CHAPTER XXIII.

A Simple Two Pronged Fitting.

Fig. 97 illustrates a two pronged fitting of the most simple order. No doubt a form as here shown will receive some criticism, which may in some instances be justifiable. However, since it is a problem containing

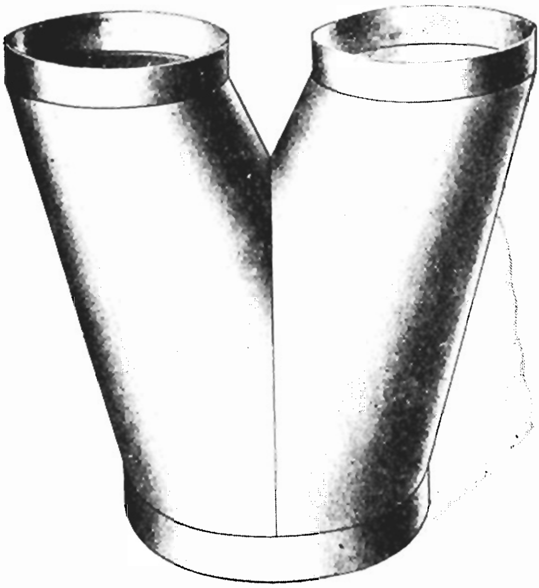

Fig. 97. Photographic View of the Fitting.

principles which may be employed in securing the patterns for the more popular forms of branched fittings, it is here introduced in an endeavor to convey to the student that understanding necessary to enable him to develop the patterns for the more complicated forms.

As illustrated at Fig. 97, the axes of all collars are in one plane, or as we hear it in the shop, it is "on center." A change of the plan places all collars tangent to one plane, or what is commonly known as "flat on one side."

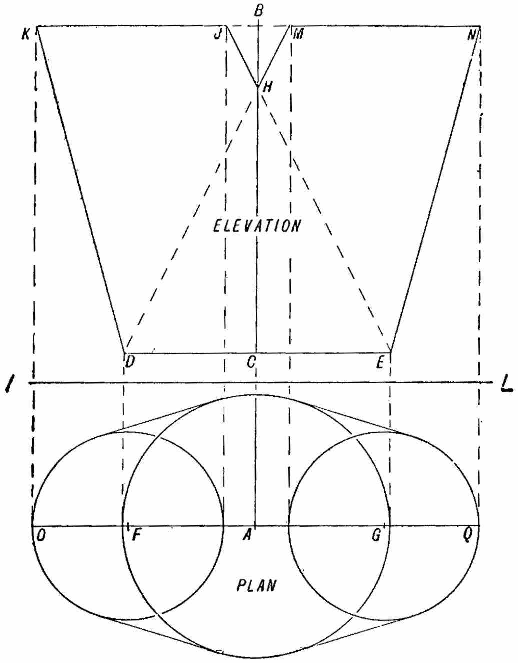

Fig. 98. The Plan and Elevation of a Fitting as Shown at Fig. 97.

For the moment we shall presume that the pattern is required for a fitting as illustrated at Fig. 97, and as the work progresses, endeavor to explain the methods which may be pursued to secure the pattern when it is required that the fitting shall be "flat on one side."

Diagrams to Represent the Object.

Simple diagrams will in this instance represent the object in plan and elevation, as shown at Fig. 98. To draw these diagrams, we may first draw a circle whose diameter is that of the main stem, as shown at *F G*. From the center of said circle as at *A*, draw an indefinite vertical line as *A B*. Locate a point along this line as *C*, which shall be in the base line of the fitting in elevation. Draw a horizontal line through point *C* as *D C E*, and project points *F* and *G* of the large circle in plan to the line *D C E*, as at points *D* and *E*. Set off from *C* along the line *C B*, a distance approximately equal to the length of line *F G* as shown at *H*. Draw lines as *E H J* and *D H M*. At a reasonable distance above point *H* on lines *D H* and *E H*, locate points as *J* and *M*. Through points *J* and *M* draw horizontal lines as shown, and set off distances equal to the diameters of the small collars as shown at *K* and *N*. Draw lines as *K D* and *N E* to complete the diagram here looked upon as an elevation. Perpendicular lines dropped from points *K J M* and *N* to intersect the line *O Q* locate points through which the circles are drawn to represent the small collars in plan.

The Length of the Fitting at the Intersection of Its Prongs.

The distance set off along line *C B*, as *C H* is by no means arbitrary, since as will be noted, it represents the length of the fitting at the intersection of its prongs. On the other hand, it has been found that a fitting of this class assumes a somewhat more symmetrical form when this length is made approximately equal to the diameter of the main stem. Make it more or less if conditions demand it, although a great departure from this rule will be found to distort the fitting.

The Form of the Object at the Intersection of Its Prongs.

From an analysis of the fitting represented in plan and elevation at Fig. 98, we conclude that a portion of the elevation as shown at *K J D E* may be looked upon as the elevation of the frustum of a scalene cone, and that the two circles directly beneath it are the plans of the upper and lower extremities. If the conical form be cut away to the right of line *C H,* the remaining portion to the left of that line will then supply one prong of the fitting, and since the conical form is cut away through the center of its base, it may be duplicated for the opposite prong. As will be noted, this mode of procedure allows the conical form to establish the form of the fitting at the intersection of its prongs. This, the author believes to be the most satisfactory course to pursue, since distortion at this point will thus be eliminated, or at least reduced.

It is not to be understood that a form cannot be pre-established for the object at the intersection of its branches and results secured, providing one is competent to establish a suitable form. Where the axes of all collars are in one plane as here represented, this is not a particularly difficult task. On the other hand, if the collars are required to be tangent to one plane, this work becomes more complex.

Diagrams from Which a Pattern May Be Secured.

When the pattern is required for a branch of given dimensions, we may secure the patterns for the frustum of a scalene cone, with diameters of its ends equal to those of the required fitting, and cut away a portion as above described. Upon examination of Fig. 98 we note that the line *O Q* divides the plan into equal parts, and that the line *C A* produced, also divides that diagram into equal parts, therefore we curtail our diagrams as shown at Fig 99. Here as will be noted, there is shown the semi-plan and elevation of the frustum of a scalene cone. To develop the pattern for this, and locate lines as shown in plan and elevation is but a simple operation, and has been fully explained in foregoing chapters. Therefore to avoid undue repetition, it is here presumed that the student is in a position to develop the pattern for the frustum of a scalene cone from diagrams as shown at Fig. 99. The complete semi-pattern is here shown for the conical form, together with full lines presumed to be upon its surface, and shown in plan and elevation as *1 1, 2 2, 3 3,* etc.

It should be remembered that this pattern was not developed without the use of the indirect or broken lines, although here omitted in an endeavor to avoid all unnecessary confusion. If the student fails to secure an understanding of the methods pursued to secure the pattern for the frustum of the oblique or scalene cone as here shown, some attention given to chapter 6 should clear this portion of the problem.

To Locate the Line upon the Pattern Which is at the Junction of the Prongs.

We may look upon the line *A 5* of the elevation, Fig. 99, as the edge view of a plane which intersects or cuts away a portion of the conical form, and the line *5 5* as its plan. Said plane thus intersects the conical element *5 5* at the base of the object, and cuts elements *4 4, 3 3, 2 2,* and *1 1,* as shown in points *A B C* and *D*. We may then construct a diagram of triangles in a position as

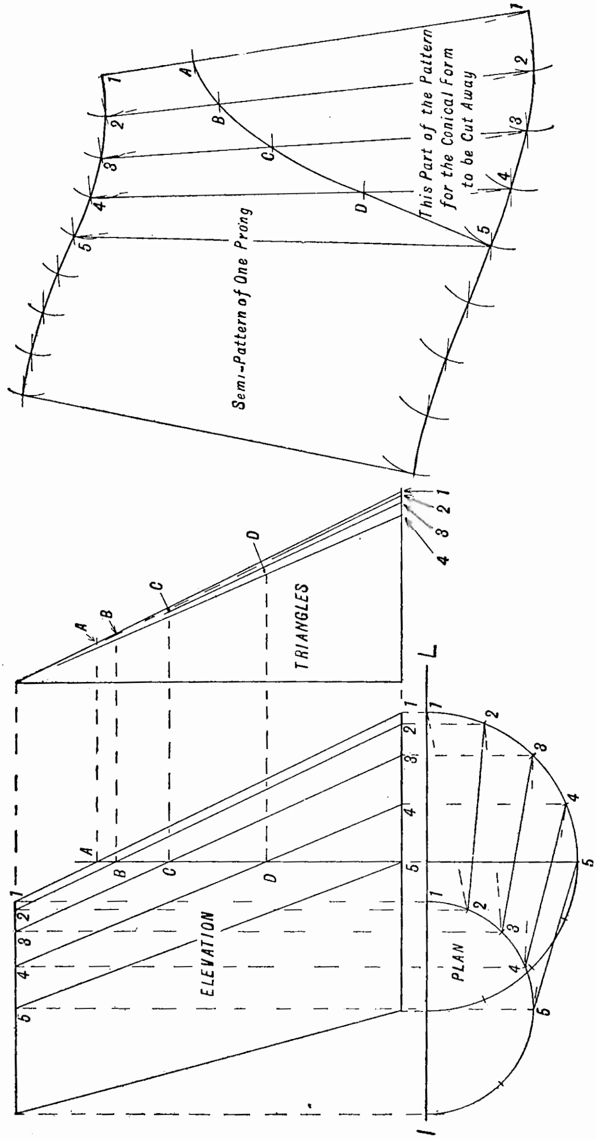

Fig. 99. Semi-Plan, Elevation, and Semi-Pattern.

shown, which will furnish the true lengths of the conical elements *1 1, 2 2, 3 3* and *4 4,* and draw horizontal lines from points *A B C* and *D* of the elevation, to intersect similar elements in the diagram of triangles, as shown. This will, as may be noted, supply the exact positions of points along said elements at which the cutting planes intersect them. To locate said points upon the pattern,

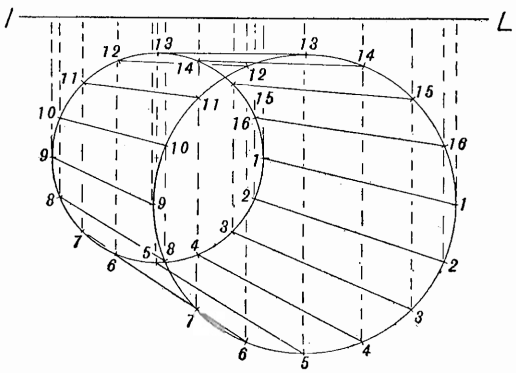

Fig. 100. *Showing a Plan to Be Substituted When It is Required That the Fitting Be "Flat on One Side."*

we transfer distances as found in the diagram of triangles to similarly designated lines upon the pattern, thereby locating points as *A B C* and *D* of the semi-pattern.

A line traced through said points is the line upon which the conical form should be cut away, and which is at the junction of the prongs when the pattern is duplicated, and bent into its required form.

It should be remembered that the pattern shown at Fig. 99 is simply the pattern for one-half of one prong, and must be duplicated for the other half. In other words, the body of the fitting will require four pieces of the pattern as here shown.

To Secure the Pattern for the Fitting When It Is Required to be "Flat on One Side."

When it is required that the fitting shall be flat on one side, the plan may be drawn to conform to this demand by drawing the circles which represent the ends of the object, tangent to one line. Fig. 100 is a diagram which fulfils this requirement in so far as one prong is concerned. If said diagram be substituted for the plan shown in Fig. 99, we may proceed in the same manner as has been explained, although it must be remembered that since this diagram cannot be divided into equal parts by lines which are parallel or perpendicular to *I L,* the true lengths of all lines must be secured, i. e., those lines presumed to be upon the surface of the object, and connecting points at the base and top.

Points of division have been so taken in Fig. 100 that the elevations of said lines remain the same. As for example, the line *2 2* in elevation, Fig. 99 is the elevation of a line, the horizontal projection of which is *2 2* of the plan, and so on. When Fig. 100 is substituted for the plan shown in Fig. 99, we note that a portion of the lines in elevation, then become elevations of not only those lines nearest the eye, but of similar lines which are farthest from the eye. As for example, the line *2 2* in elevation is not only the elevation of a line the plan of which is *2 2,* but also represents a line whose plan is *15 15,* Fig. 100, and so on. However, since lines shown in plan, Fig. 100, are of unequal lengths, the true lengths of all must be determined separately, thereby creating additional work and lines in the diagram of triangles. In addition to this, the whole pattern for one prong must be developed, and will be found to assume a somewhat different appearance from that shown in Fig. 98.

After the pattern has been duplicated to form the opposite prong, care must be used in forming, i.e., those parts must be formed in opposite directions to allow said parts to occupy correct positions when the fitting is assembled.