CHAPTER XIV.

TRANSITIONAL OFFSET FROM ROUND TO RECTANGULAR.

Throughout this work the author has endeavored to direct the reader's attention to the importance of an understanding of the principles involved. To those who have followed the work, it must have become evident that the solution of all problems coming under the head of

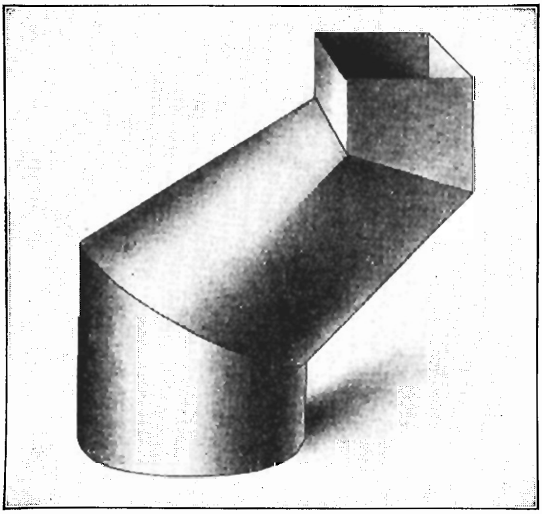

Fig. 57. Photographic View of a Transitional Offset.

Triangulation presents a great sameness. An understanding of how best to draw the first diagrams to represent the object for which a pattern is required is an important factor.

Attention is here directed to the transitional offset as shown pictorially at Fig. 57. The offset is for the purpose of making connection between a round and a rectangular pipe. The diagrams shown have been drawn to the scale appended. The diameter of the round pipe is 14 inches, with cross-sectional dimensions of the rectangular pipe of 7 x 20 inches, whose relative positions are shown in plan and elevation, Fig. 58.

The Capacity of the Fitting.

It will be noted upon examination of the elevation that both the round and rectangular pipes have been cut obliquely. This has been done, as has been previously explained, for the purpose of preserving the capacity of the fitting, whose most common application is found in furnace work, although similar examples will occasionally come before the sheet metal worker in other lines.

The specification tells us that in this instance, a transition is required between a 14 inch round pipe and a 7 x 20 inch rectangular pipe, with an offset of 8 inches as shown, and to be accomplished in a distance of 14 inches. With the above information in hand, it is but a simple matter to draw an elevation as shown by the boundary lines of that diagram, Fig. 58.

An Analysis of the Fitting.

The positions of lines which represent the connecting, or miter lines between the collars and the center irregular portion are by no means arbitrary, although their locations must be governed to some extent by existing conditions. Having located these lines to our satisfaction, somewhat as shown in elevation, we find from an analysis of the problem that the fitting is composed of three parts, i.e., we have a round collar with one end cut obliquely, which may be looked upon as one piece of an elbow in

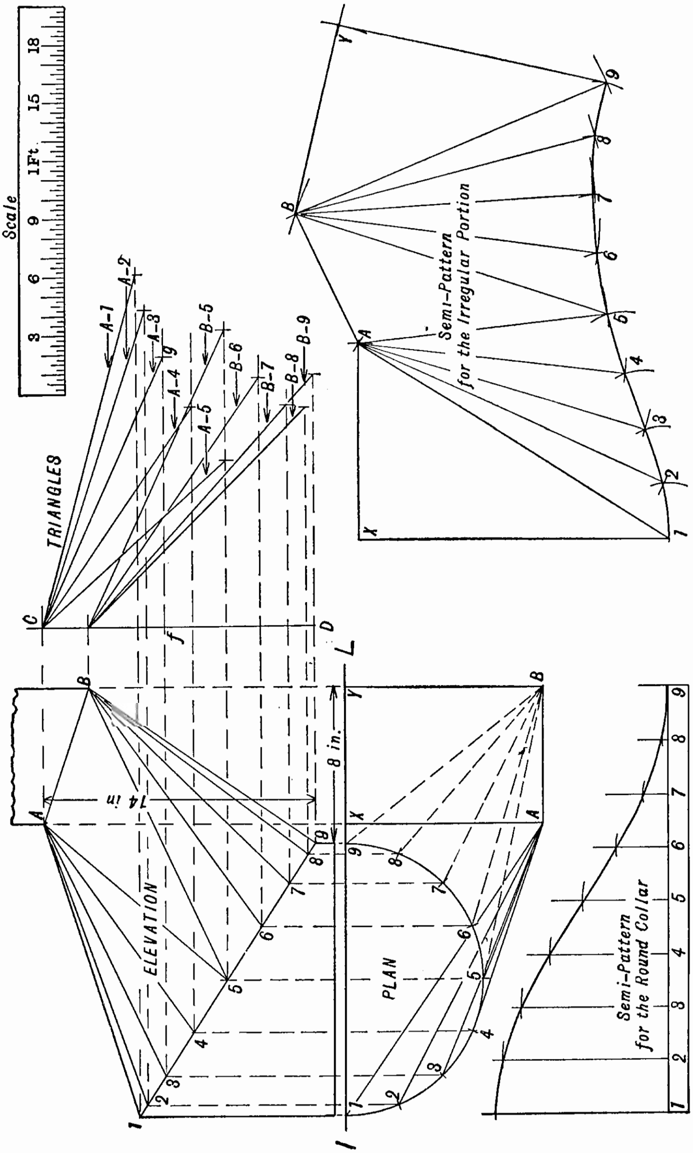

Fig. 58. Elevation, Semi-plan and Semi-pattern for a Transitional Offset.

round pipe. A collar for the rectangular pipe, which is also cut obliquely, and a center portion, which is an irregular one, making a transition from elliptical to rectangular, the ends of which are not parallel. To develop the pattern for this piece is the subject matter of this chapter.

It may be explained that to secure this pattern it is by no means necessary to follow the course here recommended, although some course must be pursued which will enable the worker to determine the true lengths of lines presumed to be upon the surface of the object. Since the diagrams shown in Fig. 58 are about as simple as the nature of the problem will permit, one will hardly go astray if he follows them absolutely.

The Plan.

After having drawn an elevation, which is in reality a section of the object, the next step is to secure a plan, or at least a semi-plan, as the fitting is here shown to be composed of two equal but opposite halves.

The semi-plan of the round collar is a semi-circle with a diameter of 14 inches, and in a position as shown. A semi-plan of the rectangular collar in its assumed position is a rectangular diagram, as *X A B Y* of the plan, and in position as clearly shown by the vertical projectors.

Divide the semi-circle of the plan into an equal number of equal parts, thereby locating one point which divides it into two equal parts as *5* of the plan. Draw lines from all points thus located upon the arc *1 5* to point *A*, and from points upon the arc *5 9* to point *B* as shown in plan. This secures the plans of lines which we presume to be upon the surface of the fitting. The elevations of the above lines are secured by projecting lines from points as *1, 2, 3, 4,* etc., of the semi-circle, perpendicular to *I L* to intersect the oblique line *1 9* of the elevation as at *1, 2, 3, 4,* etc., of that view. From these points upon the oblique line *1 9*, lines are drawn to points *A* and *B* as shown in elevation to secure elevations of lines whose plans have previously been drawn.

True Lengths of Lines.

Having now before us the plans and elevations of lines which are presumed to be upon the surface of the fitting, it remains to determine their true lengths and relative positions, also to place them upon the plane of development in those lengths and positions. The plan of the line supplies the base, and the difference in hight of the extremities of the line as shown in elevation, supplies the perpendicular of a right angled triangle, whose hypothenuse is the true length of the line, as is clearly shown in the diagram of triangles.

As for example, we select line *3 A* of the plan; its elevation is *3 A* of that view. The difference in hight of the extremities of that line has been determined by drawing lines to the right from points *A* and *3* of the elevation, and parallel to *I L* as *A C* and *3 f*. Then C *f* is the difference in hight of the extremities of line *3 A*, or the perpendicular of a right angled triangle whose base is equal in length to line *3 A* of the plan, or *f g* of the diagram of triangles. Similar work and reasoning will enable one to secure the true lengths of all lines radiating from points *A* and *B* of the plan. When the true lengths of all lines have been secured as shown in the diagram of triangles, the pattern can quickly be developed as shown.

The Pattern.

Beginning with the line whose plan is *1 X*, we find its true length in line *1 A* of the elevation. This length is set off upon the plane of development as at *X 1* of the pattern. The true length of line *1 A* of the plan is found in *1 A* of the diagram of triangles. Its lower extremity is at point *1* in all views, and its upper extremity at *A* is at a distance from *X* equal to the length of line *X A* of the plan.

We have in this demonstration four additional lines radiating from point *A,* whose true lengths are shown in the diagram of triangles, and since said lines radiate from a single point, we have only to determine the distances between their lower extremities. Should the reader experience any difficulty in comprehending this, he is advised to refer to Chapter XIII, where this feature was explained to some length.

Upon developing the semi-pattern for the round collar as shown, these distances are secured and used as radii to draw small arcs in rotation, thereby locating the lower extremities of lines as shown at *A 1, A 2, A 3, A 4* and *A 5*. Presuming that the line *A 5* has been located upon the pattern as shown, an examination of the plan and elevation shows that the triangular surface *A 5 B* should now be added.

The true length of line *B 5* is found in the diagram of triangles. Using this length as radius and with point *5* of the semi-pattern as center, a small arc is drawn as shown at *B* of the pattern. The true distance from *A* to *B* is shown in the length of line *A B* of the elevation. Therefore that length is used as radius with point *A* of the semi-pattern as center, to draw the second small arc at *B,* thereby locating the upper extremity of line *B 5* upon the pattern as shown.

There are also in this example, four additional lines radiating from point *B*. As before, the true lengths of these lines are found in the diagram of triangles, which may be used as radii in rotation, using point *B* of the pattern as center, to describe small arcs as shown at *6, 7, 8,* and *9*. The true distances between these points are found, as before, between similarly numbered elements of the round collar upon the miter cut. Using these in rotation, the second small arcs are drawn to intersect the first, thereby locating points which are in reality the lower extremities of lines *B 6, B 7, B 8* and *B 9,* as shown upon the pattern. Having drawn the line *B 9* upon the semi-pattern, the remaining triangular surface as there shown is located by first locating point *Y*.

We find upon examination that the true distance between points *B* and *Y* is the length of *B Y* of the plan, and that the true distance between points *9* and *Y* is the length of line *9 B* of the elevation, thereby enabling us, by the use of our compasses, to locate point *Y* as shown upon the pattern.

Upon drawing lines *B Y* and *Y 9* the semi-pattern is complete, which when duplicated, and formed in the opposite direction, will combine with the pattern here shown, to complete the irregular form necessary to make connection between the round and rectangular pipes when cut obliquely as shown in elevation.