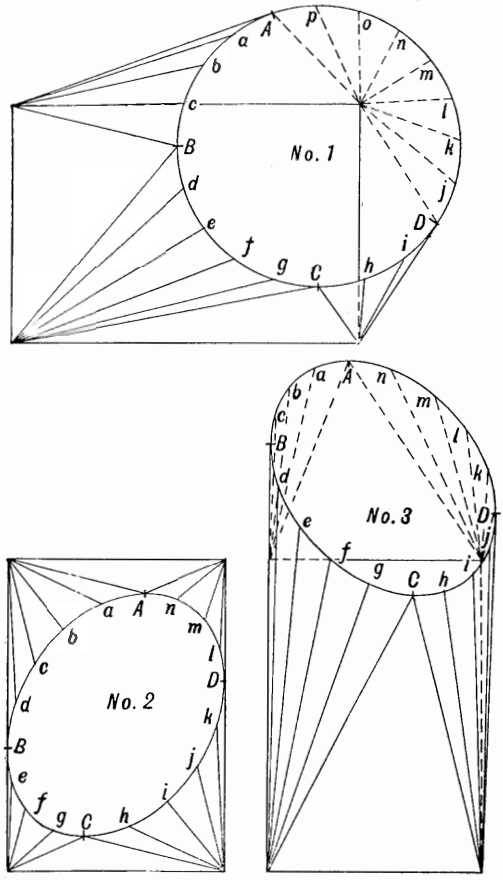


Fig. 28. Plans of Fittings.

lines as to preclude the pattern being formed into its required shape without a stretching or drawing of the material. Each individual case requires some attention to this, as it is a difficult matter to apply a fixed rule to all.

Fig. 28 contains diagrams which may be looked upon as plans of fittings. No. 1 is a fitting making a transition from rectangular to round, the round end being so placed as to require the lengths to be secured of practically all lines presumed to be upon its surface and shown in plan, i. e., the plan cannot be divided into equal parts. No. 2 is a plan of a fitting from rectangular to elliptical; the major axis of the ellipse has here been placed directly above the diagonal of the rectangle, therefore this diagram could be divided into two equal parts. However, as here shown, the better course would be to determine the true lengths of all lines. No. 3 is the plan of a fitting whose form and size of its ends are the same as those shown at No. 2, but not in the same relative positions. Here, as with No. 2, the better course to pursue when developing the pattern, is to determine the true lengths of all lines shown, or the true form and size of all triangles of which its surface is composed.

To locate triangles presumed to be upon the surface of fittings whose plans are at Nos. 1, 2 and 3, the curvilinear figures are divided into parts, and said points of division should be so located as to allow right lines to be drawn upon the object from the corners of one end to these points at the other. This is accomplished by dividing the diagrams as shown. The points *A B C D* in each are the important ones, and having located these in satisfactory positions, the intermediate points as *a b c d*, etc., may be located at pleasure, i. e., each part of the curve contained between points *A B C* and *D* may be divided into any convenient number.

After having located lines whose approximate positions are shown at Fig. 28, the process of securing the pattern is substantially the same as has been explained in Chapter IV.