CHAPTER VIII.

A Two Pronged Fitting Which Can Be Made in One Piece.

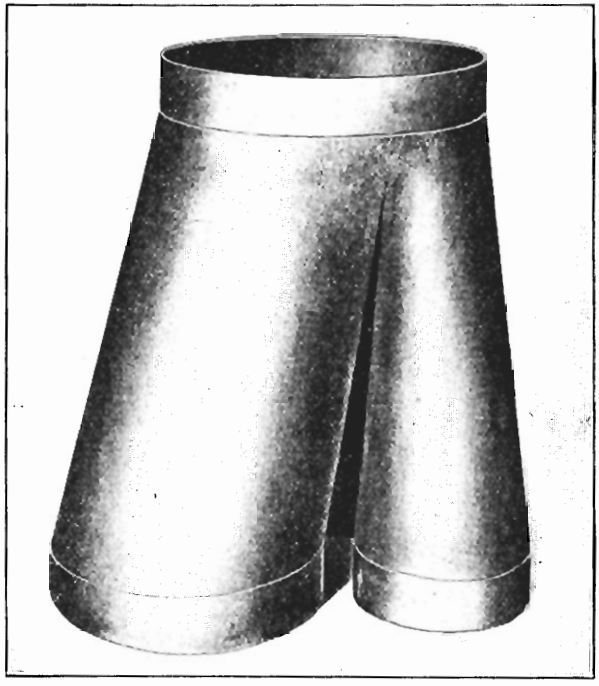

Fig. 40. Pictorial View of a Two-pronged Fork.

A two pronged fitting as illustrated at Fig. 40, made from one piece, supplies an interesting and instructive example in pattern development.

The student's attention is directed to this as one worthy of careful attention, since a clear understanding of the positions of triangles which must be presumed to com-

pose its surface when the pattern is developed, will without question, advance one's understanding of other forms which will be encountered.

Many modifications may be made of it without materially changing the methods of securing its pattern, providing its ends remain parallel.

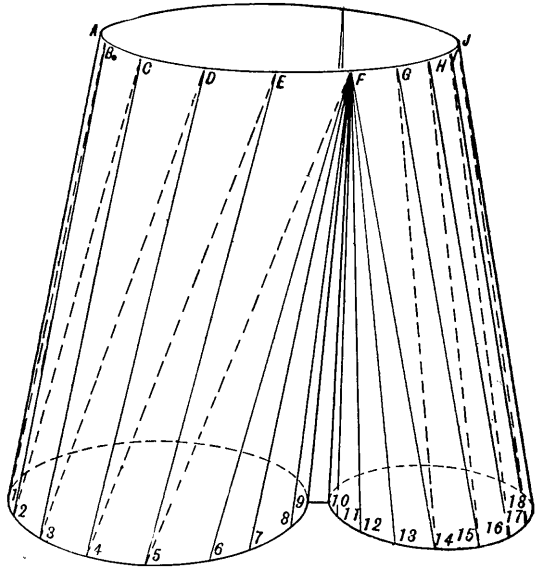

Fig. 41. *Pictorial View of the Fitting, Showing Triangles Presumed to be Upon its Surface.*

There is, perhaps, no ironclad rule which must be followed in locating the above spoken of triangles, although they should be so located as to allow all lines which are the boundaries of said triangles to be as nearly straight lines as possible when placed upon the surface of the object.

Some judgment will also be necessary to determine what amount of the collar here shown as the top shall be devoted to each prong of the fitting. Fig. 41 shows

the body of the object in a pictorial way, and the triangles the author has presumed to be upon its surface.

Upon giving Fig. 41 attention, the student will note that the body of the object is composed of parts of oblique cones. As for example, where a number of full lines radiate from a single point, that portion of its surface included within those lines is a portion of an oblique cone, and that portion of its surface where broken lines are shown which alternate the full lines, is a portion of the frustum of an oblique cone.

Therefore, as above stated, the whole surface is composed of portions of oblique cones whose bases and vertical hights are of varying dimensions.

On the Characters Used in Pattern Demonstrations.

The multiplication of characters to designate similar points in different diagrams employed to solve a problem in pattern development, is always a source of annoyance. Therefore in an endeavor to reach the reader's mind directly through the medium of the eye, the author has made it an almost universal rule to designate similar points by the same character in each diagram. As, for example, points *B* and *2*, Fig. 41, are the upper and lower extremities of line *B 2*, and this line is shown in plan, Fig. 42, between points *B* and *2*. In the diagram of triangles line *B 2* is shown in its true length, and designated as *B 2*.

The pattern shows line *B 2* in its correct relative position, with one extremity at the top, while the other is at the bottom, and if the pattern be wrapped about the object as shown at Fig. 41 in a manner as to allow line *B 2* to coincide with line *B 2* there shown, all other designated points or lines must also coincide.

On the Plan.

Since the plan of an object as here illustrated may be divided into two equal parts, one part as shown at Fig. 42 will fulfil every requirement in developing its pattern. On the other hand, it may in some instances be advisable to draw a complete plan, for the purpose of securing a clearer understanding of the object and its surface. This must be done if it is required to secure the pattern for an object whose surface cannot be divided into equal parts.

It may be here explained that to secure the pattern for an object whose surface cannot be divided into equal parts, the whole surface must be represented. This does not imply that there are any additional principles to be applied, but simply that there is an increased number of lines whose lengths and positions must be determined.

If the pattern cutter has any difficulty in securing the pattern for an object whose surface cannot be divided into equal parts, it is very likely due to his inability to form a clear conception of the object. One who finds himself thus handicapped should devote some time to the study of the relation the plan bears to the object, and remember, as stated above, that there are no additional principles involved, simply an increased number of lines to be dealt with.

The First Step to Secure the Pattern.

The first step to secure the pattern for an object as illustrated at Fig. 40 is to draw a plan, or a portion of it. This, as has been previously stated, should be as simple as the nature of the object will permit. Since the fitting is designed to make connection between three round pipes whose axes are parallel, we may presume to view these

pipes from above as in orthographic projection, and draw the circles in plan which shall represent the cross-sections of said pipes as shown at Fig. 42, assuming the diameters of these pipes to be as shown. Here the semi-circle *A E J* is a plan of one-half of the top, and the small semi-circles constitute a plan of one-half of the base.

The next step is to determine what amount of the larger semi-circle shall be devoted to each small semi-circle, or, in other words, what part of the top shall be devoted to each of the small collars. In this instance, five-eighths of the arc *A E J* has been devoted to the large collar at the base, and three-eighths to the small one, i.e., the point *F* is connected by lines to each small semi-circle.

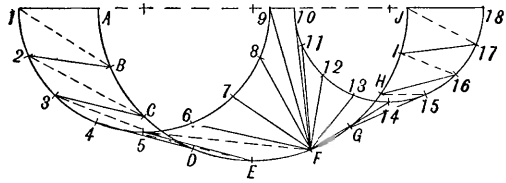

Fig. 42. Semi-plan.

We may now divide each of the semi-circles into an equal number of equal parts as shown from *1* to *9*, and from *10* to *18*. If each semi-circle is divided into eight parts, as here shown, the point *F* is located without further trouble, thereby locating six points as *A, B, C, D, E* and *F*, which may be connected to similar points of the base as shown by lines *1A, 2B, 3C, 4D, 5E,* and *6F*. These lines may now be looked upon as being elements of the surface of the frustum of an oblique cone, and the pattern for that portion may be secured in the same manner as explained for that form in Chapter VI. We may now connect points *7, 8* and *9* to *F*, and look upon that portion of the object as a portion of an oblique cone. The

surface represented in plan within the triangle *9 10 F* is a flat surface.

That portion of the large semi-circle between *F* and *J* may now be divided into one-half the number of equal parts that the semi-circle *10, 14, 18* has been divided into (in this case four), and lines drawn as *F 14, G 15, H 16, I 17,* and *J 18*. The remaining points as *10, 11, 12* and *13* may be connected to *F*, thereby securing the plans of lines which are presumed to be upon the surface of one-half the object, and shown in a pictorial way at Fig. 41.

TRIANGLES.

The lengths of the above spoken of lines are now employed as the bases of triangles whose perpendiculars are

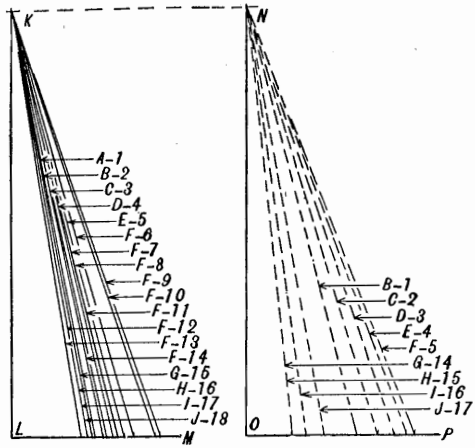

Fig. 43. Diagram of Triangles.

equal to the vertical hight of the fitting as shown at Fig. 43, where *K L* is presumed to be equal to that hight. The length of lines in plan are set off from *L* along line *L M*, and these points connected to *K*, thereby securing the true lengths of all full lines shown in plan.

Since portions of the fitting are parts of the frustums

of oblique cones, some additional lines must be assumed to completely divide the surface into triangles. These lines are shown in plan, and in Fig. 43 as broken lines, and their lengths are secured in the same general manner as has been explained and shown at Fig. 43.

The Pattern.

Having before us the true lengths of all lines necessary to develop the pattern, we may proceed by drawing in

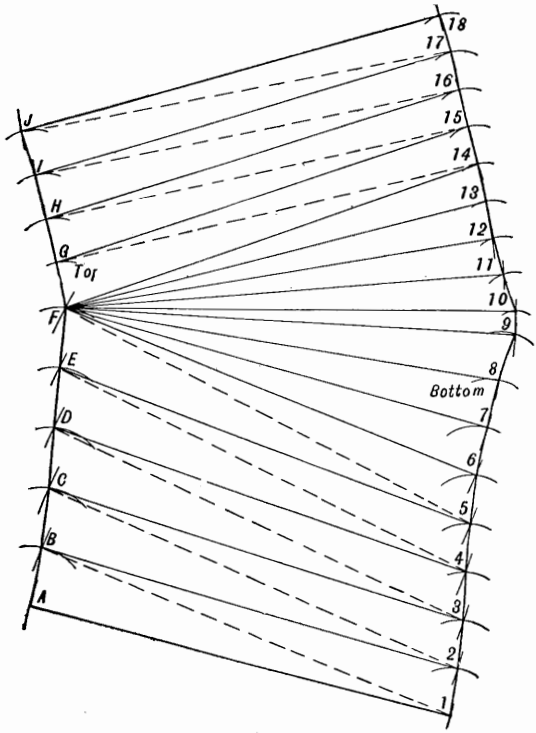

Fig. 44. The Semi-pattern.

any convenient position upon the plane of development, a line whose length is equal to the length of line *A 1*, Fig. 43, as shown at *A 1*, Fig. 44. The distance from *A* to *B* is found in plan, and the true distance from *1* to

B is the length of line *B 1,* Fig. 43, thus enabling us to locate point *B* in its correct relative position upon the plane of development, as shown at Fig. 44.

Point *2* may now be located, since the plan supplies the true distance from *1* to *2,* and the diagram of triangles supplies in line *B 2,* the true distance from *B* to *2.* Points *C, D, E* and *F* at the top, and *3, 4, 5* and *6* at the base, may all be located in the same general manner.

Presuming that line *F 6* has now been located upon the plane of development, a glance at the diagrams will show that lines *F 6* to *F 14* inclusive, all radiate from point *F.*

The diagram of triangles supplies the true lengths of these lines, and the plan supplies the true distances said lines are from each other at their extremities, therefore little trouble should be experienced in locating points *6* to *14* upon the bottom of the pattern as shown. Since the remainder of the required semi-pattern, or points *G, H, I* and *J,* also *15, 16, 17* and *18,* are located in the same general manner as were similar points shown at the left side of Fig. 41, the reader should have little difficulty in completing the work as shown.

It may be remarked that slightly more accuracy may be obtained by first locating upon the plane of development, that surface within the triangle *F 10 9,* and then adding the triangles at each side of this. This, as will be noted, eliminates some opportunity for error which may have been committed in the early part of developing the pattern. However, this is a matter for the operator to decide, since if care be used the difference will be slight.

When it is Required to Fit the Ends of the Object to Round Collars Whose Circumferences Have Been Established.

There is a constant ratio between the circumference of a circle, and its diameter, the value of this ratio to six figures is 3.14159; however, for all ordinary purposes, 3.14 is sufficiently accurate; therefore we may determine the diameter of any circle whose circumference is given, or, we may determine the circumference of any circle whose diameter is given, by either multiplying or dividing as the case may require. As for example, diameter multiplied by 3.14 equals the circumference, or the circumference divided by 3.14 equals the diameter.

When the circle is drawn and divided into a number of equal parts, for example, twenty-four, each part represents one twenty-fourth of its circumference, and as ordinarily measured each space is a straight line, or the chord of an arc. Since the chord is always less than the arc it subtends, the twenty-four spaces along a right line will very likely be something less than the figured circumference, thereby introducing some error. Therefore, if the circles be drawn in plan as accurately as may be, and their known circumferences set off upon right lines, these lines may be divided into the same number of equal parts as the circles have been divided into, and these spaces upon right lines employed as the correct distances to be set off upon the pattern, some more accuracy may be obtained.