

# SOMA SOUNDS



**SOF & A**  
SOUTHERN OHIO FORGE & ANVIL

OCTOBER/NOVEMBER 1987

Artist-Blacksmiths Association of North America

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**MARK YOU A.B.A.N.A. CALENDARS:** Unless otherwise noted, all meetings will be held at the Studebaker Frontier Homestead on Rt. 202, four miles north of I-70 near Tipp City. Please don't park on the grass or block access to the production buildings. Donations for the newsletter support raffle are always welcome.

October	No meeting due to Quad-State.
November 7th, 1PM	BUSINESS MEETING followed by a demonstration by Ken Scharabok on making a Francis Whitaker-style fireplace log fork.
December 5th, 1PM	BUSINESS MEETING followed by a demonstration by Hans Peot on making a two-piece baluster.
January 9th, 1PM	BUSINESS MEETING followed by a demonstration TBA.

BACKHANDER???

The following item appeared in the August 4, 1987 "L.M. Boyd On..." column in the Dayton Journal Herald/Dayton Daily News, "What's a 'backhander'? An apprentice who stood behind the blacksmith and handed him tools to shape the hot iron. What the nurse is to the surgeon, that was what the backhander was to the blacksmith". I would be surprised to find many blacksmiths who could have afforded an apprentice to just hand them tools. Most likely they would have been running the bellows or making chains, nails, etc. to directly produce income.

MEETING NOTES:

At the August 8th, business meeting no items were discussed which are not covered elsewhere in this newsletter.

The newsletter support raffle brought in an additional \$42.50. Principal winners were John Burris who won one of the nice brass dippers Keith Summer makes, Dick Franklin won a folding steel rule, David Kemper won a box of coke donated by Steve Roth and Ron Van Vickie won a handful of welding rods donated by John Jacobs.

**Chapter of ABANA**

Following the business meeting Ron Thompson and Ron Van Vickle demonstrated making small hatchets. The demonstration started by them, aided and abetted by Hans Peot, trying to see if they could smoke everyone out of the building. They were producing big time smoke. After the fire was going, Hans settled back with Dick Franklin to heckle the demonstrators.

Ron Thompson started by illustrating several methods of making hatchets including the one they did at the last Conner Prairie workshop (see write-up at right). Ron T. covered two, three and four piece construction.

The method they used was a two piece one using 3/8" x 2" stock. The stock was folded over about 10" back and about two inches was forge welded, with a second insurance weld taken. The end of the welded area was then upset flat since this area will become one end of the inside eye. The metal was then folded over into a "W" shape and forge welded, again with an insurance weld used. The lapped area was now four layers thick, however due to the compressing while doing the welds, it was only about 1" thick. For the blade, a piece of a used horseshoe rasp was used. Once this piece was forge welded in, the eye was drifted out and the excess metal trimmed off. The general procedure is illustrated to the right.

Ron Thompson then demonstrated drawing out the eye area by hand using a crosspeen. He said a crease at the end of the eye area could be made using the edge of the anvil top and then fullered out. However, he demonstrated a more consistent eye could be made using a piece with the top edges rounded as a bottom fuller. This resulted in a flattened eye with extra stock above and below the eye. These could be left on or ground off as desired. See illustrations at the right.

Both Rons indicated they had trouble with getting a solid forge weld at Conner Prairie. Apparently both put theirs in their tool boxes for several weeks, tried the insurance weld and both welded solid on the first attempt. This is now known as the Van Vickle/Thompson Forge Weld Method.

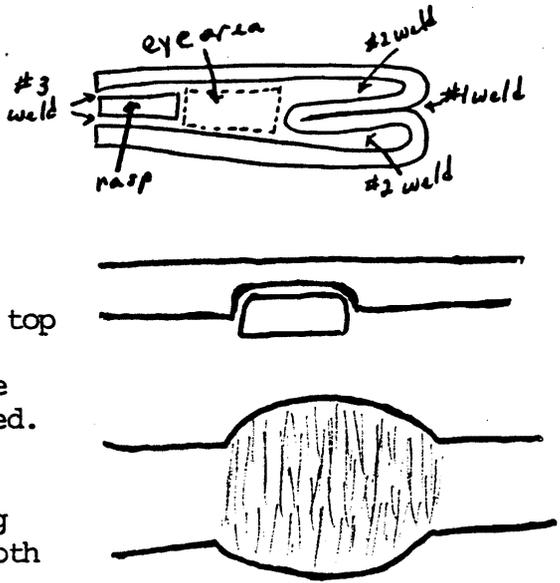
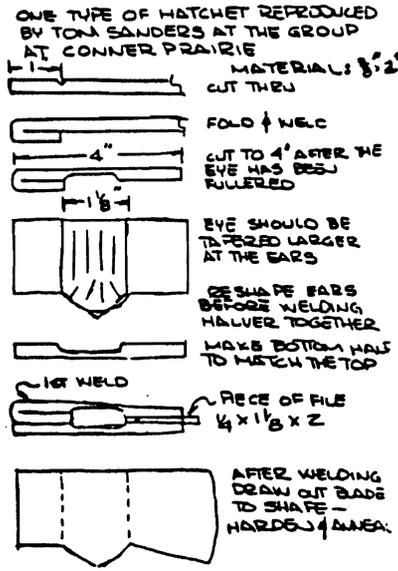
At the meeting Dave MacDonald had photos of the large gate he made for an estate in the Findlay area. Apparently the client selected a design from an illustration in a book and Dave recreated it. As I recall, each section weighed 1,500 lbs and stood over 12' tall. Dave is rapidly acquiring a reputation as a master gate builder. I would like to encourage Dave to send in a write-up on the gate covering some of his construction techniques, such as using square tubing where possible to reduce the weight. Dave may also be doing restoration work on one of Yellin's gates in the future. Dave has progressed from a farrier to a master-level blacksmith in just a couple of years.

## EARLY AMERICAN HATCHET REPRODUCTION

Conner Prairie hosted a blacksmith workshop on March 21-22. Five of our members attended and had a very good time. The Indiana Blacksmiths Association helped put on this workshop by bringing in forges and anvils to use and some of their members were instructors. This was a hands on workshop with basic and experienced areas. The five of us worked on making hatchet heads and got some very good experience. Maybe we can demonstrate these hatchets at our meet in May.

Conner Prairie and the I.B.A. does a very good job putting on this workshop and it is a good one to attend. All the items that were made were taken from originals in their collection.

Reprinted from the newsletter of the Northwest Ohio Blacksmiths.



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The meeting originally scheduled for September 12th was rescheduled to the 5th due to a conflict with the annual Process Equipment Company picnic.

During the business meeting Andrew Holly announced he had found a source of crushed coke for \$70 per ton. A ton would fill about six 55-gallon drums. Coke burns hot and clean with very little smoke. Minimum order is one ton, but Andrew may be willing to lump smaller orders together. If interested contact him at 256-6494.

Coke is better to use if in a "close neighbor" situation. One member present mentioned one of his neighbors told another neighbor (who told him) about the coal smoke being a little bothersome. He then make them a nice item and the neighbor is now satisfied. This brings to mind a story in one of the chapter newsletters. One member had a shop at the back of his lot. One day he was working and each time he added raw coal the smoke turned black. On his way up to the house for dinner one neighbor leaned over the fence and hollered "Have they elected a Pope yet!".

Emmert Studebaker attended the recent Western Conference and sat in on an informal Board of Directors meeting. He reported he is confident the board is committed to continued growth with a strong central organization to assist the chapters and that ABANA is financially solvent at present. Emmert also said he was extremely impressed with the work of Daniel Boone (recommending him as a demonstrator for a future Quad-State) and told of Don Hawley using a 300 lb powerhammer to cut through a 5" square bar with about six hammer strokes. Don Hawley has worked with large industrial-size powerhammers most of his working career.

Larry Wood noted the items brought for display and encouraged all members to bring their work, amateur as well as polished pieces, for display at the meetings. Doug Fink had brought along some forged pieces of square tubing which looked great (how about an article for SOFA SOUNDS Doug?). A suggestion has been made we have the demonstrator working with square tubing at the last national conference at a future Quad-State. Someone else had brought along a beautiful rose cluster set into a stone base.

The raffle brought in an additional \$59.00 to support the newsletter. If the raffle continues along these lines, I would like to put out at least two double issues like this a year. In the raffle, Joe Abele won a Damascus-pattern blank and a video tape of the subsequent demonstration donated by Larry Wood. Hans Peot won a chisel donated by Phil Sturr, Steve Roth won several large iron balls donated by Doug Fink, Jim Paulson won four punch or chisel blanks donated by Denny Bischoff, Ben Wunder, Jim Paulson and Jim Romosa won candle holders also donated by Denny, Phil Sturr won a ammo/tool box donated by Doug Fink and several other members won other items.

For the demonstration Larry Wood and Hans Peot demonstrated two methods of making muzzle-loading rifle barrels out of flat stock. They started with a piece of 3/8"x5" stock and forged it into the shape at Figure 1. The purpose of putting on the ears is so, when rounded into a tube, the seam would be a regular "V" (Figure 2), rather than an inverted "V" (Figure 3). With the inverted "V" they would have ended up with a teardrop effect in the inside of the barrel weakening the weld (Figure 4). The stock was rounded into a tube (using one of the round swages on a swage block)

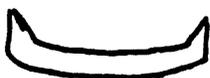


Fig 1



Fig 2



Fig 3



Fig 4

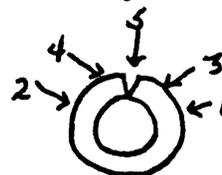


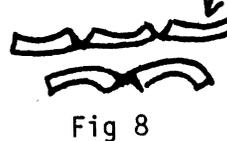
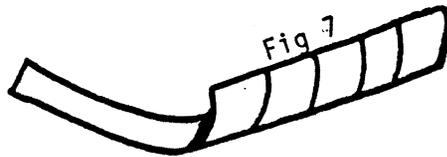
Fig 5



Fig 6

using first a crosspeen and then a mandrel (1/2" round stock) to complete the tube. To forge weld the seam, blows were directed as shown in Figure 5, again using the mandrel inside. The mandrel keeps the center round while finishing the rounding and forge welding the seam. It was removed and cooled between heats. Since the mandrel was cold, it would not be also forge welded during that process. Larry also commented the first mortar or cannon barrels were bars put into a circle, banded, then forge welded around a large mandrel (Figure 6).

The second method was to use smaller flat stock (I think Larry used 1/4"x3/4"), wrapping it around a mandrel and then forge welding the seam, again using the swage block and mandrel (Figure 7). As the flat stock was bent, the outside corners would bend up slightly, giving the "V" shape needed for forge welding. Larry indicated the barrels would usually be double wrapped at the breech area.



Following forge welding of the entire seam, the gunsmiths would hand bore to a rough round, hand ream using progressively larger hardened reamers and then hand rifle the barrel. Since it was extremely difficult to end up with a predetermined caliber, the gunsmith would also make a bullet mold for that individual rifle, making the opportunity to use someone else's bullets difficult. Common calibers only came along once precision machining was available. The outside of the barrel would also be turned down using a lathe.

For an article on making Damascus-pattern barrels by the latter method see the August/September 1986 issue of this newsletter.

#### LETTER TO THE EDITOR:

"To all ABANA Members, thank you for your letters, cards, phone calls and flowers. Your thoughtfulness and consideration are greatly appreciated". Signed: Ruth Cook, W64, N64 Hanover, Cedarburg, WI 43012.

#### ON DEMONSTRATING FOR THE PUBLIC:

In the March 1987 newsletter of the British Blacksmith Ass'n, Mike Crummy noted categories of visitors:

1. The Raver: The raver goes absolutely berserk when he sees your display. "This is the most wonderful example of workmanship and craftsmanship I've ever seen ..." and goes away without parting with a penny.
2. The Beeback: The beeback is similar to the raver, but usually "...this is the thing I've been looking for for years, I'll just go and get my wife a cup of coffee, and I'll be back." - never to be seen again.
3. The Jeweller: The jeweller is the worst of the lot. He'll involve you in a lot of on the spot designing and waste a lot of time - it'll be just what he wants and he'll go home and give you a ring - never to be heard from again.
4. The Relation: The relation always has a brother, father, uncle or cousin, who does exactly the same work as you, but in a shed at the bottom of the garden and he only charges a fraction of your sales price for his work. This one quickly goes away when you try to place an order for 1,000 Rams Head pokers just like your own.

5. The Nut: There's no answer for this one. I was asked to forge Egyptian mummies in Cairo by an Egyptian - he was serious, I wasn't.

6. The Side-winder: Potentially the most dangerous. The side-winder is generally getting on a bit, and edges sideways slowly, towards you and doesn't look directly at you. You can see him trying to think of a way to start a conversation and all the time edging closer and closer. He is a retired blacksmith, and having heard the ringing of the anvil he just cannot keep away. He had done everything and needs handling with extreme care. Depending on how you handle it, he can be a nuisance or a tremendous source of advise and help.

7. The Buyer: A very rare breed and appears without warning and at the most unexpected and inconvenient time. Unfortunately there is no way to recognize a buyer. They just appear.

In the article he noted that he seldom even breaks even on sales but the contacts and potential future commission work are his prime purpose for being there. These sales would not have come by staying in the smithy and advertising in the local press.

ON FILES AND FILING: (From the newsletter of the Florida Artist-Blacksmith Ass'n)

1. When using a file be sure it is equipped with a snug-fitting handle. Otherwise, the sharp tang on the file could injure your hand or wrist.
2. Filing is an art. Most files are worn out from abuse rather than use.
3. When filing, the work should be below the elbows. You should stand with one foot in front of the other and let your body do the moving instead of your arms. When you file with your arms, you tend to file unevenly. Make long, slow, steady strokes by swaying forward and backward on your feet. Your arms move very litting.
4. When filing pieces always clamp or secure it so it doesn't chatter when you file. Also, files are made to cut one way, so when you make a back strike, lift your file. This will keep you from wearing files out. Also, if you file cast iron which has a scale from being cast, be sure to remove the scale with a chisel or grinding as the scale is very hard and will dull your file quickly.
5. If you file soft metals, it will take a special file since the teeth will become clogged. When you file gets clogged up, clean it with a wire brush and brush in line with the cutting edges. One way to help stop clogging is to put chalk on the file. A new file will clog quicker because the cutting edge is uneven until it has been used some.
6. Cuts of files are divided into three groups: single-cut, double-cut and rasp-cut. Single and double-cut files come in six different grades: rough, course, bastard, second-cut, smooth and dead smooth. Most of the time the bastard, single-cut and smooth are used. The others are used for special jobs; although the rough and course will move a lot of metal quickly and in blacksmithing this is sometimes needed.
7. If you buy a good file, take care of it. Never throw files together in a drawer or with other tools. You will lose the cutting edges a lot quicker and then have to replace them. A good file storage device is a piece of 1 1/2"x1 1/2" x 3/8" angle iron with slots cut in one side and screwed to the wall near the vise.

SAFETY WITH HAND TOOLS: (From the newsletter of the Florida Artist-Blacksmith Ass'n)

1. Use the right tool for the job to be preformed.
2. See that the tools and your hands are clean and free of grease or oil before use.

3. Cutting tools should be sharp when using them. Dull tools cause accidents since greater force is required to use them.
4. Sharp edge tools should be carried with their points and cutting edges pointing downward.
5. Heads of cold chisels and punches should not be allowed to mushroom or crack; they should be properly dressed or repaired.
6. When using a chisel, always chip in a direction which will prevent flying chips from striking others.
7. Use the correct type of wrench for the job and use it properly. You can injure your knuckles or hand if the wrench slips.
8. When you hand tools to others, give them with the handle first.
9. Tools should always be wiped free of grease or dirt after use and returned to the proper storage location.

TIPS BY FRANK TURLEY: (From the newsletter of the Inland Northwest Blacksmith Ass'n)

- AXIOMS:

- Heat is your best friend.
- Never quench a forged weld.
- Never strike hardened steel with hardened steel.
- The handling length of hot steel without tongs is 18".

- FILING:

- Use full strokes in one direction using as much of the file surface as possible.
- Do not touch the body of the file as grease from your hands will stain it.
- Talc, soapstone, or chalk rubbed on the file will prevent it from clogging with metal chips.
- Old files may be "freshened" by soaking them in muratic acid approximately ten minutes and then neutralizing in a solution of baking soda.

- HAMMER:

- The hammer face should be smooth like a watch faceplate.
- Force of hammer blows: light - wrist, moderate - elbow, heavy - shoulder.
- Handle length: holding the head in the palm of your hand, the end of the handle should reach the crease of your elbow or a little beyond.

- HARDENING AND TEMPERING:

- Warm oil quenches faster than cold oil.
- W-steels are noted for shallow hardening. Steel greater than 5/8" harden to a depth of about 1/8". This may be a desirable quality.
- Following forging, normalize (air cool) W-1,2 steels and anneal (cool in lime or wood ashes) 0-1 steels.
- Heat treating is done on the rising, not the falling heat.
- Rainbow colors are reliable in tempering water and oil hardening steels but not for other alloy steels. A hardening and tempering reference booklet is Bethlehem Tool and Die Steel Manual available from Bethlehem Steel Corp. at the following addresses: Bethlehem, PA 18016 or 4045 Delridge Way SW, Seattle, WA 98124 or 7300 SW Landmark Lane, Portland, OR 97223.
- Water hardening steels are more prone to distortion than are oil hardening steels.

- STRIKERS:

- The right handed person grips the sledge with his right hand near the head and with his left hand lightly holding the end of the handle. His right leg is back. The reverse positions are used for the left handed person.

- The length of the sledge handle should be between 20-24" depending on the height of the striker.
- TWISTING:
  - Twist at an orange to a yellow heat. The larger the material, the hotter the heat.
  - For most pieces it is easier to place in the vise horizontally rather than vertically.
  - Turn the work in the fire frequently so as to achieve a uniform heat.
  - If twist is not uniform, freeze the portion adequately twisted with water.
  - Straighten twisted pieces with a wooden mallet on a wooden block.
- UPSETTING:
  - Taper the end before upsetting.
  - Hold the work in the vise horizontally rather than vertically.
  - For making rivet heads, etc., the work should not extend beyond the vise greater than 2½ times the thickness of the material as it will bend rather than upset.

#### TIPS ON BLADE HARDENING AND TEMPERING:

(The following tips on blade hardening and tempering are from a write-up of a demonstration by Rob Hudson in the December 1986 newsletter of the Mid-Atlantic Smith's Ass'n. Write-up by Don Plummer. They apply to O-1 steel. Damascus or pattern-welded blades can be simply hardened without going through the tempering process according to the notes).

- Always use a fairly darkened room. Rob likes to have the lights out.
- Use a dying fire and place the blade so the point is just past the far edge of the heat.
- You will only need a bit of red color throughout the entire blade. Heat carefully and slowly.
- Just before quenching, flip the blade over so the edge is down. The edge should be just a bit hotter.
- Quench horizontally in a commercially prepared quenching oil. The oil should be 124°-140° to help prevent warpage. Heat with bars of steel and check with a candy thermometer.
- Leave it in the quench about one minute while moving it up and down in the oil. Remove and dry with a towel.
- Grind off the scale so you can subsequently see the temper colors. Don't let it cool down completely. Move right into tempering.
- Start the tempering by placing it in some kind of oven for about one-half hour at 450°-500°. If it comes out slightly yellow, this is OK.
- Using an oxy-acet. torch with a roaring (oxidizing) flame, heat the tang area and back of the blade.
- The blue will tend to scallop. Monitor this process carefully as the opposite side will tend to go faster. Strive for the back to be all blue and running from there through purple and brown to dark straw at the edge. The tip should be brown or purple. Quench it at this stage.
- It is a good practice to polish the blade and repeat the tempering steps with the torch twice again. Three tempers in all.

#### TIPS FROM THE NEWSLETTER OF THE INDIANA BLACKSMITH'S ASS'N:

- There are many times I don't finish a project in one day and, if I don't write down dimensions, etc., I forget where I was at. I have put a 2'x3' chalk board on the wall to keep notes on. A piece of sheet metal painted black will work just as well. I also use it to make drawings and keep track of things I need to order for the shop. (By Ron Porter).

- For those of you who are tired of tripping over power cords around your layout table or work bench, drop an extension cord from the ceiling about 3' from the top of the table or bench. I put mine in the center of the table so I can reach it from all sides. I have four plug-ins so I can use more than one power tool at one time. (By Ron Porter).

- Whenever you have a part to temper or finish and you want to make sure you don't burn it, take a piece of plate and lay it on the fire - then lay your part on top of it. This takes a little longer but there is little chance of ruining your part. (By Ron Porter).

- If you are tired of groping in your oil or quench tank for a part you have dropped, keep a magnet on a rod or chain so you can retrieve it. (By Ron Porter).

- For those of you who have trouble hanging onto a ruler while working at the anvil, go to the hardware store and get a metal or aluminum yard stick and some screw on or stick on magnetic tape. Cut the rule to fit the anvil and place magnets or tape on back. This can be kept on the side of the anvil for reference or placed on top when measuring stock. It will stay where you put it and leave both hands free. (By Bob Wozniak).

- Wire brush your work frequently while you are working on it and it will make for a nicer finish when completed. (By Danny O'Brien).

#### TIPS FROM THE NEWSLETTER OF THE KENTUCKY BLACKSMITH'S ASS'N:

- FINDING FINE CRACKS IN TOOLS: Often it is important to be able to detect small cracks which may be present in the metal of tools. Coat the surface with oil, run it dry with a rag and then rub it again with fine chalk dust. The oil which has entered a crack soon comes out and the trace is plainly shown by the chalk.

- AVOIDING SCALE DURING THE HARDENING OF STEEL: Articles made of tool steel may be hardened after they have been polished without ruining the polish. Mix equal parts of common table salt and finely ground cornmeal. Dip the article to be hardened first into water, then into the finely mixed salt & cornmeal mixture and place it carefully in the fire. When hot enough to melt the mixture, remove and dip or roll it in the mixture again. Replace in the fire and bring to the heat required for hardening. Watch the piece closely and if any part of it shows signs of losing its coating, sprinkle some of the mixture on it. The mixture, when exposed to heat, forms a flux over the surface and keeps out air, preventing oxidation. When cooled in water or oil, the coating comes off easily, leaving the metal as smooth as before heating. Borax gives a similar result, but is much more difficult to remove when cold.

- TESTING STEEL FOR THE CORRECT HARDENING TEMPERATURE: The following procedure will help establish the correct hardening temperature for steel and give some indication of its behavior in general. Take a bar and make nine notches which run all the way around it about 5/8" apart. Next, the end-most notched section is heated in such a manner that the remainder of the bar is heated less by the fire directly than by the heat conducted through the bar. When the end-most section is heated to burning, and the color of the succeeding sections gradually passes to dark-brownish redness, the whole bar is hardened by quenching, noting the color of the various sections. Testing with a file will now show that the end-most, burned section possesses the greatest hardness, that several softer sections follow, and that one of the sections (ordinarily located in the second one-third) is the right one for hardening as it is almost as hard as the end-most sections. If the various sections are knocked off the bar, the fracture of the piece hardened at the correct temperature will exhibit the finest grain.

- HOW TO READ ANVIL WEIGHTS: (Editor's note: the easiest way is to set it on a scale, however if at an auction, etc., the following can be used). Anvils with numbers imprinted on the side (e.g., 1 3 4) are marked under the old British

Stone System. The first mark is in 112 pounds (one stone), the second in quarter stones and the last in actual pounds. Thus "1 3 4" is 200 lbs (i.e., 1 times 112 plus 3 times 28 plus 4). Actual weight may vary by a few pounds either way. For unmarked anvils (generally newer ones), a scale must be used.

- HOW TO HARDEN THIN PIECES OF STEEL WITHOUT WARPING THEM: Securely fasten the piece of thin steel to be hardened between two pieces of iron about 3/4rds of an inch thick and a little longer and wider than the steel work piece. Heat the irons and the steel piece (as an assembly) until they become a bright cherry red color, then quench the entire assembly in water. After hardening in this manner, the thin steel piece can be separated from the irons and drawn to the desired temper in the normal manner.

VASE AND FLOWER CENTERPIECE: (By Ron Porter from the newsletter of the Indiana Blacksmith Ass'n).

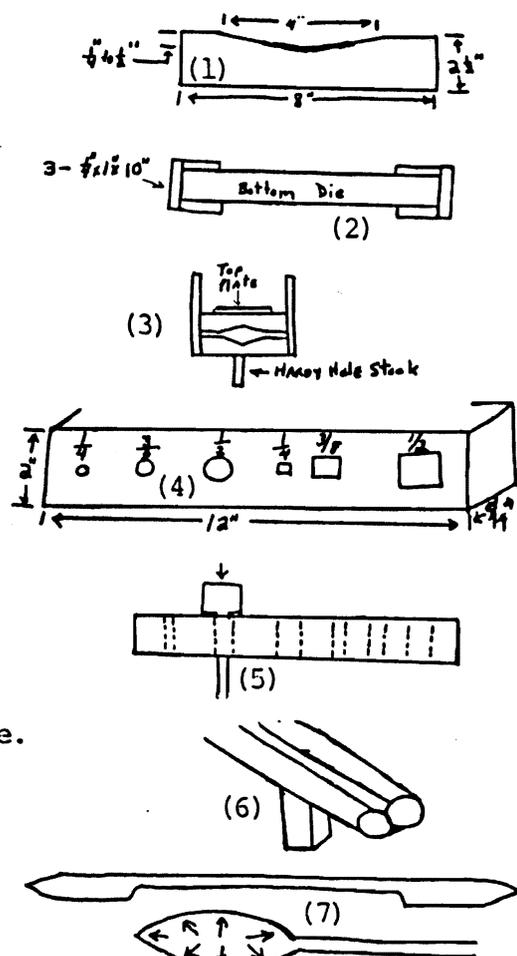
I was recently asked to make a vase with flowers for a centerpiece. This seemed like an interesting project so I took the challenge. Before I started I knew I would need some tooling to make the job go easier. I reviewed my notes from past hammer-ins, newsletters, magazines, conferences, etc., and came up with the plans to make the tooling required. The first tool I needed was for fullering the pipe for the vase. There are several tools for this job, but I like the guillotine fuller demonstrated at the '86 ABANA conference. Materials needed are: 6 pcs 1/4"x1"x10" flat stock, 2 pcs 1/2"x2 1/2"x8" flat stock, 1 pc 1/2" 1 1/2"x5 1/2" flat stock and 1 pc square stock to fit hardy hole.

Take both pieces of 1/2"x2 1/2"x8" and cut a "V" notch on one side. Use grinder to round up "V" notch to keep from cutting metal when fullering (1). Take the six pieces of 1/4"x1"x10" and weld to bottom die to form channel for top die to slide in (2). Now weld 1/2"x1 1/2"x5 1/2" stock to top die and hardy hole stock to bottom die. The top plate is to keep from mushrooming the top die.

When fullering pipe there are a few things to know which will make the job go easier: 1) plug one end of pipe to keep heat and steam from coming out end and burning you. A pipe cap with a handle welded on lets you use shorter pieces of pipe and protects you; 2) start fullering away from end of pipe to keep it rigid; 3) stop fullering when pipe begins to cool to keep from splitting pipe and 4) constantly rotate pipe while fullering to keep even. The guillotine fuller is great for working alone.

There are a variety of flowers which can be made but for this project I went with a pod shape. Before starting the flower I made a monkey tool to use when upsetting the flower pod out of 3/4"x2"x10" stock. I made it with a variety of hole sizes so I could use it for other jobs. I start the flower by drawing out the stem of flower to diameter I want. For this project I used 1/2", 3/4" and 1" round stock. After drawing out stem, put stock in proper hole of monkey tool and upset until you get the diameter and thickness desired. The length you leave for flower on end of stem will determine size of flower. This is something you will just have to experiment with. After getting flower to size I round up and then form into pod. NOTE: Wire brush before each reheating to keep work clean!

Now it is time to make the leaves to finish this project. For this I made a leaf veining tool (6). There are several types but this one is quick and works well. Take



two pieces of 5/8" round 5" long and weld together and then weld hardy hole stock to bottom. If the groove is too deep, just grind off on top to the height which works for you. To make the leaves I used 3/8" and 1/2" round stock. I began with a piece of stock 10" long and pointed both ends. I then drew out the stem from both ends leaving enough stock to form leaves (7). The more stock you leave the bigger or longer the leaf will be. When drawing out stem, I work only two sides of stock. You then flatten the leaf portion to one-half its original thickness and use a straight peen to form the leaf by working from the center out. After the leaf is formed, bring to heat and place on veining tool. Take a dull cutter and make center vein. Now add auxillary veins and use the horn of anvil to give the leaf some characture. Fold stem to flowers and leaves to give a natural look and finish all pieces by blackening them or whatever method you like best.

Another good way to make a flower is to use a bolt. The variety of flowers and leaves which can be made is only limited to your imagination.

TUBAL CAIN from James Lawson, World's Best-loved Poems  
\*\*\*\*\* (submitted by Eileen Yorysh)

Old Tubal Cain was a man of might / In the Days when Earth was Young;  
By the fierce red light of his furnace bright / The strokes of his hammer  
rung;  
And he lifted high his brawny hand / On the iron glowing clear,  
Till the sparks rushed out in scarlet showers, / As he fashioned the sword  
and spear.  
And he sang- "Hurra for my handiwork! / Hurra for the spear and sword!  
Hurra for the hand that shall wield them well, / For he shall be King and  
Lord!"

To Tubal Cain came many a one, / As he wrought by his roaring fire,  
And each one prayed for a strong steel blade / As the crown of his desire:  
And he made them weapons sharp and strong, / Till they shouted loud for  
glee,  
And gave him gifts of pearls and gold, / And spoils of the forest free.  
And they sang- "Hurra for Tubal Cain / Who hath given us strength anew!  
Hurra for the smith, hurra for the fire, / And hurra for the metal true!

But a sudden change came o'er his heart / Ere the setting of the sun,  
And Tubal Cain was filled with pain / For the evil he had done;  
He saw that men, with rage and hate, / Made war upon their kind,  
That the land was red with the blood they shed / In their lust for carnage  
blind.

And he said "Alas! that ever I made, / Or that skill of mine should plan,  
The spear and the sword for men whose joy / Is to slay their fellow man."

And for many a day old Tubal Cain / Sat brooding o'er his woe;  
And his hand forebore to smite the ore / And his furnace smouldered low.  
But he rose at last with a cheerful face, / And a bright courageous eye,  
And bared his strong right arm for work, / While the quick flames mounted  
high.

And he sang - "Hurra for my handicraft" / And the red sparks lit the air;  
"Not alone for the blade was the bright steel made" / And he fashioned the  
first ploughshare.

And men, taught wisdom from the past, / In friendship joined their hands,  
Hung the sword in the hall, the spear on the wall / And ploughed the  
willing lands;

And sang - "Hurra for Tubal Cain! / Our staunch good friend 'is he;  
And for the ploughshare and the plough / To him our praise shall be.  
But while oppression lifts its head, / Or a tyrant would be lord,  
Though we may thank him for the plough, / We'll not forget the sword"

-Charles Mackay

TOP TIPS AND TECHNIQUES: The following were, for the most part, extracted from other group newsletters. They have been rephrased from the write-up or illustrations for consistency of format with the originating source indicated where available. While all are considered valid, neither SOFA nor ABANA bear any responsibility for any adverse results which may occur from them or from elsewhere in this newsletter.

- To make a pipe bell spread out and then neck down a pipe as if you were making a candle base for a stand or chandelier. When necking down leave about a 3/16" opening in the stem. Cut off at the neck, drill to true up to 3/16" and clean up with grinder as required. For a clapper make a large hand forged nail out of 3/8" stock. Taper down the nail stem and make a loop in the end. Length should be short of the distance from bottom of bell to the lip. Attach the clapper to a 3/16" rod about 2 1/2 times the height of the bell. Insert rod and clapper through hole in base of cup, check fit of clapper, and then form into an oval handle. The last operation is to forge braze or torch braze in stem of handle in bell. Cut two or three pieces of brass or copper wire with a pinch of borax, braze in, quench as soon as brass has cooled - three to five seconds. This will give the bell a nice sound. Clean all flux and scale on inside and outside of bell and apply a finish. Now ring for the maid. (By Ron Smith from the newsletter of the Arizona Artist-Blacksmith Ass'n).

- In the newsletter of the Upper Mid-West Blacksmiths Ass'n, Editor Jim Ryan reported on a visit to the shop of Rick Morehouse in Nevada City, CA. He pointed out three innovations. For a chimney Rick used a length of 12" diameter metal driveway culvert, set on a metal base plate over a metal box about 12"x12"x12", with an opening cut in one side. It appears bricks could have been used for the box instead. A bracket on the chimney allows him to swing a coffee pot over the fire. The third item is cross-pieces in his extension bracket which allows for holding the ends of various lengths of metal. Rick does not have electricity in his shop. A similar chimney was shown in a recent newsletter of the North Carolina Chapter of ABANA. I wrote for more details and the Editor reported back to me, "This is a flue used by a number of our members. It is relatively inexpensive and very effective. The pipe is plain or galvanized stovepipe 10" to 12" in diameter. The opening is about one pipe radius high and wide. The pipe rests on bricks set just back of the firepot so the sides and back are closed and the front open (increasing the size of the opening). Cheap, effective and can be moved easily (by slipping out the bricks) if need be for big jobs." In the latter case, you will probably fill the shop with smoke though - which can be reduced by burning only coke for these fires. Seems like the same thing could be done with the culvert pipe.

- Another interesting forge chimney belongs to Danny O'Brien over in Indiana. It consists of two stacked boxes with a 12" diameter stove pipe. The back of both boxes slant in 6" resulting in a smoke ledge in the top box. This is the same concept used in fireplaces. Danny claims this chimney draws so well he has to tie a rope between one of his ankles and the anvil stump in case he gets too close to the flue opening and gets sucked in. For specific measurements, send me a 22¢ stamp.

- (By Brad Silberberg from the newsletter of the Blacksmiths' Guild of the Potomac):

-- Make a set of copper jaw covers for your leg vice using 16 ga. (1/16") or thicker sheet copper. Form them one at a time in the vise itself. Use the covers to protect soft metals from marking in the vise. These covers will also reduce the damage which can occur when cold riveting in the vise. The copper jaws will also leave less of a mark on hot steel than uncovered jaws when hot twisting.

-- Invest \$8 in a gallon of sulfur-based cutting oil available at plumbing supply shops. It is nothing short of amazing how much easier it is to tap, drill, and saw steel when cutting oil is liberally applied. Using cutting-oil when filing helps reduce pinning or clogging which often leaves deep scratches on the work piece. A gallon will probably last forever. ((Francis Whitaker recommends a product called "Rapid Tap" for these purposes. - ks)).

-- If you make a mistake when using steel letter stamps, and you don't want to grind or file out the entire stamped area, use a ball peen hammer to "erase" a letter by peening the impression shut and re-stamping with the correct letter.

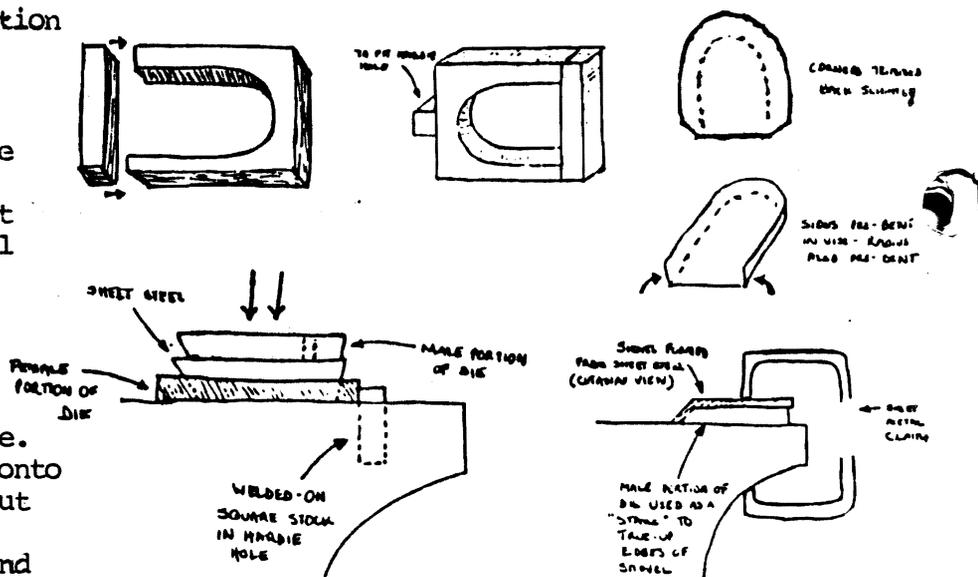
-- Be aware of the expansion and contraction of steel when forging parts which must fit accurately. A tremendous amount of shrinkage occurs below visible heat. A 16" length of 5/8" square stock will shrink 1/16" on cooling from black heat to room temperature. This amount may be critical when forming a section with a tenon on either end.

-- Agricultural vermiculite (granulated mica material) can be used as an annealing medium. It is lightweight, clean, and a very good insulator. Buy enough to fill a two to five gallon METAL bucket.

-- A locking "C" clamp (vise grip type) can be quickly used to clamp work to the anvil face. Simply insert one leg of the clamp into the hardie hole from below. This leaves the other leg above the anvil to clamp flat work. My hardie hole is over 1/2" in diameter and the clamp fits in easily. A clamp could be used with a smaller hole (such as a pritchel hole) by grinding away some of the upset end of one leg. The lower clamp tip should not protrude above the anvil face of course. One use for this type of clamp is to hold a steel framing square to the anvil. The square can be extended out over the anvil edge and clamped in place as a measuring stop on or off the anvil to get shoulder placement, etc.

- Here's a method for fabrication

of a shovel forming die, especially useful if you plan to do fireplace shovels for production work. Take a piece of 3/4" or 1" thick plate. The dimensions should be about 8" x 6". Torch cut the shovel shape at an angle to the rear slightly angled at the sides. The cut-out portion's dimensions should be about 4 1/2" x 6". This piece will serve as the male portion of the die. Weld a piece of square stock onto the side nearest the curved cut out, to enable the die to fit securely in the hardie hole and another across the open front



to close the die. File the edges for a cleaner edge and cut a hole in the male portion to make it easier to pick up. To use, take a 5 3/8" x 6 3/4" piece of 16 or 18 gauge sheet metal, mark your layout and trim the corners back a little. Now, pre-bend the sides in a vise; also pre-bend the radius slightly to center when it is red hot. The steel blank is heated in the forge to red heat and placed in the fixture; the male piece is placed on top and hammered with a 6 lb sledge. True up the edges by placing the shovel on the male portion of the die and clamping the entire unit to the anvil with a sheet metal clamp. Using the male portion as a stake, hammer the edges to remove irregularities and regain the desired curved shape. (From the newsletter of the New York State Designer Blacksmiths).

- From Ye Editor:

-- If you have priced out custom-made logo stamps lately, you know they are a bit expensive. As an alternative, if your logo is a few initials or a short name, buy individual steel letter stamps, weld them together and then weld on a side handle. I bought my three initials from Mendleson's Surplus for about \$1.50 each (as I

recall). Mendleson's also carries large washers good for putting under hardies just larger than your hardy hole to avoid damaging the edges of your hardy hole.

-- I had to cut off about 1" of a 5/8" bar and hit the last lick too hard to where the cut off piece scooted across the floor. I saw where it went and figured it could cool where it was. I finished what I was doing, went up to the house and about 15 minutes later remembered I had forgotten my work jacket. When I opened the garage door I smelled smoke and traced it to where the hot cut piece had landed beside a dropped rag. It probably wouldn't have started a fire, but I guarantee I chase spray cut off pieces now.

- FORGING A STEERS HEAD: (1) Use 1/2" or larger square bar. Flatten end slightly half again as wide as bar.

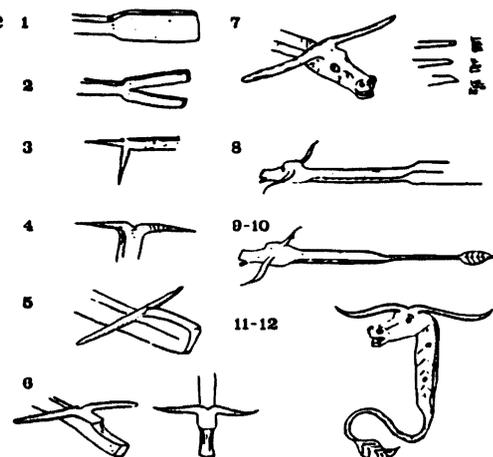
(2) Split hot with chisel. (3) Square taper horns on anvil then round. (4) Spread horns at right angles to bar. (5) Fold end over. Don't fold too much! If you do an ardvard is the result. Flux and weld end shut.

(7) After welding blows, hammer with edge of hammer face to form forehead and bridged and thinned snout. Don't hit end of nose. (7) Hold in vice - form mouth,

nostrils and eyes. Do it hot near yellow. Several heats probably necessary. Do eyes first. Finally, shape horns. (8) If steers head is to be used for a hanging bracket, do the following: Flatten stock behind steers horns for a distance near 4" to a thickness of approximately 3/16". True up sides.

(9) Next taper down end to tail cross section near 1/4" round as long as you want (approximately 5") and form a tail on the end. (10) Chisel some decorations on flattened portion and tail before bending head and tail. (11) Bend head down at right angles to flattened portion behind the horns and curve tail at other end of flattened portion in the same direction as the head. Horns and tail can be used to hang tools - three total. (12) Drill holes in flat portion for mounting. (By Ray Rantanen from the newsletter of the Southwest Artist-Blacksmith Ass'n). ((While the measurements for the horns were not given, I would estimate that about 2" - 2 1/2" of the bar was flattened out. This would produce horns about 2 1/2" - 3" long. Horn width (tip to tip) for longhorns generally run from 4' to 7'. In my opinion it would be difficult to get a good forge weld in Step 5 without burning the horns. I would recommend bending them straight back from the head so the shaft protects them during the welding heat. Once the head is welded and shaped, they can be bent back. In Step 5, it appears that about 3/4" was allowed for the head, top and bottom. This is what I use on my rams head pokers. - ks)).

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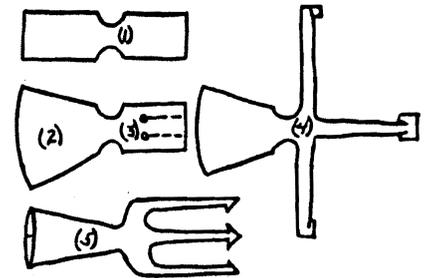


- Fred Caylor, in the newsletter of the Indiana Blacksmithing Ass'n, noted that there is enough stock in the ball end of a ball peen hammer to form it into a round punch, small hot cut, square punch or a number of other shapes. Don't pass up those cheap ball peen hammer heads at flea markets. Use them to expand your headed tools.

- A beginning blacksmith generally does not heat the metal to the proper forging temperature. This is probably due to several reasons: (1) he is impatient and doesn't allow the metal to reach the proper temperature, (2) he has a poor forge, (3) he has bad coal, (4) he does not know how to build and maintain the fire, or (5) he has a large clinker blocking off the air flow. The forge is probably the most important machine in the blacksmith's shop. If the anvil is chipped or swaybacked, or even a rail, or if the hammer is a machine ball peen, etc., the smith can hammer the metal into the desired shape. But if he cannot heat the metal to forging temperature, he is lost, and may become discouraged. Even though the anvil is the pride of any blacksmith, the beginner should probably invest his money in a good firepot, an adequate blower and the best coal he can find. This way he can get on with learning to build and maintain a fire under favorable conditions. (From the newsletter of the Alabama Forge Council). ((Editor's note: It's not just beginners who might have this

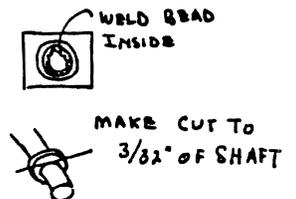
problem. The homestead gate involves upsetting the ends of 3/4" x 1" bars in order to forge out a tenon about 3/8" x 3/4" x 2". Once we figured out we should bring the end near forge welding temperature before upsetting, the process went considerably easier)).

- **FISHING GIG:** To make a "Missouri-style" fishing gig, start with a piece of car spring 5/16" x 2" x 6". With large top and bottom fullers, form shoulders in center (1). Flatten and fishtail one side for socket (edge should be 3 1/7 times gig shaft if the edges will just meet, a little wider if the edges are to be forge welded) (2). Punch and split for tines (3). Bend tines out of line, draw tines leaving a bulb on the ends for the barbs and split bulbs (4). Work barbs to a point on an anvil bridge or cut-off hardie, bend tines as shown, grind off hammer marks around shoulder and anneal (5). Harden to socket and draw barb temper to a blue. The barbs should be hard and the tines springy enough to flex or bend rather than break. (By Bob Patrick from the newsletter of the Blacksmith Ass'n of Missouri). ((When I contacted Bob to get the size of the spring stock he uses, he included the history and use of this style gig. It was used for clear, rocky bottom rivers. For a copy of his letter, send me a 22¢ postage stamp.



- By Monty Byrd from the newsletter of the Upper Mid-West Blacksmith's Ass'n:

-- **Removing bearing races:** To remove an inside bearing race or sleeve, arc weld a bead on the inside of the race and let it cool. This will shrink the race and it will usually come out. An outside race can be cut off with a cutting torch. Cut to about 3/32" of the shaft and take off with a chisel.



- Getting a stud bolt out of cast iron: When all else fails, drill a hole through the stud. Then, using a cutting torch, cut it into sections and remove. The cast iron does not cut. Clean threads with a tap.

-- **Removing nuts which are frozen on:** Using a cutting torch, slice one side of the nut off as close to the threads as possible, trying not to cut into the background material. Then slice the other side off, just up to the threads. Take a hammer and chisel and drive off the rest of the nut. Clean up threads with a die.

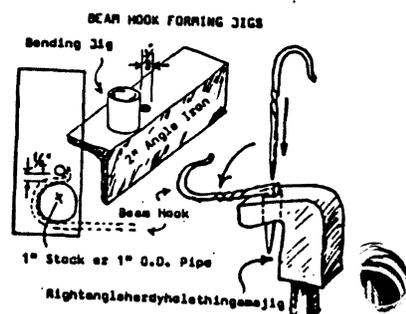


- Keeping hammer heads tight: To tighten hammer heads or to keep them tight, I put linseed oil in a squeeze bottle. When the hammers are in the rack, I put a little oil on the handle in the head. A little turpentine can be mixed with the linseed oil. The handles should be about 1/16" below the top of the head to leave an oil reservoir.



- **BEAM HOOK JIGS:** (By Paul Hubler from the newsletter of the Minnesota Metalsmiths)

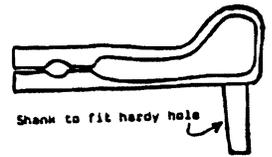
-- To make a vise jig to bend beam hooks, weld a short piece of 1" OD pipe to a short length of 2" angle iron. 1/4" from this drill a 3/8" hole and weld in a short length of 3/8" rod. To use the jig, taper the hook, put in the initial small hook in the end and use the jig as illustrated. Your hooks will come out consistent.



-- To bend for the wall nail, make a hardie bending jig as illustrated.

((It would seem like you could combine these two jigs into one which would fit into the hardy hole. - ks)).

Here is an adaptation of Francis Whitaker's tenon jig. I've found it extremely helpful on several of my fullers, jigs, etc. For those who work in their shops alone, this type of set-up saves a lot of frustration. It's like having an extra set of hands. (By Jim Ryan from the newsletter of the Upper Mid-West Blacksmiths Ass'n).



- A handy adjustable hot twist wrench can be made by arc welding a handle onto the top jaw on an old #9 auto wrench or monkey wrench. This makes it easy to keep the hot iron centered up as you twist it. (From the newsletter of the Minnesota Metalsmiths).

- A handy post vice table is simply two 1/2" plates approximately 12" x 12" with a length of 4" square tube welded in between them. Anchor this to your floor and that's all there is to it - simple, clean and accessible. (From the newsletter of the Minnesota Metalsmiths).

- For a handy bench grinder stand, mount the grinder on a plate welded to a 3" pipe and then weld the pipe to a steel rim with a truck or auto tire attached. If you are doing heavy grinding, you step on the wheel - also very little vibration transmits through the floor. To clean beneath the grinder or move it, simply tip it slightly to the side and roll it on the tire (after unplugging it, of course). (By Guy Crowther from the newsletter of the Minnesota Metalsmiths).

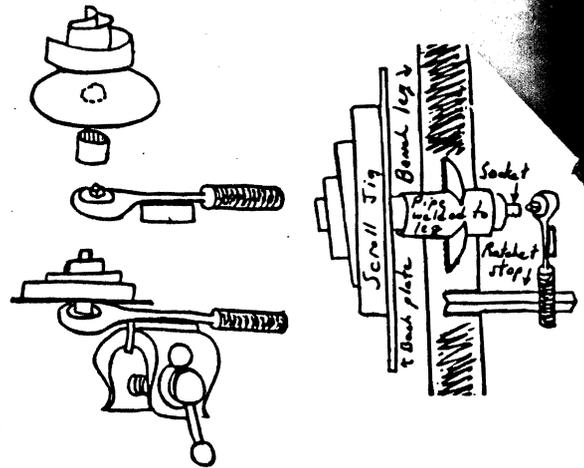
- Safety Tips on Using a Bench Grinder: 1) Don't use the stone at a faster RPM than is listed on the wheel, 2) Be sure the cardboard is around the center of the stone. This holds it in place when bolted to the axle of the bench grinder, 3) Tap the stone with a hammer and it should ring like a bell. If it doesn't ring, don't use it as it may fall apart, 4) Some are to be used in one direction only. The direction is marked on the side in this case, 5) There should be front and rear guards on your grinder. The front guard should be at least 1/4" from the stone, 6) If the stone is out of round, use the front guard as a base and trim it using carbon steel or a stone trimmer, and 7) ALWAYS WEAR SAFETY GLASSES OR GOGGLES. (By Paul Ambruster from the newsletter of the Appalachian Area Chapter - ABANA).

- Railroad Spike Door Knocker: Punch a 7/16" hole in the side of the railroad spike. Punch slightly towards the front as the back must be straight. I use a drift first then a round punch. This makes it easier without distorting the spike. Take a piece of 7/16" x 11" round and scarf the ends like making a chain link. Put through the hole in the spike and weld. Form the circle on the anvil horn. Drill two screw holes for mounting. Polish and use whatever finish you desire. This makes a good conversation piece. (By Joe Humble from the newsletter of the Appalachian Area Chapter - ABANA).

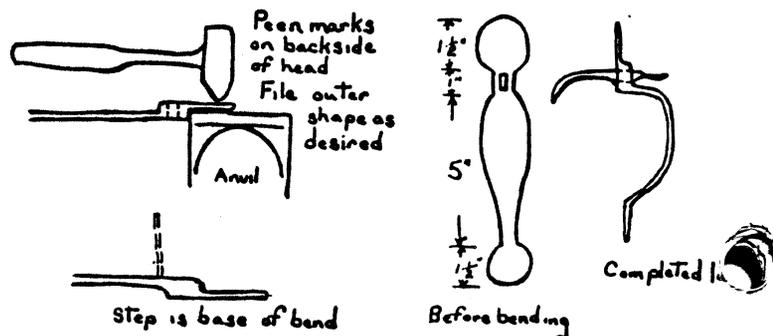
- As the old adage goes you live and learn. At our last meeting I was demonstrating how to make a fork similar to the kind used in the colonial days, around the fireplace. The handle and twist in the middle went quite smooth. After Bob Bourns helped me split the stock with a hot cut, I started to form the tines. Well, for some reason, after I would take a heat and start to work on the tines, they would fall apart. All kinds of reasons popped into my head, "I'm demonstrating to other blacksmiths", or "Just because I'm the President of the chapter", were a couple, but I ruled them out. Why is this happening was my question to all who were watching. If the steel is high carbon and gets too hot it will crumble, was one idea. If the steel was air hardened or oil quenched and was quenched in water (which it was) it could also cause it to crumble. So, an important lesson was learned the hard way, know the material you are working with, not just that it is steel. On the fork, the important part of the fork is to upset the area where the handle and tines join. This area should look flat there, not with a notch - which will cause a weak spot. (By Tim Armentrout from the newsletter of the Michigan Artist Blacksmith Ass'n).

- SCROLL JIG: (By Bob Walsh from The Anvil's Ring, March 1979)

For small scrolls, instead of making a conventional jig which drops in your hardy hole, leave off the hardy stem and weld it on a plate of steel. Then weld an old, large socket, ratchet opening exposed, on the bottom in the center. Next weld a rectangular plate on your ratchet wrench so it can be held firmly in your vice. Drop the scroll jib on the ratchet wrench and presto! This jig is very handy when working in small places where, with a stationary scroll jig, the long tail of the unmade scroll is always bumping into something. For larger scroll jigs (up to 3'), use a similar ratchet affair except mount the jigs vertically on the leg of your workbench. In this application, you must use a slip in, rotating pipe in a fixed pipe arrangement to hold the extra weight. With this set-up you can bend enormous scrolls in a very limited space, as the tail of the unfinished scroll just goes up and down. Another fringe benefit is that, because you are pushing down on the vertical scroll, you will not hurt your back. This arrangement has been used to bend a scroll from 3/8" x 2" stock, by hand, cold.

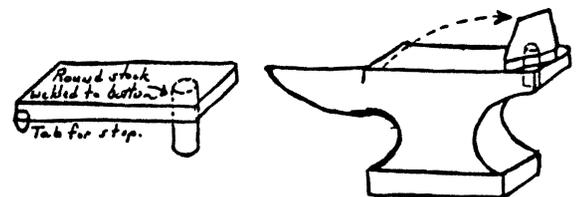


- SUFFOLK-TYPE DOOR LATCH. The following description for making a Suffolk-type door latch was provided by Peter Ross, resident master blacksmith at Colonial Williamsburg. Start with 1/4" x 3/4" mild steel bar stock. Approximately 5 1/2" will be needed, but it is easier to start with a longer bar so tongs will not have to be used in the first four steps. Form head, boss and slot area with the first heat. Step down into handle. Head is an eye-



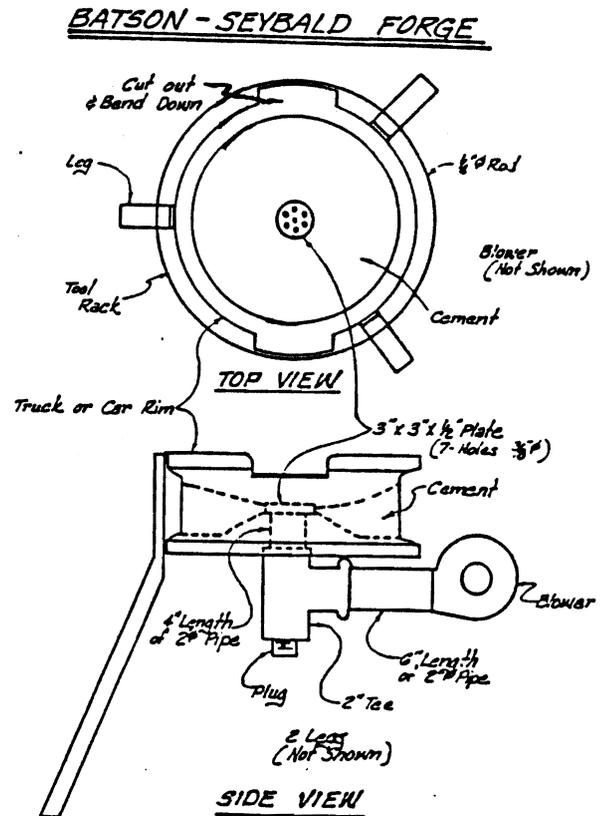
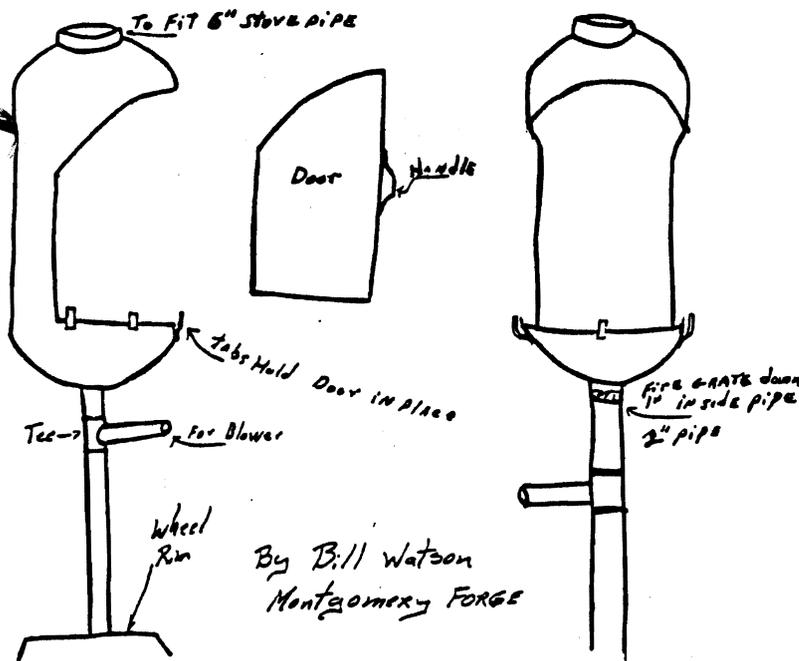
balled square of the stock. Use half-faced blows to create the offsets, then flatten head. Punch a 1/4" x 1/2" slot and dress with drift. Spread head by peening as illustrated, first the center, then the edges. Draw handle down to about 1/8" thick and rough out handle shape. A special swage for the handle makes production work easier, but it can be done with a light hammer and some file work. (By Ike Bay from the newsletter of the Northwest Blacksmiths' Ass'n).

- SWIVELLING CHOPPING PLATE: We have all, upon occasion, worked on jobs where the process involved is that of hot-cutting and then forging, possibly numerous times, components to be used in the job. Something we came up with in our shop was a chopping plate or block which is cut to the width of the anvil face, with the approximate length being 3/4rds of the face length. Two side tabs are arc welded to the plate extending no more than 1/4" from the bottom of the plate, as illustrated. Instead of a peg of square stock being arc welded in place, which will fit into the hardy hole, we welded a round peg of stock (to just fit in the hardy hole) to the plate. The tabs welded to the sides will keep the plate in place on the anvil face. The round peg will allow you to lift the chopping plate 1/4" up and swing it out of the way so you can then forge the piece on the face of the anvil. Many times it is useful to have a chopping plate which is 2/3rds or 3/4rds the length of your anvil face, and you will find this tool a great time saver. (By Rolando DeLeon from The Anvil's Ring, March 1979).



- While visiting the shop of Manfred Bredohl in Aachen, West Germany, I was impressed with several items. First, his welding tables. Basically, the table consists of two saw horses supporting two wide flange "I" beams. Between the "I" beams and flush with the top flange is a sheet of particleboard supported on two pieces of rectangular

ing. The entire layout table is completely portable. Clearly, even the largest in the shop could easily be moved and set up by two (well, maybe four) men. The particle board was used as the layout surface. When one side gets full of layout lines, you simply flip it over. When the second side gets full, you either try to wash off the lines, sand it down or replace it with another sheet. If you want to change the width of the table, you move in the "I" beams and trim the particle board down. By leveling the two "I" beams, you essentially generate a large flat surface. Contact with the "I" beams provides an arc welding contact. Much better arrangement than the more conventional welding/layout tables which are typically a couple of tons of steel and, which once set up, are impossible to take down or move. A second interesting tool in use was a swage block stand designed to allow one to use the edges of the block without manhandling it. The way the stand differed from those I've seen in books and other shops was that there was a piece of pipe going through a hole which was almost centered in the swage block. By removing two pieces of bar stock, it was possible to rotate the block around the axis. Hence, you could easily go from one edge to another. While we were there the workers were making a number of candle holders, most sharing a common feature in that the candle was held in a deeply forged cup with a small central spike which stuck into the candle. The cups were pipe caps for welded piping. Two different caps were being used, one about 2½" - 3" and the other about 5" in diameter. In every case the caps were torched around the edges to remove the welding bevel which was normally machined on these caps. I've never seen these pipe caps being used in candle holders in this country, but I think it's a neat idea and I plan to try making a few holders like this. (By Karl Schuler from the newsletter of the Southwest Artist-Blacksmith Ass'n). ((The report on the visit contained several photographs and other observations. For a copy of it send me a 22¢ stamp. - ks)).



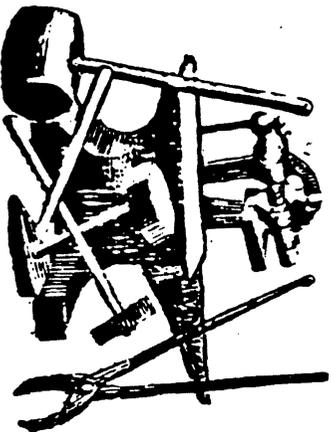
- The above two homemade forges are from the newsletter of the Alabama Forge Council - ABANA):

-- The small one on the left is a used freon bottle. Recommend using a sabresaw to make the cuts. If you use a torch make sure the tank is empty by washing it out with water. Any freon left in the bottle will create a poison gas when burned. Use a hair dryer or any type of available small blower and heavy wire cloth put down the stand-pipe for a grate. These drawings are only a guideline.

-- The one on the right requires the following material: one 15" truck rim for the forge pot, three 24" lengths of 1" pipe for legs, one blower, one 3" square by 1/2"

*For the Engineering Blacksmith.*

PLANT HANGER



1. Take a piece of 3/8 " sqr X 13 ", heat and forge a right angle on one end 1 1/2 " long. This forms a brace for the wall.
2. Punch or drill hole in the center of the brace for what ever size screw you intend to use.
3. Heat and draw out the other end, forming a hook.
4. Heat evenly and put a 2 " twist in the center.
5. Take another piece the same size and form a 1 1/2" angle bend on one end. The angle should be shaped so this piece will form a bottom brace and should touch the upper piece midway between the twist and the hook.
6. Heat and put a 2 " twist in the middle.
7. When fitted to the angle desired cut to the right length.
8. Either forge weld or arc weld. If arc welded, re-heat and shape with your hammer. It will give more the appearance of a forge weld. The advantages of a forge weld is that it is quicker and will look very neat, with no grinding etc.



(From the newsletter of the Appalachian Area Chapter - ABANA)

**METALS OF FARM MACHINES**

The following table lists the major kinds of metals used in farm machinery, how to identify them, why the manufacturer used the particular metal, common causes of failures, and recommended method of repair. It is best to refer to a welder's handbook to get the necessary procedure, treatment, and type of rod to use before attempting to weld any of these metals.

Metal	Machine Parts Commonly Made of This Metal	How to Identify and Characteristics	Why Used and Common Failures	Recommended Treatment of the Material & Repair
Cast Iron (Gray) (White)	Mower Frame, Wheels, Gears, & Sprockets on old models. Paws and Holders. Planter plates. Plow points Drill Cups and Shoes. Lever Bases; Disk Spools and Bearing Cases.	Rust very lightly. Hard to cut. Easy to drill. Shavings crumble and dark to light gray. No oil when drilling. Breaks very easily when hammered or bent. Shows mold marks, very rigid.	Easy to mfg. in irregular shapes. Holds bearings & other parts with little wear, vibration or loss of alignment. When does wear hard to restore shape.	Difficult to weld. Brazes easily; when brazing, heat entire casting, allow to cool slowly. Straight or curved castings may be splined with hot roll steel. Brad — Bolt together.
Malleable Cast Iron	Shoes of Mower. Cutter Bar, Planter & Drill. Seed Cups, Lever castings, clevises, bearing cases.	Nearly the same as cast iron except may bend slightly. Will stand some hammering.	Wears well, but faster than cast. Has greater tensile strength. Will hold thread for stud bolts.	Same as cast iron — not as brittle. Can be threaded; soft on outside and can be cut more easily.
Wrought Iron	Old machines have some in bolts & braces.	Rust resistant, soft to drill, cuts easy.	Will work easy. Can be bent to any shape, high tensile strength.	Weld by any process. Threads and forges easy.
Cast Steel	Mower yoke; gears and sprockets on new machines; draw-bar brackets. Some plow points.	Hard to drill and cut. Rusts slowly, takes very high polish. Rigid and high tensile strength.	Can be made in different shapes easily. Expensive. Wears slowly; dependable.	Welds by any process. Holds thread well. Can be heated and re-shaped or forged slowly. Temper carefully.
High Carbon Steel	Plow beams. Mower cutter bar springs. Disc. Planter shoes. Chisels, drills, and wrenches.	Shows rust quickly. Hard to drill or cut. Tempers well. Holds shape well. High tensile strength.	Expensive. Can be tempered to suit tough job. May wear some.	Welds by any process. Carefully. Can be re-tempered, but not too often. Can forge slowly. Holds thread well.
Soft Center Steel	Plow points; wing and other machines on wearing points.	Same as cast or high carbon steel.	Same as cast steel; will break.	Same as cast steel; but forge and temper more carefully.
Cold Roll Steel	Shafting & frame where straight pull tensile strength required.	Shows rust easy. Easy to cut, drill and forge. Bends easy. Cold.	Good wearing quality as rotating shaft. Cheap, but cuts easy with grit.	Weld by any process. Shape or forge easy. Cannot be tempered.
Hot Roll Steel	Angle & Channel iron frames where twisting and strain occur.	Same as cold roll but usually made in strips and angles.	Good wearing and rigid quality, but will break and fatigue.	Same as cold roll but may temper slightly.
Brass & Bronze	Found in replaceable bearings.	Wears well. Bright copper color.	Replaceable. Easy dentured or broken.	Cheaper to replace than repair
Babbit	Serves as lining for cast iron bearings.	Lead color—easily cut	Wears well Melts with heat.	Cheap to replace small bearings.

## Effect of Alloying Elements

About 26 different elements are used either singly or in combination with other elements in the production of alloy steels.

### (1) Carbon

When carbon is added in amounts up to 0.80% the steel becomes harder, increases in tensile strength and increases in response to heat treatment.

### (2) Manganese

Manganese is next important to carbon. It is normally present in amounts from 0.30% to 1.5% in constructional grades of steel. It acts as a deoxidizer and increases hardenability, toughness, shock resistance, and response to heat treatment.

Steels with 1.5% to 5% Manganese are so brittle as to be useless, but with the addition of more Manganese its strength increases. Special Manganese steels have from 10% to 14% manganese. These steels possess extreme hardness and ductility.

### (3) Nickel

Nickel increases strength, toughness, wear resistance, and corrosion resistance of steels. The alloying quantity is 3% to 3.7%

Nickel steels have high impact resistance especially at low temperatures. These steels are used for constructional purposes for bridging, buildings, armour plate, and heavy machinery.

Nickel is often alloyed with chromium to form nickel-chrome steels for constructional grade uses.

Nickel is the principle alloying element in forming stainless steel. In these steels nickel is alloyed in amounts up to 22%, together with chromium.

### (4) Chromium

Chromium increases the corrosion resistance, toughness, wear resistance, hardenability and response to heat treatment. Chromium content in constructional grade steels ranges from 0.30% to 1.60%. The carbon content usually ranges from 0.20% to 1.30%. With proper hardening and tempering the tensile strength of the steel may be doubled and the yield strength tripled in comparison with corresponding annealed steels. Without proper heat treatment these steels are not superior to plain carbon steels.

When used with nickel to form stainless steel chromium generally ranges from 11% to 26%.

### (5) Molybdenum

Molybdenum increases the heat treat properties of steel, it increases the hardenability and increases the resistance of steel to soften at high temperatures.

In constructional steels molybdenum is alloyed in relatively small amounts 0.15% to 0.40%, but in tool steels it can go as high as 9%.

### (6) Vanadium

Vanadium is alloyed to promote a finer grain structure in the steels. It also increases tensile strength, yield strength, wear resistance, and impact toughness.

In steels of constructional grade vanadium is usually combined with chromium to form chromium-vanadium steels. These steels are used to form heat-treated and forged parts, flat springs, coil springs, piston rod and splined shafts.

Vanadium is included in amounts to 5% in high speed steels to impart stability at high temperatures.

### (7) Tungsten

Tungsten is used to promote fine grain structure in the steels it is alloyed with. In amounts from 2% to 20% it produces a fine dense grain structure, and improves heat treat qualities.

Tungsten is a principle ingredient in cemented carbide cutting tools.

### (8) Cobalt

Cobalt is an important alloy for cutting tools. These include high speed steel, cemented carbide, and cast alloys. The outstanding property of cobalt is its ability to improve the hot-hardness of cutting tool materials. With high cobalt content these materials retain their hardness at the lower red-heat temperatures.

### (9) Copper

Copper is used in small amounts to improve corrosion resistance and to improve tensile and yield strengths of steel.

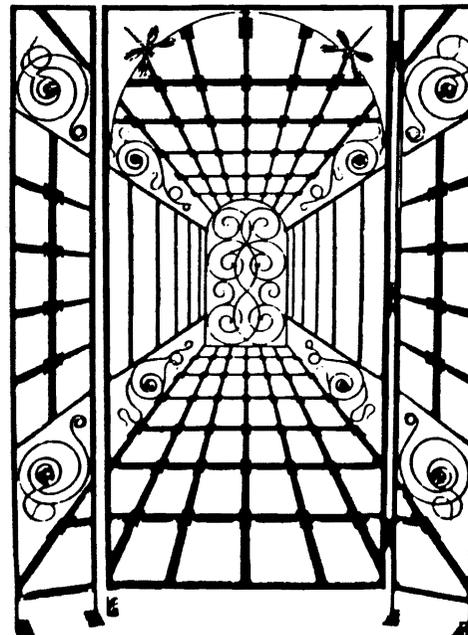
### (10) Lead

Lead is used to improve the machinability of the metal.

### (11) Sulphur

Sulphur is added to steel from 0.05% to 0.33% to improve machinability. In higher percentages sulphur becomes a detriment to the hot working properties of the steel, therefore is not recommended for use in steels to be forged or welded.

excerpts from book "Machine Tool Technology" by Willard J McCarthy and Dr. Victor E Repp  
Published McKnight Publishing Co. Bloomington IL.



Gate.

Steve Austin  
Kansas City, MO

# Office Hours

Open Most Days About 9 or 10  
Occasionally as Early as 7, But Some Days  
As Late As 12 or 1.

**We Close** About 5:30 or 6  
Occasionally About 4 or 5, But  
Sometimes as Late As 11 or 12.  
**Some Days** or Afternoons, We  
Aren't Here At All, And Lately  
I've Been Here Just About All The Time,  
Except When I'm Someplace Else,  
But I Should Be Here Then, Too.

ick plate with seven 3/8" holes drilled through it for a grate, one electrical on/off switch (or rheostat) and 2" pipe fittings (one tee, one plug, one 4" and one 6" section). For the fire cement use one shovel of Portland cement, three shovels of sand and one-half pound of table salt.

- NOVEL TWISTS: Here are four examples of types of twists made in the Samuel Yellin shop. They may be used for table legs, frames for grills, banisters and newel posts and for other uses.

The diagram below each shows the composition of the cross section. All are made of a combination of rod, square bars, angle iron and flat bar stock. The twist on the left is composed of rod but is embellished with two square knots. (By Max Segal from the June 1975 issue of The Anvil's Ring). Apparently the bundles were spot welded to hold them together -ed).



- MUDDAUBER FLUX: Crushed muddauber nests can be used as flux. It's composed of very fine sand particles. (By Larry Mann from the June 1975 issue of The Anvil's Ring).



HEAR YE! HEAR YE! HEAR YE!

**BLACKSMITH WANTED:** Full-time production blacksmith to maintain traditional-style inventory at Cedar Creek Forge in Cedarburg, WI. Room for Spaghetti, Star Wars, or other styles of self-expression. Commission work available. Opportunity to advance unlimited. Insurance benefits. Equal Opportunity Employer. Send resume to Jim English, 427 N. Washington Ave., Cedarburg, WI 53012 - 414-375-2201.

Low cost work gloves are available from Harbor Freight Salvage Co., 3491 Mission Oaks Blvd., Cammarillo, CA 93011-6010 - 800-423-2567. Example: welding gloves, 3 pair for \$9.50 and safety cuff leather work gloves, 6 pair for \$8.50. Catalog on request. I have purchased from this company in the past and have been pleased with the product quality and service.

**BLACKSMITH WANTED:** Seasonal blacksmithing work at Mackinac Island. Room and board plus pay. Contact Bill Pieh, Centaur Forge, P.O. Box 340, Burlington, WI 53105 - 414-763-9175.

Several times a year I receive an inquiry either asking for the name and address of someone in their area to give introduction to blacksmithing lessons or a referral to a blacksmith to produce an item. About the only thing I have to go by is the membership list. If you would like to receive referrals on either of these, please send me a postcard listing your services, or send me a business card.

Reminder that classified ads for blacksmithing-related items in this newsletter are free. Send in your ad to buy, sell or swap.

**FOR SALE:** Heavy-duty, cast-iron firepots. \$125.00. Contact Bob Zeller, 849-1771.

**BEGINNING BLACKSMITHING CLASSES:** Contact Larry Wood at 233-6751.

**FOR SALE:** 50 lb Williams-White power hammer, completely reconditioned, \$1,850. Wheelwright mandrel about 40" high, \$200. Contact Emmert Studebaker, 513-223-3102.

**FOR SALE:** Detailed and illustrated plans for a homemade 50 lb power hammer. \$3.00 in person or \$4.00 via mailorder. Contact Hans Peot at 6425 S. Scarff Rd., New Carlisle, OH 45344.

If you think S.O.F.A. is a bargain at \$5.00 per year, membership in the Tullie Smith House Blacksmith Guild is \$3.00 per year and include an excellent newsletter usually containing 6-8 pages of tips and techniques. Contact Clay Smith, 3007 Leafwood Dr., Marietta, GA 30067.

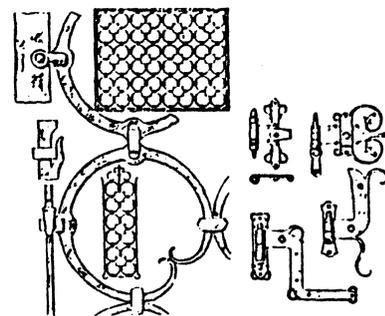
Arts and Crafts folks or members who demonstrate for the public can get a yearly listing of festivals in Ohio by sending a business-size envelope with 73¢ postage to Ohio Arts and Crafts Guild, 9 North Main St., Mt. Vernon, OH 43050. Examples of upcoming festivals are: Fairborn Fall Arts Festival, Oct. 10-11; Spring Valley Potatoe Festival, Oct. 2-4; Springfield Octoberfest Arts and Crafts Exhibit, Oct. 9-10; Piqua Fall Mall Show, Oct. 30 - Nov. 1; Springfield Holiday Mart, Nov. 20-22; and Dayton Artistry in Wood Fair, Nov. 21-22.

Homier Distributing Co., 1328 Etna Ave., Huntington, IN 46750 sells low cost tools (Buffalo Brand). 3 lb crosspein - \$4.99, 4 lb crosspein - \$5.99, 8 lb sledge hammer - \$11.95, wire block brush - \$1.69, 36" bolt cutter - \$29.95 and cast iron anvils (55 lb - \$49.95, 110 lb - \$89.95, and 220 lb - \$169.95). Prices were in 1986. Catalog on request

For those curious as to the names of other blacksmithing group newsletters, here they are: The Iron Trillium (Ontario Artist-Blacksmith Ass'n); The Atlantic Anvil (Maritime Artist-Blacksmith Ass'n); The Rivet (Western Canadian Blacksmith Guild); Metalsmith (Guild of Metalsmiths); The KBA News (Kentucky Blacksmiths Ass'n); Forge Facts (Rocky Mountain Smiths); Hot Iron News (Northwest Blacksmith Ass'n); The Clinker Breaker (Florida Artist-Blacksmith Ass'n); The Pounders Press (Southwest Artist-Blacksmith Ass'n); The Forge Fire (Indiana Blacksmithing Ass'n); Fire and Iron (Northeastern Blacksmiths Ass'n); Bituminous Bits (Alabama Forge Council); The Tuyere (Illinois Blacksmiths Ass'n); The Anvil's Horn (Arizona Artist-Blacksmith Ass'n); The Hammer's Arc (Tullie-Smith House Blacksmith Guild); Hot Iron Sparkle (North Carolina Chapter - ABANA); and California Blacksmith (California Blacksmith Ass'n). Others which I have seen suggested are: Anvil Sounds, Bellowing Horn, Tong Talk, Bellow's Roar, Hammer Strikes, Integrity Iron, Smithy Shorts, The Hot Sheets, Hot Rolled News and Forge Talk. Anyone care to suggest others?

We have given up trying to locate 1/4" and 5/16" hot rolled square stock. We thought we had some located and actually placed an order but at the last minute found out it was cold rolled (dispite our specifying hot rolled in our request for quotation and the quotation coming from the "Hot Rolled Department"). We have determined a minimum mill run (which would be several tons) would be too expensive.

Norm Larson (5426 Hwy. 246, Lampoc, CA 93436) now carries a book which appears to have some great ideas for the forge. It is Designs and Products of the Forge by C. Zimmer (105 pages of explanations and 94 illustrations. The illustrations at the right (greatly reduced) are from this book. Cost is \$10.95 plus \$1.35 S&H.



FOR SALE: Modern 50 lb and two 25 lb Little Giants, all in excellent condition. Contact R. Neil Brown, RT #5, Box 63, Decatur, IN 46723 - 219-724-7554.

APPRENTICE WANTED - shop specializes in architectural ironwork but training will include small forgings as well. Contact Craig Kaviar, 147 Stevenson Ave., Louisville, KY 40206.

BLACKSMITHING SHOP WANTED for tourist town in NC mountains. Have shop ready for occupancy, 24' x 24', with concrete floor, reasonable rent. Contact Lyle Clar, Dillsboro Supply, Dillsborn, NC 28725.

EXPERIENCED CRAFTSMAN NEEDED to help with overwhelming nationwide demand for architectural metalwork of the finest nature. I would also like to hear from smiths capable of subcontracting component parts for same. Contact David A. Ponsler, Wonderland Products, P.O. Box 6074, Jacksonville, FL 32236 - 904-786-0144.

We in the metal business must always be aware of quality! If you are not qualified to do the job, turn it down and refer the customer to someone who can. Our craft cannot tolerate sloppy, inept work. Because you have welding equipment it does not necessarily mean you have the ability to use it properly, so search your skills before you take the job. Quality work must come first, be sure you are up to it! Your discretion will keep the American tradition of quality work alive.

\* \* \* \* \* QUAD-STATE DEMONSTRATOR CHANGE \* \* \* \* \*

Russ Swider, who was scheduled to demonstrate architectural ironwork on Saturday and Sunday, had to cancel due to an accident. Apparently he was working under his truck when the jack slipped and it fell on him, resulting in a broken hip and other injuries.

Replacing Russ will be Peter Happny from Portsmouth, NH. Peter has been a blacksmith for over 16 years, primarily in the area of restoration of Colonial ironwork and gothic ironwork for churches. Peter will emphasize function first, then decoration and proportional shapes/sizes to please the eye. On Sunday afternoon he will lead a hands-on workshop making a project using the procedures taught on Saturday and Sunday morning. Peter comes highly recommended by several knowledgeable smiths contacted.

MEMBERSHIP APPLICATION

ARTIST-BLACKSMITHS' ASSOCIATION OF NORTH AMERICA

Membership in ABANA includes a subscription to The Anvil's Ring.

New Member      Renewal

Name: \_\_\_\_\_  
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Practicing Smith      Artist      Teacher  
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- Full-time Student...\$25.00 per year
- Regular Member.....\$35.00 per year
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(Please remit in U.S. currency)

CHECK MUST ACCOMPANY APPLICATION

Mail to: A.B.A.N.A.  
 P.O. Box 1181  
 Nashville, IN 47448

Comments:

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 Dayton, OH 45433-0399

NOTE: Your SOFA membership expires with the 6/88 issue.

*Dick Franklin*  
*7158 Klymore Dr.*  
*Dayton, OH 45424*



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