N.J.B.A. Newsletter

NJBA Volume 18, Issue 4 07/28/14
http://njba.abana-chapter.com

Editors Soapbox

News letter is late, so I apologize , I need to get myself back on the old schedule. But its still only by a few weeks this time.

We would like to welcome Jose Trooes to the NJBA Board, and would like to see other new faces. We look forward to working with Jose who has been active in our meets in the past.

We have covered some of what David did but we can still use help. David used to run events at Cold Spring Village and we could use help setting these up again from someone in Southern NJ.

We need to repaint the trailer, probably in April. We may do it on a Monday night or weekend, If you want to help call a board member, in particular, Jose Torres

We are working on setting up meets with opportunities to learn, forge or teach others what you know. Come out and chat or get your hands dirty! Let's boost the attendance at the upcoming meets. If you are interested in helping please contact one of the board members listed on page 2.
Larry Brown, Editor

Upcoming events for 2014

Get you calendars out and mark these events down. Please bookmark our web site and check for updated meet information. Remember most of our meets have an "Iron in the Hat" drawing, so be sure to bring something. Meet information starts on this page and continues on page 3.

August 4-10 Middlesex County Fair
September 14th Red Mill in Clinton NJ
September 19– 21 Old Time Engine Show, Washington Crossing Park, NJ, info page 3
December 7th—Annual Holiday Party, Marshall and Jan's house.
Please check the web site for updates and changes.

Middlesex County Fair August 4 –10

4H grounds East Brunswick
Description: Public paid demo – good money maker for NJBA we provide 3 paid demos and then have the facility open for blacksmiths while the fair runs.
Wonderful family activity.
The fair hours are 5 -11 PM Monday through Friday, 11 AM - 11PM on Saturday.

We will have the NJBA trailer at the site for the entire time and we will probably have additional forging stations. We will be under a tent with other crafters. The site has easy access to water and power and we will have tables to display our forged items.
All smiths are encouraged to attend. This is a wonderful fair to attend and is great opportunity for the entire family.

I am hoping that many of you will show up for it. NJBA receives payment for demonstrating for three days of this fair, but we try to do our best to be there most days. Note that this year we will NOT be demonstrating on Sunday, Aug. 10, because the (new) late closing precludes our removing our trailer that evening. Before coming out to demonstrate, please contact me. We may not have coverage every day, and unless one of the NJBA Board

The NJBA Web Site!

The NJBA Web Site is:
http://njba.abana-chapter.com/

The Newsletter is at:
http://www.lightningforge.com/njba/index.htm

or use the link on the NJBA web site for the newsletter.

Official NJBA Address

NJBA
P.O. Box 224
Farmingdale, NJ
07727-9998

Rather than use room in the newsletter, All correspondence between ABANA and NJBA can be found on the ABANA web site. If you cannot access it there, contact me and I will send you copies.

NJBA Board of Directors

NJBA Directors information
is not available online

members is there, the site will be locked up. I believe we will have coverage on Monday, Wednesday, and Friday, but for now there's no certainty of more than that.

Any NJBA member can get into the fair for free if he arrives BEFORE the opening time for that day.
(See http://www.middlesexcountyfair.com/ for Fair hours.) If you can only arrive after the fair opens, you will need an entry pass. I should be receiving these on Aug 3, when we set up. You will not need an entry pass on Sunday, Aug 3, if you come to help set up our site. Contact;

Bruce Freeman,
732-677-8301
freemab222@gmail.com

Driving instructions:
The Middlesex County Fair is located on Cranbury Rd. where it intersects Fern Roads in East Brunswick. Take Route 18 into East Brunswick, follow the directions for Cranbury onto Cranbury Road (Rt. 535 South), pass East Brunswick High School on the left, keep left at the fork, and continue on Cranbury Road for about three miles to the fair. 655 Cranbury Road.
FROM OLD BRIDGE-Take Route 18 north toward New Brunswick, pass the Colonial Diner and head toward Cranbury over the Route 18 overpass and proceed past the high school and bear left at the fork, as above. Route from north county (this is the least congested route), take Exit 8A on the New Jersey Turnpike. Turn right on Route 535 North directly to fairgrounds (5 miles). For information please contact Marshall Bienstock, Cell 732-221-3015 jlfmib@optonline.net

Canal Day Wharton NJ

August 23st

Billy Barrett will be doing a demo at Canal Day in Wharton NJ 10Am - 5PM. Here is the URL: http://www.canalday.org. All NJBA smiths are welcomed. This was a great festival in in the past. Some good bands, food and vendors. Great family event. Contact Billy Barrett, 973-234-8701
anvilman67@yahoo.com

Hammer In
Red Mill Museum Village

Sunday, September 14th from 10am-4pm
Red Mill Museum Village 56 Main Street, Clinton, New Jersey 08809
www.theredmill.org

The Red Mill Museum Village will host the annual Hammer-In on Sunday, September 15th from 10am-4pm.

The Red Mill Museum Village resident blacksmiths Robert Bozzay and Dave Ennis will host the event.

The day's activities will center at the Museum's Blacksmith Shop where local blacksmiths and the New Jersey Blacksmiths Association (NJBA), dedicated to the promotion of the art and craft of blacksmithing, will have members on hand to demonstrate and sell their work. Tool dealers and collectors are invited to tailgate, sell and swap their smithing tools and accessories. Among the items to be found will be anvils, blowers, forges, vises, hammers, and tongs.

Visitors who have "what is it?" objects cluttering up the garage can bring them along and members of NJBA will be glad to identify them.

Admission for the day's activities is $9 for adults, $7 for seniors, active military and veterans, and $5 for children (6-12). Free for chil-

dren under 6, Museum members and for NJBA members. Included in the price is admission to the Museum's historic buildings and exhibits.

For more information, or to register contact, Amy Boyce, Curator of Public Programming, at (908) 735-4101 x 102 or email programs@theredmill.org. NJBA contact is David Ennis, 908-713-1679 davidennis@att.net

Days of the Past Engine Show

Old Time Engine Show September 19th –21st

NJBA will again be at the Delaware Valley Old Time Power and Equipment Association's "Days of the Past" Engine Show at Washington Crossing State Park, in Titusville, New Jersey. Come on out and bring the family, there are hay rides for the kids, a metal heads flea market, and a lot to see. Come on out and join the fun. For more information check out their web site http://daysofthepast.com

Directions:
The "Days of the Past" show site is located in Washington Crossing State Park, Titusville NJ. The park is located between route 579 (Bear Tavern Road) and Route 29 (River Road). The entrance is off Church Road which runs between those two roads.

From the North Route 29 South: Make left turn on Church Road

From Route 579 South: Make right turn on Church Road

From Route 31 South: Make right at the Pennington Circle, go to 2nd light and make right onto Bear Tavern Road, make a left onto Church Road

From Route 1: South to 1-95 then follow directions below:

From South use I-95, I-295 (becomes I-95 south just north of Route 1), I-95, Routes 29, 130 or Route 1

From I-95 (All trucks and equipment should use this route): Take exit 3B in NJ (scotch road). Travel 3 lights to Washington Crossing-Pennington Road. Follow this to the 1st light at Bear Tavern Road, turn right at light. Make a left turn onto Church Road (sign board on corner) and follow it to your first left which enters the show grounds (gravel lane called Brickyard Road).

From Route 29 (Cars only): Travel to Titusville NJ. Make a turn onto Church Road. Church Road is located at a traffic light. Travel 1 mile up the hill to the show site entrance on your right (Brickyard Road).

Report from Dave Ennis on the High Bridge event

The Lake Solitude House Demo on Sunday, July 13th in High Bridge seemed to please the two sponsoring groups, the Municipality's Cultural and Heritage Committee and the Historical Society of High Bridge. The open house, the first time in a year and a half for the pre-revolutionary iron works and foundry manager/owner's home, was held as part of Hunterdon County's 300th year anniversary celebration. Historic places throughout the county were open and participating. (For more info on Lake Solitude House, the dam and Taylor-Wharton Ironworks, try Google).

The day was a bit longer than originally scheduled as Hunterdon County's publicized the time as 11AM - 5PM rather than our agreed 12-4 slot.

Four NJBA members demonstrated - Kevin Weber, his apprentice and new NJBA member Bill Kucharski of Newton, Billy Barrett and Dave En-

nis. There were two coal and a gas forge with three anvils set up on a lawn area under shade trees (unfortunately not chestnut) so lots was going on, with the smiths forging items ranging from hinge staples, meat forks, skewers, fireplace pokers, knives and a railroad-spike tomahawk. Two tables displayed members work for sale and one had NJBA and general blacksmith-related info. A number of NJBA cards were handed out to interested visitors.

The Shop of the Late David Macauley - Day 2

by Bruce Freeman

The move of David's equipment, on Saturday, 24 May, went very well, as I reported previously, but we needed to make one more run to get the rest of the stuff, which we decided to do on Saturday, May 31. This time I had more notice to gather a crew, so I got an email out the Tuesday beforehand, and within five minutes of sending it got a phone call from a new volunteer.

Today's participants from NJBA were David Woodward, Drew Weber, Dan Waddell, Jose Torres, Bill Ker, Pat DiGangi, Marshall Bienstock, and myself. Drew had brought a large flatbed trailer, and Marshall again drove his large truck. Craig Macauley had got there before us and started cleaning out the two rooms, making stuff ready for loading. The first things on the truck were the coal and the propane, which Craig generously donated to NJBA. Next came the gas cylinders owned by David, as well as a few boxes of miscellaneous paints, oils, etc., which Craig gave to Marshall in lieu of having to take them to a hazardous waste site.

Then, came everything else, including workbenches, shelves, a cart, and boxes of tools, etc. Things went fairly quickly and we were ready to roll by noon. There, Marshall backed right up to his storage trailer and we were able to unload directly from truck to trailer. When the truck was unloaded, Drew backed up his trailer, onto which we had loaded most of the furniture, and we loaded that in as well. The trailer is about as full as it can be and still let a person get down the center.

All these participants donated several hours and lots of effort to this move. Several had brought hand trucks. Drew brought his trailer, and Marshall again contributed the use of his large farm truck as well as the loan of an 80-ft storage trailer, without which none of this would have even been possible.

Another NJBA Loss Nathan Pettengill, 62

Nate had been a long time member of NJBA and till his move to Mass. A few years ago was the treasurer and a director.

BREWSTER — Nathan "Nate" Pettengill, 62, of Brewster, Massachusetts, died May 28, 2014 in Boston with his family at his side due to complications from a rare blood cancer. He was a member of the Town of Brewster Finance Committee and served on the Board of Trustees for the Academy of Performing Arts in Orleans.

Born in Boston in 1951, he was the third child of Kenneth Pettengill and Emma Corcoran Pettengill of Brewster, Massachusetts. He was raised in Brewster and Cincinnati, Ohio, where he graduated from St. Xavier High School in 1969. He attended Northeastern University in Boston, working as a part-time taxi driver before graduating with a degree in Mathematics in 1973.

A passionate sailor, Nate spent his summers as a sailing instructor at the Nantucket Yacht Club.

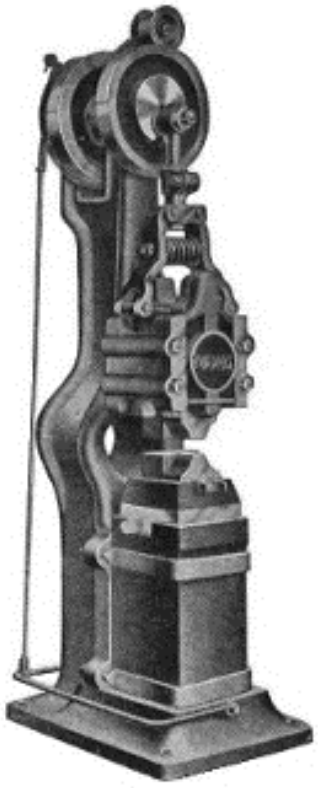
Following graduation, he pursued a career in the defense industry, working on radar and combat systems for industry titans including Hughes Air-

craft, Motorola, and Lockheed Martin. In February 2014, he retired as a consultant for Lockheed Martin where he served as a Systems Engineer Principle. Throughout his career, he traveled extensively in Australia, Germany and Norway on naval projects.

He is survived by his wife of nearly 35 years, Madeleine, whom he met in Westwood, California in 1976. He is also survived by his son, Elias, and daughter, Sarah, both of Boston, Massachusetts, and five siblings: Jean, Claire, Lewis, Adam, and William. He was preceded in death by his parents and his two older brothers, Kenneth, Jr. and Dana.

He will be remembered for his fabulous meals, most notably his legendary pies. He loved fishing, rowing, sailing, blacksmithing, wine-tasting and global travel with his family, including recent trips to Berlin, Latvia and Estonia.

In lieu of flowers, donations are encouraged to the Leukemia and Lymphoma Society at www.lls.org.



Common Mistakes to Avoid

· Cutting through your work on the anvil without using a plate. Doing so will mar the face of your anvil.
· Not wearing glasses. Burns to your skin will heal, burns to your eyes are permanent.
· Gripping your hammer too tightly. Your hammer should be held loosely, so that the power comes from your body, through your shoulder, arm, wrist and hand. Grip the hammer too tightly, and you'll put too much stress on your wrist and elbow.
· Hammering on steel that is too cold. Not only are you wasting a lot of effort, you risk putting undue stress on the work.
· Not cleaning the scale off your anvil between heats. If you don't, the next time you work your piece, you'll be driving that scale into your work.
· Not straightening your work as you go. If you don't straighten your work after every heat, you'll end up with a lot of unnecessary work at the end. A few seconds at the end of every heat will save you valuable minutes later on.
· Hammering all the way through your piece on your cutoff hardy. You will cause yourself unnecessary work having to redress the edge of your hardy and you'll put yourself and others at risk when the piece flies off.
· Using an improper set of tongs. If you don't have firm control of your work, you'll waste energy and even risk losing control of it completely.
· Positioning your head directly over top of your work when hammering on it. This is a simple recipe for a forehead bruise.
· Working when fatigued. Being overly tired makes you sloppy, grumpy and causes you to make poor decisions.
· Working when distracted. Unless you are very experienced, if you are about to engage in a conversation, pull your work out of the center of the fire and leave it there until you are ready to work again.
· Trying to forge weld with an oxygen-rich fire. Oxygen is the enemy.

From The Iron Trillium September 2010

Blacksmithing Workshops and Classes:

Peters Valley Craft Education Center
19 Kuhn Rd., Layton, NJ 07851 (973)948-5200
pv@warwick.net www.pvcrafts.org

Academy of Traditional Arts
Carrol County Farm Museum
500 South Center St. Westminster, MD 21157
(410)848-7775 (410)876-2667

Touchstone Center for Crafts
R.D.#1, Box 60, Farmington, PA 15437
(724)329-1370 Fax: (724)329-1371

John C Campbell Folk School
One Folk School Rd.
Brasstown, NC 28902
1-800-365-5724 www.folkschool.com

Open Forges

If any members have a forge at home and work in the evenings or weekends and want to open it up to help a few local guys, let me know, Larry Brown, editor, as we get requests from members who have a hard time traveling to some of the open forge locations.

Please contact, Larry Brown, Editor.

We want to encourage all to join us at:

Monday Night Open Forge in N.J.

Marshall Bienstock is hosting an open forge in his shop at 7 pm almost every Monday night (Please call ahead on holidays to make sure , (732-221-3015)

Open Forge in Long Island

Sunday from 10:00 am to 6pm.
Starting the 1st Sunday in November until the end of April. Please call ahead to confirm and get directions. Ron Grabowski, 110 Burlington Blvd. Smithtown, NY (631) 265-1564
Ronsforge@aol.com

In Southern NJ contact
Joshua Kuehne, 543 Amos Ave.
Vineland, NJ 08360
(856) 503-5297 iforgeiron88@yahoo.com

Business Members

We would like to thank those who joined with our new Business Membership category .
Business dues are $40
Please show them our support

Marshall Bienstock, Marshall's Farms
663 Casino Dr., Howell, NJ 07731
732-938-6577, 732-780-0871
jlfmib@optonline.net

John Chobrda, Dragon Run Forge
P.O. Box 315 Delaware City, DE, 19706
302-838-1960 jchob@verizon.net

Eric Cuper Artist Blacksmith
109 Lehman Lane, Neshanic Station, NJ 08853
908 642-6420 ericuper@msn.com

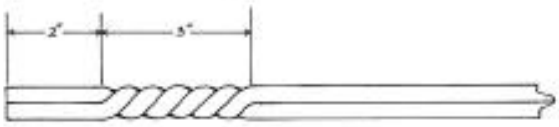
Bruce Hay, Jr.
50 Pine St., Lincroft, NJ 07738

In Northern Delaware and Southern NJ, contact Kerry Rhoades or John Chobrda
Kerry (302) 832-1631 John (302) 838-1960
(609) 610-3501 (cell)

Controlled Hand Forging 3

Twisting

By Bob Fredell
Illustrations by Tom Latané



1. The completed twist

Lesson Number Five--Twisting
Definition: Twisting rotates the bar around its axis.

Intent: The student will twist a 1/2"square bar one and one half turns.

2. A Twisting Wrench.

The twist is 3" long and starts 2" from the end of the bar. The finished twist is to be straight and along the same axis as the untwisted portions of the bar. The entire length of the twist is even so that it does not easily show variations in the spaces between the turns. The twist is to be made to dimensions and in one heat.
Tools Needed: You will need basic tools plus a twisting wrench, divider, container to direct water to parts of the twist and two light weight bars 6" to 10" long.

3. An alternative type of twisting wrench.

Different types of twisting wrenches may be used. By welding a handle on to a smooth jaw plumbers' wrench an adjustable twisting wrench is made. The traditional "S" shaped twisting wrench may also be used. Experienced blacksmiths are able to use flat-lipped blacksmith tongs. However, beginners using this method run a higher risk of making a crooked twist because when applying the rotational force from only one side of the bar there is a tendency to bend the bar up, down or sideways.

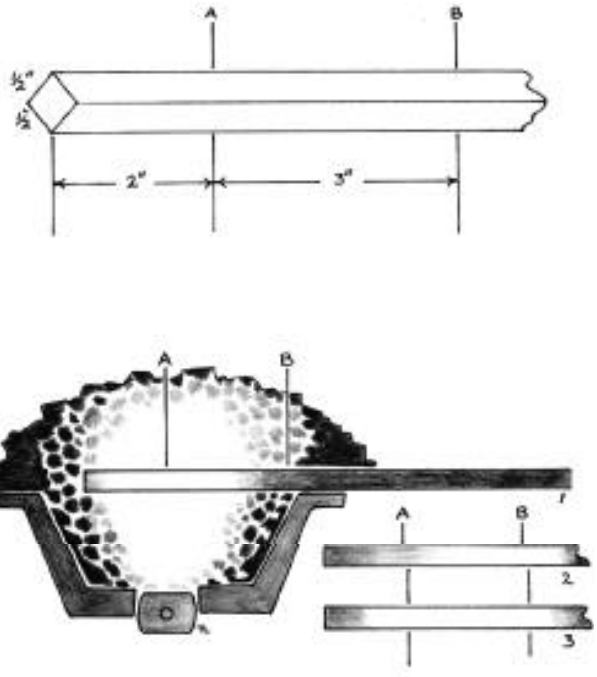
Two light bars to test completeness of the twist.

The exact size of these bars is not critical. Bars in the area of 1/4"x 1/2"x10", or slightly shorter, work well. The idea is to use straight, lightweight bars.

Water container Use a container of your choice.

You may use an old soap squeeze bottle, a tin can with a pinched top or anything else that produces a small, well-controlled stream of water.

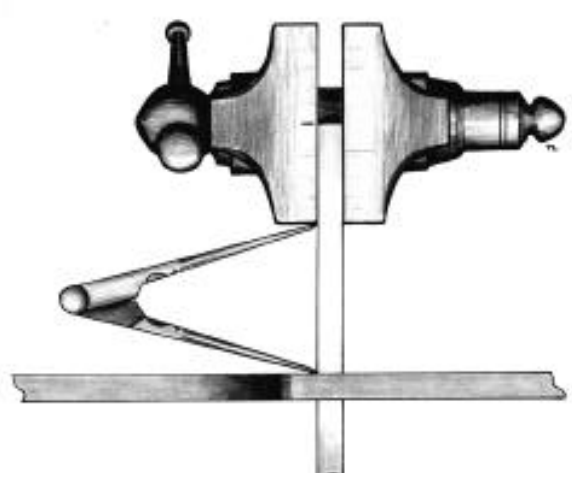
Materials: 24" of 1/2" square mild steel



4. Measuring and heating the bar

Step One: Place the bar in the fire so that 2" from the end of the bar is in the center of the fire and heat to a medium orange heat. Push the bar so that 5" from the end is over the center of the fire and heat to a medium orange heat. This is done to insure that the heat is well beyond the area to be twisted. Withdraw the bar and inspect the temperature. The color of the bar must be exactly the same for at least one inch beyond both directions of the area to be twisted. Reheat as necessary to achieve a perfectly even heat that is three inches long. The length of this heat will ensure an even twist.

Hints: An even heat makes for an even twist; an uneven heat makes for an uneven twist… close to even doesn't do it!
Do not heat the bar hotter than the recommended temperature because too high of a heat may cause the edges to crack when twisting.

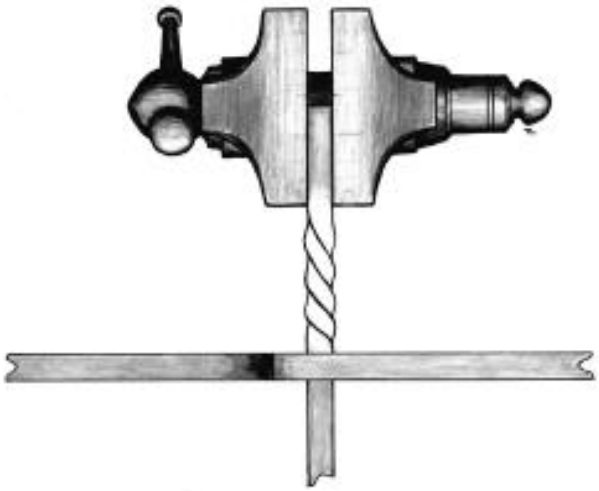


4. Setup for twisting.

Step Two Place 2" of the bar horizontally in the vise. This may be achieved in several ways. (a) Before heating the bar, center punch 2" from the end. However, this will leave a mark that you may or may not consider unsightly. (b) Place a chalk mark on the vise 2" from the end. This will work only if the twist is to be close to the end of the bar. (c) For twists in the center of a long bar, place a blacksmith's stand or other obstacle on the opposite side of the vise to act as a stop. Note—for some applications other than this lesson, the smith may find it useful to place the bar vertically in the vise. Use the dividers pre-set at 3" to determine the location of the twisting wrench and place the twisting wrench on the bar.

Hints: When setting down the dividers do not allow the weight of the twisting wrench to rest on the bar as the bar may bend downward.

Step Three: Twist one turn using even pressure with both hands. The twisting will take place only between the vise and the twisting wrench. Be sure to use gloves to protect your hands from falling scale.

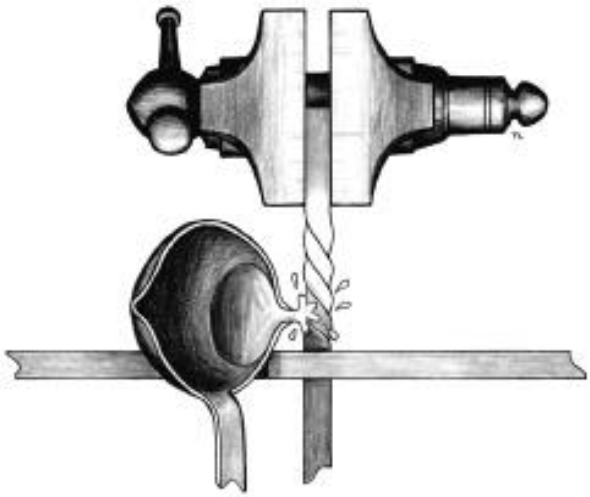


5. Twisting in the vise.

Hints: Be consciously aware of not bending the bar up, down or sideways, as this will put a bend in the bar.
Some twists call for multiple twists in the opposite direction. Always make the first twist in the same direction to avoid forgetting which way to twist. (This may be either clockwise or counter clockwise.) It is well to develop the habit of always twisting in the same direction, except when the design calls for doing otherwise.

Step Four: Quickly brush off the scale and inspect the twist. If part of the twist is tighter that the rest, cool it with water. Continue twisting to finish with exactly one and one-half turns.

Hints: You will need some practice to learn how much water to use.



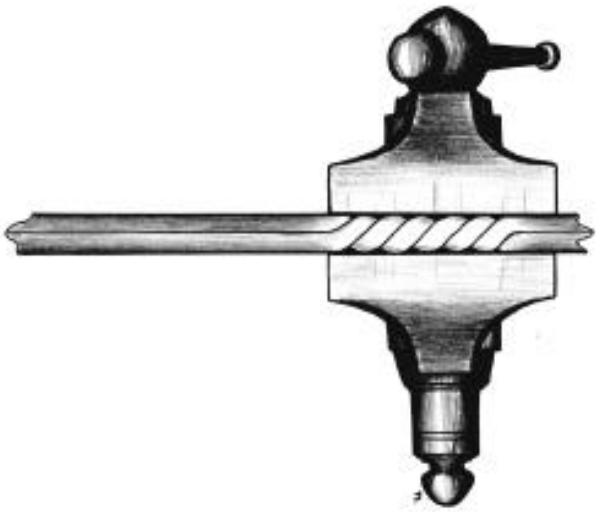
6. Cool tight sections with water.

Step Five: Sight lengthways down the bar; rotate 90 degrees and sight again. The bar, including the twisted and untwisted portions, is to be straight.

7. Check the twist to make sure it's straight.

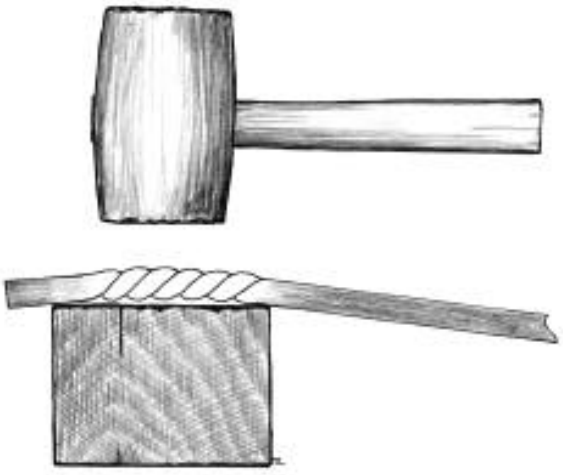
The bar needs correction if you can detect a bend. Learn to train your eye to see deviations. Beginners may need to use the following procedure to check for straightness: Place a straightedge lengthwise along the bar on a corner covering the twist and both untwisted parts. Do this on all four corners. The straightedge is to make contact with the untwisted corners and the corners of the twist. If the bar is not straight and requires correction, proceed to step #6. If it is straight go to step #7.

Step Six: If the bar is simply bent, this may be quickly corrected by placing the twist in the vise on the diamond and gently tighten, rotate to the other diamond and tighten, then repeat this procedure on the flat of the bar. A second method is to place the bar on a block of wood and strike it with a wooden or rawhide mallet. Be sure to use wood to avoid deforming the edges of the twist. Wet the wood to reduce the amount of smoke in your eyes.



8. Correcting a simple bend.

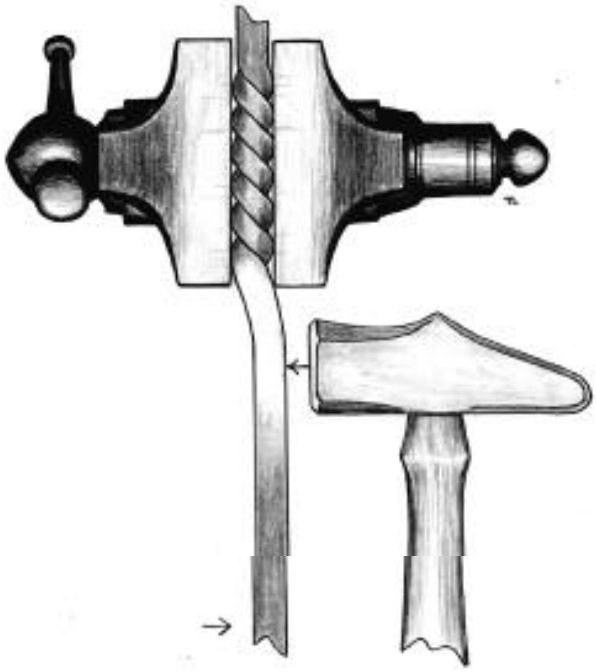
Correction may be more difficult if the bar is offset at the junction of the twist and untwisted portion. The block of wood method described above may correct the offset. Or, reheat to an orange heat, quench the twist to protect it and place the twist in the vise at the point of the offset. Strike the bar to move it back into alignment. At the same time apply pressure in the opposite direction at the end of the bar to avoid bending the bar.



9. Another method for correcting a simple bend.

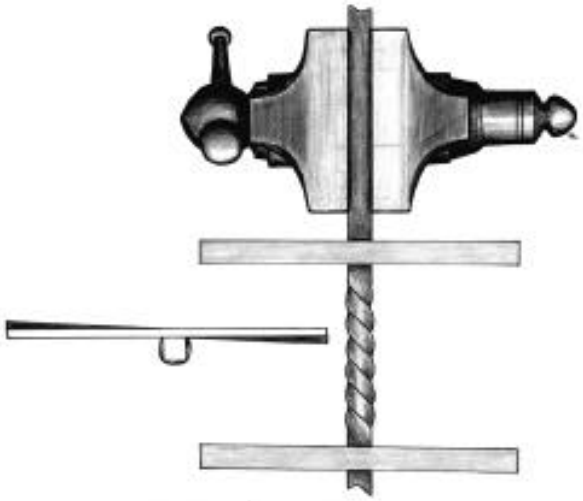
Hints: Bends and offsets are most often caused by moving the twisting wrench up, down or sideways or allowing gravity to sag the bar downward when

twisting. Be consciously aware of applying even pressure on both handles of the twisting wrench.



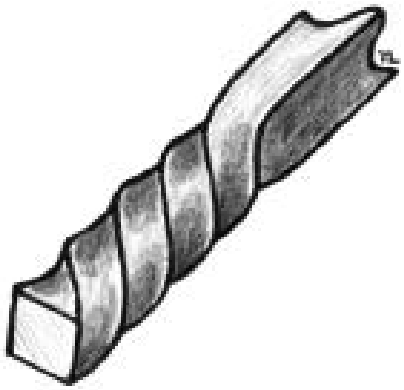
10. Correcting an offset bend.

Step Seven: To check for exactly one and one half turns, place the twisted bar horizontally in the vise. Lay one of the light bars on the flat, untwisted portion at one end of the twist and at a right angle to the twisted bar. Likewise, lay the other light bar on the other side of the twist. Sight lengthwise down the twisted bar. If the light bars are exactly parallel you have completed this lesson. If they are not exactly parallel the bar is either twisted too much or not enough. Place the twisted bar back in the original position in the vise and adjust. This process may require the twist to be heated.



10. Another way to straighten an overbent end.

Targets: The twist is to be: 1. 3" long and 2" from the end with a deviation no more than 1/16 of an inch.
2. 1 1/2 turns with the leveling bars as described in step #7.
3. No cracked edges.
4. Equal size increments of the turns. The spaces between each corner of the twist are to vary no more than 1/16" as measured lengthwise along the bar. Note—the vise and the twisting wrench are heat sinks causing slightly wider turns at the ends.
5. The entire bar is straight. A good test for straightness of the twist is to place a straightedge along the twist and check for contact with each of the corners of the twist. Also, sight lengthwise along the bar—there is to be no detectable crookedness for the entire length of the bar.
6. Complete the twist in one heat.



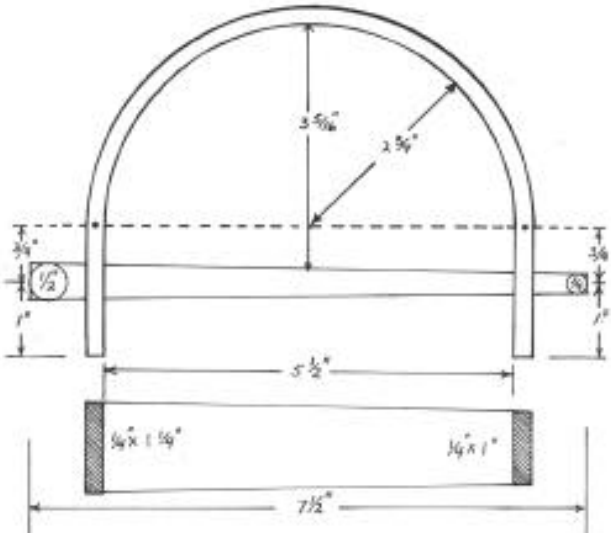
11. Forging dynamics of twisting.

Forging Dynamics: The length of the bar remains the same because the axis of the bar does not change. Twisting makes the edges stretch; the flat surfaces remain straight, although they have the appearance of being concave. A cross section of the twist will show the flat surfaces as straight. The corner-to-corner diameter of a square is greater

than the face-to-face diameter. Before twisting the bar, the corners and the faces are parallel to the axis. When twisted, the corners and faces revolve around the axis at an angle to the axis. The corners, having a greater radius than the faces, will protrude farther out from the axis of the twist than will the faces. The radii of the face gradually becomes less moving from the corner to the center of the face; a concave shape is then created between the corners while the faces remain straight..

Drawing, Punching, and Bending

By Peter Ross
Illustrations by Tom Latané
Lesson Number Six-
Drawing Punching, and Bending



1. The final forged shape.

Definition: This lesson uses skills developed by previously published lessons.
Intent: The student will learn to incorporate several basic skills into a single project while maintaining dimensional control.
Tools needed: Basic tools plus tongs to hold 1/4" thick flat bar, tongs to hold 5/8 or 3/4 diameter on end, and punching tongs to hold punch (if using a short punch), center punch, rule, compasses.
Materials:
24" (or as convenient) of 1/4" x 1 1/4"
24" (or as convenient) of 1/2" square mild steel
5/8" or 3/4" tool steel to make two punches

Method: It will take planning to achieve target dimensions. Let's start by thinking of the bent rectangular bar.

First, the bar must be the right length and the two holes correctly placed. If the bar is forged to proper length, etc., the bending will be simple. We can accurately compute the overall length and the distance between holes from the plan (see lesson Four, Bending, Hammer's Blow, Volume 11, #2, Spring 2003). This will give us the "straightened" layout of the bar. With this layout established, the choice of steps can begin.

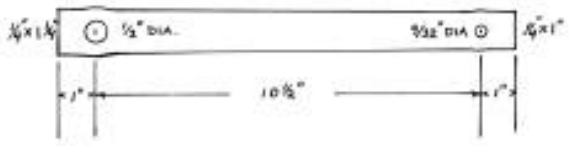
In planning a project, it is wise to do the less-predictable operations early and do the more predictable ones later. By "predictable" I mean in the dimensional sense- not the skills of the workman.

For example, forging a taper of precise length can be done with certainty (using the method learned in lesson one, Hammer's Blow, Volume 11, #1, Winter 2003), but it is difficult to predict how much stretching will occur while punching holes. If we punch early in the sequence, the uncertain effects on dimensions are resolved before drawing to final length. Maintaining correct dimensions will be simpler and more direct. Making the round tapered pin will not affect the dimensions or fit of the flat bar, and can be done independently.

Step One: Make two punches, each with a 4"-long round taper. One should end in 3/16" diameter and the other end in 3/8" diameter. Be certain that the entire taper is carefully forged and truly round. Any irregularities in the tool will transfer to the work.

Review Lesson #3 (drawing a round taper) if necessary.

Previous lessons have involved only mild steel, but for this exercise, we will need something tougher for the punch. If the punch is made of mild steel it will likely bend in use. Using a harder steel, even if it is not hardened and tempered, will make a more durable tool. At this beginning stage, I recommend avoiding more exotic and expensive tool steels. A very serviceable punch can be made from the simplest tools steels (such as W-1) and they will be much more forgiving for the beginner to use. The drawback of simple steels is that they are softer and will deform more easily during use, especially if they get hot. Good technique will enable you to use them with very little problem.
If you would rather not buy new steel, you may use a piece of scrap (such as a piece of coil spring) of appropriate thickness.



2. Flat bar in its unbent layout.

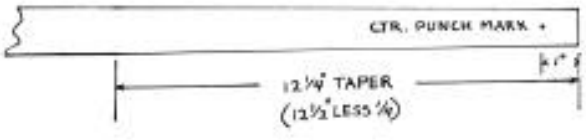
Step Two: We will start with the flat bar.

Refer to the drawing of this project for dimensions and calculate the length of the flat bar before bending. Also determine the distance between holes. Review this procedure in Lesson Four (Bending) if necessary.

It is often a good idea to make a simple sketch of the piece as it should look before bending with these dimensions noted. At this stage, it is nothing more than a tapered flat bar with two holes.

Begin by forging a taper on the end of the flat bar. This taper does not end in a point, so draw the end of the bar only until you reach the target dimension - in this case, 1/4" x 1". Square the end by upsetting if necessary. Once you have forged the end to dimension, work your way back up the bar until you have a straight, even taper 1/4" shorter than the desired length. This will allow for some stretching during punching and final corrections.

Hints: Do not draw the bar too thin, as this is the hardest fault to correct. Any areas that are too thin must be upset to proper thickness. Refer to the lesson on upsetting if necessary.



3. The marked bar.

Targets: Make sure the bar is an even 1/4 " thick the entire length of the taper. Variation should be 1/64" or less.

Hold length tolerance within 1/16"

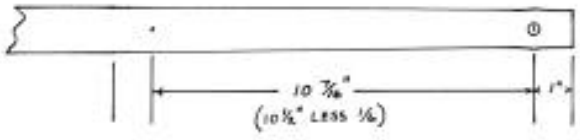
Make the taper as smooth and straight as if it were the end of the project.

Step Three: Measure from the small end to find the location of the small hole. Using the center punch, mark the location. Make a deep mark so that it will be clearly visible when the bar is hot.

Take a heat and punch the small hole.

Drift the hole to 9/32" diameter using the punch. Refer to lesson 2 (Hot Punching) if necessary.

Hints: It is a good idea to mark the bar when cold (or mostly). This will avoid errors caused by measuring a hot, expanded bar: after the bar cools and shrinks, the marks can be off by as much as 1/8". Also, using the center punch on hot material may draw the temper from the small tip.



4. The layout of the second hole.

Targets: Punch and drift the hole in the same heat. Since the punch is close to the final hole size, this should not be difficult. After drifting, the bar should be at a low heat and ready for smoothing. For this project, it will be acceptable to leave the bulge around the hole.

With practice you should be able to punch, drift, and smooth the bar in one heat.

Step Four: Using the center of the first hole as the starting point, measure for the location of the second. Punch and drift the second hole to 1/2" diameter.

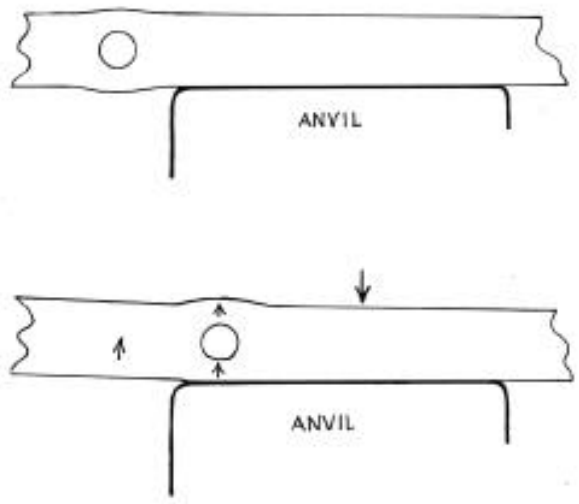
Hints: Rather than center punching the exact location, make the mark approximately 1/16" too close to the first hole. This will allow for inevitable stretching, and decrease the chance of the holes being too far apart. If there is any error to correct, it will be much easier to stretch the bar a little than to shorten it.

A more accurate measurement can be made when the bar is cool.

With the second hole finished, measure between the holes and correct the taper length to match the dimensions on your sketch. Final measurement is best done with the bar below a red heat, to minimize errors. This is also the time to make sure the taper is straight and even and the surfaces smooth.

For this project, the bulging of the bar edges around the punched holes may be left as is.

Once the holes have been punched and the bulges created, it is very important not to let the bulge rest on the anvil even when working in the middle of the taper. With a bulge on the anvil, the taper will not rest squarely on the anvil face. A hammer blow in this condition will bend the bar and squash the hole. This is an example of an idea presented in lesson one: the bar is squeezed by the hammer and the anvil simultaneously. You must think of what the anvil will do whenever positioning the bar.



5. Proper placement of the bar.

Targets: Hold length tolerances of each section to plus or minus 1/32", and overall length to within 1/16".

Step Five: Now that final length is established, the piece can be cut from the bar. Make a mark on the face of the bar with the center punch, or on the edge with the hardie. Take a heat, and using the hardie, cut the piece from the bar.

Hints: It is helpful to cut before bending for two reasons: first, if we are going to dress the end of the bar with the hammer, this is the last convenient time. Once the bar is bent, it will be impossible.

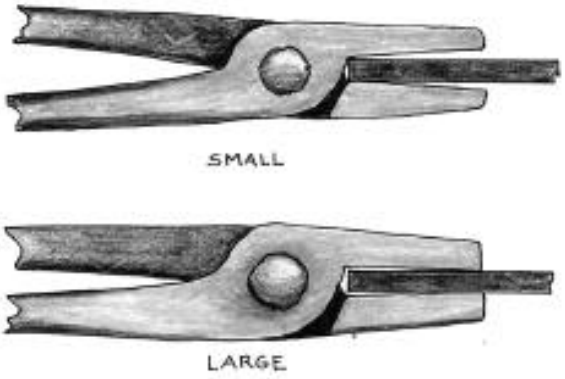
Second, cutting would deform the bend if it were already done. We would have to do the work all over again.

Careful cutting will keep the end of the bar as square as possible and make upsetting easier. Since this is a rectangular bar, it will help to cut part way through from all four sides. The intent is to keep the resulting burr as small as possible and centered on the end. If you cut equally from opposite sides rather than mostly from one side this will happen.

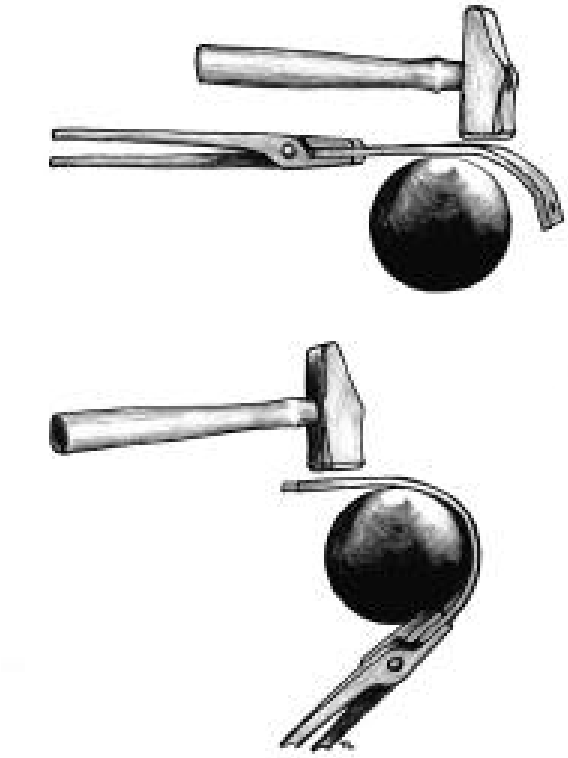
From this point onwards, it will be necessary to hold the piece with tongs. Simple flat jaw tongs will work well for this project. Most tongs are made to fit one size bar, though they sometimes will hold several additional sizes adequately. To check to see if tongs fit properly, the jaws should be parallel at the thickness of the bar. Thus, the jaws will contact the bar for the entire length of the jaw. Conveniently, one pair of tongs sized to hold 1/4" thick flat bar will hold the piece at either end, or anywhere in between.

Hints: It may be necessary to square the end after cutting. If so, make sure to quench everything except the end itself to prevent undoing the accurate dimensions already achieved.

In preparation for the final step, it may be helpful to mark the limits of the bend (see Lesson 4, Bending) on the edge of the bar.



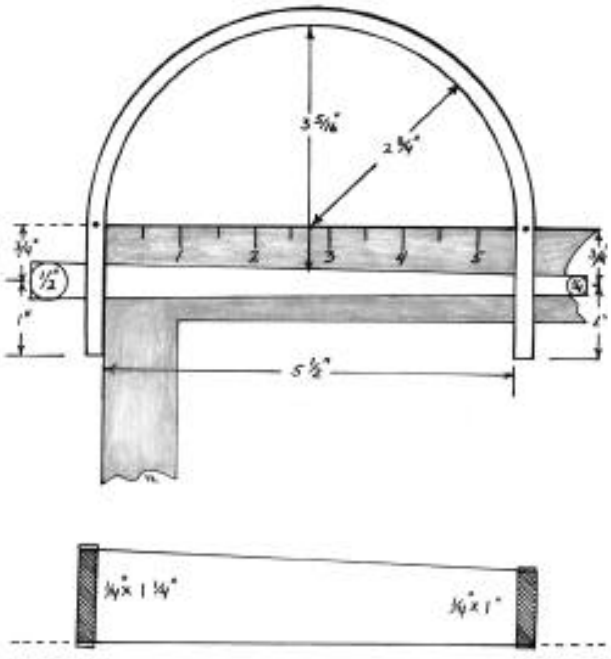
6. Proper and improper tong fit.



8. Manipulation of stock for bending on the horn.

Step Six: Bend the piece to match the given dimensions. Heat approximately one half the length of the bar and bend while holding the cold end in the tongs. Once done, switch grip to the bent end, heat the second half, and finish the bending. Switch grip as often as necessary to make corrections and adjustments.

Hints: Since the bar is tapered, care must be used to get an even bend (it will bend more easily where it is smaller). If you have chosen to center punch the edges of the bar for reference it should be easy to determine if the bends start and stop at the correct places.



9. A square can be used to assure that the curve begins and ends properly, to locate a center to check the curve, and to check that the straight ends are parallel. The sides of the curved bar should lie evenly on a flat surface except for the swelling around the punched holes.

Refer to Lesson Four (Bending) if necessary. Remember, the two ends including the holes are not bent, but straight.

Targets: The two straight sections at either end should be parallel in side and end views, and the correct distance apart.

They should also be perpendicular to the imaginary "horizon" created by connecting the two dots.

With a straightedge connecting the two reference dots, check the radius of the bend and whether the ends are square.

Match the given dimensions within 1/16" or less.

Step Seven: With the flat bar completed, it is time to make the tapered round pin.

Starting with 1/2" square bar, draw a round taper to match the given dimensions.

With the proper taper made, cut the piece from the bar and square the cut end if necessary.

Straighten and check for accuracy.

Hints: Refer to Lesson Three (Drawing a Round Taper, Hammer's Blow, Volume 11, #2, Spring 2003) if necessary.

When cutting a round bar that is to have the end squared, cut evenly all the way around the bar. This will leave the resulting burr small and centered on the end.

Since you are using 1/2" square bar as a starting material, it is possible to make a pin which is larger than 1/2 " diameter. Therefore, use care in checking your progress.

Step Eight: With both parts cool, slide the pin through the holes in the bent bar. The pin should stop close to the desired location, with close to correct amounts projecting from both holes. If the pin is round and straight, the distance between it and the top of the arc will remain constant even if the pin is rotated.

Check all given dimensions. Hold tolerances to 1/16" or less

If you have made a full-size drawing, you can place the finished piece directly over it to check your results.

If the piece does not match the sketch, you can also figure out where the errors occurred; whether holes are in the right place, bending was accurate enough, or overall length was estimated correctly.

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Dan Randall daniel@randallstudiollc.com

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Contact :
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