This Issue...
Tool Making
Fundamentals of Blacksmithing
Layout Table
Next Issue...
Plant and Animal Forms
AND MORE....

Fabrication and Forge Work

Into each forge shop some fabrication will fall. Fabrication is defined as "to make by art and labor... to assemble parts or sections". When the forging is done it is often time to fabricate those forged parts into a finished whole. While fabrication today often brings visions of cut and weld to mind, assembly with rivets, tenons and collars is also fabrication.

Layout, fitting (the adjusting and aligning of parts), and joinery are the basis of fabrication in a forge shop. A layout table that is solid and true is essential. Bending wrenches and forks, a hardwood block, pliers and files are the fitters tools. Joinery is achieved with clamps, purpose built collar sets, and bucking bars to back rivets.

With attention to layout measurements and detail, the result can be precise.

Mechanical Hammer
From Diderot’s Encyclopedia

Spring 1996
ABANA / Internet Update

The ABANA Internet Addresses are:
http://wuarchive.wustl.edu/edu/arts/blacksmithing/ABANA/
OR
http://sunsite.unc.edu/abana/

ABANA now has a second internet site located at the University of North Carolina. As the initial site developed and picked-up more traffic it was decided to add a 'mirror' site to split the load. The exposure that this pair of internet sites has given ABANA is huge. People from around the globe have discovered these sites and found out what ABANA means to the preservation and furtherance of the art of blacksmithing. The idea of educating the public to the potentials of forged metals is a task under development.

In just six months we have added over 100 new members through these sites. They include smiths and instructors of blacksmithing from Finland, Sweden, Belgium, New Zealand and South Africa as well as many states.

As E-Mail and Internet access becomes more widespread within our organization, there will be many services ABANA can offer. Tests now being done include high quality delivery of graphics and text, such as how-to material, quickly and direct to anyone's computer. The site for the storage of the test materials is at UNC, in the FTP (File Transfer Protocol) directory of the ABANA site.

To date the following chapters are on the internet:

California Blacksmith's Association http://www.quirknet.com/~ronin/CBA/cba.html
Guild of Metalsmiths http://webwrks.com/metal smiths
North Carolina Chapter of ABANA http://sunsite.unc.edu/nc-abana

There are approximately five more that are in the process of establishing their sites at this time. If your chapter has an interest, remember that there are disks available from ABANA to get you going.

An Invitation to the Connecticut Blacksmith's Guild

Having discovered this fine organization on the Internet and on behalf of ABANA and the ABANA Board; We would like to extend an invitation to the Connecticut Blacksmith's Guild to join the family of ABANA Chapters.

The Hammers' Blow

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Dear George,

Some thoughts on the Shop Notes in the Winter 1996 Hammers' Blow.

Regarding finishes, no mention was made of proper preparation. I used to use emery cloth but a power wire brush does better. In my high dry climate, satin finish polyurethane spray does a fine job. For articles where I want a black finish, heat the piece until beeswax will flow readily on it, then hold it over the flame until the wax flashes. Brush with a soft brush.

It has been said that there is nothing new on earth. In one of my most treasured books, "The Metal Workers Pattern Book" published in 1894, there is the exact formula for the ellipse per Bob Becker. Many skills and techniques have been forgotten and then re-discovered.

On door handles, when I first started making door hardware in the 20's and on, lock spindles were 9/32" square with drilled and tapped holes close together and a bunch of very thin washers to adjust the clearance against the escutcheon. I worked out a set of punches to make square holes in the handles. For 9/32" square, drill a 5/16" hole. The first punch is made to take out two corners, the second to finish all four. This is far better than the threaded spindles, even with two set screws. I now have punches to fit 1/4", 9/32" and 5/16" plus the metric for the good Austrian locks. The square spindle is also better for the lock mechanism, better fit and less wear on the square hole inside.

Cheers,
Francis Whitaker

Dear Editor,

I was taught many years ago the advantages of using a hammer with a square face for forging. The square face provides a straight peen on two edges. If your hammer is a cross peen and has a square face/straight peen, you can move metal in any direction with ease. Additionally, if the ends of the cross peen are rounded, you now have the function of a ball peen.

Shaping your hammer handle properly for your hand will result in much less gripping force being required. Flat sides with rounded corners top and bottom of the handle insure proper orientation in the hand. Soak the handle in boiled linseed oil, it will preserve the handle and improve the grip. A hammer is a personal thing.

Sincerely,
Steve Kayne

Dear George,

I like to keep my issues of The Hammers' Blow in a pressload binder so they are in order. Notebook rings eventually tear holes out. Would it be possible to move the inner margins over so it can be read in the binder? A small request but maybe others bind this way too.

Sincerely,
James Honig

(Editor: I have moved them in about an eighth of an inch, hope this makes the difference you need. To all; if there is interest in 'official' Hammers' Blow binders with our logo on the front, please let me know.)

Dear George.

I have been blacksmithing for 60 years. After reading Vol. 3 No. 4 on the fire (pg. 8 & 9) I thought you might want to add this simple procedure to keep your forge fire alive for a long time.

Bank your fire as shown, around a 2" diameter, 10" or 12" long piece of wood.

Your's,
William (Bill) Brady

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**Attention: Chapter Newsletter Editors**

The content of The Hammers' Blow is available for reprinting. If the article or tip is attributed to an author then they retain the copyright and you should contact them for permission. Those articles and tips that have no name with them are written by the editor and may be used at your discretion providing The Hammers' Blow and the editor are credited.

There are many chapter members who are not ABANA members and occasional use of material from this publication will not only share information but it may help them to see the advantages of an ABANA membership.
Blacksmith's Bookshelf

A Blacksmith’s Travel Album: European Anvils Old & New
The Art Nouveau Ironwork of Alessandro Mazzucotelli
By Leonard and Lilo Masters

This slim volume is brought to us by ABANA members Leonard and Lilo Masters. It is a dual compendium of pictures of the heart of any blacksmith’s shop, the anvil, and a gallery of the work of the Italian mastersmith Alessandro Mazzucotelli.

I first saw a book on Mazzucotelli in the library at Samuel Yellin’s shop. It is wonderful that this has been ‘reprinted’ in a manner that gets his work before all of us. The work depicted is both an excellent example of the Art Nouveau style as well as a timeless design reference for floral and geometric patterns. The predominantly architectural work appears as a fusion of the centuries of tradition that preceded it with a look that is still ”contemporary”. The relationship between the metalwork and the architecture is nearly perfect, often flowing in a seamless manner from iron to stone. A student or practitioner of either traditional or current styles could gain a lot from these pages.

The section on European anvils has tools to lust after. Stake and standard anvils, no-horn to two-horn anvils and more make this every tool collectors wish book.

Between the gallery and the tools one would have to conclude that some space should be made on a Blacksmith’s Bookshelf for this gem. It is available through Centaur Forge and Norm Larson and Mr. Masters states that one dollar of the twelve dollars this book costs will be donated to ABANA.
Thanks Leonard!

Shop Notes

Universal (almost) Scroll (kind of) Tong Reins Keeper
Howard Pohn

This ‘keeper’ has the advantage of being screwed on to the tong reins as tightly as one wishes. It can be closed from about 3 1/2” down to less than an inch with the 48 combinations possible. The spiral is formed from 3/8” bar stock. It is rolled and then filed, if you file it before you roll it it tends to kink on the filed points. From the inside out, the filed indentations are:
The first three spaced 1/2” apart, the next five are spaced 5/8” apart, the next six are 3/4” apart and the final three are 1” apart. The depressions are filled with a 1/2” rat-tail file to a depth of about 1/8”.

A Hammers’ Blow Coffee Cup Winner!

THE HAMMERS’ BLOW - SPRING 1996
Shop Notes

Here is another collection of tips and ideas from ABANA’s E-Mail Roundtable discussion group, ‘TheForge’. The topic was Anvil Stands. To join the discussions just send an E-Mail message addressed to:

listproc@wugate.wustl.edu

In the body of the message put:

subscribe theforge your name

With that you will be a member of a dynamic information sharing service.

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I made my anvil stand out of 6 pieces of 3” x 5” landscape timbers banded together, placed on end and sunk in the ground about 2 feet. The stand is really sturdy. I used lag bolts, chain and turnbuckles to fasten the anvil down. Seems to work well.

Michael Linn

To All,
The classic wood variety for an anvil stand is mulberry. Has anyone tried to cut down a mulberry tree? It will dull an axe of reasonable quality. Chain saws don’t fare much better. They are hard to find in really large diameters.

Bill Hochella

BAM has a design for anvil stands that is basically a metal can with a lip on the bottom so that the can will not slide around. The lip will dig in to the ground or floor surface. One fills the can with sand, puts a wooden board fitted to the inside of the can on top of the sand and your anvil rests upon the board. I’ve used one for about 1.5 years and am very pleased. I also have a stand made of angle iron and plate to take to demos.

Dr. Mark E. Williams

For the sand filled stand, the base needs tight so the sand doesn’t leak out. After you fill it, it takes several days of forking to get the air out and for the anvil to settle down. If you do a lot of heavy forging on one end, horn or tail, the anvil settles to that end and has to be leveled again.

For students, who come in various heights, we made adjustable anvil stands at John C. Campbell Folk School. There is a concrete base (18” x 20”) set about 4” into the ground with four corners, 1/4” x 4” x 4” (x 20” high or so) angles set in the concrete on a 10” x 12” spacing. The concrete comes up into the corners for about 4” above ground level. Then you put spacers, 1” or 2” thick, 10 x 12” on top of the concrete. The anvil sits on a 10” x 12” chunk of oak about 12” high. A chain with turnbuckle loops around the anvil feet and is secured to cross bars between the corners at 4” above the ground. They can be quickly adjusted for height and don’t move around when the chain is tight.

Clay Spencer

I just made a stand for my 140# anvil out of a 10 gallon pail filled with 120# of concrete. Before pouring the concrete I cut 4 pieces of 3/8” threaded rod and mounted them on a piece of wood (in a rectangular pattern) and put this on the bottom of the pail. I made sure the rod would stick up about 6” from the top of the pail since it was about 3-4” too short. After the concrete dried I drilled and cut three pieces of 4x6 and fitted them on top. The anvil rests on the wood and is held down by angle irons bolted to the rods.

Matt Balent

I’m using a couple of railroad ties (not the whole tie - these puppies started out 9 foot long) sunk end-wise into the floor of my shop. They’re beefy and hold up to abuse very well, plus the creosote protects the buried ends from rot.

Pete Goering

I use a pedestal made from 6’X 8’ wooden beams bolted together (4 of them). Heavy sucker, but the anvil is always level and it is just the right height (cause I made it that way).

Franklyn D. Garland
Echo’s of the 'Ring'

This selection came from the Fall, 1984 issue of The Anvil’s Ring (Volume 12, Number 3). It is titled “Larry Wood’s Tomahawk”

1. Select a piece of mild steel 10” long, 2” wide and 1/4” thick. Center punch the strip 2 1/4” on each side of center.

2. Heat and fold the two ends over the center punch marks.

3. Reheat the center section to a uniform heat and grab the two ends with tongs and rotate the two corners together to form the eye.

4. Brush the oxide off and sprinkle on welding flux in the area shown. Fold the two ends closer together and heat to welding temperature.

5. Working from the center to the top on each edge, hammer the weld together. The weld should be 1 1/2” long.

6. Cut a piece of old file to the width of the strap and hammer one end as shown.

7. Heat both pieces to an orange heat, clean with a steel brush and sprinkle the flux on both sides of the file piece and the inside of the spread ends.

8. Gently fold the two ends over the file, being careful not to drive out all of the flux.

9. Reheat to an orange heat and tap the file piece firmly into the folded over ends.

10. Heat to a welding heat and start the weld from the center out to each edge and toward the end.

11. Reheat to an orange heat and with the fuller end of a cross peen spread the hatchet end as shown. Continue the final forging to the shape desired. Straighten the handle hole with the anvil horn or a drift.

12. The top of the tomahawk hole should be larger than the bottom.
Scroll Types

This is part of a set of descriptive drawings from COSIRA’s magazine, Summer, 1934. They are being shared by Bob Bergman. (Another Hammers’ Blow Coffee Cup Winner!)

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**Fig. 1**
- Front Side
- Fish Tailed Scroll

**Fig. 2**
- Front Side
- Fish Tailed Knob Scroll

**Fig. 3**
- Front Side
- Fish Tailed Knob Scroll

**Fig. 4**
- Front Side
- Fish Tailed Knob Scroll

**Fig. 5**
- Front Side
- Fish Tailed Knob Scroll

**Fig. 6**
- Front Side
- Fish Tailed Knob Scroll

**Fig. 7**
- Front Side
- Fish Tailed Knob Scroll

**Fig. 8**
- Front Side
- Snub Ended Scroll

**Fig. 9**
- Front Side
- Snub Ended Scroll

**Fig. 10**
- Front Side
- Snub Ended Scroll

**Fig. 11**
- Front Side
- Snub Ended Scroll

**Fig. 12**
- Front Side
- Snub Ended Scroll

**Fig. 13**
- Front Side
- Snub Ended Scroll

**Fig. 14**
- Front Side
- Snub Ended Scroll

**Fig. 15**
- Front Side
- Flat Knob Scroll

**Fig. 16**
- Front Side
- Flat Knob Scroll

**Fig. 17**
- Front Side
- Flat Knob Scroll

**Fig. 18**
- Front Side
- Flat Knob Scroll

**Fig. 19**
- Front Side
- Flat Knob Scroll

**Fig. 20**
- Front Side
- Other Leaf End Scrolls

**Fig. 21**
- Front Side
- Other Leaf End Scrolls

**Fig. 22**
- Front Side
- Other Leaf End Scrolls

**Fig. 23**
- Front Side
- Other Leaf End Scrolls

**Fig. 24**
- Front Side
- Other Leaf End Scrolls

**Fig. 25**
- Front Side
- Other Leaf End Scrolls

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THE HAMMERS’ BLOW - SPRING 1996
Apprentices' Notebook

Tool Configurations:

There are many ways to form tools, this approach is geared towards producing functional, well-configured tools in as short an amount of time as possible.

Regardless of which tool steel you chose, tool configurations are basically universal. This section will focus on forging and finishing the shapes of a variety of tools with the emphasis on what makes an efficient working end.

Mild steel can be worked across a wide spectrum of heats, tool steel has a narrow range in which it can be forged. Forge the tool steel much out of this color, or temperature, and your tool stands a good chance of failing during heat treatment. Heat treatment varies with tool steels and so it will be covered in another section at a later date. Pick a type of tool steel and learn how to forge, normalize and heat treat it. Then stick to it.

Polish the finished tool end with a compound like Diamond White or Tripoli on a buffing wheel to remove fine file or belt scratches prior to heat treating. A polished tool is less likely to have a striation that can develop into a crack and it also has less friction when you cut with it.

Tool Configurations:
Slitting Chisel

Forge a thin rectangular cross-section on the end of a tool steel blank as shown (Fig.1). Keeping the taper long will reduce the ‘wedge’ aspect of the chisel allowing it to cut easier. This is because a slimmer chisel meets less resistance and has to displace less metal as it is driven into hot steel.

Take the forged blank and use a file, belt sander or grinder to do the final forming. With a belt sander, rock the blank against the belt to get a slightly elliptical cross section. The thin elliptical section of the chisel leaves a very clean cut. The slightly wider middle planishes the sidewall of the cut as the tool is struck and moved down a layout line. The result is a smooth cut without obvious tool marks.

Make this tool in a variety of cutting widths. The narrower blades can cut curves as well as straight lines. Finish the chisel so the cutting edge comes around and up the sides (Fig 2). This will keep the end of the cut clean even in thick stock. There should also be a slight radius on the corners of the blade as well as a gentle curve across the cutting edge of the blade (Fig 3). The curve will allow the tool to be walked down a cut line easier.
Apprentices' Notebook

Tool Configurations:
Curved Chisels - Small to Medium

Forge a thick rectangular cross section on the end of a tool steel blank. As with the slitting chisel, keep the taper long (Fig 4). Nick the center of the blank (Fig 5) with a triangular file or the corner of a square file. This will serve as a starting point for a round file which tends to slide without a mark to keep it in place. Use the round (rat tail) file to cut the inside curve of the chisel.

The most critical aspect of a curved chisel is symmetry. A chisel that is ‘curved’ but not symmetrical will not cut a clean circle, it will overlap its own cut line as it is rotated. To be sure of getting a symmetrical chisel, use a round file that is as wide as the cutting area you want to achieve. You can file-cut a chisel with an undersized file but be careful to keep it even.

When filing the inside of the curved chisel, keep the file low and file a long groove (Fig 6). This keeps the chisel slim for deeper cuts and allows it to be dressed more times before the cutting groove is buffed off. Once the inside groove is done, file or belt sand the outside material off until the cutting edge is finished (Fig 7). As with all the tools described here, polish the working end. Test the finished curve into a lead block before you heat treat it. Rotate the chisel as it is struck into the lead, if it tracks a circle then it is ready to heat treat.

Tool Configurations:
Curved Chisels - Large

Forge a wide, thin rectangular cross section on a tool steel blank (Fig 8). Dress the edges like you would for a slitting chisel (Fig 9).
Apprentices' Notebook

Tool Configurations:
Curved Chisels - Large

To form the curve, take a swage that is large enough to accommodate the blank and the fuller you will use to form the curve with (Fig 10). Set the blank, at forging heat, onto the bottom swage and drive the fuller down onto it, curving the chisel blank. Test the shape on a wood block if it is still hot or into lead if it's cool. Refine the shape as needed, polish and heat treat.

Make a variety of sizes of all the styles of curved chisels described here. Depending on the scale and type of work you choose to do, chisels from 1/8" radius to 1" radius are very useful.

Tool Configurations:
Butchers

Depending on the desired tool width, forge a square (wider) or rectangular (narrow) blank. Use a file, belt sander or grinder and shape the tool as shown (Fig 11). The steeper angle is for deeper cuts or layout passes which are usually followed with the shallow angle butcher (Fig 12). The steeper angle also has less tendency to skate forward when struck.

The butcher is used to depress material on one side of a layout line. (See The Hammers' Blow, Volume 3, Number 2, Spring 1995, for butcher use). Make the tools in pairs, one steep and one shallow in each width you need. As with straight chisels, a narrow butcher can cut curves as well as straight lines.

Wear Your Safety Glasses

Fig. 10

Even curve on both sides of center.

Fig. 11

Fig. 12
Apprentices' Notebook

Tool Configurations:
Flatter

A set of small, hand held flatters are invaluable in chasing and repoussé. Forge a square section on the end of a tool steel blank. Take a very localized heat on the square end and drive it down onto your anvil with moderate hammer blows. Rotate the blank as you hammer it, this will keep the end centered on the blank. To make a set of three, forge one blank square, upset another and draw the third down. One size of tool steel will give you three distinct flatter sizes.

Dress the working ends. Put a very slight crown on the face (Fig. 13). This keeps the edges from making contact as you move the tool across the surface of a project. Radius the edges gently, just enough to remove the sharpness, so any inadvertent mark is less severe and easier to planish out.

Tool Configurations:
Fuller

Depending on the desired radius of the fuller, forge a more or less narrow rectangular blank. Dress the face by rocking it against a belt sander or grinder or file the profile (Fig 14). Fullers can have a half-circle cross section or an elliptical cross section (Fig 15). The former is fine for a fullered line across or around a bar but it is less useful for drawing out. The elliptical cross section is better for drawing because it leaves marks that are less localized and are easier to smooth out. Be sure to radius the ends so they are not sharp. This will allow the fuller to be tracked along a line without leaving tool marks.
Project

Shelf Bracket
Stock: 1" X 3/16" flat 14" long
3/8" X 3/8" bar 9" long

Glue a copy of the pattern onto each end of the 1" X 3/16" stock. Rubber cement works well on small patterns.

Lightly chisel through the pattern, cold, with the appropriate curved chisel. This transfers the pattern onto the steel. Take a heat and carefully chisel out the pattern. Cut progressively around the pattern to avoid distortion. Dress with a file as needed.

Mark the center of the 1" X 3/16" flat stock with a center punch on the opposite side from where the pattern was applied. Take a heat and bend the piece as shown (Fig 16). Forge the bend square (see the Fundamentals of Blacksmithing section in this issue for how to forge a square corner). True up the lines of the finished piece and set it aside.

Take the 3/8" X 3/8" bar, measure in 1 3/4" from each end and mark it with a center punch. Put both marks on the same side. At a forging heat, bend one end of the bar at the punch mark keeping the mark on the inside of the bend. Forge the corner square. Repeat the process on the other end of the bar (Fig 17).

Make sure that the legs are even in length from the bends. Either upset or trim the long one if they are uneven. Measure in 1/4" from each end and mark around the bar in preparation for forging a tenon. (See the Volume 4, Number 4, Fall 1995 issue of The Hammers' Blow for how to forge a tenon). Butcher in on the line and forge a 1/4" diameter tenon. The stock allotted should give you a tenon about 3/8" long, trim this to 5/16" repeat the process on the other leg (Fig 18).
Project

Take a heat on the center section, quench the corners to maintain them and bend a curve in the piece as shown (Fig 19). Use a square to make certain the curve has taken the two legs 90 degrees apart from each another. To be sure the corners and curve are accurate, trace the piece and then flip it over on the tracing. If it is accurate it will lay onto the tracing either way.

Lay the finished 3/8” bar on the side of the 1” X 3/16” bent frame so that the tenoned shoulders are equal distant from the corner. Mark the 1” X 3/16” for drilling. Measure 1” on the outside of these layout marks and mark these locations for drilling as well. These are the holes for the mounting screws. Drill the four holes, counter sink the tenon holes from the outside of the corner.

Assembly

Insert one tenon into its hole in the 1” X 3/16” frame. Spring the frame, cold, enough to allow the other tenon to be rotated into place. The frame will now close down onto the shoulder of the tenon. Set both tenons flush into their respective countersinks.

Something To Try

For an added textural effect, hot forge the entire length of both pieces of stock with light hammer blows over their surface. Break all the edges slightly and then true-up the stock and proceed with the steps outlined here to make the shelf bracket. Prior to final assembly, take 60 grit emery cloth and hand sand the surface of the work until the high points are silver-gray. The work will darken with age so try taking it to a medium/bright finish. Coat the assembled bracket with polyurethane or with linseed oil mixed with turpentine and Japan Drier followed with paste wax for inside use.
Fundamentals of Blacksmithing

Upsetting

Of all basic processes, upsetting requires more heat than any except forge welding. Upsetting is compressing a section of a bar to increase its mass in a specific area. With practice and control you can upset any part of a bar, from its end to its middle.

To upset the end of a bar, take a high heat (yellow/white) and keep it as short as possible. If too much of the bar gets into the forging range it will be more apt to bend than to upset. Quench behind the heat to localize it if necessary.

Upsetting with repeated blows that are moderate in force is easier to control. When possible, rotate the bar a quarter turn with each hammer blow to even out the force you are putting into the bar. Try to move around the bar if it is upright in a vise as you hammer to get the same effect as rotating the bar. Using a light-weight hammer can also improve both control and the effect.

To upset a bar at some point along its length, take a localized heat where you want to increase the cross section. Control the heat zone with a sprinkler can as needed and either drive the bar onto a steel block or hammer the end while it is set on an anvil. As always, rotate the bar as you work. It is also important to straighten the bar between heats and sometimes during a heat. The energy needed to upset will quickly distort a bar if it begins to bend.

A quick upset on a small to medium bar can be worked into the step of the anvil (Fig 20). Again, rotate the bar a quarter turn with each hammer blow. When the end is close to the required mass, move to the surface of the anvil and drive the faceted end down (Fig 21).

Larger bars can be upset with their own weight by driving them down onto a block of steel set on the floor (Fig 22).
Fundamentals of Blacksmithing

Square Corners

This process can also be used to take a bend beyond a right angle (Fig 23). In any case, take a heat in the middle of a bar and bend it ninety degrees (Fig 24). Take a high forging heat and if possible, set one leg of the bend on the surface of an anvil when you begin to drive the material down onto the vertical leg (Fig 25). Keep the face of the hammer centered over the leg as you work.

Switch ends so the other leg of the bend is supported and repeat the process. This moves material into the curved corner which you will then continue to refine into a sharp corner (Fig 26). If the bar is too long or too heavy to stand on the anvil, you can get the same result by laying it on its side with the corner set past the anvils edge (Fig 27). Work the two sides evenly and be sure to keep the hammer blows over one of the legs to prevent distortion or thinning.

A common error is to work over the edge of the anvil. If a leg of the bend is backed by the anvil it is easy to get thinning at the corner. Use the anvil to adjust the bend and maintain 'square' periodically but keep the inside of the corner unbacked. Another tip is to mark the center line of both legs and use that center line to check against a square. This prevents any bulges in the stock near the corner from interfering with the square.
Layout Table

The layout table described here is a large one (4’ 6” x 9’) for architectural use. The same approach, with smaller dimension angle iron can be made for general shop use.

The advantage this table has over a plate top table is the ability to clamp work just about anywhere. If the gap between the cross members occurs where you need support for a component, it is easy to stub-in a short ‘bridge’ of angle iron for that specific assembly. The stock in the example is 3” X 6” X 3/8” offset angle iron. The legs are 4” X 4” X 1/4” square tube joined by a 3” X 8” X 1/4” rectangular tube ‘trestle’. There are 1” diameter acme thread bolt levelers on each corner to allow the table to be trued where it sits in spite of floor conditions.

The welding in the table assembly is important. After test fitting, grind out pockets 1 1/2” long for the welding prep. To avoid warpage from the welding, the frame and cross members were ‘skip-welded’. This is where the welds are of short length and the site of the welding is moved around the assembly to prevent heat build-up. It is also welded ‘just enough’, that is there are many 1 1/2” welds, mostly at corners and spaced about a foot apart on cross member joinery to minimize warpage. This as opposed to long, continuous weld beads that can cause distortion.

![Diagram of Layout Table]

Assembly:

The angle iron ribs are cut and assembled. The two pieces of angle for the ends are cut to span the total width of the table while the others are inside dimensions. In all cases it is essential that the pieces be straight. They can be trued in a press or in a box frame made for the job that will accommodate a hydraulic jack. You only build this table once in a lifetime, so the effort is worth while.

With good quality levels, the frame can be assembled on any floor. Blocks and shims can be used to set the frame members level and square. Use the two longer end pieces as braces to clamp and hold the long side angles as the inside cross members are placed. Weld the table top carefully, as described. Place the two end pieces after they are no longer needed as braces.

Drill the 4” X 4” legs to receive the 1” acme bolts. Weld the nuts in place. Point the bolt bluntly and set a countersink into the center of four small pieces of plate. These will sit on the floor, the points of the acme bolts will rest in the countersink and when the bolts are turned for leveling they won’t travel or chew up the floor. Weld the 4” X 4” uprights to the legs and cut and weld in the trestle. Cut the trestle at a length which positions the uprights properly under the table top. Set the table top onto the trestle/leg assembly. Make the final welds and grind those that are above grade flush.
Motif:
Chisel-cut and Forged Motif
Stock: 1" X 3/16" Steel Flat
Tools: Straight and curved chisels, thin fuller.

Fullered Line

Chisel-cut Line

3/8"

2"

1/2" 1/4"

Take a heat.

Spread and taper the end of the bar.

Layout and mark with the tools to be used hot. Fuller the center line, then start with the chisels.

Hot split. Draw out. Scroll the end.

The last step is to scroll the flared end back over the top of the piece.
It's A Kit!

The pictures on the cover are of a person-powered power hammer from the 1700's. It worked in a manner similar to a water driven hammer with a hand-cranked fly wheel in place of the water driven shaft. This page shows all of the non-wooden parts you would need to build one. Please send photos as you get yours finished.
Opportunities

Position Announced:
Artist In Residence / Smithy Manager at the National Ornamental Metal Museum in Memphis, Tennessee. This is a full-time position which requires an undergraduate degree from a ferrous or non-ferrous metals program. Starting salary is $16,500. Benefits include medical insurance, workman’s compensation, paid sick and annual leave and an employer supported pension plan. Access to studio space is included and personal commissions and work for exhibition are encouraged.

This is not a training position, experience with a wide variety of metalworking techniques and processes is required. To apply, send a letter of interest, slides of recent work and a resume detailing education, current and previous work experience and three references with addresses and daytime phone numbers.

Interviews will be conducted at the 1996 ABANA Conference in Alfred, New York (June 26-29) and at the Museum in Memphis.

Send all correspondence to Jim Wallace, Director, National Ornamental Metal Museum, 374 Metal Museum Drive, Memphis, TN 38106

Position Announced:
Two-year museum internship at the National Ornamental Metals Museum. In addition to a $500 per month stipend, The Museum provides health insurance, workman’s compensation, a one bedroom apartment with utilities and studio space. There are opportunities for commission and repair work throughout the year.

Applicants must have completed undergraduate work in metals or have comparable training through an apprenticeship or an academic situation. To apply, send a letter of interest, slides of recent work and a resume detailing education, current and previous work experience and three references with addresses and daytime phone numbers.

Interviews will be conducted at the 1996 ABANA Conference in Alfred, New York (June 26-29) and at the Museum in Memphis.

Send all correspondence to Jim Wallace, Director, National Ornamental Metal Museum, 374 Metal Museum Drive, Memphis, TN 38106

Position Announced: Journeyman level or advanced apprentice to do architectural/product line work. Contact Craig May, Dragon Forge Ltd., 303 838-2619 (after 6:00pm MST)

For Sale

200lb. Bradley Upright Helve Hammer:
7 sets of dies, 10hp 3ph motor. A1 condition $4,400 or best offer. Contact Art Wolfe, 12090 Caves Rd., Chesterland, Ohio 44026 216 729-0777 Fax 216 729-0702

150lb. Bradley Upright Power Hammer:
Excellent condition, 71/2hp 3-phase motor. $4,000 Robert Oberlander, 7180 Millfair Rd. McKean, PA 16426 814 833-7896

Johnson 133B Forge Furnace: 400M BTU $850 or trade for vertical milling machine. Contact Tom Myers, 307 Lincoln Ave., Pittsburgh, PA 15202 412 766-6860

Studio/Factory For Sale: 6,000 sq. ft. 3 phase and 240v D.C. electric service, compressed air system, loading dock on 1 acre lot. Village water and cheap municipal electric rates. $60,000. 8 miles from Alfred, NY. Current tenant has installed 200lb. Bradley upright hammer, possibly available to buyer. 607 478-8989

Heavy Duty Frying Pan Blanks: Steel, approximately 9" diameter with 2" sides -- 12 gauge (.095) thickness. Has two 3/16" holes for your decorative handle or available without holes. $7.75 each, $7.00 for 5-9, $6.00 for 10 or more. Shipping $2.50 plus .50 for each pan. Contact Bob Tuftee, 3855 Aspen Hills Drive, Bettendorf, IA 52722

Hammers' Blow Coffee Mugs!
You can get one free if your Shop Tip is selected as Best Beginner or Best Intermediate/Advanced Tip. OR........you can buy one from the ABANA office for $5.00 plus shipping. (Free is definitely better!) They are light gray with the new HB logo on one side and our anvil toting assistant on the other.

Join ABANA!
For membership information call 1-314-390-2133 or write to: ABANA PO Box 206, Washington, MO 63090

THE HAMMERS' BLOW - SPRING 1996
1996 ABANA Conference, June 26-29
Get A 25lb. Little Giant For $1....... 

The Iron-In-The-Hat at the ABANA Conference this year promises to be interesting. Aside from the usual array of donated tools will be a 25lb Little Giant power hammer, rebuilt on site and donated by Sid Suedmeier, the one-stop Little Giant man. Sid's generous gift to the Conference will benefit the ABANA Scholarship Fund. This year, as at St. Louis in 1994, the Iron-In-The-Hat proceeds go to the fund which in turn helps ABANA members pursue educational opportunities. Every ticket you buy, every tool you donate will go to build up the Scholarship Fund for the coming two years.

Regional Events

Indiana Blacksmithing Association
Tipton, Indiana
June 1-2, 1996

Illinois Valley Blacksmithing Association
June 8-9, 1996
Pontiac, IL

ABANA Conference
June 26-29, 1996
Alfred, NY

Banging on the Bayou III
Louisiana Metalsmith's Association
October 4-5, 1996

Alabama Forge Council
September 6-8, 1996
Tannehill State Park
Mc Calla, AL

Florida Artists Blacksmith's Association
October 1996
Barberville, FL

Rocky Mountain Smiths
Sixth Annual Blacksmithing Conference
August 15-18, 1996
Including:
Pre-Conference Workshops:
August 4-9
Beginning Blacksmithing
Gordo Stonington

August 10-14
Advanced Blacksmithing
Francis Whitaker

August 12-15
Repousse
Nahum Hersom

Conference Contact: Dan Nibbelink
970 532-4382
Workshop Contact: Adele Hause
970 963-2562

Hmm, I wonder where the 1998 ABANA Conference will be held?