Foundations!

A Resource for Beginners.
by Bud Oggier
the Anvil's Ring/ Fall 1987 Part 7

"Hi, Jean, good to see you again. Ready for some more blacksmithing?

Today let's make a tool for the anvil, a hardie. The hardie is a tool used to cut off a piece of stock. It looks like an overgrown chisel that sits in the square hole in the anvil. To use it, you position the stock on top of the hardie, then hit the stock with a hammer until it is cut off. We can use a piece of this old truck axle I've got here to make our hardie tool from. It is oil-hardening and gets quite tough.

In making anvil tools, I like to make the shank first and get a good shoulder to seat on the anvil, then forge up the working, or top side. When forging a shoulder, it is much easier if you use a downsider or butcher tool to form the shoulder. This tool looks like a blunt cold chisel with all of the angle on one side. It forms a groove made up of one straight side and one angled side. Once you've made a groove around all four sides of the stock, you can forge the rest of the shank down to size. When you put in the grooves, don't go quite to the full depth of the tool; leave about 1/1 6" to forge down in the bottom to be sure you don't get a cold shut or lap in the corner.

Well, let's get started. To put these grooves in, one of us will hold the piece and the downsider, and the other will be the striker and hit the downsider with a sledge. Let me put in the first groove or two while you strike, then you do the other two while I strike. When you strike, Jean, stand on the opposite side of the anvil and don't hit the first blow too hard. I'll tell you if you should strike harder.

O.K., this bar is hot enough. You ready? I'll put the downsider on top of the bar and position it to get a square groove across. O.K., hit, again, harder, good, keep hitting. Stop, that's deep enough. Now I'll turn the bar 90° and start the second groove. O.K., hit, again, again, keep going. Stop, that's enough. We'll reheat and you cut the next two grooves. Try to match the previous groove and keep the tool square across the bar.

Jean, because this downsider is quite heavy, it doesn't get very hot; if it or any other striking tool were smaller, we'd have to cool it in the slack tub to keep it from getting hot enough to draw the temper. When your bar is ready, bring it out, line up the downsider, and tell me when to hit. Don't forget to tell me when to stop, O.K.?

Is that bar ready? Turn the last groove so it's at right angle to the anvil face and line up your downsider; ready for a hit? Good! Now turn 90° again and line up the downsider so it matches the two grooves coming up on each side. Here we go. There—now we can finish up forging the shank.

While the bar is reheating, let's talk about what we're going to do next. When we start to forge down the shank, the bar has to be positioned on the anvil so the newly made groove is partly off the anvil edge; otherwise, the anvil would deform the shoulder part we've just put in. One has to be careful not to create a cold shut or any folds in the corner while forging. To avoid this, start close to the shoulder and forge toward the end.

It's wise to take a look after each heat and be sure there is not the beginning of a cold shut. If there is, right then is the time to cut it out with a hot cut chisel. I use one shaped like a carpenter's gouge, that is, radiused, so it scoops out a chip and doesn't leave any sharp line or demarcation.

O.K., the bar is hot. I'll start out on the first two sides and you can do the other two. Remember, keep the edge of the groove off the anvil, start forging at the groove and work towards the end. Boy! This oil hardening steel sure is hard to move, not like mild steel. But if we want a good tool that's part of the price we have to pay. Time to reheat, but first let's check both sides to be sure no cold shut is starting in a corner. It looks O.K., so back into the fire.

Jean, hardening steels are not as forgiving as mild steel when they are forged; they also have a rather limited range of forging temperatures. If you work them too hot, they will probably break apart. If you work too cold they tend to crack. Generally, they should be no hotter than bright orange and no colder than medium red. Jean, this bar is ready again, but I'm not, so why don't you start forging the other two sides while I get my wind back. Be sure to position the bar right. O.K., go for it. Good, check it for cold shuts, now

back into the fire.

About four more heats and we'll be ready to finish this shank. Well, here I go. Now that we've forged the shank so it's below the shoulder, can push the bar so the anvil hits up against the shoulder. I'm going to move down to the center of the anvil where the edge has a very small radius—that way it will forge all the way into the corner. There, that's about all I'm going to get on this heat. Your turn!

You're doing well, Jean; your two sides are about as far down as mine. My experience just about offsets your youth and vigor so we come out even!
Jean, I've shown you how this part is done if you are working alone and don't have a power hammer. Now, on the next two heats I'll show you how to do it with a striker.

On this heat I'll hold a set hammer in position while you strike with the sledge, O.K.? I'll be moving the set hammer after each blow so pay close attention. A set hammer is a square, thick-handled tool that is hit with a heavy hammer wherever the blows must be precisely positioned (as in the corner of this hardie) or when forging with a striker. My set hammer is about 1 1/4" square.

Here we go—O.K., keep striking about that force. Notice the set hammer moves after each blow, but not its full width—instead the blows overlap one another. Jean, that 8 lb. hammer you're using is a good size for general striking. Sometimes, on larger work, you may have to go up as high as a 12 lb. in order to get the metal to move.

This time I'll strike for you. When you use a sledge for smithing, it doesn't have to travel as far as when you split wood with wedges, and the technique is a little different. If you are right-handed, put your left foot forward, place your right hand fairly close to the head of the hammer and your left hand towards the end of the handle. Notice my striking sledge has a shorter handle than a normal sledge hammer because you don't swing it as far as you would on other types of work.

Your hands don't move on the handle during the stroke. Your right hand moves just the same as if you were using a regular forging hammer, and the left hand moves the handle up under your right arm pit. The hammer moves up and down in a straight line. Don't start up too high—a little above shoulder height is about right. This may feel awkward to begin with, but it's a system that's been proven over hundreds of years, and works well.

Well, let's work on the other two sides, ready? Hold up, Jean. While there is still a little heat left, put your set hammer in place and watch how I use the hammer. See how the end of the handle comes right up under my right arm pit? My right hand works just like it was using my regular forging hammer, and the hammer goes straight up and down. To regulate the force, I just move the hammer higher to start the stroke. In blacksmithing, it is rarely necessary to hit something harder than can be done this way.

I'm going to put a blunt taper on the end of the shank so we can try it in the hardie hole and see how we're coming for it. Now that it's tapered and is still hot, I'll put it in the hardie hole and hit the cold end. The hardie hole will mark the shank were it is too tight. There, see the marks? Most hardie holes in old anvils are not straight, the sides are tapered some, and I've seen some that were not square. There's nothing you can do about this without major work, so just live with it.

O.K., let's finish the shank so it fits into the hole. We'll be using the marks as an indicator of where to hit. There, I think I've got it finished down enough, but let's check by using the same technique as before. Stick it in the hardie hole and hit the top end. Well, it went in better than halfway, and all the marks are on two opposite sides, so we have to forge down a little more. One more heat ought to do it. I don't know if you noticed, but the corners showed heavy marking, so I'll not only forge down the two tight sides, but also chamfer the corners to give them clearance.

There, I think the two sides are down enough; now I'll do the corners and try it in the hardie hole. Great, it went all the way down. Notice that the shoulder doesn't hit the anvil all the way around, so with the next heat we'll set it in the anvil and hit the end hard enough to drive it down and get a good seat on the anvil face. I'll put it in the hole and you strike, O.K.?

Here we go, hit it hard, again, again, stop. Looks like it's not quite down all the way around, so hit it again, once more, good!

Now we're ready to start on the working, or top side. This is going to be a hot cut chisel, so it should

be quite thin at the top. It will look like a chisel sticking up from the anvil and be about 1/2" thick where it meets the base. A thin chisel cuts more quickly than a thick one, but if you're working on heavy stock, you'll still have to cool it. I can usually cut off 1 1/4" square stock on mine without getting it too hot. Just remember, the chisel may be hot when you pick it out of the anvil, so don't get burned.

The first thing we're going to do is put a large radiuses groove in on two sides. If we start the groove about an inch above the shoulder, it should leave us a good base under the blade. We're going to use top and bottom fullers in order to put in both grooves at the same time.

Top fullers are striking tools which are hit with a heavy hammer and have a radiuses end on them. Bottom fullers fit into the hardie hole and have a radius on top. In effect, it's like driving a cold round bar into a hot piece to create a round bottomed groove. In this case I'll use a 3/4" top and bottom fuller. I'll put the bar on the bottom fuller and position the top fuller directly above it. Then when the top fuller is hit, the groove goes into both sides at once.

O.K., the bar is hot. Let's line up over the bottom fuller, put the top fuller directly above, and hit it. Again, again, keep on, once more, now stop.
Look at that, Jean—a groove on each side, both put in at the same time. There is about 1/2" between the bottoms of the grooves, and the grooves come out about 3/8" above the shoulder. Now, all we have to do is cut off the bar and forge out the blade.

To cut off the bar, we're going to use a hot cut hardie and top hot cutter similarly to the way we used the fullers. O.K., here we go. Ready to strike? Put the bar on the hot cut hardie, position the top hot cut directly above, and hit. Again, again, harder, again. There, it's almost cut through, so I'll break it off, I didn't want to cut it completely off or I might have damaged one or both cutters, and besides, the piece would have flown off and might have hit my striker. Now, Jean, we have to draw out the blade, starting at the two grooves we just put in, and taper it out to the end. In order to draw this out more quickly, let's do it together. This time I'll hit the piece, then you hit in the same place with the sledge. Strike with the same relative force as my blow, if I hit harder, you hit harder. I'll hit, you hit, I hit, you hit, etc.

Notice these tongs I'm going to use? They're called box tongs. They're the same as the flat jaw tongs we used before, except one jaw has a lip on each side so that when the jaws are closed they hold the piece in a box. That way there is no slippage from side to side and the piece is held firmly.

O.K., let's draw out the blade. Remember to hit where I hit, and just as hard. We'll be working over the horn in order to make it draw out faster. Here we go, hit, hit, hit, got the rhythm? Keep going, good. Whoa! Let me straighten up the sides a little—that looks pretty good. A couple of more heats and that ought to do it.

O.K., Jean, let's go once more—hit, again, a little lighter now. Let me finish off the sides. There, notice how our drawing out now starts at the bottom of the groove and tapers all the way to the end, so it's about a 1/4" at the very end? I see that the sides have overlapped a little at the end . If we forged them back, there would probably be a cold shut or seam in the middle and that wouldn't be good. Why don't you heat it up and cut about 1/4" off the end to get rid of the cold shut—O.K., good.

Now let's look and be sure the blade sticks up straight from the anvil and that it still seats properly, because after it is hardened we won't be able to correct without annealing and rehardening. Looks like everything is O.K. Next time we'll harden and temper this, then grind it, and it's ready to use.

Well Jean, the work on this piece is all done, and there was quite a bit of it, but each time you use it you can say to yourself, "I pounded every surface and shape into this, and it suits me, and if it doesn't, I know how to make another that will". I personally believe that making your own tools is good forging discipline. Also, your tools are made to suit you, it's cheaper than buying them, and you derive a lot of pleasure and satisfaction from using them.

See you next time, and we'll harden and temper this piece."

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Building Blocks

A "Back to basics" project

the Anvil's Ring/Spring 1988

by Dorothy Stiegler

We're making something for Spring this time; easy, but very pretty. You will need to have a spring fuller for this. If you have one, skip the next part; if you don't, read on.

Start with a 26' piece of 5/8" round mild steel. If your anvil face is short, be sure to vary the dimensions accordingly. Tool steel is fine, but generally you don't need it and you can't quench it. Heat the last 2" at the end of the bar and position the work on the anvil, keeping as much of the 2" on the anvil face as possible. Using a rounding hammer, punch, or a large ball-peen, forge a fin-like section (1" X 3/8") out of the side of the stock, approximately 3/4" from the end. Leave the stock opposite the fin its original size.

Fig. 1

Reheat and hold the tip end (see Fig. 1-A) over the tip of the horn. If you are right-handed, drop your left hand down and strike the tip with the flat side of the hammer. The end should now be curved down (see Fig. 2). Dress it with a hot rasp and then repeat the whole operation on the other end of the bar. Keep the fin-like sections aligned on the same plane.

Fig. 2

If the piece twists a little, take a heat along the round bar, hold the work in the vise ahead of the heat, put a wrench on the work behind the heat, and even the ends up. A twist in round stock won't show as a twist.

Measure and mark the bar at 8", 11", 13 3/4" and 16". Heat at the 8" mark and, with the fin side up, bend at a 90° angle (see Fig. 3). Take care to keep it from twisting. Heat the 11" area, quench the 8" bend with a can of water, and bend the piece back on itself. Keep everything in a flat plane. Heat at the 1 3 3/4" mark and bend at a 90° angle away from the 11" bend. This makes a hardie hole leg and keeps the fuller tool level with the anvil at the same time.

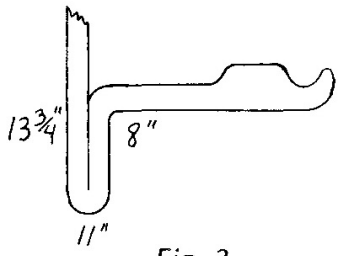

Fig. 3

Now, measure 15", 16" and 17" and heat that area (localize this with your can of H20); then bend around in a U-shape until the two fins meet (Fig. 4). If the top leg is too long, heat at B and tap at A, driving the leg back and thereby shortening it. If the leg is too short, heat at C and tap at B, driving the leg forward a little. The fins should match up. If they are not aligned, you can heat the piece up and straighten it out with flat, overlapping hammer blows.

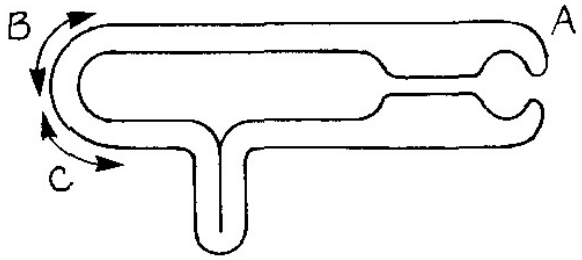

Fig. 4

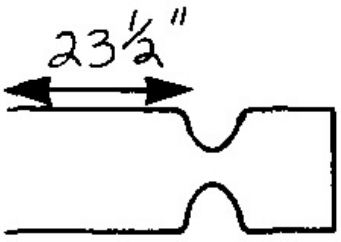

Fig.5

Take a 3 oz. lead sinker and flatten it with the hammer; this makes a good shim to hold the fuller in the hardie hole. O.K., here we go now. Put the tool in the hardie so it rests along the face of the anvil. You will still have room to work, unless your anvil is shorter than mine. Take a 24" piece of 3/8" round mild steel and heat the last 1 ". Taking the work to the anvil, stick the last 1/2" of the piece into the spring fuller between the nibs. Be sure to keep the work level; don't let the left hand drop. Strike a couple of flat, even hammer blows and turn the work 90° to the left, and repeat (Fig.5). Reheat the work and remove the fuller from the anvil, unless you work with the horn facing the hammer hand.

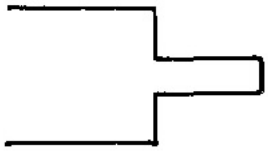

Fig.. 6

Take the work to the anvil and, holding the fullered notch at the front side of the anvil face, come in with the hammer and draw the little nib out to make a square rivet, approximately 1/8" — 3/1 6" square (see Fig.. 6). To keep the rivet from work hardening keep the work hot, level and clean, and at a good 90° to the front side of your anvil. I brace my work hand on my hip which helps a lot.

To keep it square, hit the same number of times on one side as you do another. To keep it centered, keep the work hot — not sparking — and keep the heats even and the hammer flat. To keep a clean shoulder, keep the work level and don't look at the shoulder — look instead at the spot you want to hit, the rivet part. You generally will hit where you look. Draw the rivet out to approximately 3/16" sq. It will vary from 3/4" 1 "long. Cut off anything else.

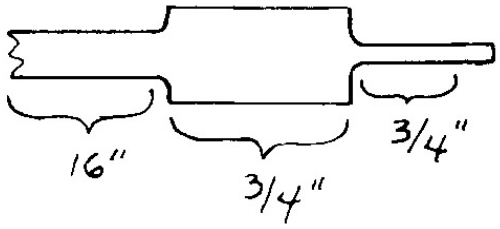

Fig. 7

Reheat, this time about 3/4" — 1" behind the rivet head. Place the piece in the fuller 3/4" past the rivet shoulder. Rotate the piece around as you neck it down gently to approximately 1/4" round, leaving the piece rounded in the shoulder instead of square as the first one was. This is the beginning of a flower hip. It's rather long like an iris hip, instead of round like a rose hip.

After reheating, take the work to the anvil and, keeping the hip part just to the far side of the anvil, draw the stem down to the fullering depth (1/4"round). Working from the front to the back, draw it down square first; then when it's almost there, make it octagonal and then round. This way it will be much less lumpy when you are finished. When you get a stem about 1 6" long, cut the rest off (Fig. 7). File it up nicely, and get rid of the dings if they bother you.

There will be 8 leaves in all: 3 long and big, 3 medium, 2 small. Here's the pattern. Draw everything out on paper and transfer with a pencil onto 20 ga. non-galvanized sheet steel. Use right and left hand sheers to cut the leaves out. File the edges well.

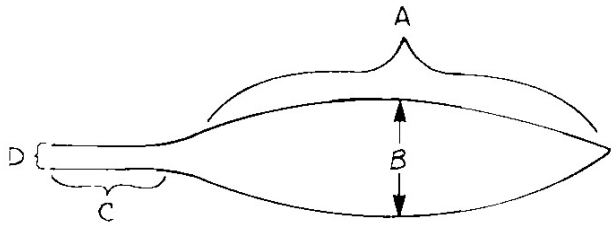

Fig. 8

Make 3 leaves in the following dimensions (refer to Fig. 8 for all):
A = 8"
B = 2"
C=1 1/4"
D = 3/4"

Make 3 more leaves at:
A = 5"
B = 1 3/4"
C=1 1/4"
D = 3/4"

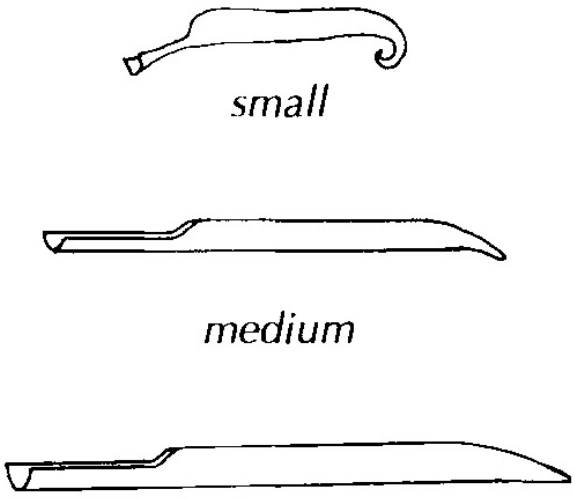

Fig.9

Make the last 2 leaves at:
A = 2 3/4"
B = 1 1/4"
C = 1 1/4"
D = 3/4"

Cold hammer these with a straightpeen or crosspeen so you have a long texture pattern going down the length of the leaf. These dents are important to the overall look of the finished piece, so take care to aim.

Now, heat the stem end a little (it burns quickly) and lay it in a small bottom swedge or lengthwise to the anvil step. Put a piece of 1/4' round on top of it lengthwke and hit the 1/4 round with a flat hammer. This bends the stem into a U-shape that fits around a piece the size of your stem. Be careful not to kink anything. Don't force it to stop at the end of the stem let it flow on into the leaf.

Reheat and, using a larger fuller or the step, use the same technique to make a slight bow in the leaf (not much, now, these are fairly straight leaves). On the tip of one long, one medium, and both small leaves, heat and roll the tip back away from the inside of the leaf away from the bow shape. On the small leaves you can curl back only the tip end. The medium and larger ones should be curled longer but less tightly (Fig.9).

Clean everything up with a wire brush. We'll make the flower parts next time. Do you have an idea which kind ft will be? If you attend the Sloss Conference you will have a leg up on the next installment I'm going to demonstrate this flower while I'm there.

See you next time.

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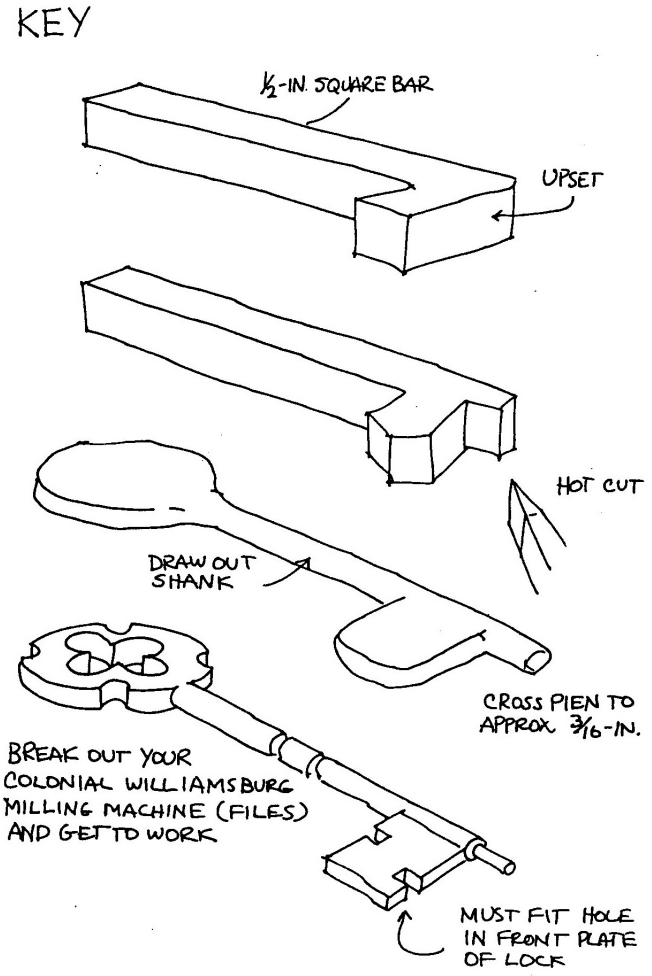
Treasure Chest Padlock

By Doug Merkel
from the North Carolina Chapter

A pirate's treasure chest with forged hinges, hasp, and reinforcing straps would look a little odd with a Master Combination Lock on the front. Never having forged a padlock I started by looking through blacksmithing books for examples. Few were found and those I did find gave no clue as to their internal workings. I was able to look at a few antiques that Tal Harris has in his possession which helped. Peter Ross was kind enough to provide a sketch of a padlock that was recovered from a ship that sank in the Delaware River in 1759. Needing a period lock I decided to reproduce the one sketched by Peter.

All the pieces other than the pins were made out of mild steel. The pins were made out of large soft Iron rivets. The first item to make is the key as this becomes your pattern and test piece. All other parts are made to the scale of the key. See the sketch for how the key was made. In fact, the sketches should give you all you need to build your own lock. The front and back plate were cut from 16 gauge steel as was the side piece that goes all the way around the lock.

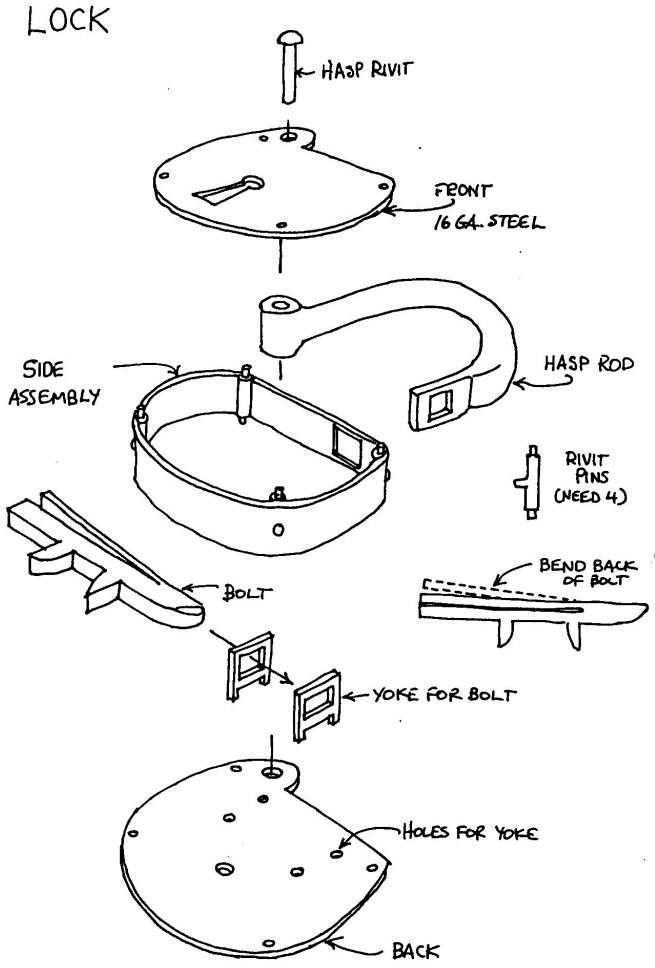
The front and back plate are held together with pins with the side piece acting as a spacer. The holding pins around the edge of the lock were made out of soft iron each with three tenons, one holds the side plate. one holds the front plate and the third holds the back plate, see diagrams. The side tenon was made first then both ends were forged. An alternative method of making the pins is shown in the diagrams. Lots of file work and tests were made to get the right spacing. Rivet the pins to the side piece first and use this as a gauge as to where to drill the holes in the front and back plate. I did it in reverse and had a heck of a time getting things to fit.



If you use them the internal wards are pinned to the inside of the front plate. The key is used as your gauge for making and placing the wards. The wards must be finished and attached before the lock is assembled. Also the sliding key hole cover needs to be finished and attached before you assemble the lock. The sliding internal bolt is attached to the inside of the back plate with two yokes that are pinned to the back plate. These yokes need to hold the sliding bolt centered between the front and back plates. The placement of the yokes is important so that the bolt does not go too far in either direction and fall out once the lock is assembled. Again, the key is used to check the bolt's operation before the lock is assembled. Lots of dry assemblies file work, and more assemblies are required before you head over the final rivets.

The curved hasp rod was forged and added to the lock after the lock body was assembled. Think ahead as you work. Don't rivet things together before you check what comes next. It is a lot of work to drill out a rivet and remake a pin, I know. Good luck on your own lock. I think I will try the next one out of wrought iron and let it antique outside for a few months. I'd like to hear if anyone knows of a good book that details the internal working of old locks.

Redrawn by Jim Richey

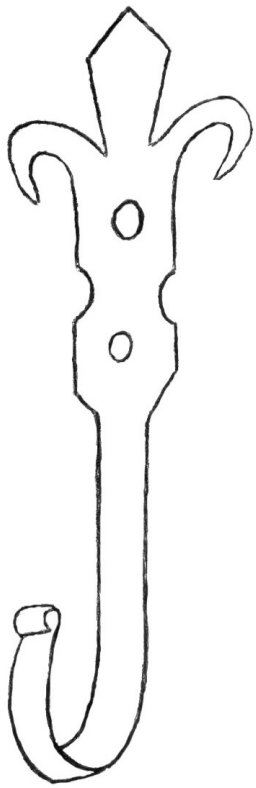


Fleur-de-lis Hook

Alabama Forge Council
Athens Forge-

At our October meeting our project was a small utility hook with a fleur-de-lis based design. Our stock was 3/16' x 1" x 6". We started out by cold marking with a spring fuller at 2-1/2" and at 3-1/2" from one end. These two points were fullered to 1/2 the thickness of the stock. Starting at the 3-1/2" fuller, that remaining portion was drawn out to a taper that was about 1/8" X 3/16" wide. The taper was about 5-1/2" long. Next, the fleur de lis is hot chiseled as shown in the picture. If it is hot chiseled, as opposed to being cut with a saw, the edges are nicely beveled. Finally, the hook end is formed. Makes a nice "carry home" project.

Bill Richardson



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Northeast Blacksmiths holds its meets twice a year at the Ashokan Field Campus in New York State.

The Ashokan campus is located in Olivebridge, N.Y., several miles west of Kingston, N.Y. The meets are held the first weekend in May and in the first weekend in October every year. The main demonstration is in the blacksmith shop and there is a "Hands On" workshop for beginners. A main demonstrator is brought in for each meet, food and bunk-house style lodging are provided as part of the cost of the weekend long meet.

Contact : Tim Neu
to register for hammer-ins
or subscribe to the newsletter;
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Home / work Phone # **E-mail (optional)**

ABANA Member? O **Yes** O **No**
Can you host a PABA meeting? O **Yes** O **No**
Are you willing to demonstrate at a PABA meeting? O **Yes** O **No**

_____
Suggestions for PABA demonstrations

What is your skill level?
O Beginner O Intermediate O Advanced O Professional

Send your completed application with $ 10 (one year dues) to;
Treasurer Gene Degenhardt
271 Stoney Lane
Lancaster, PA 17603

PABA Membership Application
Membership is from
Jan. 1 — Dec. 31

PENNSYLVANIA Artist BLACKSMITHS' ASSOCIATION

New Jersey
Blacksmiths Association
90 William Avenue
Staten Island, New York 10308
Attn: Larry Brown, Editor

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How to Join or Renew your Membership in NJBA:

NJBA Dues are $18 per year (as of July 1, 2001).
Please make your check out to: "NJBA"
Please mail checks to:
NJBA, P.O. Box 195, Howell, N.J. 07731

Please include payment with the information listed below. You will receive a postcard confirmation of your membership, and will receive a newsletter within a month. NJBA's "year" runs from June to June. If you join mid-year, the postcard will offer a prorated dues option which will then allow you to extend your membership till the following June. The following information will be listed in a roster available to other members.

Name _____ Home Phone_____
Address _____ Day Phone _____
City _____
State _____ Zip _____
E-Mail _____ Skill Level (optional)_____
Comments _____