

Forging Tongs- Part One

Lesson 22A- Forging the Jaws

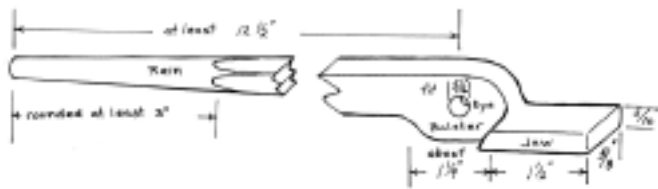
Text By Jay Close

Photos by Jane Guilden and Jay Close

Drawings by Tom Latané

Introduction: There are many tong forms serving myriad functions, and there are diverse approaches to this common tool. Some smiths collect tongs in profusion; others get by with a small number. Some like alloy steel for tongs; others find mild steel adequate. The tongs discussed here are basic, forged from mild steel and, except for those used in punching, these tongs can be made without the use of tongs.

Intent: The lesson is designed to familiarize the learner with the basics of tong forging. The student will practice basic forging operations including drawing down, hot punching, drifting, shouldering, rounding, cutting and upsetting. These operations come together forging a set of flat jaw tongs using 5/8 inch square bar and drawing down the reins. Drawing 1 illustrates one side of the tongs discussed here. Dimensions and the terms used for the major parts of the tongs are included.



Drawing 1.

Material: 5/8 inch square mild steel at least 24 inches long.

5/16 inch round mild steel for the rivet.

Tools: Basic forging tools including a hot punch and drift to make a 5/16 inch diameter hole; a post vise will be useful but is not a necessity; layout tools including a rule, dividers and center-punch.

Procedural Overview: Each half of the tong is forged identically; there is no left and right jaw.

To create the jaws and pivot bolster, three, one - sided shoulders are forged on the rounded edges of the anvil. Become confident with these three shoulders, their order and where on the anvil they are forged before proceeding. There is no time to puzzle over where to hit. Rehearse these shoulders in the workshop between your ears.

Photos 1 through 5 show the shoulders that start the tongs. You will review these photos later in the lesson too.

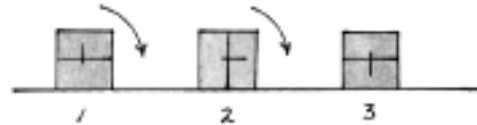
Hint: For a learner without an experienced coach, it may be wise to go through the procedure with an appropriately sized "bar" of

modeling clay.

Shoulder One– made on the near rounded edge of the anvil.

Step in the bar about one half of its thickness the full amount of the stock lying on the anvil. Address sideways spread keeping the jaw the same width as the parent bar. (Photos 1 and 2).

Shoulder Two– made on the far rounded edge of the anvil after tumbling or rotating the bar 90 degrees to the left. That is rotate



Drawing 2- Tumbling a bar around its long axis, as viewed from the free end of the bar. The rotation would be to the smith's left.

the bar around its long axis so the adjacent face of the bar is positioned uppermost. Drawing 2 illustrates the idea.

This shoulder comes at the base of the first one. Many smiths will also slightly angle the bar at about 30 degrees off perpendicular to the axis of the anvil. Here you want sideways spread. Again, reduce the bar thickness by about half. See Photos 3, 4 and 5.

Shoulder Three– also made on the far rounded edge of the anvil after another left hand turn or tumble of 90 degrees. Photo 6.

This shoulder defines the pivot bolster and the start of the reins.

After the jaws are forged and the pivot bolster defined, a pivot hole is hot punched and drifted.

The reins are drawn out using the anvil horn and the reins are smoothed on the anvil face.

The two tong halves are riveted together. Once assembled, they are sized to fit a specific bar thickness.

Note: directions assume a right handed smith forging tongs used principally in the left hand. Tongs for a left handed smith that will be held primarily in the right hand are sometimes made with 90 degree tumbling to the right. The slight offset in the handles to the left or to the right seem to better conform to the anatomy of the left or right hand. Many smiths do not bother with the distinction or bend the reins in vertical alignment creating a neutral grip

Step One (layout):

Cut a length of 5/8 inch square mild steel a minimum of 24 inches long. This will provide sufficient length to forge both halves of the tongs without use of tongs.

Put two centerpunch marks (or some other permanent layout mark) on the bar. The first should be 5 and 1/2 inches from the end of the bar and the second should be 11 inches from the end.

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See Photo 7 for the layout. These marks indicate the material for each tong half.

A layout easily seen when the bar is at heat can be made by placing a deep centerpunch mark very near the edge of the bar. If the mark is near enough to the edge, the steel bulges out from the bar looking like the bulging eye of a frog. Prominent "frog's eye" layout marks save precious time lost searching for more subtle indicators.

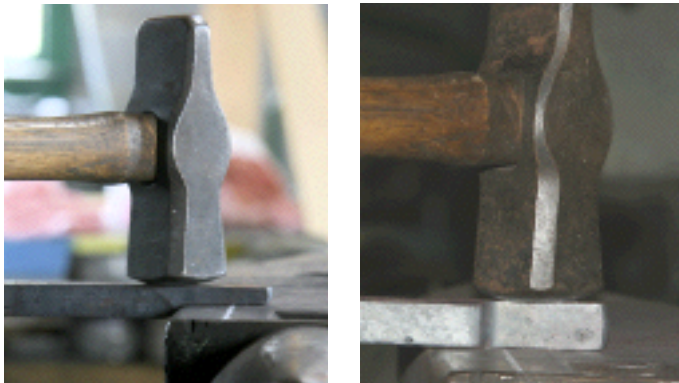
Step Two (first shoulder):

The student should review previous lessons on shouldering at the near and far edges of the anvil using half faced hammer blows.

Heat the end of the bar to a yellow and place 1 inch of it on the anvil face at the near rounded edge of the anvil. Hold it horizontal and perpendicular to the edge of the anvil as in Photo 8.

Hint: if you need, place a chalk or soap stone mark on the anvil so you can readily repeat the over lap. With practice such an aid will not be necessary.

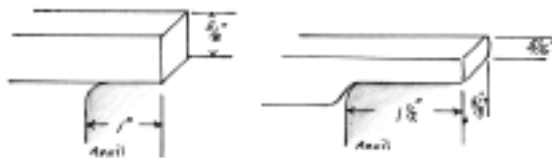
With half face hammer blows sink a vertical shoulder reducing



Photos 1 and 2.

the thickness of the bar by about half all the way to the end of the bar. You want a parallel sided extension that will become the tong jaw.

Eliminate sideways spread, keeping the bar 5/8 inch wide as you forge. See Photos 1 and 2.

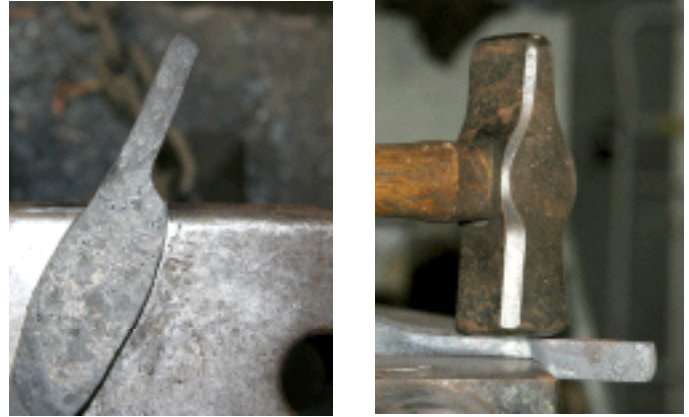


Drawing 3- The first shoulder, made on the near edge of the anvil, to form the jaw.

The higher the heat and the harder you hit the more readily this shoulder will develop.

Drawing 3 shows the needed result with approximate dimensions.

Target: This shoulder is readily forged in one heat. With practice you may be able to forge more than one shoulder on the same



Photos 3 and 4.



Photos 5.

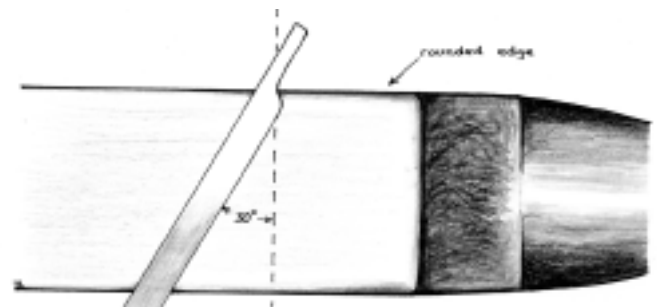
heat, but it is critical to set shoulders at the highest possible temperature. Do not extend a heat attempting to do more than the temperature allows.

As the bar drops to orange temperature, get it back in the fire.

Step Three (second shoulder):

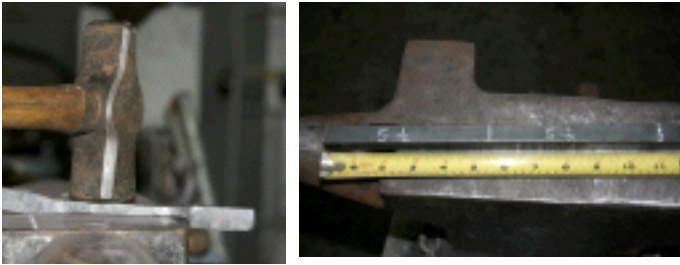
The second shoulder is made by tumbling or rotating the bar 90 degrees to the left and repositioning it on the anvil. See Photos 3, 4 and 5.

Place all of the drawn down portion of the first shoulder extend-



Drawing 4- The second shoulder, made on the far edge of the anvil, to form the bolster. The 30-degree angle forms a slightly stronger transition between the jaw and bolster..

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Photos 6 and 7.

ing off the far side of the anvil so the base of the shoulder aligns with the far rounded edge. Keep the bar flat on the anvil face. Drawing 4 shows the positioning of the bar for the second shoulder. Note that the bar is swung about 30 degrees to the left. This makes the joint a bit more refined. It is permissible to simply hold the bar straight across the anvil.

At a yellow heat, hit flat, half-faced hammer blows.

Thin the bar to about half of its starting thickness and create symmetrical sideways spread. You ought to be able to get 1 inch of spread and about 5/16 inch thickness. Photo 5 shows the result.

Work this reduced thickness down the length of the bar for about 2 inches. This gives a head start in drawing the reins. See Photo 6.



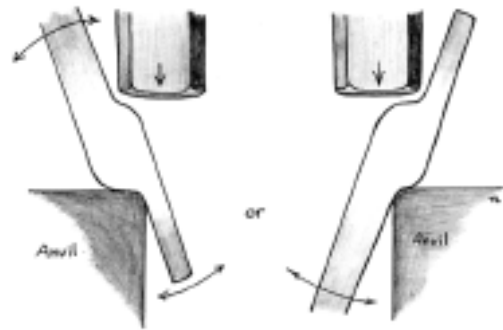
Photos 9 and 10.

Forging dynamics— because this spreading and shouldering is accomplished entirely from one side of the bar, the spread in cross section can be expected to be slightly wider on the top than the bottom. This is evidence of the differential impact of the hammer blow as opposed to the anvil on the hot bar. The harder you hit and the hotter the temperature, the less this asymmetry develops.

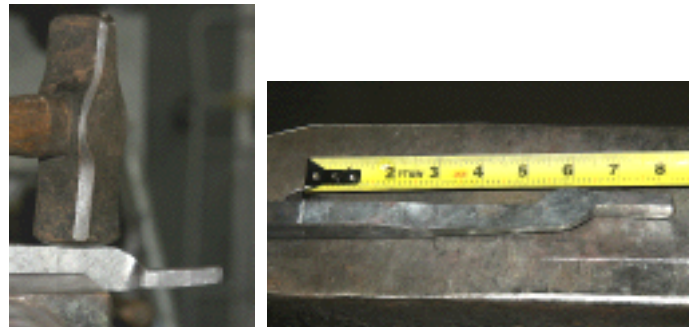
Step Four (third shoulder):

The third shoulder requires another tumble of the bar 90 degrees to the left. This orients the flat you made in Step Three vertically.

If you spread the bar to one inch in width when making the second shoulder, you now want to place that same amount of the spread bar extending off the anvil. Compare Photo 9 and Photo



Drawing 5- Dressing the shoulders, which defines the bolster.



Photos 11 and 12.

10. These photos show use of dividers to compare dimensions for explanatory purposes; in forging make this an eye judgement.

At a yellow heat, hit hard, half face blows to forge the third shoulder. Be sure you are using the rounded edge of the anvil. See Photo 11.

Control the bar dimensions. Define the pivot bolster and begin to draw the start of the reins. At this point retain the 5/8 inch width of the bar but reduce the thickness to match that of the bolster.

Your results should look like Photo 12.

Hint: After the third shoulder is established use the horn of the anvil as much as possible to do all subsequent drawing out of the reins. The rounded form will greatly enhance the stretching effect of your hammer blows and speed the work significantly.

You can refine the bolster shape by working it on the anvil as shown in Drawing 5. You can even selectively cool one edge to retain its form while the opposite side is altered. You want a symmetrical “football” or lozenge shape to the bolster area.

Often the transitions between the first shoulder and the second when forged on the rounded edges of the anvil will develop a “web.” The transitions will not be crisp and angular, but will flow into each other reflecting the curve of the anvil edge. Attempting to forge this web away will often result in a cold shut, so it is preferable to leave it for now and do a bit of file clean up as necessary prior to final assembly.

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Photos 13 and 14.

Step Five (punching):

Review previous lessons on punches and hot punching.

The most efficient forging procedure is one in which each section is completed before moving to the next. This avoids reheating areas that have been left incomplete after they are cool.

While some smiths will reheat and punch the pivot hole after the rest of the tongs are done, efficiency dictates that now is the time to punch the pivot hole. With care drawing the reins, there

should be little or no distortion of a hole punched at this stage.

Punch the center of the bolster using a hot punch about 1/4-inch diameter on the end.

Remember to start punching from the outside of the joint with the jaw off the anvil at the far rounded edge. See Photo 13.

When you flip the work 180 degrees to complete the hole and then move to the pritchel hole or punching block to free the slug or "biscuit," the flat outside of the joint will lie flat on the anvil face. See Photo 14.

Drift the hole to 5/16 inch diameter.

Target:

Punch and drift the hole in a single heat. The hole should be centered in the mass of the pivot bolster.

This lesson is concluded in the next issue with Controlled Hand Forging Lesson 22B, "Drawing The Reins."

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