Foundations!

A Resource for Beginners.
by Bud Oggier
the Anvil's Ring/ Winter 1989 Part 11

"Hi, Jean, good to see you again. Come on in."
'Have you made any more tools for your shop?"

"Yes, I made three or four chisels and a bottom swage. Had some trouble getting the shank on the swage to size, but it came out OK.

Well, Jean, I think it's time we made a pair of tongs. You've noticed all the tongs in my rack; there are well over a hundred. You won't need that many for a while, but you'll need some. After I made the most common sizes, I made the rest as I had a job that needed them.

Jean, tongs are a very personal thing. They should be made to suit you, and of a weight suitable for what you will be doing with them. I like my tongs quite substantial, consequently, they are a little heavier than most, but they suit me.

Let's start out your tong supply with a pair of flat jaw tongs for 1/4" stock. If we use 7/8" stock, we ought to have enough material for a good pair.

First thing is to form the jaw. To do this, put the piece over the edge of the anvil nearest you with as much on the anvil as you want for the jaw, and forge it down until it is about 1/4" - 3/8" thick and about 1" wide. I like to taper the jaw so it is thicker at the rivet end than at the other.

I have two pieces of stock for each of us. It pays to make both parts on each operation before going to the next step. I'm having you use two pieces of stock so you can compare each half easily.

OK, here we go, piece in the fire. I want these jaws about 1 1/2" long, so I'll just put a chalk mark on the anvil about 1 1/4" in from the edge. My piece is ready, on the anvil, move it in to the chalk mark and hit it with my hammer, half over the anvil and half off. That way I'll get a fairly sharp shoulder. Notice I'm using the radius corner on the anvil so I won't have a sharp corner, but one with about 1/8" - 1/4 radius in the bottom. There, I've got it about the right thickness, square up the sides, and that step is done. Your turn, Jean.

This is a mild steel, so don't be afraid to get it hot, a nice orange, that way it will be easier to forge. Can you still see the chalk mark? OK, go for it. Don't let your piece crawl away from the anvil, Jean, keep it tight up against the shoulder, that's better. OK, straighten up the sides, good.

Some smith s like to make tongs from a hardenable steel, but I don't because if you get them hot and forget to quench them to cool, they will be hard and may break, unless you draw them.

OK, now to make the other jaw. In making tongs both parts are alike. It seems that one should be right hand and the other left, but that's not true they are both the same.

My piece is ready, set it into the mark and flog away. There, notice that the jaw is thinner at the end than at the rivet end, and that it is now about 1 wide and 1 1/2" long. I'll check it against the other one because these will be a "pair" of tongs. Well, they match up quite well.

Your turn, Jean. OK, how does it match up with the other half? Good, looks fine.

Now we have to forge down the cheek where the rivet goes. To do this, bring the piece out of the fire and lay it on the anvil the same way it was when you made the jaw. Turn it one quarter turn away from you, move it across the anvil, and move it to 45° to the anvil's edge. The back end of the jaw should be right at the anvil's edge.

My piece is ready, on the anvil, quarter turn away from, me, across the anvil, move it over to a 45° and hit again, half on and half off the anvil. I'll forge it down until the edge of the cheek is right at the middle of the jaw. That looks about right.

Your turn. Good, you made all the right moves.

Drive right down on the piece and hold it back against the anvil. Don't worry if it bends the jaw down a little, we'll straighten it up. Good, let's look. See, the cheek is a little tapered. It's thicker on one end than it is at the jaw end, but we'll fix that in the next step.

Now, let's each make the other piece and check them. There, mine matches up pretty good, how's yours? That looks fine, Jean, you're beginning to produce pretty professional looking work.

Now, to forge down the end behind the cheek for the start of the reigns. We'll be using 1/2 stock for the reigns, so this end needs to be about 3/4" at the end of the cheek and taper down to about 9/16" where the 1/2" stock will weld on.

Here go, the same motions, jaw on the anvil, 1/4 turn away, across the anvil, now another quarter turn away from me and move it out until the cheek is about 1 1/2" long and forge away. See, I've got it over the large radius on the anvil. I want a good fillet in that corner. There, now to taper it down to 9/1 6". I'm going to leave a small lump at the weld end so I won't have to upset it for welding. There, that looks OK.

Go ahead, Jean, good, get a full 11/2" of cheek. Great, go. While the piece is reheating, we'll get ready to flatten the cheek and take out that taper I'll do this with the flatter. Even if it wasn't tapered, I'd use a flatter on the cheek. I like a good flat surface for the two cheeks to mate against. That piece hot yet? OK, Jean, strike for me, hit, again, OK. See, by tilting the flatter, I get a flat parallel face. OK, as soon as we get the mating pieces forged, we'll be ready to make and weld on the reigns.

Well, we're all done with these pieces except cutting them off the bar. So let's do that. Don't forget to leave the knob on the end for welding.

See how this straight sided hardie put the angle on the cutoff end and left a square cut on the bar? That way our scarfs are half made. Now the reigns, we'll have to upset the ends of these bars a little before scarfing, so here goes. Short heat and then upset, there, that's enough, reheat and scan.

Now the jaws ends are scarfed the same way. There, mine are ready to weld. Your turn. How do they match up, Jean? OK? Good.

Now to weld. Check the fire for clinker and clean it if it needs it. Well, guess we're ready. In goes one reign and one jaw end. Heat them and flux them all over the weld area.

Looks like they're getting ready, check them with the feeler, doesn't stick yet, just a little more, good, now they're ready. Knock them together to get rid of the dirt or coal that got on them, to the anvil, right hand piece scarf up, left hand scarf down, lay one on the other and weld. First hit in the middle, next over the bottom lip, then the top lip, and forge down to size.

OK, Jean, you go. Good, be sure you get the lips welded tight and check if you need a second heat. That looks pretty good, Jean. We'll weld up the other two and then finish them.

Now that they are all welded, they need a little finishing. So let's heat them up and put a light chamfer on all the edges and make a smooth transition where the square end joins the round portion of the reigns. OK, that one looks pretty good. Now the other. Now one last check to see if they are a pair. Say, they came out pretty good. If someone didn't know better, they might think I'd done this before!

Go ahead, Jean. Good, the cheeks on these are a little longer than some, but I like them to be substantial, and a long cheek helps keep them from being sloppy.

Now for a rivet hole. I like to drill mine, they can be punched, but I like the better hole a drill produces. The rivet hole goes in the middle of the cheek. So I'll measure to find the middle in both directions and center punch the outside face. That way when I drill them, the joint face will be down and the hole will be at 90° to it, then the rivet won't get bent, or the faces won't be together, and the tongs will always loosen up.

OK, what size rivet? Since these tongs are for 1/4" stock, a 3/8" rivet will be fine. You can use almost any size, but unless the tongs are very light and only for

small work, 1/4" would be too light. I'll drill these and we can rivet them.

Now they're drilled, how long should the rivet be to make a good head? The Machinery Handbook says that 1 1/2 times the diameter makes a standard head. So the jaws are 1/2 each, that's 1"; plus 1 1/2 times the diameter (3/8" plus 3/1 6), that's 9/1 6", so I'll cut this rivet 1 9/1 6" under the head, and it should be right.

To rivet these, I'm going to use a top and bottom rivet set. The bottom fits in the pritchel hole and has the same depression in it as the rivet head. The top one is held in the hand and finishes the rivet head, it has the same depression as the bottom one.

OK, we're ready, put in the rivet, hit it a couple of licks with the hammer peen so it won't fall out, then into the fire, rivet head up. Heat it up until the whole area is a good red. Now it's ready, set it on the anvil with the rivet in the bottom set and hit the rivet six or seven times good with the hammer, then use the top set to finish it. Be sure the edges of the rivet get set tight against the cheek.

Now to make them free. While they are still hot, work the reigns open and shut a few times, then put the tongs in the slack tub and keep working the reigns back and forth until it's cool. You will notice that when the tongs are in the tub they will be free and then in just a little bit they tighten up; keep them working and they loosen up again. This happens when the steel is changing its crystalline form, just as in hardening. This occurs as you go through the critical temperature. If this were a hardenable material, it would come out hard.

OK, Jean, rivet yours. The reason for putting the rivet head up in the fire is that the end you are going to heat up is closer to the heart of the fire, and will get hotter and rivet easier. The reason for hitting the rivet with the hammer first and only finishing with the set is, if the rivet is hit hard enough to upset its entire length, it will fill the hole before the head starts to upset and give you a good joint.

I think your piece is ready to rivet, Jean. Don't be afraid to hit that rivet with the hammer; good, OK, now go to the set. Get the edges down tight, now work the reigns until the jaws move freely. Now in the slack tub, work the reigns, feel them tighten up, keep working the reigns until they are cool.

Well, Jean, how do they look? The jaws are not quite in line with each other and the reigns need to be lined up, but that's easily done. What are mine like? Looks like I'll have to do the same thing, so get them hot and on the anvil and straighten things up. There now, get yours, Jean.

They look pretty good now, but we want them to hold 1/4" thick stock, and the jaws need to be sized so that when the reigns are a comfortable distance apart the jaws will be parallel and 1/4 apart.

I have a piece of wood here that if it fits between the reigns they will be the right distance for me. So we'll heat the jaws up and put a piece of 1/4" stock between them and then hit them on the anvil until they are tight on the stock, and the reigns are tight on my wooden piece.

OK, here we go, tongs are hot, stick between the reigns, jaws on the anvil, 1/4' stock between them and make them fit.

Darn, the fit is good, but the stock does not come out of the jaws straight. Well, to fix that, reheat and go to the vise, put the stock between the jaws and tighten, bend until the stock and the middle of the reigns are in line.
There, go ahead and size yours.

Jean, that's a nice pair of tongs. I like my reigns about 16" long from the rivet, that's what these should be, but if they don't suit you, just cut them to suit. Jean, all types of tongs are made with this same technique, the only difference is the shape of the jaws.

Why don't you make a pair at home and bring them next time?

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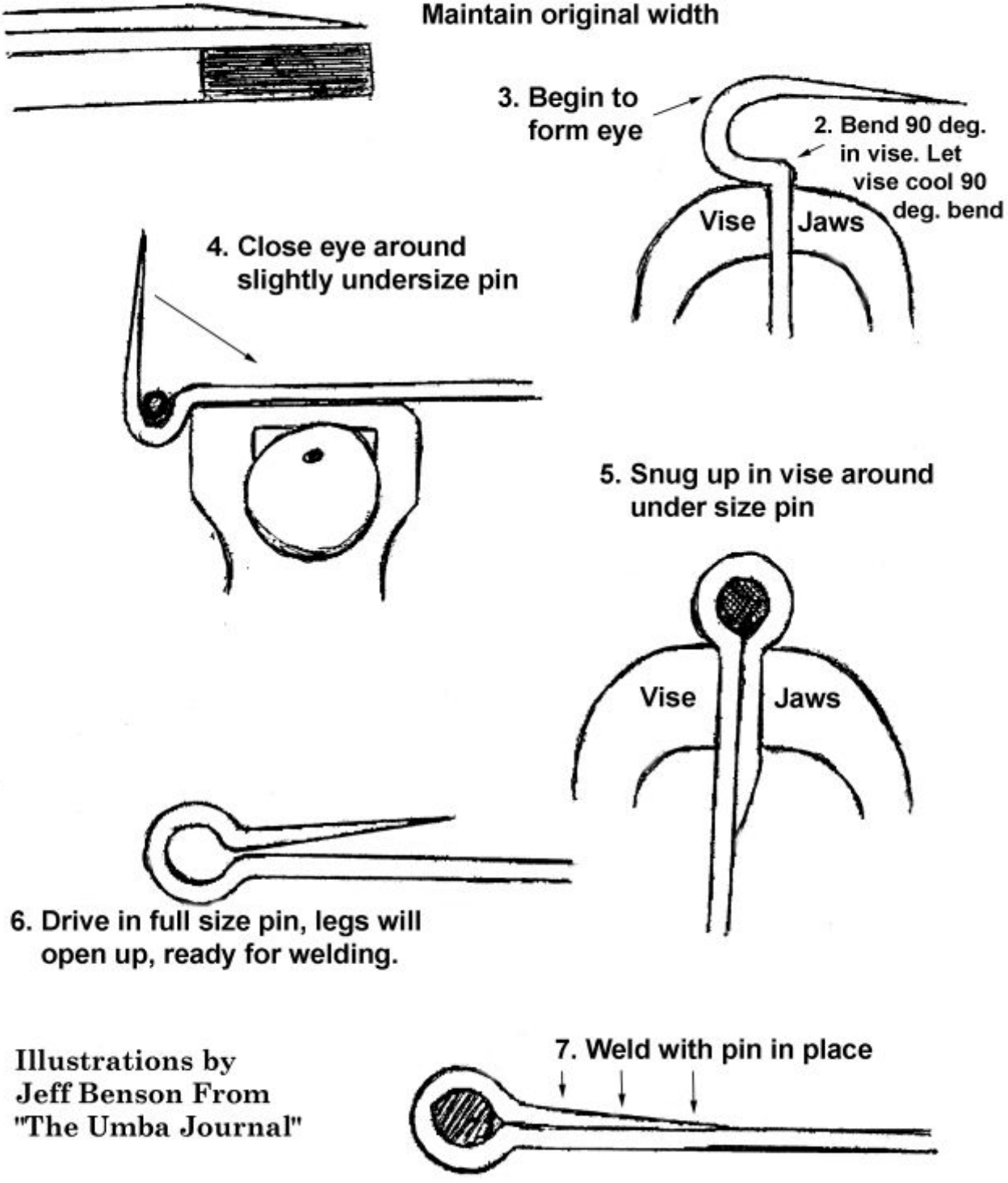
Peter Ross
Forming a Hinge Eye



Illustrations by
Jeff Benson From
"The Umba Journal"

Colonial Hardware

By Lou Mueller

Commentary and Graphics by Ernie Dorrill III. As illustrated in Donald Streeter's book "Professional Smithing" From The Upset, newsletter of the Mississippi Forge Council

The Mississippi Forge Council was fortunate to sponsor this weekend workshop in April which drew a crowd from not only Mississippi but also from Tennessee, Louisiana and Missouri. For those who are not familiar with Lou Mueller, he is the current president (Now former) of the Artist~Blacksmith's Association of North America.

Lou began by talking about Streeter and his comments follow:

Streeter made his living doing colonial hardware and his main emphasis was on locks. During the 50's, 60's & 70's, Streeter was one of the leaders who was producing colonial hardware. His reproductions can be seen in New Orleans, LA, Charleston, SC, along the east coast and in Canada.

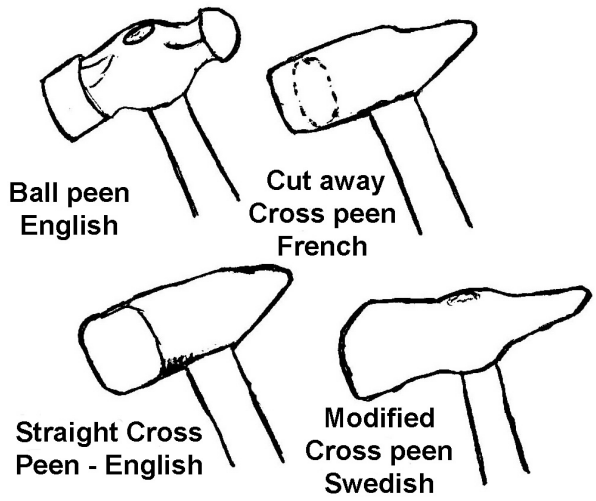
On historic buildings, a series of pieces might be needed and they would all be the same design. For example, there might be a need for 100 pair of H hinges for cabinet doors. Streeter developed tooling to produce this hardware in a more efficient way. Tooling was very simple & used the Hand Work & Forging - Hammers

First, there are NO rules! When you work with your hands, do what is right for you. Be comfortable and in control. Adjust the anvil height where you're most comfortable.

Some guidelines might be helpful to prevent problems in the future. When hammering, use techniques to save your arm. First, at the point of impact between the hammer and anvil, the hammer face should be at 90 degrees to the anvil.

Second, hold the hammer for control and consistency. Keep your hand dry and hold the hammer

loosely (don't squeeze the sap out of the handle, it's dry already). A tight grip will only send shock up your arm. A loose grip with heavy forging is



best and only a tight grip with the thumb on top of the handle when doing finish work. Also, don't over extend the wrist. This can be avoided by standing close to the anvil.

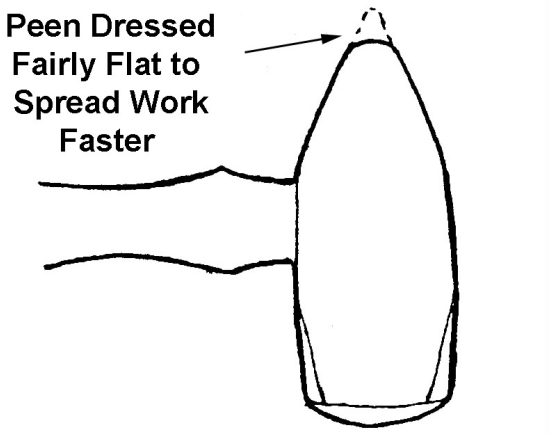
All these different shapes don't seem to make that much difference. The shape of the face and cross peen do have an effect on the work.

Roughing Hammers: Total crown across face in all directions with the cross peen having the same profile as the face. These hammers also make work on inside curves much easier and do not mar the work.

same concepts that were developed in the early 1700's regarding the way dies were built (cutting dies, forming dies, fixtures, etc.).

Now, some blacksmiths specialize in certain periods of time such as Peter Ross and Francis Whitaker using only hand methods and techniques of that period. Streeter's concept of reproducing hardware was that the finished product (reproduction) should be as close to the original as possible. How you arrive at the finished product and what you used in the process was not important, as long as the reproduction looked like

an authentic piece.
With many reproductions, it's easier to use the old techniques, processes and methods. You can forge by hand, saw or cut, grind or use a milling machine but with some of these methods, little subtleties that make it authentic may be lost. In this case, only the original techniques will work. If you can use a file, grinder, drill press, etc. to produce that part, there is nothing wrong with that approach.
The method is sometimes not nearly as important as the finished product. Streeter had to maximize his time because he made a living doing it.
Speaking of duplication of work, there are times you might hear someone say, "someone has copied my work'. An individual may be making a hanger, candle stand, fire tools, gate, etc. and another person sees it and copies it. The original designer gets upset because someone copied his work. This attitude has no merit because as you learn, you copy. You look at the old masters and you copy. This is how we learn! The learning process begins by copying and you continue copying until you develop your own techniques and then produce your own designs. The learning process first

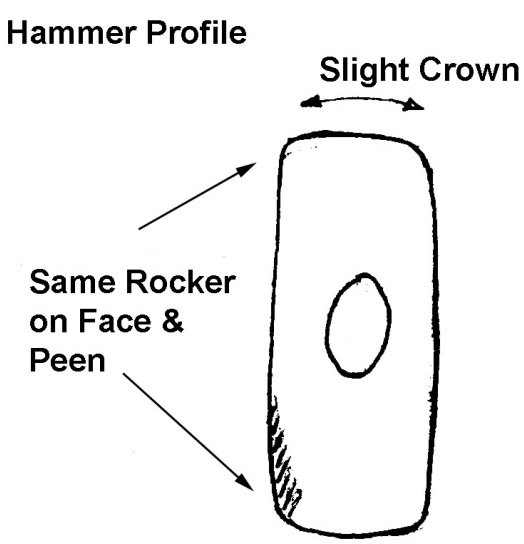


begins with copying!
Finishing Hammers: Have a slight curve (almost flat) across the face and peen end.

Anvil position also doesn't make that much difference. Turn the anvil so that it is most comfortable for you.

Bench Tools

At some point you will need a variety of files to do finish work. There was a great deal of file work on colonial pieces. Notice that engraving tools have a large palm grip. Those tools were designed to be pushed but conventional file handles, unlike engraving tool handles, are somewhat uncomfortable. Golf balls are handy and cheap. Drill a 1/8" hole in the golf ball and drive it down on the file tang. Several of mine are



color coded.

Flat files-white
Triangular files- blue
Square files-yellow
Special shaped files-pink

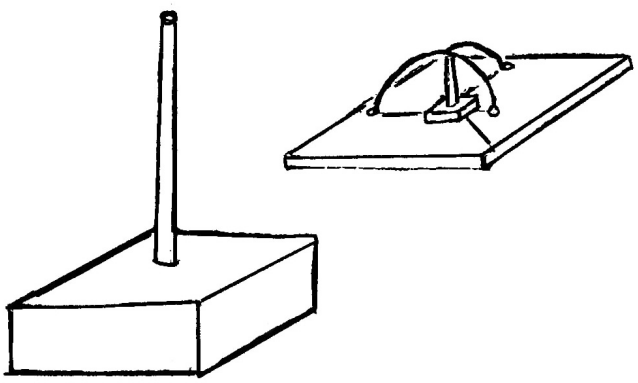
File Cleaning

File cards or brushes are OK but some of the individual wires on brushes are too large to get in between file teeth. An inexpensive way to clean files is to use a flat piece of copper (annealed), file a knife edge and run that edge parallel to the teeth. The copper edge will conform to the file teeth and provide the proper dimension to move between the teeth to remove articles.

Circle Template

Some jobs require a ring when you are attempting to lay out divisions in a circle or along an arc. A circle template is a great tool to use for this purpose. It can

be constructed from sheet steel, brass, copper, or aluminum. After locating the center, scribe a series of circles as shown. Drill a 3/8" hole in the center. Take a block of steel l"x2"x2" with a 3/8" rod through the center and locked into the block with a tapped screw. the rod can be lengthened to protrude just under a multi-leg stand in order to determine appropriate spacing or leg adjustment.



An Adjustable Stand and Circle Template

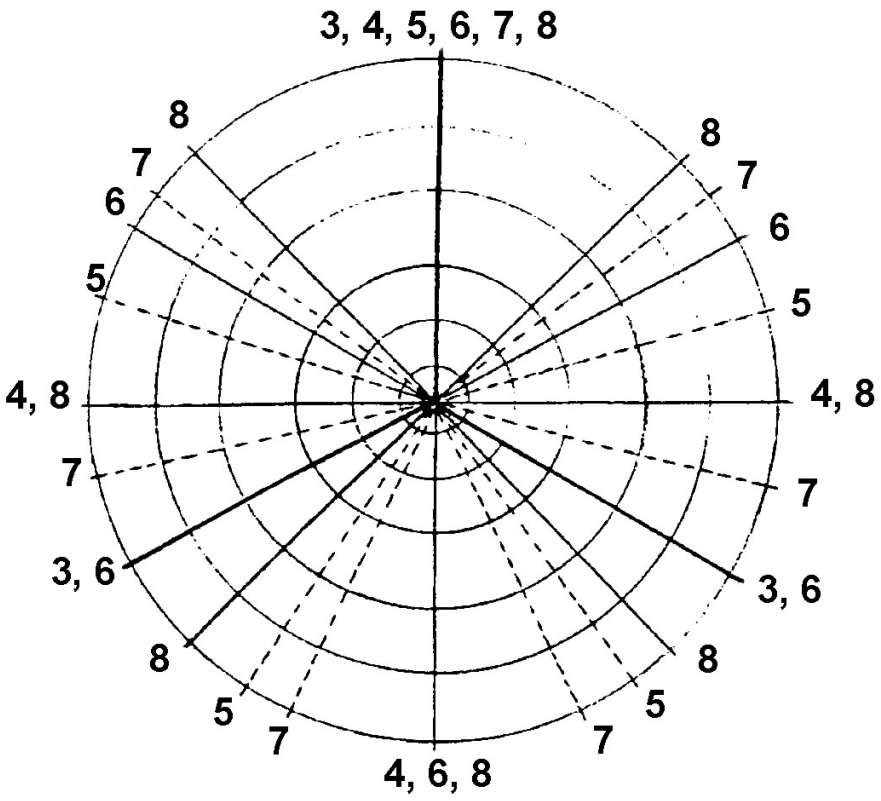
Benders

An essential too that can be simply made in the shop using simple tools is the bender. Commercial or manufactured benders bend 1/2" cold can cost as much as $2000. A shop made tool can be produced to bend any size. If only one bend is needed, then the horn of the anvil is ok but if you need 25, 50 or more, none made by hand will be the same and if uniformity is needed, then a bender will be very beneficial. Key for the bend is a roller with a radius, which will be the inside of the radius of the desired bend. It doesn't matter if the radius is 1" or 6". The roller will dictate the radius.

Adjust the stop - put in hot metal and bend. Anything on the outside does not have to be tight. Drill all holes on standard increments if using a plate, i.e. 1" x 1".

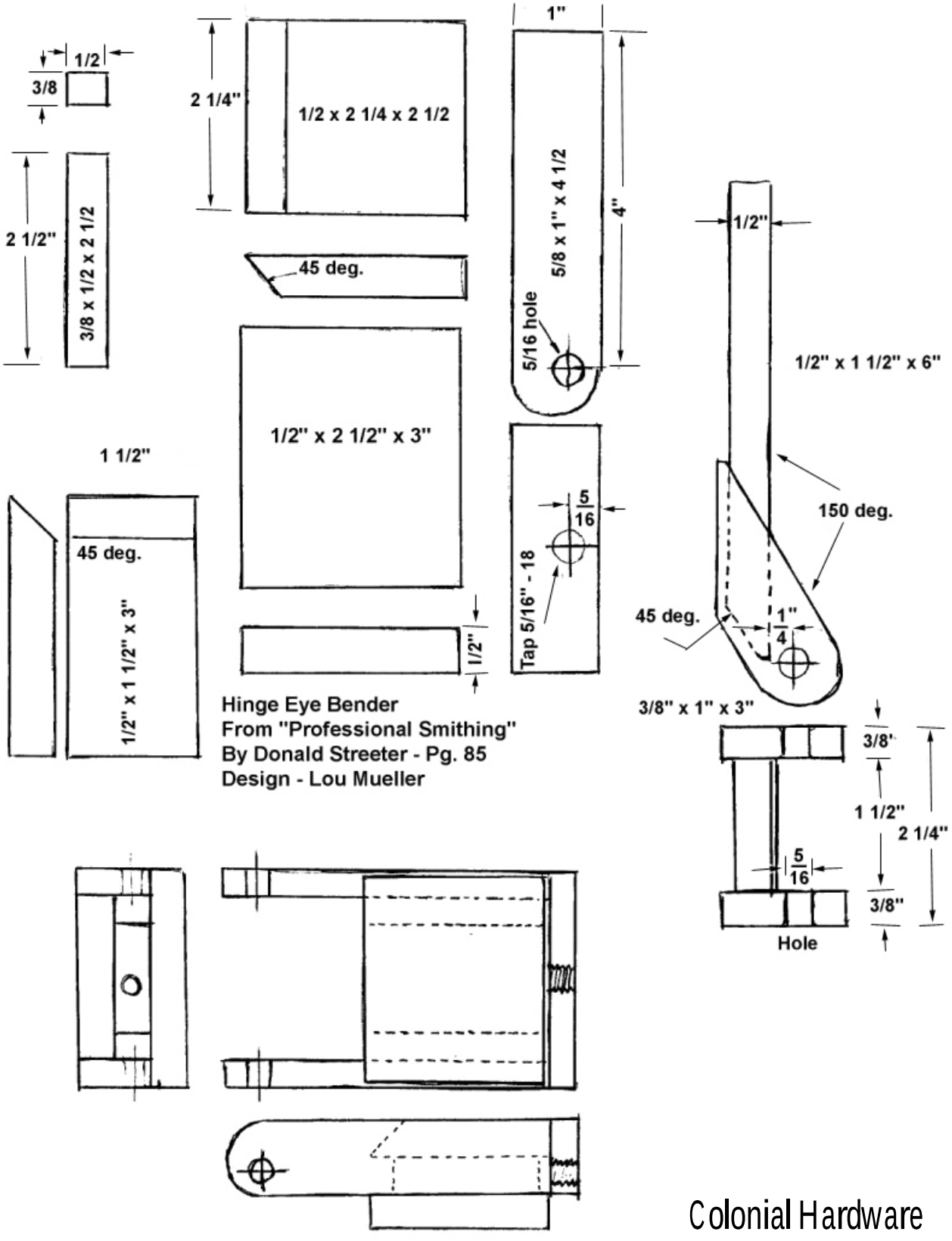
The bender is a production piece.

Punch & Die Block



For these combinations, make the punch first, then the die block. All of these pieces can be made with a drill press, grinder, saw & files.

After the punch is made with the above tools and is brought to the correct shape, place the punch on the die block and mark its' outline on the die block. Drill a series of holes on the area to be removed, chisel out the drop and file excess down to the outline.
Some play is necessary. In making any punch and die sets, 10 percent is the magic number. What ever thickness the metal (1/8" or .125), a 10 percent clearance (.025) will be required on each side



Hinge Eye Bender
From "Professional Smithing"
By Donald Streeter - Pg. 85
Design - Lou Mueller

Colonial Hardware

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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;
Tim Neu, Ashokan Field Campus,
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For more information check out the web site; <http://nba.abana-chapter.com/>

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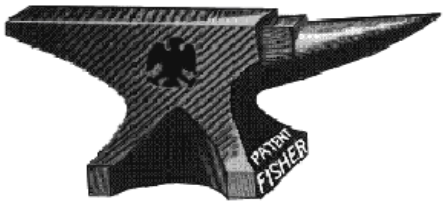
New Jersey Blacksmiths Association



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