New Jersey Blacksmiths Association

NEWSLETTER

Volume 3, No. 3 Dec., 1998

December Holiday Party (Pot-Luck)

Marshall Bienstock will host the **December Holiday Party on Sunday, December 13.** *(NOTE the correction in the date.)* The **party and potluck dinner** will be held at the home of Marshall and Jan, **301 Casino Dr., Howell,** (Monmouth Co.) from 2:00 to ? p.m. (Ph: **732-938-6577**). Spouses (or "significant others") are welcome. **Please bring a dish of your choosing**, enough for about six or eight modest servings (or twice that if there are two of you coming). If you bring a special-diet dish, such as vegetarian, please label it so others will know. We will provide a green salad and soft drinks; if you wish something alcoholic, please bring your own.

Directions: Take any N-S route to Rte. I-195 or Rt. 33, and from there to Rte. 9. Go north from I-195 or south from Rte. 33 to Casino Dr. Travel about 3 miles down Casino Dr. to #301.

1999 Membership Meeting

Plans are not yet complete for the 1999 meetings. Postcard announcements will be sent. Watch for them.

Events Outside New Jersey

Sat., Dec. 5, 1998. Pennsylvania Artist-Blacksmiths Association (PABA) meeting: Annual showcase of PABA members' work at the Paradise, Pa., Community Center. Al Stephens is the contact person at 717-687-8905.

Sat., Feb. 6, 1999. PABA meeting at Greg Leavitt's shop, 346 Parkmount Road, Glen Riddle, Pa. 610-358-1766.

Sat. & Sun., Feb. 20-21. Ocean View, DE. Bill Gichner's Hammer-In, sponsored by the Mid-Atlantic Smiths Association. Special guests will be Mike and Robin Boone from Colorado. Mike will talk and demonstrate ironwork. Robin will talk and give pointers on drawing, as related to ironwork. Registration fee for the Hammer-In is $25 before February 6, $30 after the 6th. Make checks payable to Iron Age Antiques, Rt. 1, Box 169, Ocean View, DE 19970. Bring items for Iron-in-the-Hat, blacksmith tools to sell or trade, and money to spend. Bill Gichner's phone: 302-539-5344 at the shop, 302-539-6274 at home.

The Saturday evening program will be at the Princess Bayside Hotel, Ocean City, MD. Rooms are available at the hotel for $50 - standard room, or $60 for the new deluxe Bayfront Efficiencies for up to two people. $15 each for more than two. Children under 16 stay free. Call 1-800-854-9785 for hotel reservations. Ask for the Mid-Atlantic Blacksmith Association rate. Make your reservations early - before January 17 if possible.

Sat., Mar. 20, 9 am - 5 pm. Joint Meeting at Furnace Town. Our demonstrator will be **Robb Gunter** from New Mexico. He will be using **junkyard steels** for various projects. There will be Iron in the Hat and an auction. The cost for the meeting including all the activities will be $10 payable when you sign in. For more information contact Ray Noble at 800-220-3015 (w) or 410-651-0987 (h). People should bring items for IITH and the auction. We may have space for items for display if anyone wanted to bring something to show.

Coffee and donuts will be available until they are gone. Lunch will be provided by Furnace Town Blacksmiths Guild but any help will be gratefully accepted. In addition, there will be a catered dinner after the demo. The main entrees will be roast pork and grilled chicken. The cost will be $12.50 (this includes tax). The caterers must know in advance how many will be there for dinner. **The deadline for making dinner reservations is 15 March 1999.** Call Mark Williams at 410-632-0914 to make reservations. Payment must be made before eating.

On **Sunday, March 21st.** Robb will be having a **workshop** on the use of modern tool steels to make tools for the blacksmith. The cost has yet to be determined but will probably be around $30. There will be a maximum of 14 in the workshop. We will begin taking names after 1 January 1999.

Sat, April 17. PABA meeting at Al Stephens' place, 2 Leaman Road, Paradise, Pa. 717-687-8905.

Report on the August Meeting

The August meeting was held at Ray Maiara's "Aurora Forge" on Staten Island. Ray was showing off **the worlds** first (steel) Grasshopper Treadlehammer (see "Saga of the Grasshopper Hammer" later in the last issue). He demonstrated using the hammer to forge sheet metal, using a spherical die on top and a ring die on the bottom. Then he let the rest of us loose on it. With a hammer of over 100#, it was a job getting it moving, but it delivered a respectable blow.

Ray also showed us his shop, in which he has both manufactured commercial iron products (grill guards for trucks) and executed works of art (tables, plant stands, masks and other works).

The meeting was notable also because we saw faces we hadn't seen in some time, and we attracted a number of folks from Long Island to make the trek to join us. We hope to see more of these folks.

Report on the Anvil-Repair Workshop

The first day of the anvil-repair workshop was Saturday, September 19, at the shop of Marshal Bienstock. Marshall was hard at it by the time I arrived at about 8:30 am. We cleared out the fire pit from last year's workshop, mowed all around it and rebuilt it with cement brick faced with firebrick. About this time Bob Holzman arrived, and we started cutting wood and getting the fire going. Doug Learn, Andy Vida-Szucs, David Macauley and Nate Pettengill wandered in by about 10 am. Bill Ker and Josh Kavett also stopped by, but only to say hi.

Despite reminder postcards and repeated exhortations by yours truly, only one person (Nate) had preregistered for the workshop. However we ended up with six anvils to do: One of these was a 300-pounder belonging to David, one belonged to Allaire Village, and three belonged to Andy. Of these three, however, one was the original anvil we'd used before the first workshop to test the process. It had only a small chip out of the edge, and we were fixing it back up to loan out to Longstreet Farm. Hence there were only four "paying" anvils in the workshop.

Using the same two-handled carriers we used last year, we hung the anvils in the fire two at a time, starting with those that needed underlayment. As they came to temperature, Marshall applied the underlayment (MIG wire), and we returned them to the fire. During this time, Bob and I mostly tended the fire, while Doug, Andy and David did some grinding of excess underlayment. We all helped move the anvils around. To move the 300-pounder, we used Marshall's front end loader, equipped with a long extension shaft, and suspended the anvil well below this on chains. Then Marshall switched to the hardfacing MIG wire and finished them off. At the end of the day, we put the five smaller anvils back in the dying fire to cool slowly overnight, but David's monster we just wrapped with an insulating blanket.

Sunday, I slept in and didn't arrive at Marshall's until about 10:30 am. Dan Cruzan and Marshall were there. Nate, Andy and Michael Hargrove arrived to work, but David spent the day at the beach, so we left his anvil alone. With not enough grinders to go around, I spent most of my time working on the Grasshopper Hammer. A whole lot of grinding went on, and most of the anvils came out looking quite good.

Thanks to all who participated. Especial thanks to Bob, Doug and Michael for contributing their time. Thanks to Doug and Josh for the use of their grinders or sanders. Of course, especial thanks goes to Marshall who contributed two days of his time and of his shop's time for the workshop.

- Bruce Freeman

Report on the October Meeting

The meeting was held at the forge of Dan Cruzan near Bridgeton, NJ. Dan has a spacious shop that easily accommodated twenty-five people, a respectable attendance. The morning began with coffee and donuts. **Tim Suter** showed us a number of the tools he's made for his use, some quite clever. **Bill Futer** gave a concise demonstration of cable welding for damascus, even including the pickling in ferric chloride of a blade he'd previously forged and ground. **Doug Learn** demonstrated Uri Hoffi's forging technique, including a couple hammers made in Hoffi's style.

We then broke for a lunch of sandwiches, courtesy NJBA. This was the first meeting at which NJBA has provided lunch and it was well received. We expect to do this regularly in the future. We also held our HTH, as reported below. Our thanks to everybody who participated.

After lunch we had three demonstrations of items which make good Christmas gifts. **Marshall Bienstock** demonstrated the forging of a traditional 18th century fork. **Dave Macauley** forged a courting candle, which he finds to be quite popular among visitors to Historic Allaire Village. **Dan Cruzan** made a rather free-form coat hook, ornamented with a leaf.

After the demonstrations we fired up a couple of gas forges outdoors (in beautiful weather!), in addition to coal forge indoors. A few people tried their hands at the forges, but this part of the program was apparently not so well received. We may try it again under different circumstances.

October HTH

Item	Donor	Recipient
50' Tape Measure	Tim Suter	Japh Learn
Combo. Square	Tim Suter	Bruce Freeman
5160 Steel	Tim Suter	Bruce Freeman
5160 Steel	Tim Suter	Doug Learn
Butcher Block Brush	Tim Suter	Bob Scarlett
Framing Square	Tim Suter	Josh Kavett
Tongs	Tim Suter	Peter Bazakas
Tongs	Tim Suter	Dan Cruzan
Pliers + Box	Dan Cruzan	Michael Hargrove
Book: De Re Metallica	Dan Cruzan	Michael Hargrove
Drill Bits	Dan Cruzan	Bruce Freeman
Wire Rope & Clamps	Ron Grabowski	Steve Rhoades
Chisels	Ron Grabowski	Steve Rhoades
W-1 Cut-offs	Larry Brown	Bruce Freeman
Drill Rod	Larry Brown	Anton Holstrom
Draw Knives + Hammer	Joe Grasso	Bob Scarlet
Tongs	Joe Grasso	Dan Cruzan
T-shirt	River Bluff Forge Council	Ron Grabowski
Set Hammer	Michael Hargrove	Marshall Bienstock

Report on the November Meeting

The November meeting was on Saturday November 14 at the blacksmith shop at Peters Valley Craft Center. Peters Valley is a renowned craft school with a topnotch blacksmithing program, currently directed by John Rais. (See the draft Peters Valley calendar, elsewhere in this issue.) John's morning demonstration was on the forging of titanium. Unfortunately, an order of titanium he'd placed had not arrived in time for the meeting. Fortunately, NJBA member Bruce Ringier, who has provided considerable support to Peters Valley, came through with a donation of stout length of titanium he'd purchased at a scrap metal dealer. (A. Bickoff

& Son. 760 Paterson Ave., East Rutherford, NJ, 07073, 201-778-2777 and 778-8492. Bruce says they have nickel, brass and other "exotic" metals as well.) Using this piece, John demonstrated the differences between forging iron and forging titanium. He also had on display some items made from titanium. Their light weight was noteworthy.

The lunch, of sandwiches, pizza, and soft drinks, was well received. The tailgate sale was the best we've seen at an NJBA meeting. After lunch The IITH brought in about $190 to the NJBA treasury.

After lunch, John showed slides of his work, from early to recent. Some of the same items were also seen in an informal tour of his shop. John finished the day with a demonstration of forging a door latch. Overall, the day was very worthwhile.

November IITH

Item	Donor	Recipient
Combo. Square	Tim Suter	Marshall Bienstock
Framing Square	Tim Suter	Marshall Bienstock
Old Tool Material	Tim Suter	Bill Futer
Tongs	Tim Suter	David Macauley
Tongs	Tim Suter	David Barth
Steel - 5160	Tim Suter	Jim Helstrom
Steel - 5160	Tim Suter	Bruce Ringier
50-ft. tape measure	Tim Suter	Bruce Ringier
Bees' Wax	Tim Suter	Jim Helstrom
Bees' Wax	Tim Suter	Ron Grabowski
Fork Anvil	Larry Brown	David Macauley
Fork Anvil	Larry Brown	Bob Holzman
Bed Knives + Leather	Mike Mills	Art Munson
RR Track + Punch	Bruce Ringier	Tim Suter
Misc. Stuff	Mike Mills	Tim Suter
Pack of gloves	Curt Tindall	Bruce Ringier
Chisels	Ron Grabowski	Bruce Ringier
Tongs	Ben Suhaka	Bruce Ringier
Tool steel	David Macauley	Bruce Freeman
Courting Candle	Bill Futer	Nate Pettengill
Ironware Catalogue	Doug Learn & NOMM	Art Munson
Hook Hangers	Ron Jani	Mike H?
Coil Spring	Nate Pettingill	Marshall Bienstock
Tucker's Book	Bruce Freeman	Jim Helstrom
Taps	Jim Helstrom	Bruce Ringier

Report on the Aug. PABA Meeting

Bill Ker and I had a nice time one Saturday in August when we attended the PABA (Pennsylvania Artist-Blacksmith Association) meeting, near Hamburg, PA. It was about a 2.5-hr ride out, nice driving. PABA really has their act together, but Al Stephens, their president and (until recently) newsletter editor, tells me it wasn't always so. He attributes their success to multiple-demonstrator meetings. It doesn't hurt that they also serve lunch! They don't charge admission, but they do request an item for the IITH. Al's approach is to have meetings every other month, and have the newsletter come out on alternate months.

I didn't get the names of all the demonstrators at last Saturday's meeting -- some things were going on simultaneously, so I couldn't see them all. The one I particularly went to see was Hap Fisher, an octogenarian who I take to be the father of the host, Dave Fisher. He got up on a toolbox so he could reach the lathe and then gave a wonderful demonstrating how to spin a disk of pewter into a candlestick base.

Other demonstrators made such things as latches, betty lamps, etc. Good stuff. Of course no one actually completed a whole project in front of the audience, but they had examples to pass around.

Hope this encourages some other NJBA members to attend some of these meetings outside NJ.

Blacksmith Workshops in NJ

Peters Valley Craft Education Center

19 Kuhn Rd., Layton, NJ 07851 (973) 948-5200

pv@warwick.net http://www.pvcrafts.org/

SUMMER 1999 BLACKSMITHING WORKSHOPS

Codes: "B" = beginner, "I" = intermediate, "A" = advanced, "T" = tuition, "LF" = lab fee.

May 21-25 (5 days), Dale Wedig and Rico Eastman, *Rolled, Folded, Spindled, Bent and Beaten*, B to A. T: $380 LF: $55

May 28 - June 1 (5 days), Dan Radven, *Iron Furniture: Challenging the Familiar*, I to A. T: $380 LF: $60

June 4-7 (4 days), James Viste and Brad Nichols, *Hydraulic Press Work and General Forge Practice*, B to I. T: $312 LF: $55

June 11-15 (5 days), Jonathan Nedbor, *How to Hit a Moving Target*, I to A. T: $380 LF: $55

June 18-22 (5 days), Stephen Yusko, *Sculptural Containers and More*, I. T: $380 LF: $50

June 25-29 (5 days), Doug Wilson, *Traditional Joinery Contemporary Design*, I. T: $380 LF: $50

July 2-6 (5 days), Rick Smith, *Containers and Box Forms*, B to A. T: $380 LF: $55

July 9-13 (5 days), Bobby Hansson, *Tin Can Art*, B to A. T: $380 LF: $30

July 16-21 (6 days), Carl Close, Jr., *Gothic Details and Metalworking Techniques / Table Lamp Workshop*, I to A. T: $420 LF: $65

July 23-27 (5 days), John Rais, *Forging Titanium. The Introduction*, I to A. T: $380 LF: $70

July 30 - Aug. 3 (5 days), Paul Casey, *Multiple Parts and Mechanisms*, B to I. T: $380 LF: $50

August 6-10 (5 days), Scott Lankton, *Pattern Welding Steel*, I. T: $380 LF: $60

August 13-17 (5 days), Corrina Mensoff -, *Forged Iron and Copper*, B to I. T: $380 LF: $70

August 20-25 (6 days), John Rais, *Contemporary Forged Hardware and Beyond*, B to A. T: $420 LF: $60

Aug. 27 - Sept. 1 (6 days), Jim Wyckoff, *Making Metal Move*, B. T: $420 LF: $55

September 3-7 (5 days), Bill Brown, *Sculptural Forging*, I. T: $380 LF: $45

September 10-14 (5 days), Elizabeth Brim, *Basic Blacksmithing*, B. T: $380 LF: $55

The Scrap Corner

(A place of repose for bits and pieces that may someday be of use.)

⇒ If you are looking for flower patterns, pick several of your favorite posies out at any artificial flower stand. Take one apart, iron out the sections and paste them onto poster paper. Cut them out and *voila'*, there is your pattern. Leave one intact as a model.

⇒ Fay LeCompte recommends handles made from old RotoRooter "cable" for top swages and the like. Real flexible, but the rubber core will burn when it gets hot and let out a stench!

⇒ RR spikes come in high- or low-carbon. New high-carbon spikes are clearly marked "HC." Useful for many projects.

⇒ Jim Sorber writes, "I've headed a lot of nails for Don Streeter, a well-known blacksmith in New Jersey back in the 1970's, as payment for his teaching me blacksmithing. We used Tremont nails with large heads and heated them and formed the head into a rose-head 18th century nail. Sometimes I even pointed these nails so they could be driven in and bent over and clinched. The hard way is to start with a square nail rod and do it from scratch. I still have a couple hundred pounds of Tremont nails!" By the way, Tremont cut nails are available in many home-town hardware stores, where one or two sizes may be sold by the pound.

⇒ **Q:** Because of my 6" (bench grinder (3450rpm) mounted) wire brush's propensity towards grabbing and flinging sharp pointy objects like hooks around the room at 1800 fps, I tend to avoid it like the plague, in favor of the hand-held traditional model. I was wondering if any of you more knowledgeable than me (this includes pretty much everyone) could tell me of a cheap and effective method of slowing it down. - Mike

A: I feel that the wire wheel is the most dangerous tool in the shop. I seem to have cured it from grabbing and tossing stuff around by removing it from the Stanley pedestal-mounted 1/2 hp grinder and mounting in a cheap Craftsman 1/3 hp bench model. (Their rating is probably five times what it actually produces.) The unit turns at 3450 but doesn't have the power to take anything out of my hands. It does as good a job as it did in the big grinder but without the danger Jack Yates

Tips for Attending Conferences

1. Bring a cooler with your favorite beverage. Some groups provide, others don't, and hot and thirsty is no fun. It can really save your day.

2. Wear a baseball cap. If you have to look toward a bright background all day to view a demonstration, it can tire you out. A cap won't block the view of the person behind you. It can really save your eyes.

3. Bring a bleacher pad (1' square x 2" thick pad). Bleachers and folding chairs can get *incredibly hard* after a while. It can really save your ***.

Gunter's Super Quench

I

The recipe for the soap quench is as follows

- 5 gals water
- 5 lb. table salt
- 32 oz dawn dishwashing liquid (blue)
- 8 oz Shaklee Basic "I" Wetting Agent}

One clean 5 gal pail with lid holds it just fine. Quench at 1550 F (Light cherry red). Expect 43 to 45 Rockwell C on 1018 mild steel. For mild and low carbon steels. (Robb Gunter's recipe made available to IBA member at last conference.) -RJhaus@aol.com

II

Minor changes to the last two items:

- Dawn is now a concentrate. The bottle for a 5g mix is something like 28.5 oz.
- You can replace the Shaklee products (hard to find in a lot of areas) with the small (6 oz?) bottle of Jet-Dry, which is available in most supermarkets.

Don't forget that it's color coded - when you've exhausted the usefulness of the quench, it'll shift color from blue to green. Nifty stuff. -Roy Wilson

III

If you ever need a lot of small pieces of very hard 5150, just quench a leaf spring in Gunter's Superquench. It'll fill the bottom of the slack tub with chunks in about three nanoseconds! He wasn't kidding when he said carbon no higher than 35 points. -Roy Wilson

Letter to the Editor

[At the November, meeting Greg Phillips and I discussed forge hoods, and I gave him my view, printed in this newsletter a couple years ago, that even a six-inch flue suffices, if you just get it close enough to the fire. After the meeting, he sent the following E-mail. - Ed]

Hi Bruce,

I just gotta tell you a few things, mainly about last weekend. First thanks again for inviting me to your group....

Second, I got busy at our shop Sunday morning. I ripped out the six inch pipe and the hood I had over the forge. I made a temporary side draft flue out of a piece of 10" round to 8"x16" transition. I simply cut a 10 x12" hole in it and fitted it to the forge "deck." I can't believe how well this works! This beats any "hood" type arrangement I've ever seen. Thanks for the advice.

Third, after I fixed the flue I found a piece of titanium 1/2" bar stock. The demo inspired me to give forging it a try. The corrosion resistance and non- toxicity open up a lot of possibilities. I made a couple of baby spoons.

Thanks again.

Greg

A Wrought Iron Primer

by Doug Learn

First some basics. I simplified these descriptions to keep confusion to a minimum. Wrought iron was made many ways over the last 1000 years, and I don't want to write a history. For those interested in historical details and a short treatise on manufacturing, A.M. Byers' book on wrought iron is a great introduction. Bruce Freeman will sell you all the copies you want. And for each fact here, there probably is an exception.

Remember that one quality of wrought iron may have application (need for pattern) that is useless in others (able to withstand forging into intricate shapes for reproduction ironware).

Wrought iron is essentially pure iron with iron silicate slag interspersed throughout the iron as strings or fibers. This fibrous nature is due to the squeezing and rolling that was done to reduce the iron bloom to dimension. Most of the slag was squeezed out in this first rolling. This iron was usually termed muck bar. If the iron needed to be further refined, with the fibers becoming more fine, the iron was cut, piled, then welded together again. This was first refined wrought iron or merchant bar. Triple refined was usually the most refined grade sold. Piling and re-welding took time and money, so relatively little triple refined was made. There was lots of muck bar and merchant bar made. In an attempt to more economically produce wrought iron and better control the quality, A.M. Byers developed a technique in the early 1920's where molten iron silicate was dumped into pure molten iron and the resultant bloom rolled. This wrought iron had a fiber density of over 20,000 per square inch and tight specifications.

If using wrought iron, forge very hot (at a yellow to a middle orange at the coldest) and do not abuse it. Wrought iron is not at all forgiving of sloppy technique, and will split apart if abused by cold forging, sloppy technique, and stupid decisions. Remember, if you think it is just a bit cold to work, you are already working too cold. However, the softness and ease of forging more than makes up for its temperamental nature. Punching/slitting holes requires different techniques to prevent run-outs but these are easily learned by reading reprints of old forging texts or pay attention to demonstrations by David Court or Peter Ross. When you will get used to using it you may want to use nothing else.

The double or triple refined iron or the modern Byers iron is a real joy to forge. This wrought iron moves like modeling clay and will not readily split apart. By working this good material one can understand how large forgings were done with only hand hammers and strikers in the old days.

There is a huge range in wrought iron quality, and the quality is based in part on the original intended use of the material. Since most of what is available is salvaged material with no history, here are some guidelines that can help.

Salvaged spikes from old wooden buildings and other structures were often made from muck bar because there was no need for further refining. They usually have good fiber structure for visible effects, but are lousy

Wrought iron bolts are usually of better quality than spikes, since the head had to be forged to a close dimension and the threads required decent quality material. But cut off the threads and the heads before use. These areas are not worth the headaches in splits and nicks they cause in the material.

Some wrought iron will be crystallized and look like cast iron when broken. This stuff is great to take to the scrapper and sell for 2 cents a pound. This material may be muck bar that had only minimal rolling or is hot short (contaminated with sulfur), crumbling even at near welding heat and not worth the frustration to use. I have only found this in a few spikes.

Wrought iron wagon tires are usually a decent quality, as they had to be welded together and the smiths and wainwrights probably demanded better material. In general the later tires were better quality than the early ones. But if you want great grain for visual appeal in a trade hatchet or cleaver blade, the gnarly stuff looks better.

Wrought iron pipe is good high quality material and can be identified by a red paint candy stripe down the pipe (if out of a building and/or not rusty) or often by having the name of the company rolled into the pipe. This pipe was often used for fire suppression systems or for low pressure steam return lines. Lots of this pipe was also used in the oil and gas well industry because the wrought iron better resisted the corrosion of the salt water and sulfur in oil and gas. Cutting the pipe into a manageable size and flattening it at a near welding heat gives reasonably sized flat stock.

The large slag inclusions in muck bar can be problematic. The large strings will cause splits during forging that will require re-welding at nearly every heat. If the material has visible strings and inclusions on a cut surface, plan on using lots of borax and welding at each heat when working it. If the material is large enough and you have a power hammer or striker, lap it, weld it, and forge it to dimension and purify it first. Remember though, that slag will fly all over. Leave a couple raw cut ends for the slag to squirt out of. And it will really squirt.

If wrought iron is heavily rusted, especially from water immersion, the rust will move down big inclusions and turn into splits when forged. One way to overcome these splits is to forge to rough dimension at a welding heat to weld all these rusted lines together. Supposedly wrought iron soaked in salt water is worse for this than that from fresh water, and stinks real badly when heated.

Where to find the stuff? Poke around any old (pre-1910) buildings that are being torn down AFTER asking permission and/or get to know your local heavy demolition company owner or the scrap dealer he takes the stuff to. The scrapper often loads directly into a container that goes to the melt shop, so get there before the iron is loaded. While demolition of old buildings is often short-sighted and a loss of a thing of beauty and/or historical relevance, if the building is being pulled down anyway, you might as well benefit. Pipe, tie

bolts, large spikes, bolts and flats used to hold beams and heavy timbers together, pipe hangers, sliding door track, angle edging on concrete ledges and curbs, real old railroad and trolley track, and structural elements are all potentially wrought iron. Beams, ells, and flats in old bridges and buildings that seem way to heavy for the application are often wrought iron. Old water towers are a good source, but can be heavily rusted inside and covered with lead paint, if lead toxicity is a concern to you. Wagon tires are often available at the local junk shop or flea market. Learn the subtle surface textures on rusted iron that gives away it is wrought iron. Learn the sound of wrought iron when tapped with another piece of metal or dropped on a hard surface. Spark test any suspicious material, regardless of the application you will use it for.

Be real careful about tearing old things apart for the iron in them without explicit permission. What looks like junk to you may be a historically valuable item or structure. If all else fails, you can buy good quality wrought iron from England rolled to specific dimension, but it is expensive.

Lehigh Heavy Forge

by David E. Smucker

I recently had the chance to visit Lehigh Heavy Forge in Bethlehem, PA. In my "day" job, among other things, I am the chairman of a Roll Technology Committee for a major aluminum producer. We purchase a large number of forged rolls for both our hot and cold rolling mills. Part of the job of members of this committee is to visit various roll manufactures and review their technology and quality methods.

Lehigh Heavy Forge is a new company formed by the purchase of the major forging and finishing assets of the former BethForge, which was a subsidiary of Bethlehem Steel. The forge shops were part of a huge steel complex, once the home site of Bethlehem Steel. It is now shut down except for the forging and finishing area of what is now the new Lehigh Heavy Forge. One of the Lehigh engineers told me that when he went to work at this site in 1969 there were more than 17,000 working there in many aspects of the steel operations. Today there is just the Forge shop of Lehigh with less that 200 workers. None the less what they have and what they can do is most impressive.

Lehigh Heavy Forge Corporation is a wholly owned subsidiary of the Park Corporation and is the sole remaining super heavy open die forging plant in North America. At this site the where the historical facilities that some consider to be the birthplace of the modern American defense industry. Since the 1880's this forging plant at Bethlehem, PA, has been a vital supplier of critical components to the United States Navy, as well a leading producer of rolling mill rolls for the manufacture of aluminum and steel rolled products. In this shop at the turn of the century the armor plate and giant guns were forged for the US Great White Fleet. Later the heavy guns -- up to 16 inch, for WWII battle ships -- were also forged here. This plant was also the dominant supplier for the electric power generation forging market, producing rotor shafts for the large hydroelectric and steam power generating plants.

While the ability to produce very large forgings for the defense industry, including drive shafts for Navy ships and the forging for both commercial and navy nuclear reactor vessels, is an important business the main part of this forge's business was and is the manufacture of rolling mill rolls. Both the aluminum and steel industry use a very large number of rolls in their manufacturing processes. Steel uses about ten times the number of rolls as aluminum. These rolls take many different forms but the most important are the work rolls which actually do the rolling reduction and the very much larger backup rolls that provide stiffness in a rolling mill. Rolls can be made either by casting or forging. Different applications and requirements define which to use, but for many of the most difficult requirements, such as where strength is critical, we use forged rolls. About 80 % of the pieces forged at Lehigh are rolling mill rolls.

Lehigh has two forging presses, a 10,000 ton hydraulic press built in 1983 and a smaller 3,000 ton steam powered press. The big press is of a four post, four cylinder design and is powered by five 1,500 horsepower pumps for a total of 7,500 horsepower. The big press is used mostly for backup rolls, large work rolls, large shafts and pressure vessels, while the small press is used mostly for work rolls. (I am not too sure calling a 3,000 ton press "small" makes much sense.) One of the most impressive things about the big press is the size of the handling equipment that is part of the press complex. This includes two 200-ton cranes and a 75 ton rotary manipulator. With these, the complex can handle hot ingots up to 300 ton starting weight. The ingots can range from 40 to 130 inches in diameter. Finished backup rolls from this complex are as large as 80 inches in diameter and up to 108 inches roll face and weighing in at greater than 112 tons. (While this is the largest open die press in North America, ALCOA operates a 50,000 ton closed die press at its Cleveland plant for forging very large aircraft forgings in aluminum. Both the French and Russians have 75,000 ton closed die presses, both of these presses having been built by the Russians. Closed die press work is normally a single shot pressing operation per closed die, not the multiple working of an open die as in power hammer.)

When in operation, part of the weight of the ingot is carried by a crane, part by the anvil of the press and part by the manipulator. A furnace car brings the ingot to the press and then the cranes load it through the frame of the press. Then, with manipulator in place on one end of the ingot, forging can begin. The manipulator is much like a set of tongs in the hands of the blacksmith, allowing the press operators to both rotate and move forward and back the work piece.

Most round forging is done with a vee block on the anvil and a flat face on the ram of the press. Hollow shells for things like pressure vessels are made by first core punching a hole in a round ingot. This results in a donut shape part which is then placed on a mandrel. The mandrel acts as the anvil and the forging is done between the anvil and the

mandrel, with a series of rotations working the piece around the mandrel. Depending on the combination of tooling used, a large forged ring or a long hollow tube, and any thing in between, can be forged.

Enough of the background! What did we see while we were there? Well, the big press was down for maintenance so we didn't get to see it operate, but we got to take a look around. (They were working on the 75 ton manipulator -- big blacksmith tongs -- getting ready to make a very large backup roll for a plate mill.) One of the interesting things here at the large press was the cutoff tool, or what we would call a hack. It was shaped much like one we would use on a power hammer, but was a vee about 12 in x 12 in by maybe 40 inches long on curved shaft, mounted on the front of a rail-mounted front end loader (without the bucket). This unit was parked at right angles to the working axis of the press and it was clear how it could be used to act a cutoff under the force of the ram to trim excess material from one end of the work piece. They use this just as a blacksmith would use a hack on a power hammer to do the same function.

While we didn't get to see the big press in operation (good reason to have to visit again), we did get to see the 3,000 ton steam hammer, or press, in operation. Lehigh is about to take this press down and revamp it as a hydraulic press with new computer controls to operate both the press and the manipulator. This forging operation was really something to see. We were able to watch them make two good sized work rolls. The amazing thing about this process was that this older steam hammer is still manual control with two different operators running the press and the manipulator. This is just like the operation of smaller hammer, where the blacksmith held the work and a helper or press operator ran the hammer. It was amazing to see the coordination of these two men as they ran the press at a high rate of speed, and turned the work and positioned it under the ram while it was off of the work. This press is being converted to hydraulic because Lehigh is the only remaining steam user on the site and Bethlehem is shutting down the steam plant.

The roll forging operation is at least a three to four heat process. In the first heat the ingot or billet is reduced to a overall cylinder of equal cross section. In the next heat there is some more body reduction, follow by drawing out the roll neck on the end away from the manipulator. On the third heat the roll is turned around end for end and the neck on the second side forged. They use a witness stick -- made from what looked like 1/2 inch pipe with white marks on it to know the they have the body and the necks forged to the correct length.

After the forging operation the rolls go to anneal and then rough machining before heat treatment. Lehigh uses both classical heat treating (furnace heat followed by oil or spray quench) and induction heat treating. Then final machining and /or grinding and the rolls are ready to ship.

Lehigh has two finishing shops -- the " big shop' which has some very large lathes that can handle work 110 inches in diameter up to 80 feet long. They also have very large vertical lathes, and very deep hole boring capacity. There were three large prop shafts for the Navy in the shop when we went through. These were about 40 feet long and 2 feet in diameter except on the prop end they were about 4 feet in diameter. These shafts were also hollow -- for the actuation shaft for the variable pitch prop. The small shop -- is set up with its own heat treat area and machining and roll grinding areas. Want some chips? They have a lot of them.

The one thing that Lehigh does not have is any hot metal (melting) capacity. They have to buy in all of their ingot and get most of them from Pennsylvania Steel Technologies (PST) in Steelton, PA (owned by Bethlehem). The ingot produced at PST is shipped hot -- 1200 F -- in special insulated rail cars to Lehigh. PST supplies the forging ingot from steel produced in an electric arc furnace and poured using either a vacuum degassing ladle process or a Vacuum Stream Degassing Process, but that is another story for another time.

If you are interested more information on heavy industrial forging, see the 10th edition of *The Making, Shaping and Treating of Steel*, William T. Lankford Jr. et. al., editor.ISBN 0-930767-00-4. (c. 1985, Association of Iron and Steel Engineers). Chapter 39 is "Manufacture of Heavy Press Forgings." This book, a bible of steel making, should be available though inter library loan.

Decorative Wrought Iron

The following are excerpts from *Decorative Wrought Iron in Great Britain* by Raymond Lister (Chas. E. Tuttle Co.: Publishers, Rutland, VT, c. 1957, 1970)

"Before any art or craft can be fully appreciated either historically, aesthetically, or mechanically, it is essential to know something of its technique; but such appreciation is made even more complete if that technique is mastered. ... [The amateur blacksmith] will find his appreciation of fine wrought ironwork of all ages vastly improved by his contact with the practice of the craft; he will never thereafter silently accept the crudities so often put on the market as examples of blacksmithery." (Chapter Two, Technique, p.10)

"Worst of all, some smiths (they are hardly worthy of the name) will even stoop to making electrically welded joints, which, even if they are acceptable to some people on the grounds of cheapness, are more often than not improperly prepared and roughly made. Incidentally, and this is the most treacherous thing about it, it is this cheaper work that is so often heavily disguised by hammer bruises - a thing that at once makes the inexperienced accept it as hand-forged. Make no mistake - the best ironwork is singularly free from such disfigurement. (p 58)

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Unclassified advertisements must be legible, preferably typed, double-spaced. Electronic copy is appreciated. photocopy-ready advertisements must not contain photographs, solid black backgrounds, etc., and NJBA cannot be responsible if submitted copy does not reproduce well when photocopied. (Try photocopying it yourself, to be sure.) Send all copy to Bruce Freeman (see above).

Rates for Photocopy-Ready Advertisements

Size	Measurements (W x H, less margins)	Price
full page	7" x 9"	$50
half page, vertical	3.4" 9"	30
half page, horizontal	7" x 4.4"	30
quarter page	3.4" x 4.4"	20
business card	3.3" x 2" overall	10
bus. card (**NJBA members**)	"	5

Rate for Unclassified Advertisements

(Including typesetting; text only.)

12 lines (about 100 words)	$15
6 lines (about 50 words)	10
NJBA members, 12 lines.	5
NJBA members, 6 lines max.	**free**

Welding Wire Rope

Wire rope welding is very easy to do if you follow some simple rules

1) If at all possible, use clean or new wire rope. This helps to learn the process.

2) To learn, start with a small piece and work up to combined pieces.

3) Try to get a piece 1 in. or bigger. The large rope makes it easier to control.

4) Heat forge up: If gas, until inside is at a welding heat. If coal, build an igloo with a small hole in the front, let coals make coke, then let heat up to welding heat.

5) Place wire rope inside to preheat. Oil will burn off, let it burn, this well not last long.

6) After wire heats to a cherry red, flux with 20-Mule Team Borax™ all around wire. Put back in forge.

7) Bring to welding heat. This is when flux bubbles in between wires.

8) Take to the anvil, with a light tap and twist at the far end. The wire rope will shrink as you work but is not welded yet. Work a short way, stop, place back in forge to reheat. After a little practice you will know how long to work the piece before losing heat. Each time you start where you left off, the bar will tighten up. Now, it's important to twist the bar as you work tape twist tape twist. Start over from the end. Soon the bar becomes welded. Keep working until you feel the bar solid. Each time you place the bar in the forge *flux* and look for bubbles, then hammer with light blows.

9) When bar is solid the blows can be harder, but don't rush it. - Ron Claiborne

Your Input Needed...

We are designing a new NJBA brochure to encourage people to join NJBA and to inform the public about NJBA. We need input. If you joined using our current brochure, tell us what you though was good or bad about that brochure. Tell us what you'd like to see in a brochure? If you were to hand a brochure to a friend, what would you want it to say? What would you want it to look like?

The Sorber Collection

Jim Sorber, retired blacksmith, is a long-time collector of antique ironwork, from tools to cookware to door hardware to whathaveyou. The best of his collection is being written up as a book by Don Plummer and Jack Andrews. The second best is being sold Sundays at the Black Angus flea market off Exit 21 of the PA Turnpike. Judging by Jim's donations to recent IITH's, second best is still quite good.

5-Gallon Buckets Wanted

If you have any clean 5-gallon buckets with lids that you would donate to NJBA for a fund-raiser, please contact Bruce Freeman. (See "NJBA Directors," left) to make arrangements. Metal are best, but plastic will do.

Making a Small Grille

A Demonstration by Peter Sevin of Phoenix, Arizona

at the Early American Wrought Iron Conference, Dover, DE, Sept. 12, 1998
as recorded by Bruce Freeman

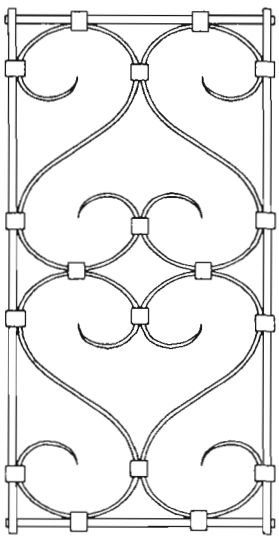


Figure 1.
The Completed Grille

Peter had pre-cut the 3/8" x 3/4" stock to length, rounded and drilled the ends of the side-pieces (Fig. 2), and saw-cut the ends of end-pieces as a start for the tenons (Fig. 3). He completed the tenons by rounding in a swage (Fig. 4) and squaring up the shoulders with a monkey-tool (Fig. 5). He assembled the frame by heading over the tenons to join ends to sides.

Figure 2 Side Bar Figure 3 End Bar

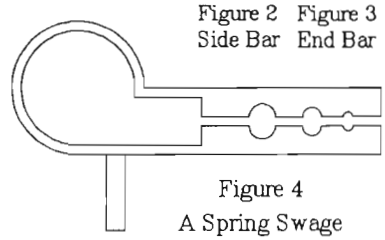


Figure 4
A Spring Swage

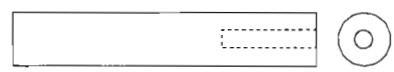


Figure 5. A Monkey Tool

He used a measuring "jig" made of 3/4" square tubing (See Fig. 6), with an interior rectangular opening exactly one-quarter that of the completed frame. He traced the inner dimension with a soapstone crayon (Fig. 6), then removed the frame, found the midpoint of the traced rectangle, and sketched in a scroll, ending at the midpoint (Fig. 7). He made the scroll tool from 5/8" square stock by drawing out one end, allowing it to flair out (Fig. 8).

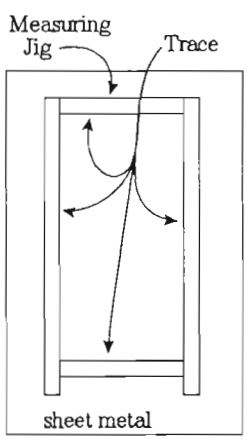


Figure 6
Tracing the Jig

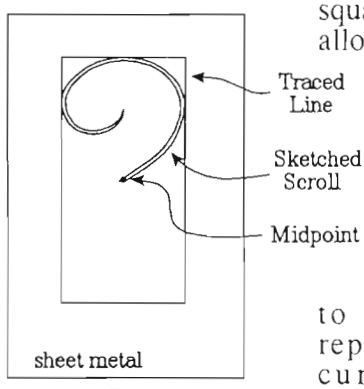


Figure 7
The Sketch of the Scroll

He offset the flared end and cut it off straight, across the hardy (Fig. 9).

Laying the bar flat on the anvil with the end over the edge, he held his hammer with the face almost vertical and stroked downward to start the curve (Fig. 10). He repeated this a few times, until the curve is well established. He continued the scroll using back-up blows (Fig. 11).

Figure 8. The Drawn-Out 5/8" Bar for the Scroll Tool, Two Views

Figure 9. The Offset and Cut-Off Bar

He compared the developing scroll to the sketch on the sheet metal (Fig. 7), and, when satisfied with his scroll, he bent the excess of the bar down to give a handle to grip in the vise (Fig. 12). The flared end of the scroll tool extended

Figure 10. Starting the Scroll

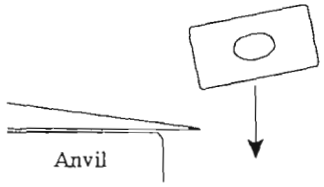
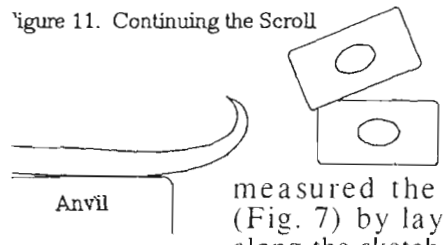
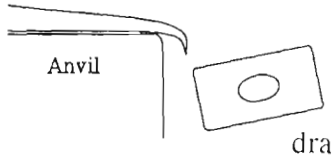


Figure 11. Continuing the Scroll





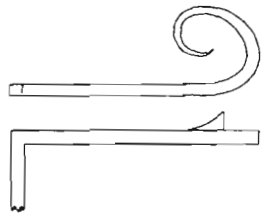


Figure 12. The Scroll Tool

Figure 13. The Drawn-Out Scroll Stock

Figure 16. 3/8" x 3/4" Collar Mandrel

Figure 17. 9/16" x 3/4" Collar Mandrel

above the plane of the scroll to permit starting a scroll on the scroll tool.

Peter measured the sketch of the scroll (Fig. 7) by laying a piece of string along the sketch and measuring the string. He cut off a test piece of his scroll stock (3/8" x 3/4") in excess of this length (namely, 12"). He tapered the end of the bar in both dimensions. (Fig. 13). When satisfied with the taper, he measured the length of the drawn-out bar. (It was 12 3/4"). He started the scroll the same way as for the scroll tool (Figs. 10 and 11), but then wrapped it around the scroll tool to finish the form, using a lightweight tongs, at first, to hold the scroll to the tool. When the form was sufficiently developed, he marked the scroll tool with a soapstone crayon at the point he stopped, as a guide to making the rest of the scrolls.

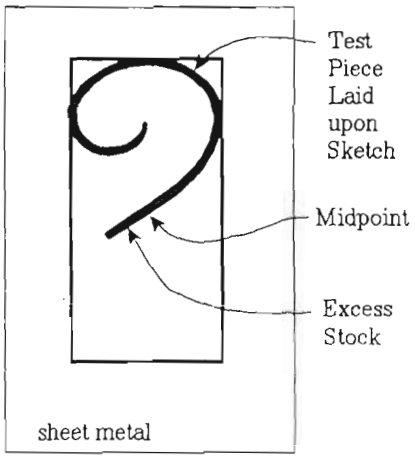


Figure 14
Checking Excess Length of the Test Piece

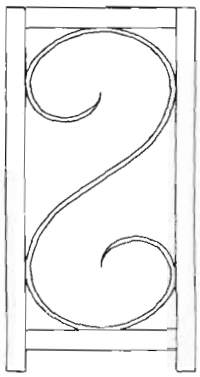


Figure 15
Testing the S-Scroll
in the Measuring Jig

He then measured the excess stock on the test piece, being that which extended beyond the midpoint of the sketch. (Fig. 14) This turned out to be 1 1/2". From his measurements he calculated that each S-scroll would require a length of stock equal to 21" (= 12" x 2 - 1.5" x 2), which would have to be drawn out on each end until it reached the length 22.5" (= 12.75" x 2 - 1.5" x 2). Each piece would then be made into an S-scroll, using the mark on the scroll tool as a guide when to stop.

Peter cut one piece and tapered each end (Fig. 13). He continued drawing these out until the piece grew from 21" to 22.5". He then started the scroll as in Figures 10 and 11 and completed it on the scroll tool. Reversing the piece, he formed the scroll on the other end. To test the overall size of the S-scroll, he placed it into the measuring jig (Fig. 15), and adjusted its shape until it fit easily but snugly. He then cut three more pieces and made the remaining three S-scrolls. then tested the four scrolls in the frame (as in Fig. 1, but without the collars).

Next Peter made the collars. Two collar sizes were needed, and a mandrel was needed to form each size collar. Peter made the smaller mandrel by folding over

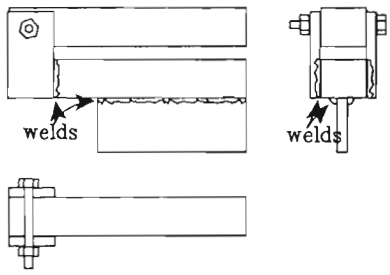


Figure 18. Tool for Starting Collars

about 3" of the end of a 3/16" x 3/4" bar (Fig. 16). The larger mandrel he formed from the same stock, but folded it. (Fig. 17) Peter calculated the length of stock needed for the collar as 2 x W + 2 x T + 2 x C + 1/16", where W = width of the pieces (3/4"), T = total thickness of the pieces, C = thickness of collar stock (3/16"). This gave 3 1/16" and 2 11/16" for the larger and smaller collars. Peter started the collar using the tool shown in Fig. 18. He placed the annealed collar stock cross-wise in the jaws of the tool, then clamped the tool + stock in the vise and hammered down one side, cold. He then reversed the tool and hammered down the other side.

Figure 19. Bending down the First Leg

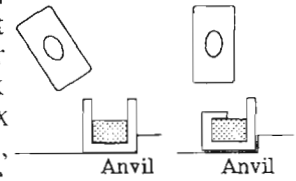
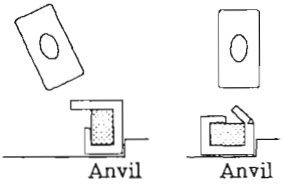
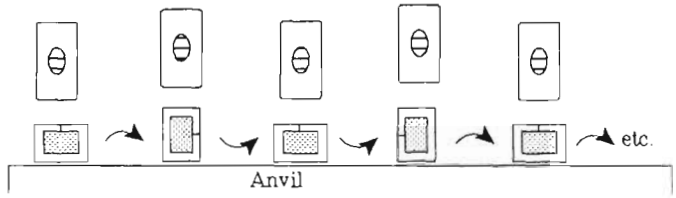


Figure 20. Bending down the Second Leg



After heating each half-formed collar to red, he placed it at the step of the anvil, slipped in the mandrel and hammered down one side (Fig. 19). He then turned it 90 degrees and hammered down the second side, rotating the collar as needed as he did so (Fig. 20). He then closed up and squared off the collar by hammering alternately on three sides (Fig. 21). Before the collar could cool onto the mandrel, Peter placed the collar over the edge of the anvil and hammered the mandrel out of the collar.

Figure 21. Finishing the Collar



After making twelve large and six small collars, Peter was ready to assemble the grille. For this he used three tools: a tongs, a Channel-Lock pliers, and a "large-jaw Vise Grips locking pliers" (See Fig. 24), which he highly recommended.

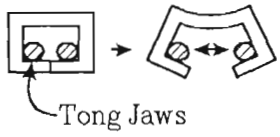


Figure 22. Spreading the Collar

Peter reheated the collar to red heat and spread it with the tongs (Fig. 22). He then took the hot collar in the Channel Lock pliers and closed it over the pieces to be joined (Fig 23). With the Vice Grips pliers he clamped down on the collar, first from the front and back of the screen (Fig 24) and then from the sides (Fig 25). He repeated this process seventeen more times to complete the grille (Fig. 1).

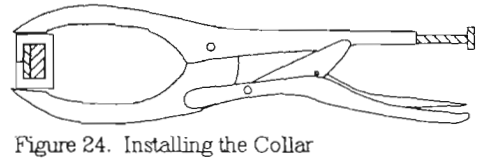


Figure 24. Installing the Collar

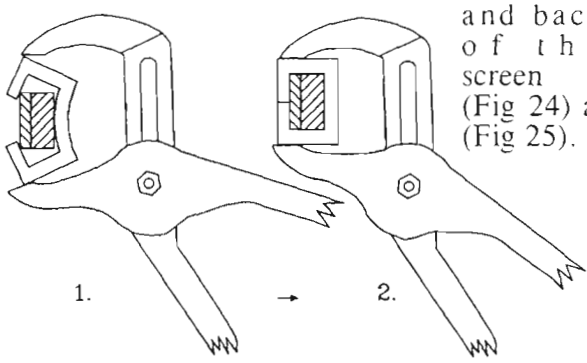
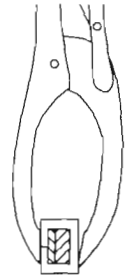


Figure 23. Installing the Collar

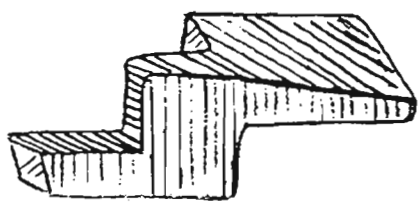


Mike Boone

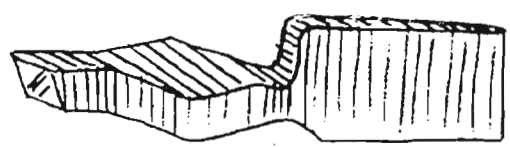
"Treadle Hammer" Tongs

by Mike Boone
Drawings by Robin Boone

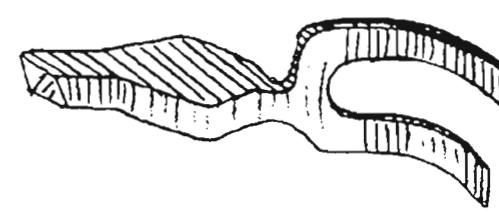
This is a style of tongs that is very useful for holding punches , chisels, and other top tools. They can be used at the treadle hammer, anvil, or vise. The benefits are that the tongs will hold virtually any style or size of chisel/punch; round, square(flat or on the diamond), rectangular, or octagonal. The oval shape of the "claw" style jaw allows one to get a firm hold on a top tool, quickly rotate the tool, or switch to a different chisel without loss of heat/time of the piece being forged. Another positive aspect is the option of using shorter tooling which saves on tool steel. Forged from mild steel and hardened with Rob Gunter's "Quick-Quench" formula gives the tongs good spring and durability.



(1) Side view of blank

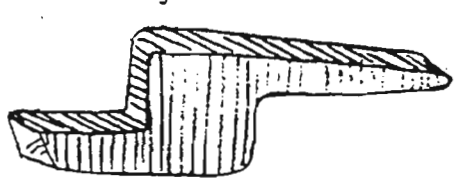


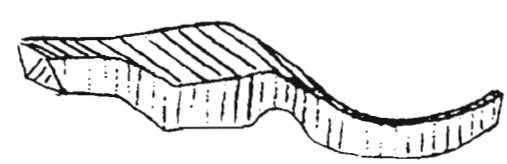
(2) Forge one jaw with a wide off-set



(3) Cut-out middle section and add slight radius

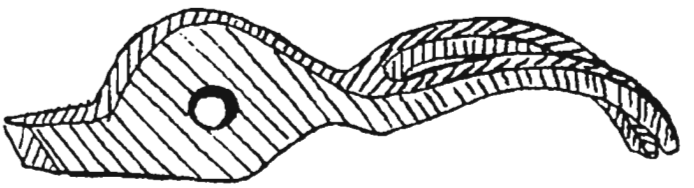
(4) Side view of jaw blank



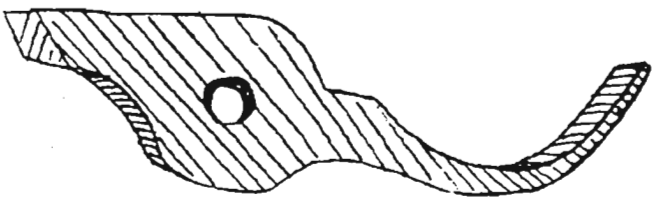


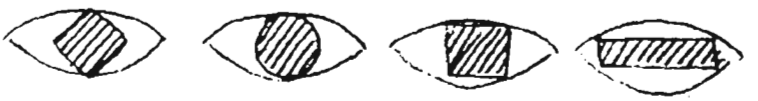
(5) forge second jaw straight in line with boss

Mike Boone -page 2-



Matching set of jaws

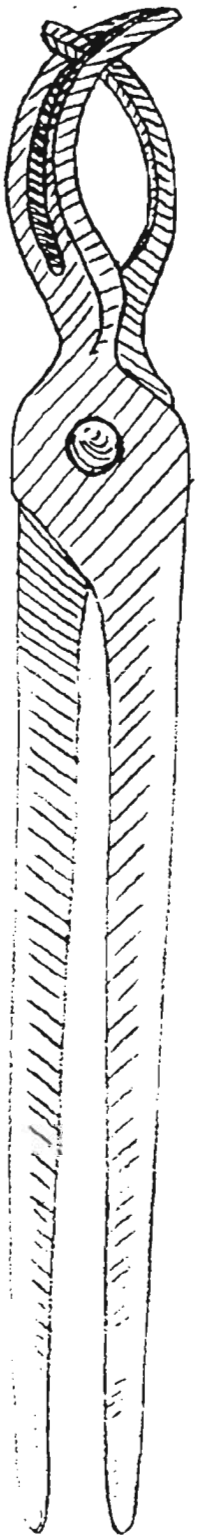




Chisel/punch holding variations

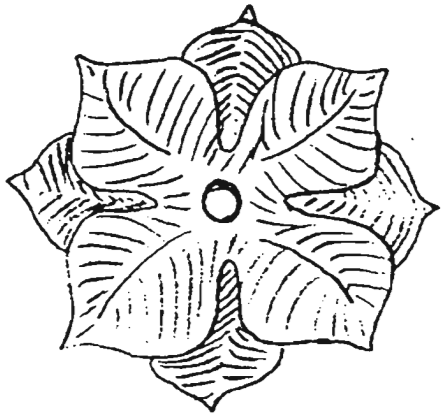
(6) Match the two forged tong jaws.
Drill holes in boss for rivet.
Put tongs together and make any final adjustments so that they pass through one another smoothly.
The desired final shape is an oval/eyeball, forming the "claw".
"Quick-Quench" for spring and durability.

Finished set of "Treadle Hammer" tongs

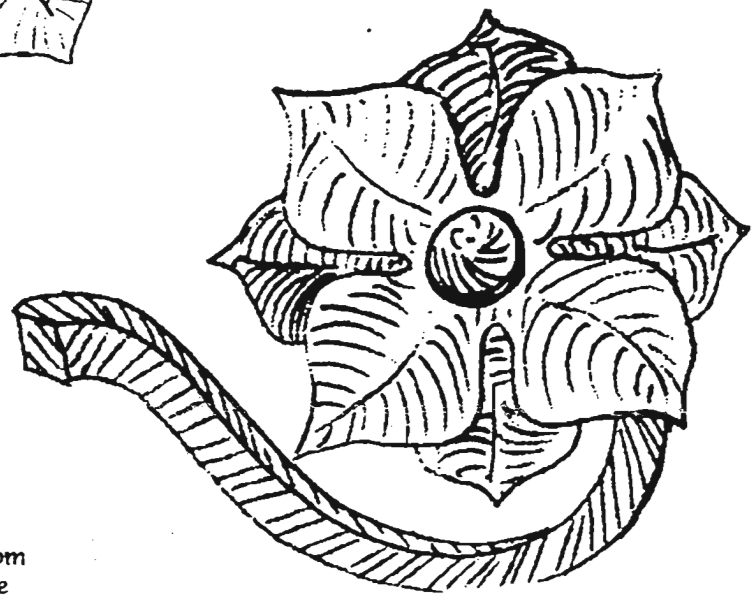


Mike Boone

-page 2-

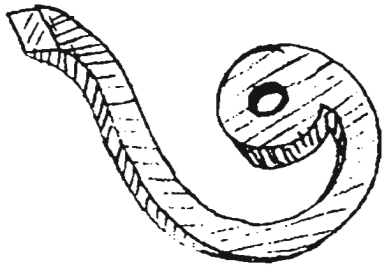


Drill holes in forged elements and overlay as shown.



Assembled Flower

Forge ball from 3/4" square stock with a 3/8" threaded tenon.



Drill and tap stem detail.

Poor Man's Damascus

by Lance Olson

In our reading, we are constantly reminded that Damascus is a special *process* that we don't follow so we should call what we do, "pattern-welded." Ok, the following procedure will produce a "pattern-welded" billet that is really quite beautiful. What is unique here is that we start with easily obtainable, thin materials. The special material that is created (billet) can be used to make a knife, jewelry, leaves, flowers, or anything else your creative mind will come up with.

Since the layers are *already* thin to start, the process is not as labor intensive as beginning with thicker pieces and having to fold & weld several times. Since less welding and folding is involved, losses due to scale are greatly reduced. And less welding means less chance of slag inclusions. A power hammer is not required, but as always, is a great labor saver *after* welding.

Commonly found materials are used, such as 1 1/8" wide, used band saw blades (high carbon steel alloy). Sheet metal is used for the low carbon portion (1018). And *we* also have access to .005" thick nickel sheet. Nickel is not necessary, but I, personally think it is a *key* ingredient if you want to make jewelry-grade material.

I began experimenting with poor man's "damascus" several years ago. I would bundle several layers of banding ribbon (medium carbon steel) with sheet metal. It was kinda boring... Later I discovered the concept of using band saw blades (high carbon steel alloy). Then I would have the bundle welded at the ends and that welded to a 3/8 dia. rod. The handle made it easy to hold the bundle in the welding fire.
But a bundle of thin material will buckle when heated and allow junk to get between layers. The other problem is that when the pieces buckle and separate, they insulate the neighboring pieces and welding is quite difficult, time consuming, and frustrating! Despite the problems, I would keep at it until I had a billet. I would wind up with some really exciting patterns that kept me interested, but then there were those dreaded inclusions!

Finally, I ran across **the secret**: The concept of wiring ***stainless steel retainers*** on the top and bottom of the bundle, is gleaned out of Jim Hrisoulas' book, "*The Pattern-Welded BLADE, Artistry in Iron.*" This idea is brilliant, since retaining solved most of my problems. And the stainless falls off after the billet is complete! It is easy to determine if the stainless you have is the right kind....it is non-magnetic! Test it with a magnet. (Caution: Aluminum is also non-magnetic and will melt in your forge! Don't get them mixed up.) This stainless, which is most common, will *not* weld to steel in the forge! Jim has written other books too (I haven't read them), but I would definitely recommend purchasing *this* one. If you are smitten with Damascus [sorry Jim....I mean pattern-welded], you will definitely learn some big time creative ideas with this book.

In some of his knives, Jim uses very thin "shim stock" made of nickel, high carbon steel, etc. When he layers them, he only has to weld a couple of times and he has a completed billet. Think about it...200 layers of .005 thick pieces is only 1 inch thick! Imagine what you'd have with .001 or .002 inch thick pieces.... (By the way, I have heard that you wouldn't want more than 600 layers because the pattern gets too small to be visually exciting.)

Since high carbon steel will not weld to itself, we use low carbon steel on the outsides of the bundle. Then, all you have to do is fold and reweld (medium carbon layers weld together). Or, if you insert a high carbon piece in between the fold and weld, you will have a knife billet. This way there will always be low carbon steel on both sides of the (high carbon steel) fold.

What follows is what my friend **Andy Draminski** and I have learned, so far, at my forge. This information is not complete. We are not experts and have a long way to go to learn more about it, but we thought you'd like to hear about it and maybe get started with your own experimenting. Try it and let us know about what works for you and what tricks you come up with.

I. Components & Preparation:

Jim's book recommends an 8" long bundle, but we found that the center (4" from either end) is hard to weld, being so close to the tongs, so we went to a 10" length for a coal forge. It's a lot easier to handle. Cut off what you don't use.

1. **1 1/8" wide BAND SAW or CUT-OFF SAW blades** (or whatever width you can find)
   a. Cut off into 10" lengths (abrasive cutoff saw works well)
   b. Grind-off teeth and square ends to length (remove all edge burrs)
   c. Sand blast to remove all traces of aluminum and other metals on the saw blade surfaces. Perhaps sand paper would also do the job (*cleanliness is key* to prevent inclusions and hours of work down the drain)

2. **1" wide 18-16 gage PICKLED STEEL** sheet metal (1018).
   Cut to 10" lengths. Why 1 inch? Because the saw blades are about 1 inch after removing the teeth. Adjust this 1"

FROM

dimension to the remaining width of *your* saw blades.

3. NICKEL if you can find it. We use .005" thick electroplated, print cylinder backing...it is a tube that is about 4" dia. x 20" long used for print plate backing. One of it's advantages in printing is that you can cut print plates with a razor knife without damaging the print cylinder. Nickel is hard stuff! We remove the print plates, clean it up with acetone and cut to 1" x 10" size with tin snips. I won't be surprised if my snips don't last very long between sharpening.
One other neat thing I tried in the past, but don't have available to me now...If your company nickel-plates parts, ask about sending along some sheet metal strips to be plated. The cost isn't very high if they go with a bunch of other parts. Put a hole in one end so they can hang the strips in the plating tank. When they return, cut off the ends with the holes. The plating is only about .001"-.002" thick, but it looks great and has the advantage of cutting down on the number of pieces in the bundle.
Nickel looks very nice, but it is not necessary in making damascus. It sure makes a difference in contrast! Nickel will keep a shine throughout etching and it will not erode. Try some if you can get it! Out of curiosity, the *melting temperature* (not forge welding temperature) is 2651 Deg. F; 2500 for carbon steel.

4. 1" wide x 1/8 or 3/16" thick x 10" long STAINLESS STEEL (300 series)- 2 pieces

5. BAILING WIRE or other soft steel wire. Don't use aluminum, or galvanized wire. We haven't tried stainless steel wire, but it sounds like it could be an excellent choice if you have it.

II. Weldment Assembly:

(When assembling, make sure pieces are *clean*!...no dust or grit)
Assemble in this order:
Stainless steel, low carbon, nickel, saw blade (high carbon), nickel, low carbon, nickel, high carbon, etc. And end up with low carbon and then stainless. Hold tightly together, put into a vice and clamp them together in the center. (Stainless pieces against vice jaws.)

Use a length of bailing wire and pliers to secure the bundle tightly together. Then move bundle over, clamp, and use another length to bind some more. Use individual wires about an inch and a half apart along the entire length of the bunch. As you weld, the wire will fall off, or you can cut it off after that section is welded. Don't have a heart attack when you see sparklers in the fire.....it's probably wire that fell off into the fire, burning up!

III. Welding Fire & Flux:

We use a coal forge so I will explain how we do it. But I'm sure a gas forge would be cleaner and maybe even better for this type of work..

1. The Fire: Get a good fire going, with *lots* of coke formed *before starting*. While welding, use a "slice" to keep moving the outsides of the coke towards the fire. A slice is just a *flat* "shovel-like" tool that can be inserted between the coal and the fire pot, to pry the formed-coke into the center. Then rake green coal into the sides where you just made smokey voids. Don't let the fire get hollow, or your billet won't reach welding temperature. Occasionally put more small pieces of coke under the billet. Don't let green coal fall onto the bundle. This is easy once you get the hang of it. *It is very important to keep the fire narrow. Keep it just a **little** wider than the bundle.*. If there is burning coke *past* both sides of the bundle, too much heat is escaping your fire. Keep your heat concentrated. Also, keep a little dome of coal/coke over the top of the fire and a little to the back. You will be heating to weld temperature, under this dome. And you will be able to *see* what is taking place with the bundle. We use didymium glasses to keep the IR out of our eyes and so we can see to weld.

You need to pay attention to what is happening to the bundle in the fire. (Question: Can you make "Poor" Man's Damascus using $40 didymium glasses? Answer: Yes, and after selling a few billets to knife makers, you can buy an extra pair too!)

2. The Flux: For flux, I use 20 Mule Team Borax. Guess that maybe I'm just used to it, but it does spread out nicely and seems to melt into all the nooks and crannies of the bundle. Use it just like you normally would....heat the area of the bundle you want to weld until it is in the yellow/orange range, and then pull it out and sprinkle Borax all over it, including on the end. Put it on at least an inch past where you want to weld. Flux keeps the air out and keeps the piece from burning. And remember, you need heat *next to* the weld too, or it will suck heat out of the weld area when you try to weld it.. Don't feel like you have to hit *this* area too, just because it is yellow.

IV. Welding the Billet:

1. What to Look For: As you heat up the bundle, ***slowly***, turn it occasionally to insure even heating throughout. Usually, the edges of the bundle are vertical.. Remember what the flux looks like when it melts.....it moves around and swirls. Well, you are looking for something similar to that.

As you turn your bundle over (180 degrees), you may see swirls and bubbles on the yellow/white surface that was down. You are getting close. *This* side is up to heat. But the whole bundle will not be up to heat unless the swirls and bubbles continue for a few seconds. That means that there is enough heat *throughout* the bundle to weld it. Go for it! If the bubbling & swirling go away, that means that the bundle was not evenly hot throughout its thickness, yet.

2. Welding Hammer and Kevlar Gloves: Believe it or not, I use an 8 pound sledge with a short handle to weld my billets. It's not that I need that much force. I like it because it strikes the soft billet **flat** and doesn't leave any "craters" in it. I swing it easy....not hard. I will soon make a hammer with a large, flat head that weighs 3-4 pounds, because my elbow is sure starting to hurt! Kevlar gloves keep the intense heat off my hammer hand while I am hammering.

3. Welding Progress: As with any piece, keep the billet straight and flat while you are working on it. Overlap each weld slightly, as you go. After welding down past the center of the billet, turn the piece around and catch with proper tongs. *(Modify the end of the billet if you need to, to fit.)* After removing most of the wire ties, you may have trouble with the stainless retainers coming loose... If you need to, let the billet cool off a little and rewire part of what is already welded. Or, if you are using the proper tongs, they will hold the stainless together until welding is complete.

4. Remove the Stainless Steel Retainers: After welding the entire length of the billet, you can let the stainless drop off. You may have to pry them off if they are *mechanically* fastened into the billet from hammering. Remember, they won't weld to the billet.

5. Grind Edges and Look for Unwelded Parts: Look over the entire billet. Are there any dark "cracks" along the edges of the billet? If so, do another weld or two. If you are in doubt, weld it up again! You may notice, now, that you don't have quite as much material volume as you did when you started. That is because you will loose some of your material due to oxidation and welding (sparks are molten steel and nickel, squirting out of your billet!).

6. Finish to Thickness and Length: Now hammer it longer and thinner, or wider and thinner. Or hammer it square or round in cross section and twist it for a new pattern. (***Keep the whole thing very hot or nickel layers may shear.***) Then hammer it into whatever shape you desire.

7. What Next?: Now you have a long billet of pattern-welded steel, ready for whatever you want. If you want to have thinner layers (smaller art pieces look better with thinner layers) , try cutting the billet about 2/3 through at the center of length, fold over onto itself and weld again. Repeat until you are satisfied. (You may want to grind a little and etch to see where you stand).

If you want to make a knife blade, put another piece of high carbon into the fold before welding. This process gives you a thicker piece of high carbon steel in the center of the knife for an sharp edge. But it is *really* hard to control getting that piece exactly in the center on the finished piece. Or, you could just quit while you are ahead and make a long knife. Or, cut the billet in half and make two knives. Or three knives, or maybe a hundred earrings! How about a damascus bracelet?!

8. Heat the piece and Normalize it: heat it up to yellow (loss of magnetism), and use a wire brush on it. After brushing, set it aside to cool slowly, or if you have a warm, dry bucket of powdered limestone, push it in deep and let it cool off for a few hours. These processes will allow the billet to become soft enough to file and sand easily. It is also a necessary step before hardening.

9. Saw, Grind and File Into Shape: Just remember that the beauty in Damascus lies in its layers... The thicker the layer, the wider the pattern. Remember that the beauty of damascus comes out when you cut, grind, or file the layers on an angle. If you shape a knife form, hot, like you would a solid material, the pattern may be lost or boring!
Caution! Do not clamp the billet in a vice with the layers perpendicular to the jaws. The nickel has a shear strength less than steel and may cause a weld shear (layer separation). This can be a tear jerking experience after all the other work has been done. This happened to me when I was attempting to punch holes in a handle while the metal was too cool. Work it yellow!

V. Hardening & Tempering:

This is done like you would any high carbon steel. Heat it up until it looses its magnetism and then quench in oil. Plunge the billet straight down into the oil, "point" first. Now you can swish it around. If you put it into the oil sideways, a bend may form in the billet due to uneven heating.

Now, clean it off and sand it until it is almost finished (shiny). Heat the knife in the oven at 500-550 degrees until it is blue all over (it won't hurt to leave it in for about half an hour to be sure), and then quench again. Clean it off and then use a very fine paper to remove the blue patina. You are now done with the "work" part. If you have your own special way to harden and temper a knife, do it. As a rule of thumb, when hardening and tempering pattern-welded steel, treat it like it was solid, high carbon steel.

VI. Etching and Surface Finish:

Etching is done with **Printed Circuit Board Etching Solution**, found at Radio Shack or any electronics store. It is **Ferric Chloride** with a little Hydrochloric Acid (HCL). Don't use this stuff straight. It is too strong and will "wash out" your pattern. I have read about and heard others talk about adding from 30%-50% distilled water. Since it is all relative; based upon how fast you want it to work, I use about 30% distilled water.
Look around your supermarket for plastic containers you can use for the etchant solution. A spaghetti container works well, but the lid is not air tight. You could use plastic over the top and then pop the lid on when in storage. Tip it over once, however, and you'll wish you chose something more stable.

What is neat about this etchant is that you see your pattern quickly.....usually within a few seconds. You just stay with it until you have the depth of contrast that you want. The high carbon steel will turn black, the low carbon a satin grey, and the nickel will stay shiny. You may need to remove the knife ocasionally and wipe off the sludge, which prevents etching. Nickel will not etch. It will remain untouched. The longer the piece is in the solution, the deeper the steel will continue to dissolve...an opportunity for some creative work. (As an etching side note: I just finished a cable billet....I was really disappointed about the pattern until someone told me to that I had to leave it in for about half an hour. Wow, does this extra time make a difference!)

If you have black "greasy spots" after you are done, just wipe them off good with a rag. Then rinse the piece off real well, while rubbing it with a cloth, in the sink. I have read about using baking soda to "neutralize" the acid, but I haven't talked to anyone who actually did it. We'll try it sometime... Once the piece is dry, get some oil on it or rub on a coat of floor wax immediately. Rust will swarm in on the mild steel portions...

And something else neat about this PC Etchant is that you can pour it down the sink and flush with plenty of water, when you want to get rid of it. (Read label directions to be sure of yours.)

People have asked me about using a hydrochloric acid "etch"... HCL (Muriatic Acid is frequently used--mostly used for cleaning mortar off bricks, etc.) is used as a *pickling solution.* i.e., it will dissolve scale and other crud on the surfaces of flowers and other intricate iron that can't be wirebrushed easily, and will turn the steel a light satin grey. This will not give a very good color contrast between high carbon and low carbon. Frankly, it is *boring*....

VII. Summary:

Poor Man's Damascus (pattern welding) is a *process* that *creates a really special art material.* It cannot be easily made by any other method than forge welding. ("If you make it, they will come...")

Using thinner pieces of material in the beginning reduces the amount of work, loss due to scale, and the chance of having slag inclusions. (Remember, the materials must be clean.)

Using commonly found components drastically reduces the cost to make the material.

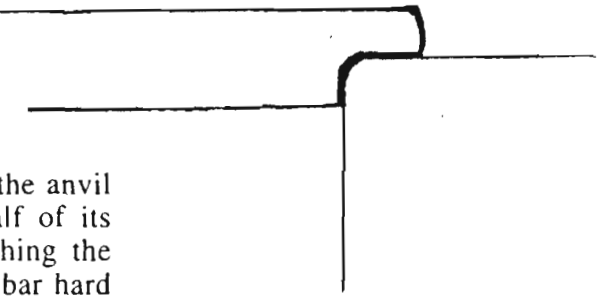
This material can be used for making knives, daggers, or swords. It can be used for flowers and leaves as well. But it can also be used for delicate jewelry pieces.

Just keep in mind; anything you can hammer out of plain steel, you can make out of Poor Man's Damascus...twist it, split it, mash it, punch holes in it, harden it, weld it. Just keep it ***hot*** when you work it!

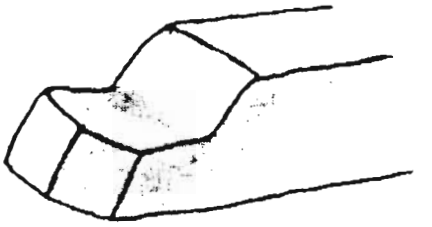
Have fun and keep us posted on things you learn along the way...

Dragon Head

Example : 5/8" x 5/8" Bar Stock

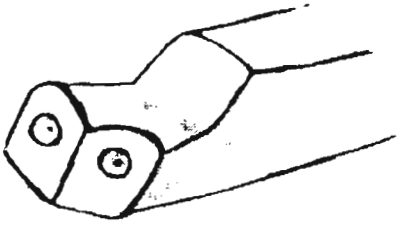


At a forging heat, set 1/2" of the bar onto the anvil and step the bar down slightly more than half of its thickness. Strike so the hammer face is pushing the stock down establishing a shoulder. Hold the bar hard against the anvil to avoid a bounce that would result in a multi-stepped shoulder.

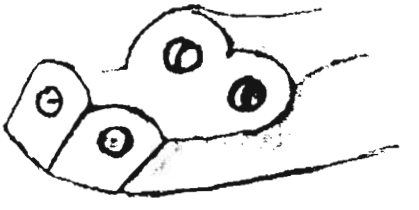


Take a forging heat and clamp the bar into a vise, shoulder side up. Gently hammer a set of facets where the nose and mouth will be developed.

(Note the support tooling shown on page 9 of this issue).



Use a pointed punch, a center punch would do, to form the nostrils. As the punch is driven deeper into the stock, the displacement of material will cause the nose area to round-out.

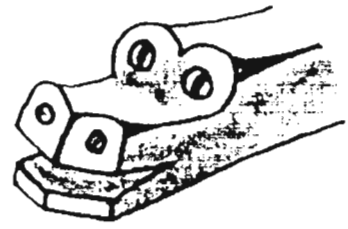


Develop the eyes next. Mark the eye locations cold with the eye tool. Take a heat, clamp the piece into a vise and drive the eye-punch into the stock. As with the nostrils, the deeper the eye tool is driven into the stock, the more dramatic the effect will be.

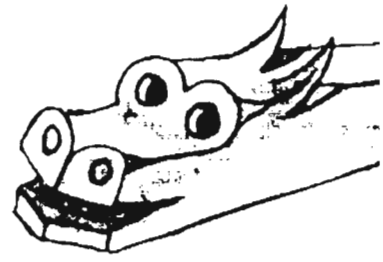
CONNECTICUT BLACKSMITH GUILD

The Blacksmith Bellows

Dragon Head Cont.



Take a chisel and lightly incise the lines of the mouth. At a forging heat, take a thin chisel and cut into the mouth layout lines. This will open the mouth as it is cut.



To raise the ears or horns, take a thin, sharp chisel and cold mark the starting point on each side of the head about 1/2" to 3/4" behind the eyes.

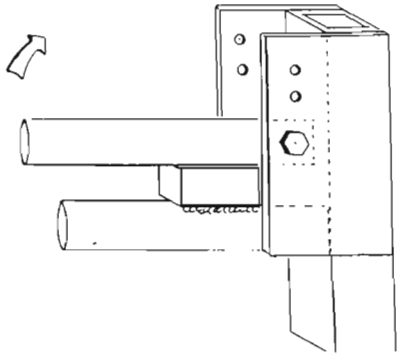
At a forging heat, drive the chisel in at a steep angle to begin the cut. Drop the angle of the chisel as it is driven forward. This cuts and lifts the ear/horn. Control the depth of cut by changing the angle of the chisel and work with moderate, progressive hammer blows onto the chisel to maintain control. If the chisel is too thick it will drag the tip of the ear/horn back into the stock, upsetting it instead of cleanly cutting and lifting the material.

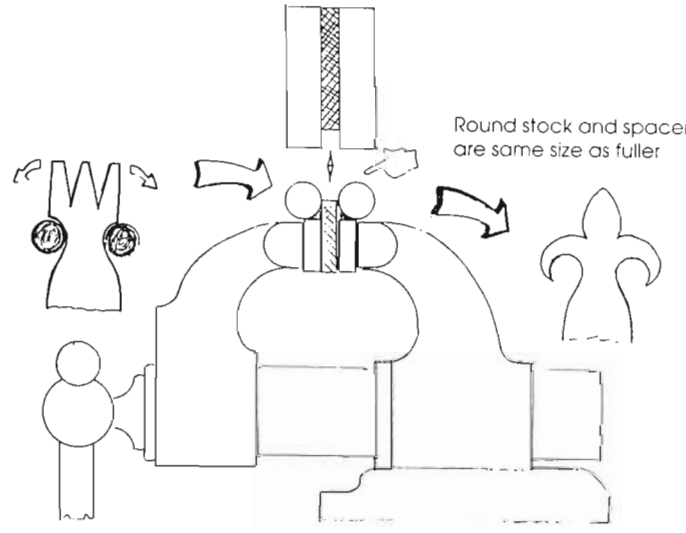
There are many variants on the dragon theme. The mouth can include teeth or a tongue, the eye be changed by configuring the eye tool differently. The basic steps can be applied to different blan such as a drawn out nose which gives a mouse-like appearance.

Fleur-de-lis en masse

by Gary Gloyne, Mt. Shasta, California

I recently had to make 200 hinges with a fleur-de-lis on the end of $3/16$" x 3" flat stock. This is the fuller and holding fixture I came up with. Thought I would pass it on.

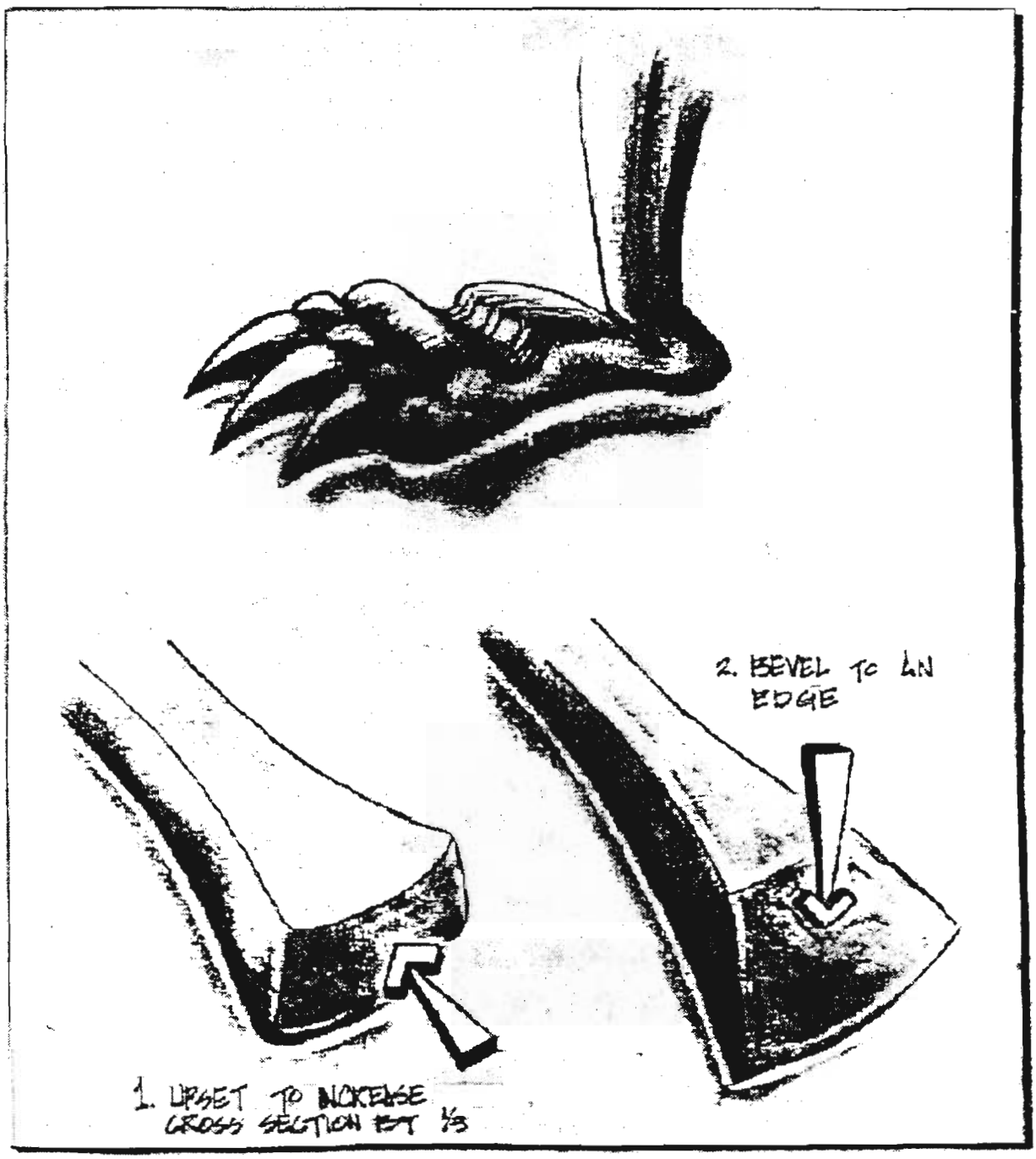


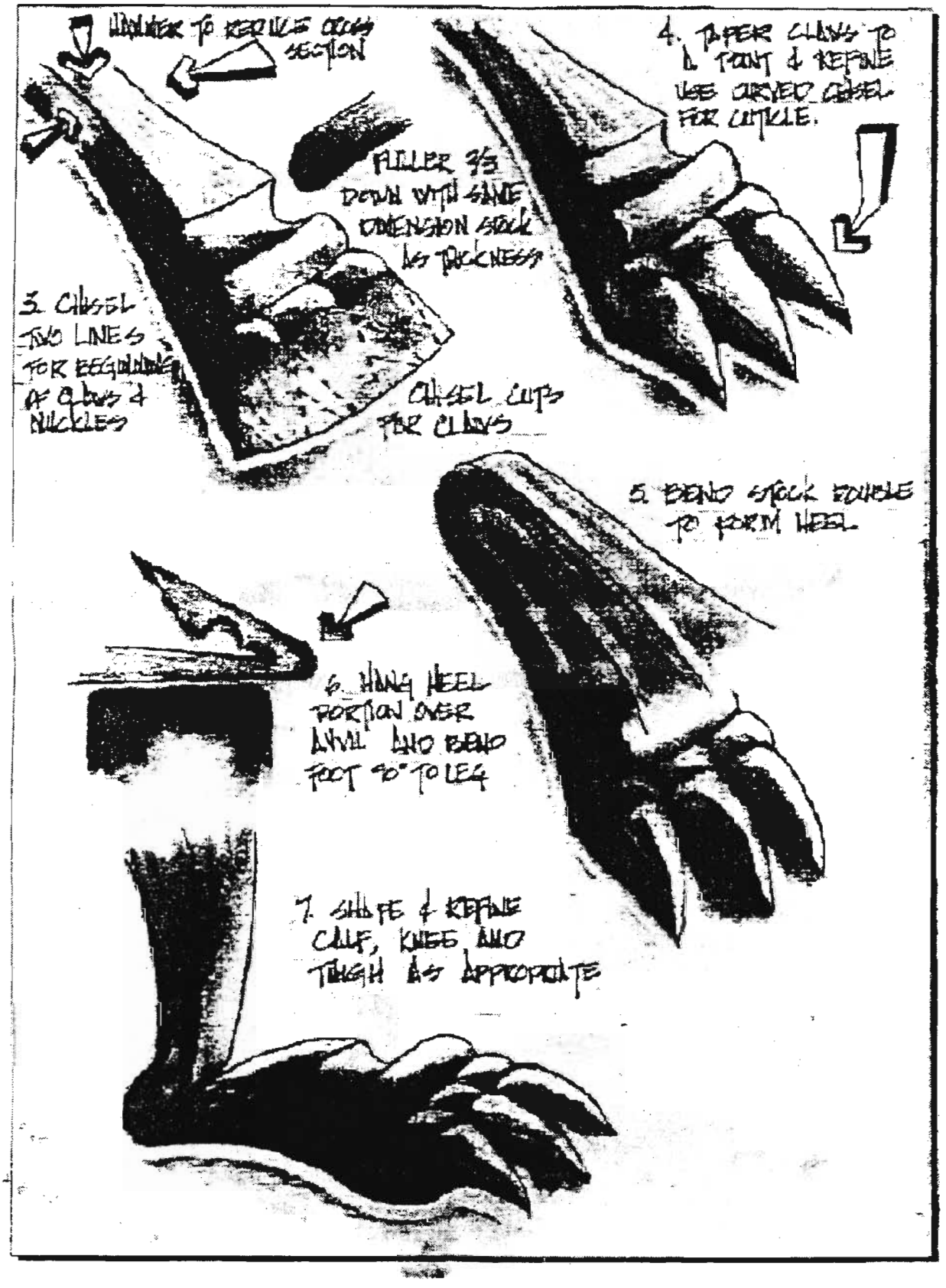


MISSISSIPPI FORGE COUNCIL

Gargoyle Feet - 3/98

Purpose & Scope: Outline procedure that can be applied to any size flat bar stock in multiples of one to two i.e. (1/4x1/2", 3/8x3/4", 1/2x1" etc.) to produce feet for candle sticks, table legs, plant stands or other architectural features where whimsical details may be appropriate.




HAMMER TO REDUCE CROSS SECTION
FILLER 2/3 DOWN WITH SAME DIMENSION STOCK AS THICKNESS
3. CHISEL TWO LINES FOR BEGINNING OF CLAWS & KNUCKLES
CHISEL CUTS FOR CLAWS
4. TAPER CLAWS TO A POINT & REFINE USE CURVED CHISEL FOR CUTICLE.
5. BEND STOCK DOUBLE TO FORM HEEL
6. HANG HEEL PORTION OVER ANVIL AND BEND FOOT 90° TO LEG
7. SHAPE & REFINE CALF, KNEE AND THIGH AS APPROPRIATE

How to Join or Renew your Membership in NJBA:

NJBA dues are $15 per year. Please make out your check to

"New Jersey Blacksmiths Association."

Please mail checks to

Pete Engle, 47 Center St., Rumson, NJ 07760,

along with the following information. You will receive the most recent newsletter as an acknowledgment of your membership. Annual dues are due on June 1. If you join in April through June, you will not owe renewal dues until June of the following year. If you join at another time of year, your will owe dues the following June, but you will receive any back issues of the current volume of the newsletter.

(This information will be listed in a roster available to other members.)

Name_____ Home Phone_____

Address, City, State, Zip_____

Electronic Mail Address_____

New Jersey Blacksmiths Association

Newsletter

222 Laurel Place
Neptune, NJ 07753