

# SOFA SOUNDS



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

FEBRUARY/MARCH 1992

**Artist-Blacksmiths Association of North America**

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BOARD OF DIRECTORS:

Emmert Studebaker (Director Emeritus)  
Dick Franklin  
Hans Peot (Also ABANA Board Member)  
Ron Thompson  
Ron Van Vickle  
Larry Wood

OFFICERS:

Dick Franklin (President)  
Larry Gindlesperger (Vice President)  
Ron Van Vickle (Secretary/Treasurer)

ACTING NEWSLETTER EDITOR:

Ken Scharabok (513-427-2447)

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MARK YOUR CALENDAR: Unless otherwise noted, all meetings will be held at the Studebaker Frontier Homestead on Rt. 202, about 4 miles north of I-70 near Tipp City. Please don't park on the grass or block access to the production buildings. Donations of items to the newsletter support raffle are always welcome. Please bring your work or tooling for display. The public and guests are welcome. Finger food and cold drinks provided on a break-even donation plate basis. The forges at the homestead are available before and after meetings for individual projects. PLEASE BRING AND WEAR SAFETY GLASSES.

February 1st, 1 PM

Demonstration by Bob Cruikshank.

March 7th, 1 PM

Demonstration by Larry Gindlesperger on scrolls.

April 4th, 1 PM

Demonstration by Hank Steinmetz and Don Mumford on fixture bending.

May 2nd, 1 PM

Demonstration by Mike Dowler.

June 6th, 1 PM

Demonstrator needed.

July 11th, 1 PM

Tentative: Work day to repair several of the homestead forges.

VCR TAPE LIBRARY:

Hank Steinmetz has volunteered to become the SOF&A tape librarian. Details should be announced in the next newsletter. I know you are getting tired of my harping on this point but there are about 50 tapes in circulation but we only have about 18 on-hand. Thus, pretty, pretty please check your VCR tape library to see if you don't have some of these stored there. If so, return them to Ron Van Vickle, 1121 Central Avenue, Greenville, OH 45331. These tapes contain a wealth of information but we need to keep them in circulation to be an effective teaching tool.

1992 ABANA CONFERENCE:

Remember the next ABANA Conference will be June 18-20 at the California Polytechnic Institute in San Luis Obispo, CA. Make your plans to attend.

**Chapter of ABANA**

# ABANA

Artist-Blacksmiths' Association of North America



P.O. Box 1181, Nashville, Indiana 47448  
Executive Secretary, Janelle Gilbert

Office Hours: 7:30-11:30am & 1:30-4:30pm  
Phone: (812) 988-6919

## PRESIDENT'S MESSAGE December 1991

Dear Friends,

The Board of Directors meeting in Ohio went very well and many positive things came out of the effort. We elected the one year terms of officers and the new Executive Board is:

1st Vice President - Clayton Carr  
RFD #2 Box 2911  
Kennewick, WA 99337  
Ph: (509) 586-9278

2nd Vice President - Ron Porter  
R.R.1 Box 154  
Bunker Hill, IN 46914  
Ph: (317) 689-8450

Secretary - Hans Peot  
6425 S. Scarff Road  
New Carlisle, OH 45344  
Ph: (513)845-9934

Treasurer - Bill Callaway  
3646 W. Lawrence Lane  
Phoenix, AZ 85051  
Ph: (602) 973-4142

I remain as President for the rest of my term to 1992. After that, if re-elected to the Board, I will serve on one of the committees and put my energy to good use there.

We tripled the budget in the Membership Services area. The sub-committees are: Chapter Liaison Committee, Member Services Committee, and Marketing Committee. Clayton Carr, as Coordinator of the sub-committees, has a well thought out program ready to go into full swing. It is our intention that this committee will continue to unite the Chapters and ABANA and increase service to the individual members of ABANA. (See the Chapter Liaison Letter from Clayton Carr to review the functions of these committees.)

We have done well this past year and inspite of the additional non-budgeted expenses that incurred over the course of the time frame, we have come in very close to the budgeted amount. Overall membership is holding despite the recession and sales have increased. We set the budget for 1992 on a conservative estimate and Treasurer Bill Callaway will run that in the spring issue of *The Anvils Ring* (Vol. 19, #4), along with the year end statement. Financially, ABANA does look very good and we will keep a sharp eye on the monies for you.

If at any time you, as an ABANA member, would like a monthly statement, send \$5.00 to the ABANA Office with your name, address, and notification that you would like a copy of the statement and we will get one to you. The monthly statement is running about 22 pages long, thus the need to charge a small fee for shipping and handling.

Efforts are in full swing to bring all of you up to date on the 1992 Conference to be held June 18 - 20 1992. (Registration starts on the 17th and departure on the 21<sup>st</sup>.) ABANA Members will be receiving packets during the months of March and April in plenty of time to plan your trip. Remember that this is a conference for ABANA Members, (one of your benefits) so be sure to keep your membership current. If you are planning a family vacation out that way, be sure to renew at the family membership rate of \$40. At \$5 more than the regular rate, it will save you quite a bit when you arrive at the registration office.

We are always looking for articles for the *Anvils Ring*, and a lot of you have some excellent ideas to share. Contact Editor Robert Owings, 230 Keokuk St, Petaluma CA 94952, (707) 778-8261 and let's see it in print.

We of the Board of ABANA want to thank Emmert and Jane Studebaker for their hospitality as they once again hosted the November Board meeting. Emmert was one of the founders of this organization and we are in his debt.

Look for your next issue of *The Anvils Ring* to come out the end of December and enjoy the holidays.

Warm Regards,

Dorothy Stiegler  
President of ABANA

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## PRESIDENT'S MESSAGE January 1992

Dear Friends,

Wow! The holidays are almost here as I write this message for your January newsletters! I love this time of year. It's such a festive, positive time to look forward to. I hope this message finds you safe and sound after an enjoyable New Year.

The ABANA Board has voted to make Emmert Studebaker a lifetime member of ABANA. This is one of the highest honors that we bestow on our members, and it is rarely done. The recipient must be indeed worthy, and it takes the unanimous vote of the entire ABANA Board. Most of you know Emmert and realize that he was one of our founders, 20 years ago. Since then, he has donated more time and energy into ABANA and the advancement of blacksmithing than most of us can remember. Certainly more than I can list today. I am thrilled that this bestowed lifetime membership to a truly great person came under my tenure as President.

The information on the upcoming ABANA Conference will be in the mail to you after the first of the year. I think you will be pleased with the packet and I know you will get your money's worth out of the event itself. The committee is working very hard to see that everything is up to your expectations and we have a lot great programs for you and your family.

Several people and businesses are donating equipment and energy to the conference this year, as in the past. I spoke with Bill Pieh of Centaur Forge this weekend and he is donating several large air hammers for the event as well as the shipping. This is a substantial donation and I wanted to tell you because people do these things so that we can have a great event and sometimes, not very many people know about the unsung heroes in the background. Frankly, without this type of sacrifice from people just like Bill, we couldn't do this and stay within budget. If you have a minute, drop Bill a line and thank him. Stop by the hammer events at the conference to take a look at the latest air hammers available.

Wishing you the best for 1992.

Warm Regards,

  
Dorothy Stiegler  
President of ABANA

FOR SALE: 25 lb powerhammer and two large spring fullers - \$275, you haul, plus tire machine - \$175, Edwards #5 shears - \$200, 150 lb swage block - \$175, complete Buffalo forge - \$350 and 210 lb mandrel - \$200. Contact David Unuck, Grand Rapids, OH 419-832-0277.

- FLUXLESS WELD: Use two pieces of 1/2" square mild steel, no flux! Clean out fire and get to high temperature. Make scarfs on both pieces. With hot cut, cut a notch in face of each scarf so they will interlock when placed together. Heat to good welding heat and weld, again without using flux. (From the newsletter of the Alabama Forge Council. They have an "Order of the Fluxless Weld" and to qualify you have to make a weld using mild steel without using flux.)



MEETINGS/DEMONSTRATIONS:

For the December 7th meeting/demonstration Ron Thompson and Ron Van Vickle gave a demonstration on treating springs in various quenching mediums and then testing them for breakage and springage. The mediums tested were quenching oil, water, oil on water, motor oil and hot water.

They noted in their tests that quenching oil worked best, probably because it was designed for that purpose. They obtained it from Springfield Heat Treating at about \$4 gallon. It was noted it had a very high flash point and did not emit any toxic fumes.

They used a gas forge to heat up strips of 1075 steel, noting that the gas forge produced a uniform heat through the strip. The strips were when hammered slightly to compress the grain pattern and bent into a "V" shape for further tempering to a blue and then testing by bending almost into a "U" shape in the legvise. On their first attempts all of the springs broke, which they attributed to having heated the pieces at too high of a temperature (yellowish) prior to quenching. They then achieved better results but just heating the springs to a cherry red as this was closer to the critical point where the grain pattern changes structure.

Also tried was the three flash method where the spring is dipped in motor oil, flared until the oil burned off, redipped, flared, etc. Larry Wood noted he tempers his gun springs in molten lead on the same type basis as the temperature of the molten lead is very near that desired for tempering.

When available the vidio tape will provide a wealth of information on this spring tempering demonstration.

\* \* \* \* \*

For the January meeting Hans Peot demonstrated the procedures for making a dandy window grill out of Otto Schindler's book "Work Methods and Tools of the Artist-Blacksmith"- "Werk Und Werkzeug Des Duntschmieds". This book, and 14 others either authored or co-authored by Schindler, is available from Centaur Forge and contain a wealth of information on European blacksmithing through the ages.

The grill (I-1) is constructed out of twelve pieces of 1/2" square stock, but the outside pieces look like they were woven out of a single piece each since they pass through each bar they encounter. This was done by making each loop out of four pieces and then arc welding them where they met at the top of each outside oval (at arrows).

Hans started by using stock which was longer than what the outside center of each oval would be from end to end and then punched 1/2" square holes through the 1/2" stock by using the slitting and upsetting method. The length of the split was 1 1/2 times the diameter of the hole (in this case 3/4"). To center mark the slit on both sides, Hans used a device he made which was handheld with the bottom shaped as in I-2. One side held against the side of the bar results in a consistent mark in the middle. Since this stock was not exactly 1/2" square, Hans marked from both edges and then slit between any railroad-like marks at the center (again from both sides). After slitting through from both sides, the stock was held in the legvise just below the end of the slit and then upset to open the hole to an oval (Hans started the oval with a punch before upsetting). A slitting chisel has a very sharp and narrow blade to avoid compressing the stock during the slitting process. After upsetting the hole was squared with a punch just oversized.

To mark the location of the second hole, Hans had made a marking device as shown in I-3. The 1/2" handle went in the previously punched hole and the base (out of 1/4" x 1" stock) towards the next hole. The slit marking tool was then held against this to ensure each hole was the same distance apart. The vertical bars did not receive any holes as they needed to be slid into holes in the horizontal bars.

The center pieces were also made out of 1/2" square stock. They were cut about 3" with a bandsaw, forged out slightly and then bent using another jig as shown in I-4. This device has held in the legvise, the piece to be bent inserted at the arrow, the device closed and then the stock bent around to the correct angle. Note that the two torch cut pieces were welded to one side of the angle irons each and both overlapped onto the other angle iron leg. This left the stock similar to I-5. Two of these received two punched square holes and two were left unpunched.

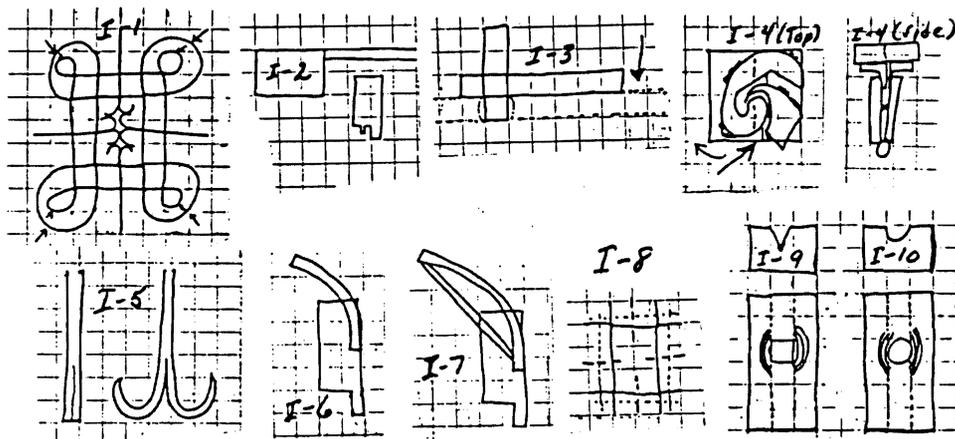
The curves at the end were formed using two bending jigs which fit into the legvise - I-6 & I-7.

Assembly was by laying the two bottom horizontal pieces on a table and the four vertical bars passed through the appropriate holes (the vertical bars had been bent on only one end). The first of the inner pieces (I-5) was also put through the two bottom horizontal pieces. Next the two inside vertical pieces (I-5) were added by the holes in them slipping over the two appropriate vertical bars. After this the two top horizontal bars would be added (including the center (I-5) and the last remaining legs from the vertical bars bent over to touch the ends of the horizontal bars. When everything was fine tuned, the ends of the horizontal and vertical bars would be arch welded. Hans also spot welded at each punched hole pass through for extra strength.

I know this sounds complicated but you can help to envision it by using straight pieces as shown in I-8. Start with the solid lines, then lay shorter pieces to represent the outer dashed lines and finally shorter still pieces to represent the inner pieces. Note where each bar would have to be punched for it to fit together.

Even though the holes were punched oversized, Hans still had to do some filing to ensure enough room for the bars to pass through freely.

Two jigs which Hans brought along but did not use were meant to punch square bars on the point or through round bars. In addition to the holes punched (and square filed on one), a large drill bit was used to allow expansion room around the punch area. This only went to the bottom of the "V" or half circle (I-9 & I-10).



Not to scale.

## Estimating Welding Temperature.

Dick Franklin

The color of a piece of steel that has been heated until glows is directly related to its temperature. There are a number of color charts that have been printed which equate color to temperature. If you don't have a chart, you can make one. Barrow your kids Crayola crayons, negotiate the loan, don't dictate it. Here's the relationship:

Blacksmith's Color	Crayola Crayon Color	Temperature (Degrees Fahrenheit)
Blue White		2900
Dazzling White		2800
Brilliant White		2700
White		2500
Light Yellow	Lemon Yellow	2100
Yellow	Yellow	2000
Light Orange	Yellow Orange	1800
Orange	Orange	1700
Light Cherry	Orange Red	1500
Cherry		1400
Dark Cherry		1300
Blood Red	Red	1200
Color begins to show		1000

The glowing colors should be viewed in a dim light. If you are in a bright well lighted area, put the piece in a bucket laying on its side so that the inside of the bucket is full of shadow.

When I reviewed several sources, I found disagreement when assigning colors to temperatures. For example, the Machinery's Handbook assigns the color orange red to 2000 degrees Fahrenheit; Jack Andrews in the Edge of the Anvil assigns yellow to that temperature and the Eddeholm chart assigns light yellow. The laws of physics predict the wave length of the light emitted at a given temperature. Defining these wave lengths as colors seen by the human eye is art. Its for that simple reason that I've listed Crayola colors and blacksmith colors.

The right temperature to weld steel depends upon its carbon content. Here are the approximate temperatures from the Edge of the Anvil:

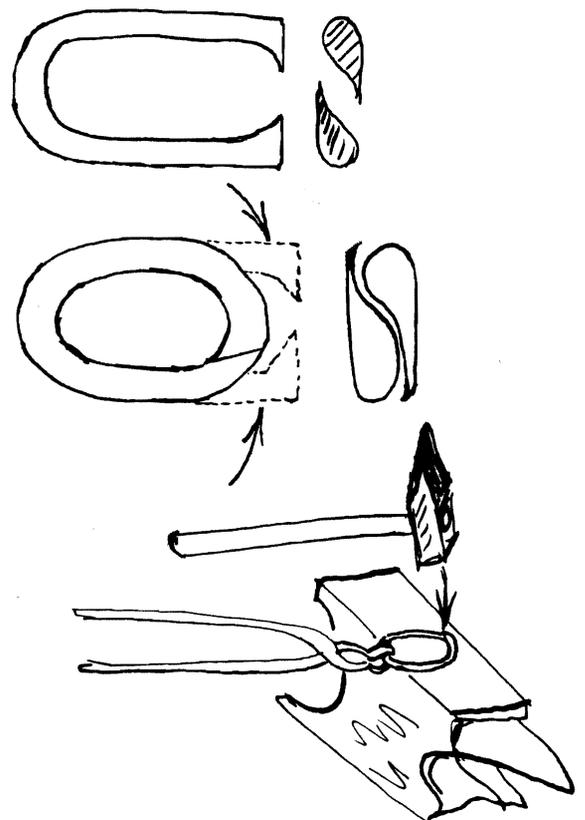
Points of Carbon	Welding Temperature Range Degrees Fahrenheit
20	2500 - 2700
40	2450 - 2650
60	2300 - 2600
80	2250 - 2500
100	2150 - 2450

The temperature ranges have a great deal of overlap. Generally, higher carbon steels weld at a slightly lower temperature. They aren't critical.

The Machinery's Handbook sites the U.S. Bureau of Standards who says that skilled observers may vary as much as 100 degrees below 2200 degrees Fahrenheit and above that temperature it is practically impossible to make estimations with any certainty. 2600 degrees corresponds to brilliant white and 2350 degrees to light yellow. I'm not sure that I know what brilliant white is or light yellow for that matter. I know that it is very difficult to judge temperatures in bright light and widely varying conditions. But the task isn't hopeless, but I don't think that you can learn judging welding temperature by reading.

The practical working limits are that not hot enough won't weld and too hot burns. Heat a piece of low carbon scrap in the fire, flux it and heat it slowly until it burns and carefully note the appearance, both color and texture, at the instant burning starts. Now you know how the upper temperature limit appears. To do this effectively, you have to be able to see your piece in the fire while its heating. Note the color of the hot coals, how the colors change and how the position of a given color moves in the fire as fire burns. Compare the color of the steel with the color of the coals. Repeat this a number of times, until you can heat the piece of steel to the point where it is ready to burn, but doesn't. When you can do this predictably, you're ready to see if the temperature you've gotten is hot enough for welding.

The best shape to learn to weld is the chain link. Everything is fixed. The only task you have is to watch the temperature in fire and the temperature of your work piece. Cut a seven inch length of three eighths and bend it "U" shaped. Scarf the ends as shown in the sketch. Heat and bend the scarfs so they overlap. Heat and flux the link and begin heating it slowly until the scarfed area is just below the burning temperature. Remove the piece from the fire and move it to the anvil quickly and hammer the scarfed area. Hit it just hard enough to flatten the scarf area to the level of the link. Don't worry about appearance. You have about five seconds to do this operation. Let it cool and examine it. Put it in the vice and twist it to see if it holds. Odds are, you have a weld! Once you get the weld, then finish link for appearance.



Welding is dangerous! As in all blacksmithing wear eye protection and proper clothing. Hot flux and scale will be spread over a considerable area. Protect yourself and anyone else who may be near. If you have any doubts about safe procedures, don't do it!



HEAR YE!

HEAR YE!

HEAR YE!

**BLACKSMITHING EQUIPMENT FOR SALE:** The following generally have a variety of equipment, including powerhammers, for sale: Neil Brown - 219-724-7554; Russell Cashion - 615-731-3215; Benny Wilson - 615-758-7176; Fred Caylor - 317-769-6351 (he also reconditions powerhammers); David Oliver - 615-878-5712 and John Kosirnik - 517-456-7881/4494. Locally try Joe Abele - 276-2977 or Steve Roth - 836-8520.

**FOR SALE:** Champion blowers and firepots. Send SASE for list and prices. Steve Battaini, 212 Bradburg Ct., Redwood, CA 94061 - 415-363-2288.

In the last issue I included a note that Hank Steimetz was now acting as a local distributor for the iron puzzles produced at the Tucker House Forge. Unfortunately I listed his telephone number incorrectly. It should have been 513-548-9084. These puzzles make excellent gifts.

Due to a pending divorce, Jack Brubaker is offering for sale their successful blacksmithing business. Copy righted candle holder designs, custom tooling, marketing contracts, everything from inventory of finished products and raw materials to complete forging equipment, welding, grinding, finishing, sandblasting, painting, and computer system. A 21-year collection of production tools and spares. A proven, profitable business (business appraisal available to serious buyers). Contact Jack Brubaker, RR 2, Box 102A, Nashville, IN 47448 or call 812-988-3826.

The September/October 1991 issue to "Bituminous Bits", newsletter of the Alabama Forge Council, contains a 12-page write up of a demonstration by Jerry Darnell, a featured demonstrator at a recent Quad-State. Included are well illustrated write-ups of a tulip door latch, nails, welded eye hinge, weeping heart finial and H-hinges. For a copy of this issue send \$3.00 to AFC, c/o 176 Brentwood Lane, Madison, AL 35758 (or better yet, send \$15 and join to receive 6 information filled issues a year.

**FOR SALE:** 50 lb Little Giant powerhammer with three sets of dies. Uses single phase power. Excellent running condition. Set up in shop. \$2,600. Contact Fred Fisher at 703-350-2284 (Virginia area).

As I have mentioned in an earlier newsletter, Superior Flux Co. (which bought out E-Z Weld) thinks they have solved the problem in reproducing the old E-Z Weld formula. For a free sample of their new formula (EZ - D1-68HW) call Linda Cohen at 216-461-3315. All they ask in return is to let them know your evaluation of it.

# LITTLE TREE DESIGNS

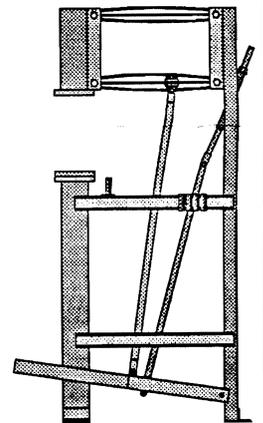
115 E. Mendocino Ave. Willits, CA 95490  
(707) 459-1934

## TREADLE HAMMER KIT

Designed by Jere Kirkpatrick  
Valley Forge & Welding

This kit includes all material required for completion (except lead for head). All material is cut and mitered. Hole locations have been center punched. Assembles in 7 to 10 hours. Easy to follow assembly instructions included.

**Available soon!**  
Tooling for metal workers. A variety of tools for producing ornamental & functional pieces. Each tool furnished with an illustrated guide, showing how to achieve numerous effects.



*Call or write for more information*

Take advantage of our quantity discount by getting five or more people together & having a Treadle Hammer making workshop.

Kit: \$475.00

CA residents add 7.25% sales tax

Kits are shipped F.O.B. Willits via UPS

Steel, brass and stainless wire cloth is available in all sizes and in small amounts from Fenway Wire Cloth, Inc., (Attn: Clarence Tamborski), P.O. Box 1, Fenton, MO 63026 - 314-677-3666.

In the last newsletter I noted I had not seen a Peter Wright anvil made before 1910. Wouldn't you know it a week later Jeff Morrison brought over an anvil to have the edges welded up and it was a Peter Wright made between 1850 and 1910. Speaking of anvils, if you have an anvil you want identified or dated, contact Dick Postman, 10 Fisher Ct., Berrien Springs, MI 49103. Dick is known as "The Anvil Man" and has done extensive research in preparation for writing a book on the history and manufacturers of anvils. Provide photos, trademarks or other markings and dimensions if possible.

FOR SALE: Three new-in-the-box Dillon torches. Contact Colin Campbell, 1350 N. Springfield Ave., Union, MO 63084 - 314-583-3512.

There are currently 35 demonstrators on the ABANA Demonstrator List. If you are interested in being listed, send me a SASE with 29¢ postage for a registration form.

Watch for future details on the reopening of the Allison's Wells School of Arts and Crafts in Canton, Mississippi. This will be a restored town area near Jackson dedicated to fostering arts and crafts - including blacksmithing. They plan it to be a place where artists - including blacksmiths - can work until they are well established enough to strike out on their own.

If you supply a source of material or service to blacksmiths, send information on your product to Ron Porter, RR 1, Box 64, Bunker Hill, IN 46914 to be listed in the ABANA Supply Directory.

REPOUSSE TRAINING: The Les Metalliers Champenois Corp. (the French company which worked on the Statue of Liberty) will hold a 78 instructional hour training session on Repoussage-Relevage in the XVII and XVIII Century French Styles. The course will be held in France and will cost \$2,600. If interested contact Jean Wiart, 118 2nd Avenue, Patterson, NJ 07514 - 201-279-3573.

The Connecticut School of Wrought Iron Design, Box 8116, Buckland Station, Manchester, CT 06040 - 203-646-8363 teaches ornamental ironworking techniques at all levels of skill.

FOR SALE: 800 lb Nazel Hammer, EC, \$10,000 FOB Mountain Home, AR. Metal Specialities Co., Hwy 62 N.E., Mountain Home, AR 72653 - 501-492-5800.

FOR SALE: Powerhammers: 2 Mayer Brothers 50 lb - \$900 each; 1 Beaudry 100, EC with spare parts and pieces - \$3,500; 1 Little Giant 100 lb, rebuilt - \$3,000 and 1 Buffalo 1/2 Ironworker, older model, GC - \$3,000. Contact Postville Blacksmith in SW Wisc. at 608-527-2494 or 523-4750.

WANTED: Chambersburg utility hammer, 300 or 400 lb model in GC. Contact Bill Goldman, Jacobs Service, 1304 Red Baron Rd., Payson, AZ 85541 - 602-474-2014.

EMPLOYMENT OPPORTUNITY: Luna Felix, Designer/Goldsmith in Santa Fe, NM is seeking to hire, under contract, a bench person with experience in gold work and fabrication, to work in her studio. The job will include training by Felix in 22K gold work with granulation. Contract is negotiable based on craftsmanship experience. Contact Luna Felix, 104 S. Capital, #6, Santa Fe., NM 87501 - 505-989-7679.

WANTED: 25 lb powerhammer. Any condition. Contact Jeff Morrison at 614-869-4049.

# Blacksmithing Notes

By Ned Edelen

## Joe Anderson Demo

Delaware Ag Museum, Oct '89

In his shop, Joe uses a gas forge and two 50 lb. power hammers. One has flat dies with relieved edges. The other has rounded fullering dies. His anvil sits in a sheet metal box filled with sand. The sand settles in 2 to 3 weeks, providing a solid base for the anvil.

Joe amazed the spectators by shearing a 1/4" steel plate using only the edge of Dan Boone's anvil and a small set hammer. Joe bravely held the plate in place on the anvil by gripping it between his legs. Joe held the set hammer at an angle to the plate and anvil face, and struck the set hammer with a 2.5 to 3 lb. hammer. Once the plate started shearing, Joe continued to make a straight cut.

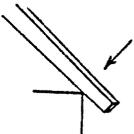
Joe uses lots of different hammers. He attributes this to his former job as a jeweler. Joe also freely scatters tools about on the ground around the anvil as he works. It doesn't seem to impede his productivity.

Joe recommends that craft fair participants avoid having a lot of hardware hanging around their booth. Hinges and such inhibit sales of your artistic work.

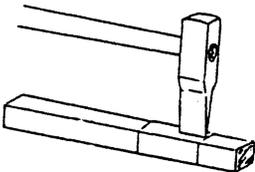
## Basket Twist Handle

To make a basket twist handle, Joe starts with 1/2" square stock. Mark the limits of the twist (about 4" in length) by tapping bar with a hammer as the bar is held against a sharp edge of the anvil.

Lightly hammer the corners of the bar between the marks to break the sharp edges.

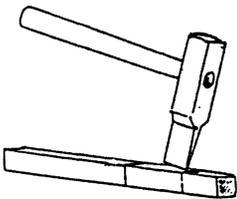


Use a handled hot chisel to make a cut down the center of one side. Go back and recut deeper until the length of the cut has been cut a little more than halfway through the bar.



Close the cut back up to return the bar to square.

After reheating, cut through from the opposite side. Hold the hot chisel at an angle for this cut. The metal will split easily. After cutting all the way through, close the cut back up to return the bar to square.



Cut an adjacent (3rd) side as you did with the first cut. Cut straight down with the chisel. Close up the cut before proceeding.

Cut through the opposite (4th) side at an angle. Close up the cut to reform the bar to a square.

Get a good, even heat on the cut section, but do not overheat, or the cuts will weld themselves in spots when you twist.

Joe uses vise-grip pliers for a twisting wrench. Start with a flat jaw vise-grip, and fill in the teeth with a welding rod. Grind and file the

jaws flat and parallel. Weld a 12" piece of 1/2" round rod on the nose of the vise grips for a handle.

With the cut area evenly hot, remove from the forge and clamp the bar in the vise. Place the twisting wrench on the end of the bar and twist two turns.

Hammer out any sharp edges of the twisted area as the twist cools.

Reheat the twist to a moderate, even heat. Place in the vise, and attach the twisting wrench to the end as before.

Back off the twist. If it sticks in places, hammer on the end of the bar, or pry apart the sticking area with a screwdriver. Use a leather mallet to help fix uneven twists. If it doesn't open up satisfactorily, retwist, reheat, and untwist again.

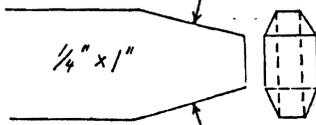
## Joe Anderson Demo, Oct. '89

Joe likes hand-held spring fullers. He feels they are easier to use and are more precise than spring fullers that sit in the hardy hole. To use a hand-held spring fuller when working alone, you either have to hold the workpiece between your legs, or you have to place it on a stand. Joe makes spring fullers from hay rake teeth or automobile trunk lid springs. Make them with a big loop. Don't temper or harden. Open or close the ends to suit the size piece to be fullered.

## Animal Heads in Flat Stock

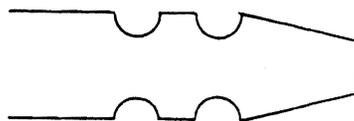
Use 1/4 x 1" or 1/4 x 1.25" stock for this animal head. Keep control of the symmetry. Do each side of the head the same.

Flatten the ends to make a square nose.



Spring fuller just back of the area you squared up. Joe used a hand-held spring fuller while gripping the bar between his legs.

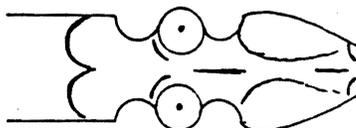
Go back about 3/8" and fuller again. The area between the fuller marks are for the eyeballs.



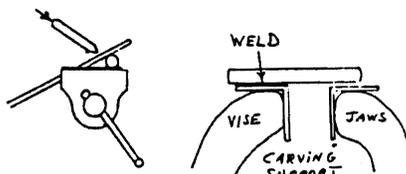
Use a round punch or a cone punch to form the eyeballs.

Chisel in eyebrows with a curved chisel. Centerpunch pupils in the eye depressions.

Use a round or square set hammer to spread the cheeks in front of the eyes and behind the nose.



Support the head in the vise on a carving support tool. Joe uses a very simple carving support consisting of a round 1/2" rod welded at a 90° angle to a piece of angle iron that fits in the vise jaws. Another piece of angle iron acts as a vise jaw protector on the other side.

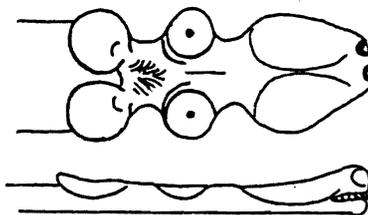


Chisel in the mouth. Use a deerfoot chisel to put a ridge under the nose. This creates upper teeth. Use a regular chisel to delineate the teeth. Joe uses the chisel to make "buck" teeth.



Use a curved chisel to cut the outline of the ears behind the fullered area in back of the eyes. To make this type of curved chisel, upset the end of a piece of tool steel rod. Flatten the end to form a wide chisel. Form it rounded in a swage block. Center the edge by sharpening on both sides. This will keep detail from being lost as you chisel.

Chisel one ear first. Chisel the second one lighter at first. If it matches the other, chisel it in deeper.



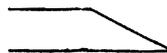
Use a round end punch to shape the ears, creating a depression. A small ball pein hammer can also be used as a round punch.

Chisel behind the ear to make it stand up a little. Use a file to clean up the area around the ears.

Ned's Note: Dan Boone always spends time filing his animal heads. This gives them a smooth, finished appearance that makes Dan's work stand out. Dan may spend 20 to 30 minutes going over a dragon head. Dan doesn't stop to do this while he is forging. Dan has a special shop area where he does his finishing work at the end of the day.

## Ram's Head

Joe Anderson starts with a 3/4" bar. Taper the end to one side for about 1.5"



Split the taper to make horns.



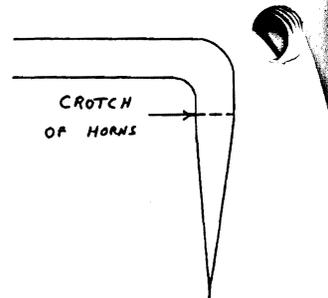
Spread the horns on the anvil edge.

Draw one horn out longer. Curl it back toward the bar before you heat the second one so that the first horn doesn't burn off. Ned's Note: This isn't as important if you are using a gas forge where the temperature is more uniform and below the burning point. If you are using a coal forge, always protect the thinner parts of your forging while you heat up thicker sections. Always place your workpiece level in the forge coals so that it heats evenly.

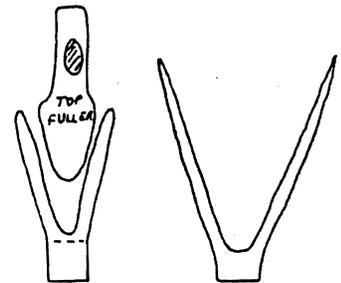


Straighten both horns out again. Both horns should be even and 3 to 4" long.

Go back 1" from the crotch of the horns, a centerpunch to mark location of the bending point. Place the bar horns-down in the vise. Pull and drive the bar over on itself 90°.



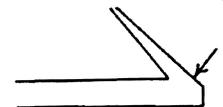
Here is where Joe Anderson's ram's head differs from some other smiths' methods. Some smiths fold the head over on itself and make a weld. Joe doesn't fold the head over, and he doesn't make a weld. Instead, he drives a fuller down between the horns to upset the head and form a nose.



Joe warns not to use a big hammer for fullering job. Use a small hammer, and make of light blows. Heavy blows will split the area rather than a good upset.

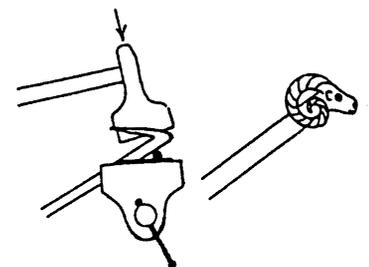
Before proceeding, hammer the square bar behind the horns to break the edges. If you don't do this step now, you will not be able to get to the area once the horns are driven back.

Drive the horns back to start forming the nose.



Use light hammer blows to roll the edges of the face on the top and bottom.

Set the head into the vise with Joe's type of carving block which is a 1/2" round bar welded to a piece of angle iron. Place the head so that the throat area is over the round bar. Again place the top swage between the horns and drive the head down on the crossbar.



This bends the head over, giving it a natural appearance.

Carve and punch the facial details of the eye, nose, and mouth.

Twist each horn using pliers. After they are twisted, they need to be curled. Use a heavy pair of needle nose pliers to start the twist. Use a hammer or needlenose to complete the twist. Check for symmetry.

# WELDING ALLOY FILLER MATERIALS

## PROCEDURE DATA FOR VARIOUS TOOL STEELS USING CRONAWELD AND CRONATIG TOOL STEEL ALLOYS



AISI-SAE Designation (1)	Recommended Electrode & Arc Current Requirement (2)	TIG Equivalent	HARDENED BASE METAL			ANNEALED BASE METAL						
			Preheat °F (5)	Postheat °F (5)	Normal HRC as Deposited	Annealing Temp. °F	Preheat °F (5)	Postheat °F (5)	Hardening Temp. °F	Quench Media	Normal Tempering Temp. °F	Resulting Hardness H Rc
W1 W2		Cronatig 348T DCSP	250/450	250/450	56/62	1325/1425	250/450	250/450	1375/1475	Water	300/650	54/65
O1 O6		Cronatig 347T DCSP	300/400	300/400	56/62	01-1450 06-1425/1450	300/400	300/400	01-1475 06-1450/1500	Oil	300/450	61/63
L6		Cronatig 347T DCSP	300/400	300/400	60/61	1400	300/500	300/500	1500/1550	Oil	400	60/61
A2		Cronatig 346T DCSP	300/400	300/400	56/58	1650	300/500	300/500	1775	Air	400/350 DBL	59/60
A4		Cronatig 346T DCSP	300/400	300/400	60/62	1425	300/500	300/500	1550	Air	400/350 DBL	60/61
A6		Cronatig 346T DCSP	300/400	300/400	59/60	1400	300/500	300/500	1550	Air	400 DBL	58/60
D2	Cronaweld 344 AC/DCRP	Cronatig 344T DCSP	900/950	900/950	59/61	1650	700/900	700/900	1850	Air	925/900 DBL	58/60
H11 H12 H13	Cronaweld 345 AC/DCSP	Cronatig 345T DCSP	700/1000	700/1000	46/54	H11-1600 H12-1625 H13-1600	900/1200	900/1200	1850	Air	1150/1000 DBL	40/50
S1 S5 S7	Cronaweld 345 AC/DCSP	Cronatig 345T DCSP	500/600	500/600	52/56	S1-1475 S5-1450 S7-1500/1550	300/500	300/500	S1-1750 S5-1600 S7-1725	Oil Oil Air or Oil	300/500 500 Min. 425/400 DBL	54/57 55/59 56/58
M2	Cronaweld 344 AC/DCRP	Cronatig 344T DCSP	900/1050	950/1050	60/63	1625	950/1000	950/1000	2250/2275	Salt or Oil	1050/1000 DBL	60/63
Special Build Up	Cronaweld 375 AC/DCRP	Cronalloy (3) 7940 (MIG) DCRP	According to Base Metal	According to Base Metal	32/34	According to Base Metal	According to Base Metal	According to Base Metal	According to Base Metal	According to Base Metal	According to Base Metal	32/44
Special Build Up	Cronaweld 333 AC/DCRP (2)	Cronalloy 333T (DCSP) (4) 7100 (MIG) DCRP	According to Base Metal	According to Base Metal	42/44	According to Base Metal	According to Base Metal	According to Base Metal	According to Base Metal	According to Base Metal	According to Base Metal	42/44

### NOTES:

(1) Cronatig 345T is recommended when base metal analysis is unknown, since it is compatible with most tool steel types.

(2) When welding a cracked die or joining two pieces of tool steel together, the weld metal need not be of matching analysis or hardness except at cutting edges or wear surfaces. It is often advisable to use a filler material of lower strength and higher ductility, leaving approximately 3/16 in. for finishing with the required tool steel alloy. Cronaweld 333 is widely recommended for this application as a "cushion" to act as a "shock absorber" between the base metal and the finishing tool steel alloy. It is important that the "cushion" layer be thoroughly covered or premature wear will result.

(3) Recommended on steel with carbon below .45% and chrome less than 5%.

(4) Recommended on steel with carbon above .45% and chrome more than 5%.

(5) Most of these temperatures can be simply and accurately determined and monitored with the use of Cronatron Temperature Indicating Crayons.

**Note:** The properties listed in this booklet are typical or average values based on laboratory tests conducted by the manufacturer. They are indicative only of the results obtained in such tests and should not be considered as guaranteed maximums or minimums. Materials must be tested under actual service to determine their suitability for a particular purpose.

(11)

