

CHAPTER II

CUTTING PATTERNS AND TEMPLATES

Hand Shears.—Sheet metal patterns are cut from metal by means of shears or snips of various shapes and sizes. The shears in general use for light work is known as the straight hand shears, or snip, having a left-hand cut, the length of the cut commonly being $3\frac{1}{2}$ inches, an illustration of which is shown in Figure 3. This shears, when taken in the right hand, has the lower blade

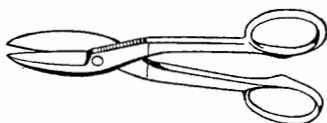


Figure 3.—1819 Original Straight Snip.

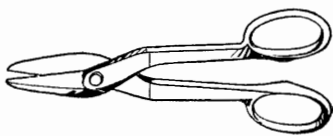


Figure 4.—Lyon Snip.

on the left side of the shears, and cuts at the left side of the upper jaw. The position of the jaws enables the sheet metal worker to follow the cutting line accurately, as it is always in full view.

Another straight shears, known as Lyon pattern snip, shown in Figure 4, is well adapted for regular work. The jaws are pointed and rounded, permitting the metal to pass freely when cutting curves, scrolls, and circles.

Circular snips, shown in Figure 5, are well adapted for cutting small circles and openings of various shapes in sheet metal. The popular size has a length of cut of 3 inches.

A bench shears, shown in Figure 6, is used for cutting heavy material. This tool is much larger than the

ordinary hand shears. When in use it is fastened in the bench by inserting the prong in the bench plate, Figure 7, or a hole of the proper size cut in the bench for this purpose. This shears has a right-hand cut, with the lower blade on the right side of the shears. Note the difference

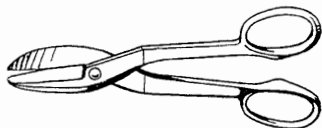


Figure 5.—1819 Original Circular Snip.



Figure 6.—Bench Shears.

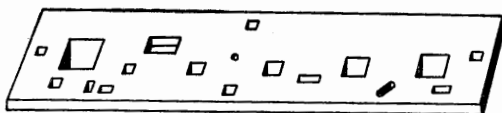


Figure 7.—Bench Plate for Holding Stakes.

in the position of the upper blades in the right hand shears in Figure 3, and the right hand bench shears in Figure 6.

The double cutting shears, shown in Figure 8, is adapted to cutting off round and square pipes, bottoms of pails, cans, etc. A hole is punched in the article to be cut, and the point of the lower blade inserted, after which the cutting is done in the regular manner, leaving the edges clean and smooth.

Squaring Shears.—Turning to cutting machinery, Figure 9 shows a modern squaring shears which is recommended for this course in cutting strips, squaring tin.

and making long straight cuts across sheets of metal when shearing material for the construction of pipes and articles cylindrical in form.

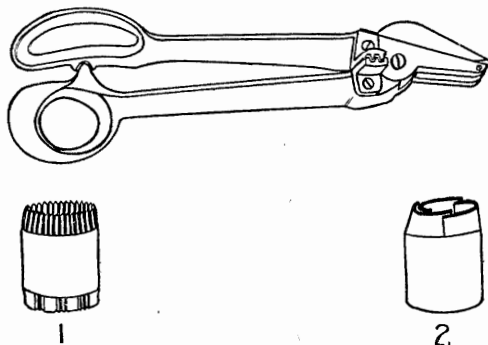


Figure 8.—Double Cutting Shears with Pipe Crimper. 1, Crimped with Attachment Fitted to Shears; 2, Old Method.

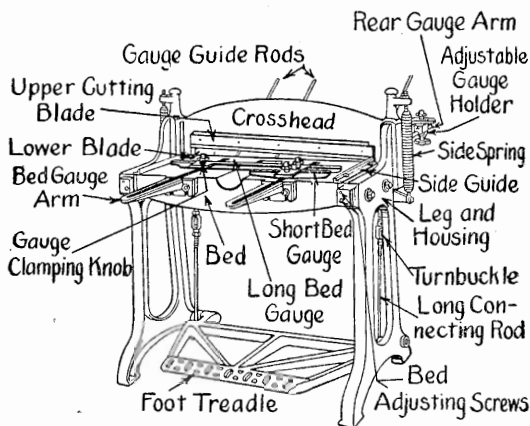


Figure 9.—Foot Power Squaring Shears.

If the shears do not respond in cutting material of heavier gauges within the rated capacities claimed by the

manufacturer, the blades should be set farther apart. The lower blade must be set back from the upper, though not far enough to burr the edge of the material. This adjustment can be made by releasing slightly the bed bolts that hold the bed of the shears to the legs, and by loosening the two front bed screws. The bed can then be shifted on its seat towards or away from the upper cutting blade until the proper position is secured.

The blades can be easily removed for grinding, and

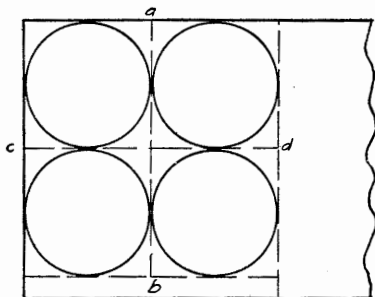


Figure 10.—How to Cut Circles to Avoid Waste of Metal.

when dull they should be returned to the factory for grinding. After being ground they are fastened securely to their frames and adjusted so that they will cut paper the entire length.

Cutting Circles and Curves.—When cutting circles from metal, as shown in Figure 1, pattern *A*, take the straight shears, Figure 3, in the right hand, start the cut at *n* on the scribed line, and make a continuous cut around the circle in the direction of the arrow shown in *na*. When several circles are to be cut from a large piece of metal, care should be taken to avoid waste of material by scribing the circles tangent to each other upon the metal, as shown in Fig. 10.

After the circles have been marked on the metal in this

manner, cut the metal into squares by following the dotted lines *a* and *b*, after which the circles are cut in the usual manner; care being exercised in having each circle accurate and true.

When cutting curves, the cut should be continuous. Short cuts should never be made; stopping, and starting again at different points on the line, will result in an uneven pattern with rough edges containing slivers and projections that will cut the hands while working with the metal. When cutting patterns *B* and *C*, Figure 1,

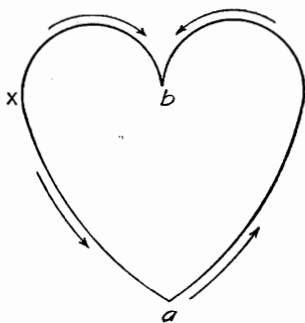


Figure 11.—Direction of Cut Shown by Arrows.

and similar forms, start to cut at the corner of the pattern, cutting in the direction of arrows *ab*, *bc*.

When cutting concave and convex curves, as shown in the outline of pattern *D*, Figure 1, use the straight shears, starting at *a*, and cut in the direction of arrows as shown in the drawing.

Pattern *E* is shown in Figure 11. Starting at *a*, make a continuous cut from *a* to *b*, then placing the shears at point *x* on the pattern, cut from *x* to *a*. Complete the pattern by cutting in the opposite direction from *x* to *b*.

When cutting pattern *F*, as shown in Figure 12, the cutting should begin at *a*, then to *b*, then to *c*, then start-

ing at x the leaves should be cut in the direction of the arrows. A continuous cut could be made from x to x , but in turning the shears at points d and e , the metal is likely to be torn and the pattern ruined. The circular shears, as shown in Figure 5, can be used to advantage in cutting the small curves in patterns E and F .

The small circle in the center of pattern G , Figure 2, is cut out by using a hollow punch, as shown in Figure 13. The metal is placed upon a lead or wooden block. A

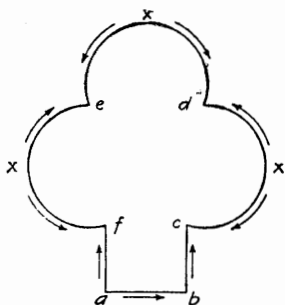


Figure 12.—Best Method of Cutting Indicated by Arrows.



Figure 13.—Hollow Punch.

punch of the required size is placed upon the circle and struck with a heavy mallet or hammer. If the piece of metal remains in the punch, it can be removed by striking the punch lightly with the hammer. Hollow punches are made in various sizes.

When an opening is to be cut in a piece of light metal as at a in pattern I , Figure 2, place the metal upon a block of lead; then by using a hollow punch or small thin chisel, cut a hole in the metal large enough to insert the point of the lower blade of the circular shears in the opening; then cut along the line in the direction of the arrow. The outer circle is cut in the usual manner, which completes the pattern.

Cutting Elbow Patterns.—When cutting elbow patterns or similar forms, as shown in *H*, Figure 2, the straight cuts *b* to *c*, *c* to *d*, *d* to *e*, are made with the straight snips, or upon the square shears. The upper curve of the pattern is cut by using the straight shears, starting at *e* and making one continuous cut ending at *b*.

In using the hand shears, a mistake is often made by

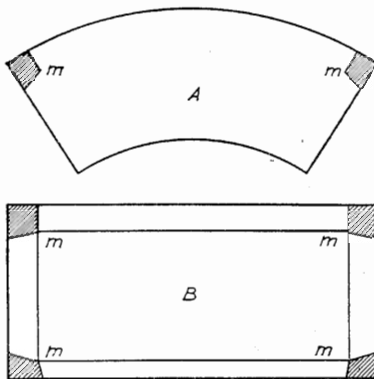


Figure 14.—Notched Patterns, the Shaded Portions Being the Notches.

the student in cutting beyond the stopping point shown on the pattern. This can be avoided by always completing the cut with the *point* of the shears. When cutting from *a* to *b*, Figure 11, the end of the shears should be directly upon point *b* when making the final cut. The point of the shears is also used in notching patterns, as shown in *A* and *B*, Figure 14. When cutting out the shaded portion of patterns, the end of the shears blade should never extend beyond the point *m* in the pattern.

Hints on the Care and Use of Hand Shears.—The following suggestions are offered on the use and care of the hand shears and should be followed carefully by the student or workman:

When using the shears the blade should be held in a vertical position, making straight up and down cuts.

Never twist the shears sidewise when cutting, as this causes the bending of the edge of the metal, leaving a burred edge, which requires additional work in flattening it out with a mallet on a stake or level plate.

Keep the shears sharp, but do not grind too fine an edge.

The bolt and nut joint should be oiled frequently, and

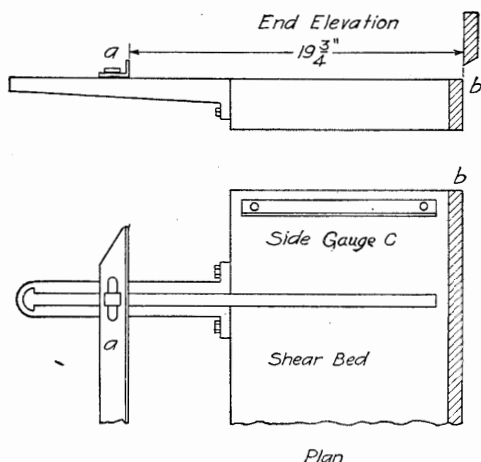


Figure 15.—Plan and End Elevation of Squaring Shears.

the nut adjusted so the shears will work easily at all times.

Never use the cutting edges of shears for cutting wire, but always use instead the cutting nippers which are made for this purpose.

Squaring Sheets of Metal.—In preparing sheets of tin for roofing purposes and constructing various sheet metal articles which require the sheets to be perfectly square

and exactly the same size, with the edges true and straight, the sheets can be squared very rapidly and accurately on the squaring shears, Figure 1. A plan and end elevation of the squaring shears are shown in Figure 15, where *a* is the front gauge, *b* the lower cutting knife, and *c* the side gauge.