

Basic Tongs- Light Duty

By Denis Frechette

I define light duty tongs as any type of tongs that will be used to hold bar stock weighing less than 1 or 2 lbs. For example, you could use this method to make tongs to hold a 1" bar that is under 8" or 10" long but if you work a lot with stock that is over 12" or 16" long, you would be happier with more traditional tongs. I use the following method for making all my production tongs that hold short lengths of flat stock up to 3/8" thick or bar stock up to 5/8". The weight and the balance of these tongs makes them very comfortable to use and they are also much quicker to make than the welded method for traditional tongs.



Figure 1. A comparison of 1/2" round and finished tong blank

Step 1- Preparing the stock

The stock is prepared by upsetting the end of a 22" length of 1/2" round mild steel bar. The finished bar stock is now 19" long and has a 3" to 4" section that is 5/8" round followed by a 3" to 4" section that tapers gradually from 5/8" round to the 1/2" round section that will form the reins. See Fig. 1.

The main component of the process is the upsetting die. A 6" to 8" section of the stock must be upset by at least 3". The only practical way to do this is to hammer the bar into a die that will restrict the amount of bending that occurs. Only one upsetting die is used and it is made to fit the final dimensions of stock. You will notice a lot of bending in the first heat because the die is much too large for the initial stock size, but the whole process only takes about 3-4 heats. Straightening the bar after each heat is less of a problem than keeping track of a progression of dies. There are many variations on this type of tool. The simplest and most basic form is illustrated here. It can be welded or riveted together. See fig. 2-4. Fig. 13 gives dimensions of tooling.



Figure 3. Original upsetting die. This die was used to make approximately 200 pairs of tongs.



Figure 4. Typical wear caused by hammering the blank from the die.

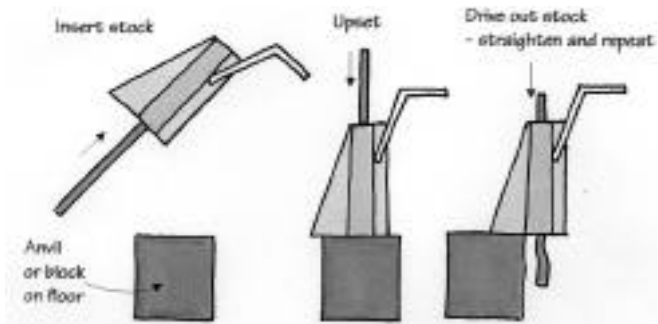


Figure 2. Using the upsetting die

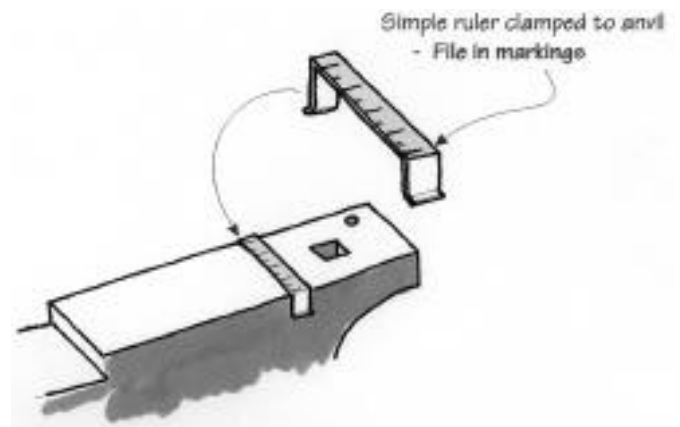


Figure 5. A clamp-on ruler makes accurate measurements

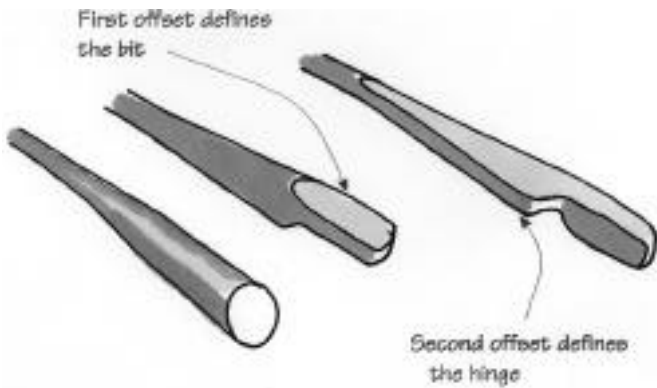


Figure 6. Forging the offsets.



Figure 7. The forging progression—tong blank rough forged, slot punched, drifted, and rivet pin inserted.

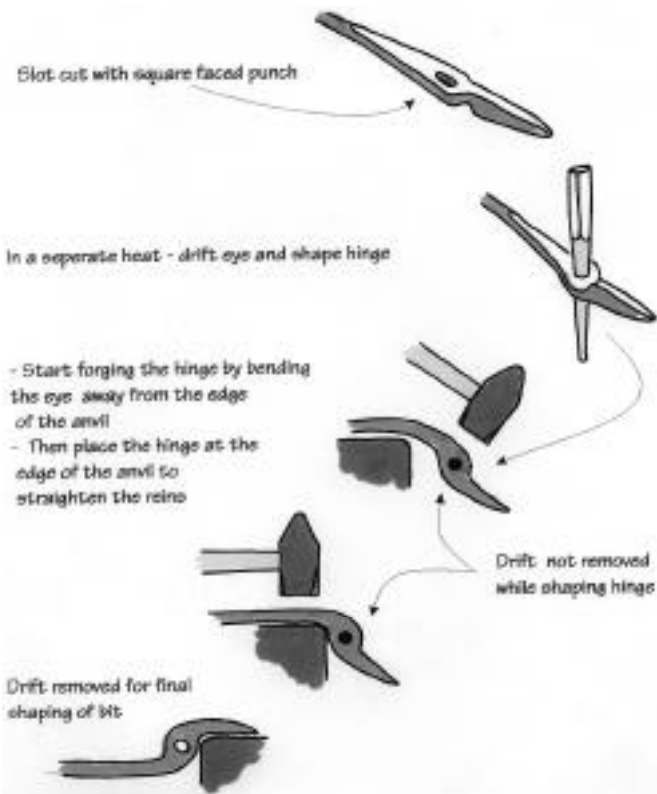


Figure 8. Drifting and forging the jaws

Heat an 8" length of 1/2" bar to a bright orange or yellow. Insert the bar into the die and hammer with a heavy hand hammer. This must be done quickly as the die will draw the heat from the bar. When the bar cools to a bright red heat, slide the die off the face of the anvil and drive the bar out of the die. Use the remaining heat to straighten the bar. Repeat the process until the bar is upset to 19". Note that hammering the bar in the die past a red heat will cause it to wedge tightly into the die. This will slow down the process because an additional heat will be required to straighten it before continuing the upsetting.

Step 2- Forging the bit

The only thing that must be stressed in laying out the hinge and bit is taking the time to measure accurately. The first offset defines the amount of material that can be shaped into the bit.



Figure 9. Showing the position of the anvil and drift while forging the third offset.

Since both halves of the tongs must be identical to produce symmetrical tongs, you will need to set up a ruler or gauge on your anvil. It can be as simple as a chalkmark but if you plan on making several tongs, the best solution is to make a simple ruler that can be clipped to your anvil, as in fig.5. Position this ruler right next to the work for the most accurate measurement. Forging the offsets is shown in fig. 6.



Figure 10. A cross-section of the tongs at the rivet.

Step 3- Punching the eye and shaping the hinge

The eye is punched with a square-faced slot punch and shaped with a 1/2" round drift. The hinge is forged over the edge of the anvil to create the third offset that will define the start of the reins and rotate the hinge off the centerline of the reins. The key to this process is using the right-sized punch that is matched to the drift. The square-faced punch must make a slot that is just long enough so that a 1/2" drift can be used to shape the eye without stretching and thinning the sides. If the hole is made too large, the drift will not be held tightly in the stock while forging the hinge. See figs. 7-9.

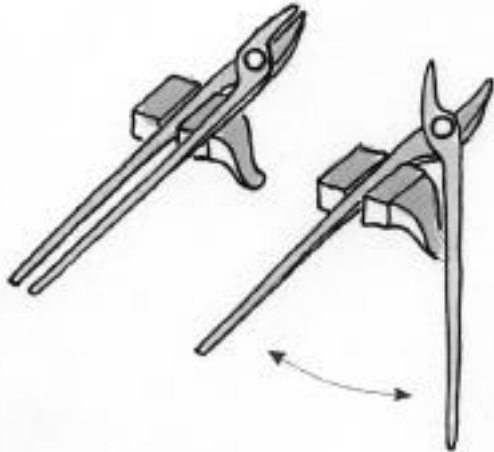


Figure 11. Working the tong joint until they swing freely.



Figure 12. A finished pair of tongs, and a pair ready to be riveted.

Step 4- Combining the two halves

Once both halves of the tongs are forged they are pinned together with the rivet blank. The rivet blank is a 2" long piece of 1/2" round.

The tongs are placed back into the fire and brought up to a yellow heat. The rivet is first hammered with very light blows to begin setting it. Heavy blows at this stage will bend the rivet rather than upsetting it evenly. See fig. 10.

Once the rivet begins to clamp down on the hinge, open and close the tongs a few times to free up the hinge joint. Set the rivet a little tighter and work the joint again. At this point the

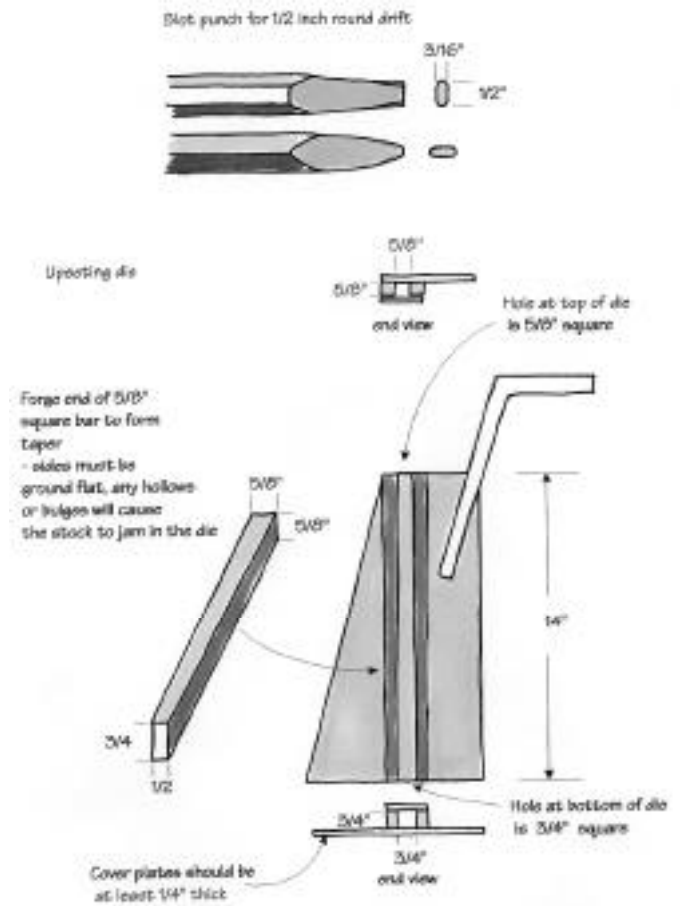


Figure 13. Dimensions of the slot punch and the upsetting die.

hinge should feel snug, but it should not be binding anywhere within the normal operating range of the tongs. Once the joint has a smooth action you can hammer the rivet tight. Do any rough shaping and aligning now while the hinge is held solid by the rivet. Fig 12 shows a prepared and riveted pair of tongs.

If you want to practice this step, mock up the hinge joint by drilling 1/2" holes into two lengths of 3/8" thick flat bar and rivet together.

Step 5- Final shaping and adjusting

Bring the tongs to a bright orange or yellow heat and place in a vise as shown in figure 11. Gently open the tongs and work the joint till the tongs open and close freely. The tongs can then be removed from the vise and adjusted to fit the desired stock size. When cool, trim the reins to length and grind any irregularities in the bit. Oiling the hinge joint will flush out any forging scale and prevent the joint from binding.