CHAPTER VIII

NOTCHING AND BURRING

Every experienced sheet metal worker understands the importance of notching patterns properly for wiring and seaming. Special attention should be given by the student to this part of the work, and great care should be taken that the corners are notched in such a manner that

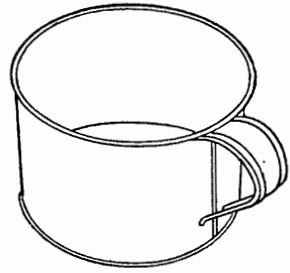

Figure 66.—Sheet Metal Cup, Notched and Burred.

when the work is formed up and seamed, the notched corners will fit snugly together without overlapping or leaving an opening exposing the wire at the end of the seam.

In constructing sheet metal articles in the form of a cylinder, having a wire inserted in the top edge, and the lower end inclosed with a bottom of the same material, if the side seam is grooved the corners of the pattern must be notched for wiring and seaming in such a manner that when finished the article will present a neat appearance.

We will take for a description of the notching and burring processes the making of a sheet metal cup, shown in Figure 66. This is the next problem given in the

graded series that we are following. These cups are made up in different sizes and for various purposes.

The method of construction and patterns for the cup are shown in Figure 67, in which the sectional view at *E* shows the construction. A No. 12 wire is inclosed in the top edge at *kk*, the bottom with a single edge at *mm* is slipped over the body and soldered on the inside. The pattern *C* for the body is a rectangular piece of IC bright tin, equal in length to the circumference of the body shown at *A*. To this dimension is added an allowance for a ⅛-inch grooved seam. The width of pattern is equal to the height plus the ¼-inch allowance for a No. 12 wire.

Notching Patterns.—Having cut the material the required size, the next step is to notch the pattern for wiring and seaming, as shown by the shaded corners in pattern *C*. The upper corners are notched for wiring as shown by *abcd*. The width of the notches *da* and *ef* is equal to one and one-half times the width of the ⅛-inch edge turned for the seam. When a ⅛-inch edge is turned, ⅜ inch is allowed for the seam, and one-half of this amount or $\frac{3}{16}$ inch is notched from each corner. This will allow the notched corners *a* and *e* to fit snugly together. The grooved seam extends up to the wire as shown at *o*. The distance *ab* should be slightly greater than the allowance for covering the wire. A continuous cut is made from *a* to *b* to *c*, cutting *bc* on an angle of 45°. The lower corners are notched on an angle of about 45°, the width being one and one-half times the width of the edge to be turned. The corners *g* and *h* will then fit together, leaving only one thickness of metal on the lower edge after the grooved seam is completed.

After the pattern has been properly notched, set the gauge on the folder (Figure 16) ⅛ inch, then place one end of the pattern against the gauge, with the upper corners that have been notched for wire facing toward the right end of the machine. By placing the work in the

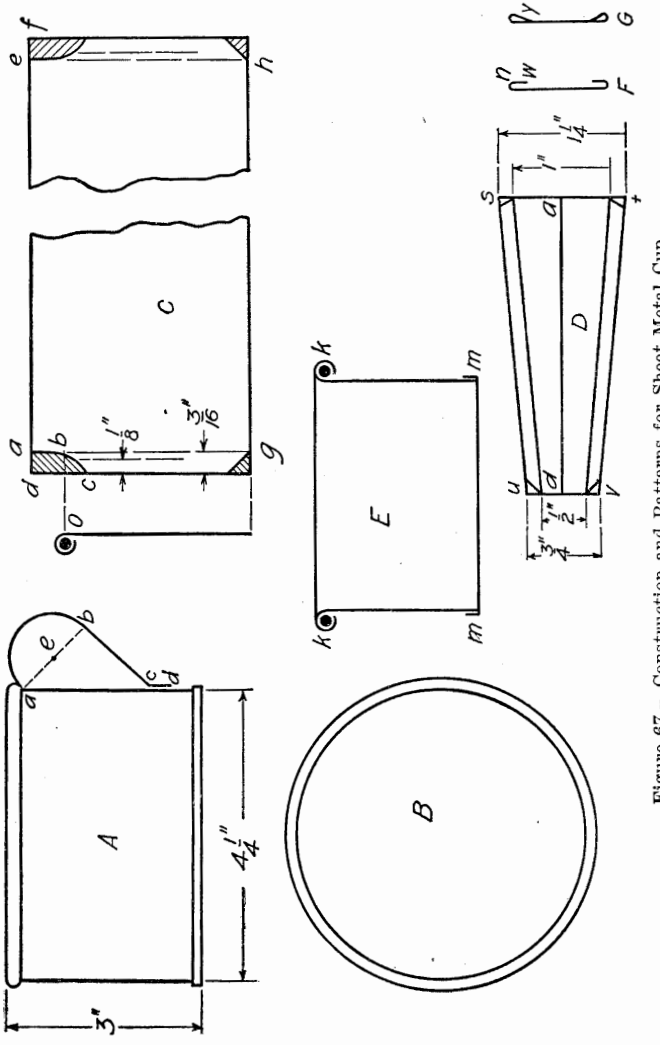

Figure 67.—Construction and Patterns for Sheet Metal Cup.

folder in this manner, the edges for the seam are turned in their proper position for wiring and seaming. The body is then wired, formed up on the rolls, and the seam grooved. These operations have been fully described in previous chapters.

The pattern *D* for the handle is laid out by drawing a center line, making *ad* equal in length to *abcd* in elevation *A*. Through points *a* and *d* at right angles to the center line draw *st* and *uv*, equal to the width of the top and bottom of the handle. Next draw lines *su* and *tv*. Then *sutv* will be the pattern for the handle, with the allowance added for a single hemmed edge. The corners are notched as shown in the drawing, and a ⅛-inch single edge turned on the sides. The handle is then formed by hand over the tapering end of the blowhorn stake (Figure 53).

The method of drawing the profile of the handle is shown in the elevation. At pleasure locate the point *c* where the lower end of the handle joins the cup. The upper end of the handle fits closely under the wire at point *a*. Using the 45° triangle, draw lines from points *c* and *a* intersecting at *b*. Bisect line *ab* at *e;* with *eb* as radius, and *e* as center, describe a half circle connecting *a* and *b*. The amount *cd* is added for a lap at the lower end. Then *abcd* will be the profile and stretch-out of the handle.

After the edges have been turned on the handle, as shown in *F*, Figure 67, set the gauge on the small burring machine (Figure 68) equal to the width of the edge *nw*. Then run the work through the machine, having the upper roll turn the inner edge *n* against the handle, as shown at *y* in *G*. This operation will make the handle rigid, giving it a finished appearance after being formed into shape.

BURRING MACHINE

The burring machine shown in Figure 68 is used for various purposes and is well adapted for turning small edges on circular pieces of metal, edging hoops and rims of covers, and bodies of sheet metal articles for seaming. These machines are made in two sizes for general work. The small machine is used for turning edges on small curves, and will burr edges up to $\frac{3}{16}$ inch in width. For

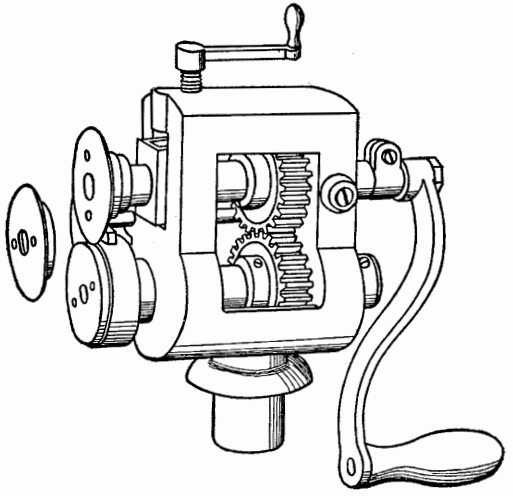

Figure 68.—Burring Machine.

large curves the large machine is preferable; an edge or flange up to ¼ inch wide can be turned on this machine.

When burring edges for seaming light sheet metal, the experienced workman will turn the edge as small as possible, as he fully understands that it is almost impossible to turn a wide edge evenly on thin metal without crimping the burr. A narrow edge for seaming is practically as strong as a wide edge. It can be turned easily, and the

seam will have a more finished appearance when completed.

Burring Edges.—Turning edges on the burring machine is a difficult operation for the beginner. It requires careful work and practice to become proficient in burring an even edge on a circular piece of flat plate, without crimping the burr or warping the metal.

The pattern for the cup bottom with an allowance for a single edge is shown in *B*, Figure 67. The bottom is simply a circular piece of metal having an edge ⅛ inch wide turned at a right angle. To find the size of the bottom,

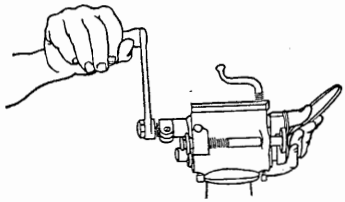

Figure 69.—Burring an Edge on Cup Bottom.

measure the diameter of the body, and to this dimension add twice the width of the burr to be turned by means of the small burring machine.

After the bottom is cut from metal, then proceed to burr the edge in the following manner: Having made an allowance for a ⅛-inch burr on the bottom, set the gauge on the machine a scant ⅛ inch from the edge of the upper roll. This will allow for the take-up of the material after the edge is turned. Then holding the bottom in a horizontal position, place the edge of the metal on the lower roll, touching the gauge. Next bring down the upper roll until the metal is held firmly between the rolls. Then with the palm of the left hand resting against the frame of the machine, grasp the bottom between the thumb and fingers, the ball of the thumb resting on the upper side near

the center, with the fingers extended on the lower side. With the hand in this position, holding the edge of the bottom firmly against the gauge, allow the metal to pass between the thumb and fingers while revolving in the machine. After the first revolution and while the machine is turning, the bottom is gradually raised until the edge is turned to the required angle.

The correct position of the hand while burring edges on flat circular pieces of metal is shown in Figure 69. This method of holding the disc will keep the metal from warping out of shape while turning the edge. The bottom is then slipped over the body and the cup soldered on the inside, after which the handle is soldered in position, completing the problem.

BRAKING TIN

When constructing articles made from tin plate, sharp parallel kinks or wrinkles will often appear on the metal after being formed on the rolls. This can be avoided if the sheets are taken before wiring and passed through the forming rolls three or four times. With each pass they are reversed, then straightened out by being pulled over the rear roll while making the last pass through the machine. When formed up again the metal will not wrinkle. This process is known to the sheet metal worker as "braking tin" and is used constantly by the careful workman, for the parallel kinks are always evident if the metal is only rolled once.

SUPPLEMENTARY PROBLEMS

Before continuing with the next of the graded problems in this series, several supplementary problems are given, the construction being similar to the cup problem described in this chapter. These problems consist of small drinking cups and measuring cups for household use, and

are usually made from IC or IX bright tin, having a No. 14 wire inclosed in the top. As these utensils hold a given quantity, unusual care must be observed by the workman when making the allowances for wiring and seaming.

Cup Dimensions.—The following table gives the diameter and height for different cups from ½ pint to one quart in size:

Size	Diameter (Inches)	Height (Inches)
½ pint	$2\frac{9}{16}$	$2\frac{15}{16}$
½ pint	$2\frac{3}{4}$	$2\frac{3}{8}$
1 pint	3	$3\frac{7}{8}$
1 quart	$3\frac{9}{16}$	$5\frac{5}{8}$
Drinking cup	3	$2\frac{1}{2}$
Drinking cup	$3\frac{5}{8}$	$2\frac{3}{4}$

PATTERNS FOR A MEASURE LIP

Another adaption of the cup problem is the one quart lipped measure shown in Figure 70. The construction is the same, except that a circular flaring lip is attached

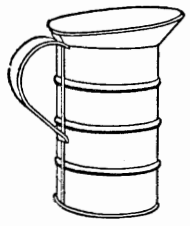

Figure 70.—One-Quart Measure with Flaring Lip.

to the top. The handle is double hemmed, and the body is graduated into four parts and marked on the metal by means of the beading machine. (Figure 35.)

The dimensions of the measure and method of obtaining the pattern for the lip are shown in Figure 71. First draw the elevation *A* to the required size. Then draw

the side view of the lip *B* as shown by *abcd,* extending the lines until they intersect at *e*. With *f* as center describe the half section of the top of the measure as shown by *b5d;* divide this semicircle into equal parts as shown. The lip is an intersected frustum of a right cone, which can be developed by the radial method.

If the time is limited and only a few pieces are required, there are several short methods which can be applied to the same purpose. An approximate pattern developed by one of the short methods in common use is shown in *C,* Figure 71, and may be produced as follows: Draw a center line as *AB* and on it fix a convenient point *e*. With the compasses set to a radius equal to *ed* in the elevation *A,* scribe the arc *dbd;* starting from the point *b* space off a distance *dd* on each side equal to one-half the circumference of the top of the measure, as shown by the figures 1 to 9 in the half-section in the elevation. Draw a line from *e* extended through *d,* and place the width of the back of the lip as shown from *d* to *c*. Now take the distance of the front of the lip *ab* and place it as shown from *b* to *a*. Draw a line from *c* to *a* and bisect it to obtain the center point *m*. From *m* at right angles to *ca,* draw a line intersecting the center line *AB* at *n*. Then with *n* as center and *nc* as radius, describe the arc *cac,* which will complete the net pattern for the lip. Add an allowance for a lap seam on the end, and a ⅛-inch edge for a single hem on the top. After this edge has been turned in the burring machine (Figure 68) the lip is placed on a flat stake and the edge closed down by means of the mallet. Then the lip is formed on the blowhorn stake, placed in position on the top of the measure, and soldered on the inside. Lips for measures of large diameter are usually wired at the top edge, and the allowance for wire is made in the usual manner.

Another style of lip is shown by *abgh* in elevation, and incloses about three-fourths of the circumference of the

measure. The top is cut off as shown by the dotted line *ag*. The method of laying out the pattern for a lip of this

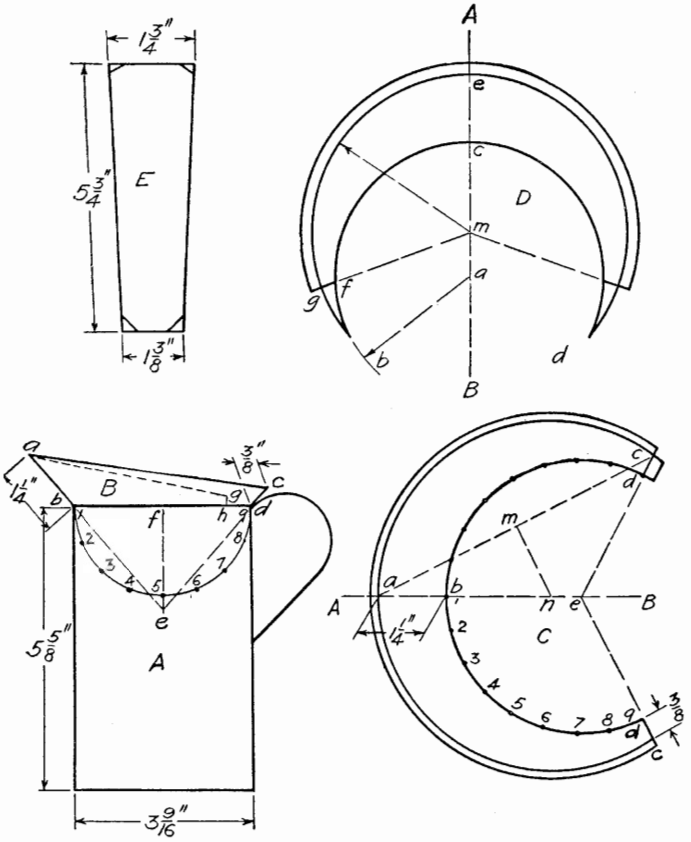

Figure 71.—Plan of Measure with Flaring Lip, and Patterns for Lip.

form is shown in *D*, and is obtained as follows: Draw center line *AB*. Set the compasses to a radius equal to three-quarters of the diameter of the top of measure.

With *a* as center, describe the arc *bcd*. Next set off the width *ce*, and make the distance *cm* equal to one-half the diameter of the measure. With *m* as center and *me* as radius, describe an arc intersecting the arc *bd*. Cut off the end of the pattern as shown, making *fg* equal in width to *gh* in the elevation. Add allowances for wiring or hemming the top, thus completing the approximate pattern for the lip.