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THE FORGE FIRE

**The Newsletter of the Indiana Blacksmithing Association, Inc.
 An Affiliate Of The Artists-Blacksmiths' Association of North
 America, Inc.**

IBA is a Not For Profit Indiana Corporation recognized by the IRS under section 501(c)(3)

9:30 AM is the regular meeting time for IBA Hammer-Ins with beginner training available at 9:00 AM.
PLEASE MAKE SURE TO ASK FOR HELP!

If you would like an IBA membership application form, please contact Farrel Wells, Membership Secretary (765) 768-6235.

BULK LOTS ARE AVAILABLE TO DEMONSTRATORS, SHOPS, SHOWS AND OTHERS WILLING TO MAKE THEM AVAILABLE. WE APPRECIATE YOUR HELP.

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More nearby resources and organizations for blacksmiths:
Rural Smiths of Mid-America:
 Meetings are on the first Saturday of each month
 Call Ron Gill
 317-374-8323 for details

IBA MEETING SCHEDULE	
Check the latest <i>Forge Fire</i> for monthly IBA revisions.	
Apr 15 2023	BOB HUNLEY'S SHOP SULLIVAN, IN
May 20 2023	ROB HOUGH'S SHOP ALBANY, IN
Jun 2-4 2023	IBA CONFERENCE TIPTON CO FAIRGROUND
Jun 17 2023	TBD



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Dates to Remember

Hammer Ins
April 15
May 20

IBA Conference
June 2-4

Editors Message

My error in March Forge Fire: The back page of last month's Forge Fire had the incorrect dates the business meeting and the April hammer in. The April hammer in is set for Saturday April 15 at Bob Hunley's shop.

The 2023 IBA Conference

The conference preparations are coming along quite nicely. Daniel Sutton is the conference chair again. Daniel has done some great work on this year's event. Here are a few highlights.

- Featured demonstrators are Ellen Durkan and Andrew Larson
- Friday night demo is induction forging by Mark Blosser and Norm Gable.
- Saturday morning demo is Josh Sampson (2022 Rookie of the Year)
- We will use a different and nicer building for the caterer, iron-in-the-hat and auction.
- Along with individual tailgating, we expect Blue Moon Press, Holland Anvils and Werner Steel to be on hand.
- Full conference brochure and registration form will be coming out soon in mail and on IBA website.

IBA Business Meeting Highlights (full details on page 5)

- Rob Hough joins the IBA board, replacing Aaron Baker. Thank you to Aaron for his active participation
- Bill Corey will continue as the IBA coordinator for the Indiana State Fair. Bill mentioned in passing that he would appreciate having groups sign up to support a full day in the blacksmith shop. If you are interested in demonstrating at the Fair, contact Bill.

Project Articles of Interest

- Recently I saw a few Facebook posts from Daniel Sutton regarding proportions for eye pleasing scrolls. Along that theme, page 4 has a simple article on scrolls.
- As appetizer for Mark Blosser and Norm Gable's demonstration on induction heating, pages 7-10 have part 1 of a 2 part article on induction heating.
- A recent struggle with a project requiring upsetting the end of my stock triggered a desire to reprise the upset bolster article on page 10.

IBA website: www.indianablacksmithing.org **IBA Facebook page:** www.facebook.com/groups/IndianaBlacksmithingAssociation/

IBA Satellite Groups and News

1) Sutton-Terock Memorial Blacksmith Shop

Meet: 2nd Saturday at 9 AM
 Contacts: Fred Oden (574) 223-3508
 Tim Pearson (574) 298-8595

2) Jennings County Historical Society Blacksmith Shop

Meet: 2nd Saturday at 9 AM
 Contact: Ray Sease (812) 522-7722

3) Wabash Valley Blacksmith Shop

Meet: 3rd Saturday at 9 AM
 Contacts: Bill Cochran (812) 241-8447
 Max Hoopengartner (812) 249-8303

4) Fall Creek Blacksmith Shop

Meet: 4th Saturday at 9 AM
 Contacts: Gary Phillips (260) 251-4670

5) Maumee Valley Blacksmiths

Meet: 2nd Saturday
 Contacts: Clint Casey (260) 627-6270
 Mark Thomas (260) 758 2332

6) St. Joe Valley Forgers

Meet: 4th Saturday at 9 AM
 Contacts: Bill Conyers (574) 277-8729
 John Latowski (574) 344-1730

7) Rocky Forge Blacksmith Guild

Meet: 2nd Saturday at 9 AM
 Contacts: Ted Stout (765) 572-2467

8) Meteorite Mashers

Contacts: Mike Mills (812) 633-4273
 Steve King (812) 797-0059
 Jeff Reinhardt 812-949-7163

9) Whitewater Valley Blacksmiths

Meet: 2nd Saturday
 Contact: Keith Hicks (765) 914-6584

10) Bunkum Valley Metalsmiths

Meet: 1st Saturday
 Contacts: Jim Malone (812) 725-3311
 Terry Byers (812) 275-7150
 Carol Baker (317) 809-0314

11) Covered Bridge Blacksmith Guild

Meet: 1st Saturday
 Contact: John Bennett (812) 877-7274

12) Snake Road Forge

Meet: 1st Saturday
 Contact: Rod Marvel (219) 241-0628

13) Satellite 13

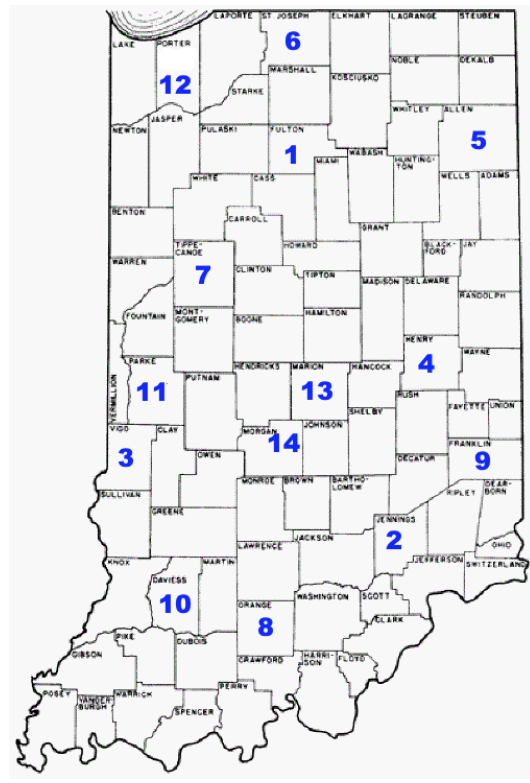
Meet: 4th Saturday
 Contact: Darrin Burch (317) 607-3170
 Doug Wilson (317) 439-7684

14) Old Town Waverly Blacksmiths

Meet: 2nd Saturday
 Contacts: Mike Lyvers (317-728-5771),
 Kenny Hale (765-318-3390),
 Mike Jackson (317-509-9115).

Jennings County Historical Society Blacksmith Shop

The Vernon blacksmiths met on March 11 at the forge of Kevin Welsh. We were greeted with biscuits and gravy with a lot of trimmings. After we had our bellies full, Keven showed us how to make a pair of "honeydew" tongs, which he donated for a door prize. Dave McNalty made a pair of modified box tongs. Dave Good made an inverted cross peen hammer head. our April meeting will return to Vernon. Hope to see you there. Don't forget to bring all that iron in the hat you have been saving back that you know that you may never use! and by lots of tickets. Paul Bray



IBA Satellite Groups and News (continued)

Meteorite Mashers

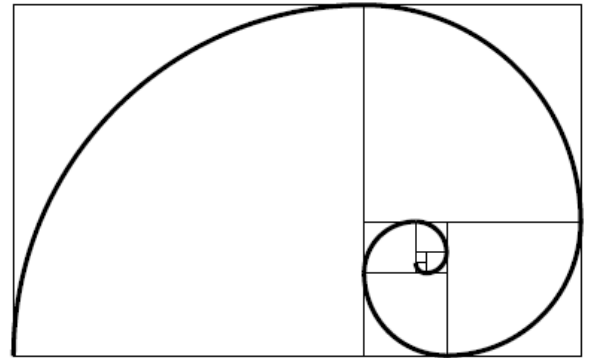
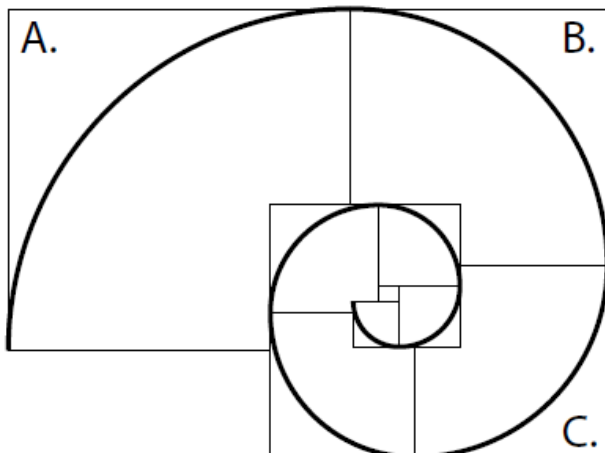
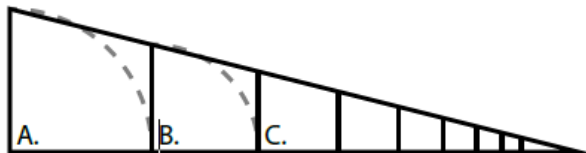
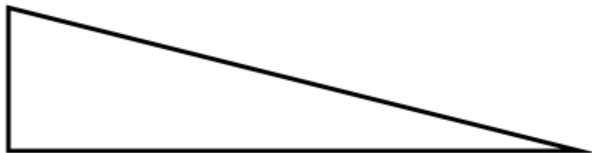
This month's meeting was at Chuck Henderson's freshly made over shop. He has added a concrete floor, lots of great tool and stock organization structures and a new Anyang power hammer.

The demonstrator was Allen Eldred from Tn. Allen demonstrated a 90 degree square corner with a bar passed through on the 45 thru the corner. Very neat. Good food and an excellent iron in the hat was had. The next meeting location is as yet UN-determined. Watch the meteorite Mashers page for updates.

Drawing the Perfect Scroll THOMAS BOUCHER.

I recently watched a video demonstrating how to draw the perfect scroll, for blacksmithing. Having studied design in school, I quickly assumed the spiral to be that of the Golden Ratio. The Golden Ratio can be found all over in nature and in famous paintings, architecture and the like. However, upon closer inspection I discovered that it was not the Golden Ratio. In fact, I find it to be more pleasing for the application of forged scroll work.

To draw this scroll, you will need a square and a compass/dividers. Start, by drawing a right triangle that is four times as wide as it is tall. Next, measure over to the right the same



THE GOLDEN RATIO IS A SERIES OF, PROPORTIONALLY INCREASING, RECTANGLES DIVIDED IN SUCH A WAY SO THAT THE WHOLE IS TO THE LARGER PART AS THE LARGER PART IS TO THE SMALLER PART.

distance as the triangle is tall. From that mark, use your compass to measure up to the hypotenuse. Measure over to the right that distance. (Repeat this step as many times as you need to complete your scroll.) These distances are used to make squares in an increasing ratio that form our scroll.

Traditionally, this was a common method used in producing scrolls. This would be a good place to start if you are trying to reproduce a scroll for restoration work, as chances are they drew it this way. This ratio can be scaled up and down and will always retain the same proportions. Because of this, no real numbers or math is required to draw this scroll. As long as you retain the 1:4 dimensions of your triangle, it will always look the same.

This article re-printed from December 2012 edition of *The Hammer's Arc*, the newsletter of the Alex Bealer Blacksmith Association

IBA Business Meeting Minutes

(provided by Bill Corey)

Meeting called to order by President Steve King at approximately 11:00 with the following present:

From the Board of Directors; Jeff Reinhardt and Dave Kunkler on phone, Daniel Sutton, Bob Hunley, Bill Corey and Steve King.

From the membership; Newsletter Editor, Bill Kendrick, Keith Hicks, Dave Switzer, Ted and Carol Stout.

Bill Corey was re-elected and Rob Hough was added to the board to replace Arron Baker. And we all would like to thank Arron for the time he spent on the board of directors and look forward to working with Rob in the future.

The following were elected to office:

President: Steve King, Vice President: Gary Philips, Secretary: Bill Corey, Treasurer: Dave Kunkler, Membership Secretary : Rob Hough

Steve King appointed Bill Kendrick to remain as the News Letter Editor and for Bill Corey to remain as the State Fair Coordinator.

Next discussions were in reference to the events of the IBA annual conference, and from all of the discussion we are looking forward to an eventful and exciting 2023 conference.

It was decided to raise all admittance fees	In Advance		At the Door	
	One Day	Weekend	One Day	Weekend
Member of any Blacksmith Association	\$35	\$47	\$40	\$52
Additional Family Members	\$5	\$7	\$6	\$8
Non-Members	\$40	\$52	\$45	\$57
Additional Family Members Non-Members	\$6	\$8	\$7	\$9

Fred Oden will be in charge of the Iron In The Hat and has already been looking for entries.

For those who come and help us get ready prior to the event on Friday, Steve agreed to contact the local Pizza Hut about Friday night pizza for the setup crew.

Arron Withrow has agreed to be in charge of the forging competition and it was decided for him to also be in charge of the Project From Home Competition and will be relaying what that project is here shortly on the IBA Facebook group.

[Editor's Note: The Project From Home Competition will be a Steak Turner](#)

Many contacts have been made with various vendors from Blacksmith Suppliers of all kinds and it indeed looks to be like a good conference for 2023.

The business meeting was then properly adjourned and those present feasted on a fine prepared meal.

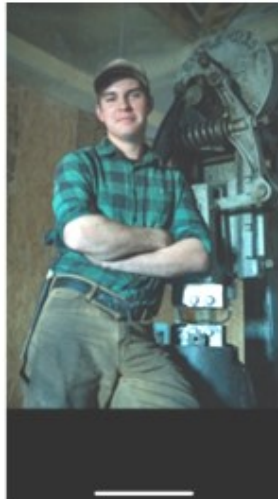


IBA 41st Annual Conference

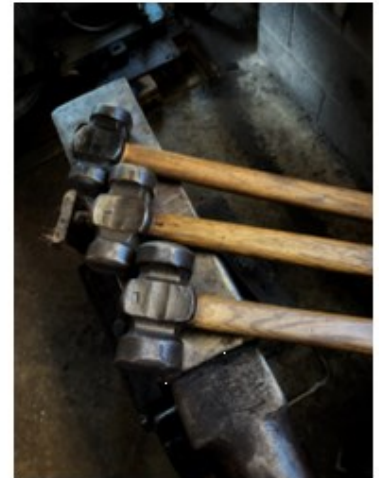
June 2-4, 2023

Tipton County Fairgrounds
Auction, Gallery, Iron-in-the-Hat
Forging Contests, Beginners Classes

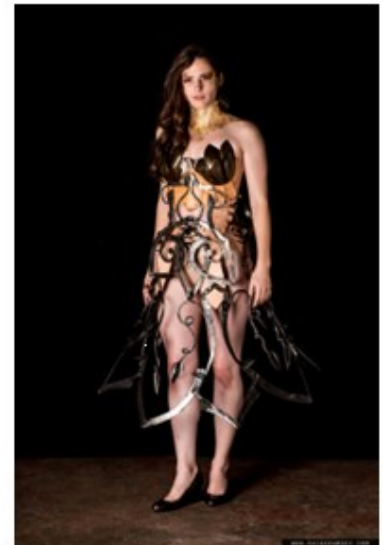
Featured Demonstrators:



**Andrew Larson:
Blacksmith &
Toolmaker**



**Ellen Durkan:
Forged Fashion**



Induction Heating 101:

A Practical Guide for Blacksmiths, Part I

Written by: Sam Perakis

Layout Design by: Laura Klepinger

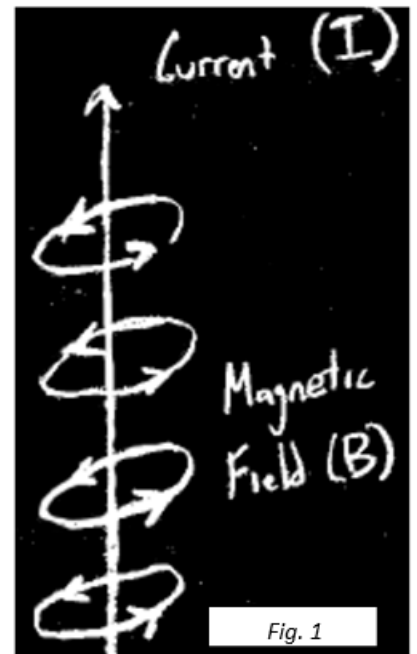


Recently I recorded a YouTube video about induction heaters and I re-tooled the script for that video into this article. If you're interested in a video version, look up my YouTube channel BigPigForge and check out my video called "Induction Heating 101: A Practical Guide for Blacksmiths." Please find me online and give me your feedback - I enjoy making these educational videos and your feedback will help me produce better material.

I'd like to talk about magnetic induction heating in the blacksmith shop. These heaters have become accessible within the past 5 or 10 years via eBay or other US-based sellers but they're all based off of the same Chinese-made 7.2 kW (15 kW peak) design. They take 240 V out of the wall and turn it into a high efficiency heat with no fumes, no hydrocarbons, and much less waiting than traditional heating methods like coal or propane.

The basis for this technology is magnetic induction which you might have heard about from induction stovetops. To talk about it we need to get into some light physics.

When you have a current running in a conductor, it always generates a magnetic field orbiting the conductor according to the "right hand rule" where if there's a current going along my thumb, magnetic field lines will form a loop around that conductor in the direction of my fingers (Fig. 1).



If the conductor itself is bent into a loop or a coil, the sum of those field lines generate a donut shape or a "toroid" that wraps itself through the coil (Figs. 2 and 3). This results in a tunnel of highly organized magnetic field lines inside the coil with most of the lines near the coil and very few at the center of the coil. This will become important when we design coils.

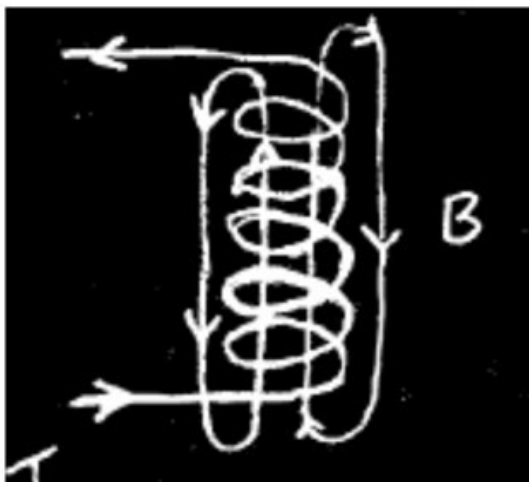


Fig. 2 The Right Hand Rule in a Coiled Conductor



Fig. 3 A Toroid of Magnetic Field

The converse of the right hand rule is also true, where if you have a moving magnetic field moving in the direction of my thumb, it'll generate a current in the direction I curl my fingers. So for every magnetic field line that pierces the material in the coil, a tiny loop of current will be "induced" in the material hence the name. The sum of all these little eddy currents becomes a net current that travels in the material in the opposite spin of the current in the coil (Fig. 4). You can basically think of it as the material resisting the current in the coil by generating a current of its own. In induction heating, we switch the direction of the drive current back and forth at tens of kHz so the bulk current in the material is changing thousands of times per second but the effect is the same: it heats up.



Fig 4: Eddy Currents Caused By Induction

If I try to heat this piece of copper, it doesn't heat as quickly as a piece of steel because the steel has a trick up its sleeve: it's a ferromagnetic material. Iron, steels, and nickel are all common ferromagnetic materials which means that they can be made magnetic by applying a strong magnetic field and forcing their electron orbitals to "line up." This aligning of orbitals generates the north and south poles of the newly formed magnet and new magnetic field lines which flow from north to south, even after the original magnetic field is removed. (Figs. 5 and 6).

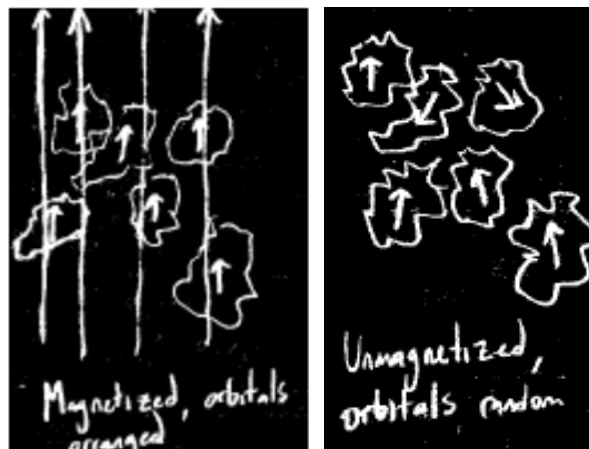


Fig 5 & 6: Applying A Magnetic Field Arranges the Electron Orbitals

When we apply an alternating magnetic field to a ferromagnetic material, new poles form and collapse over and over as the orbitals are aligned in one direction and then flip to be aligned in the opposite direction. But magnetizing a material isn't a perfect process, some of the energy needed to create order in the material is wasted in heat from the molecules shifting and bumping on each other when they flip their alignment. This effect is called hysteresis and it's why ferromagnetic materials heat so astoundingly fast in induction heaters and it's why you can't effectively use an aluminum pan on your induction cooktop.

Like I mentioned before, the magnetic field lines in the coil are most concentrated along the inside surface of the coil and least concentrated in the center - the field lines tend to take the shortest path in a circuit around the surface of the coil, just like current takes the shortest path to ground in a conductor.

When a piece of metal is heated, the magnetic field lines and the heating energy are absorbed mostly at the surface of the metal since it's closest to the most field lines. This outer surface heats rapidly but only until the Curie temperature of the material is reached. When that happens, the material can't be magnetized anymore and it can only heat by eddy currents. At that point, another small layer (about 1/32") deeper in the middle will heat rapidly until it hits the Curie temperature and so on.

This is what happens in theory; in reality, you can't see individual layers heat up from the outside in. This process is muddied by the conduction of heat through the material and heat loss from the material to the surroundings, but the point is that the metal heats from the outside in and that the heating rate slows dramatically after the Curie temperature is reached (about 1400°F).

One important thing to mention is that these induction heaters operate between 30 and 80 kHz and there's a computer inside that chooses the correct frequency at which to drive the coil. Induction is a lot more complicated than I've described here, but in reality there's an ideal frequency of current that couples best with a given diameter and type of material to be heated. General purpose surface heating like I've described happens between 10 and 100 kHz, deep heating for melting metals occurs at lower frequencies below 10 kHz.

Some induction heaters are even specialized to heat insulating materials like wood or plastic at frequencies in the MHz range. I won't go into the details here because it's not relevant to us, but the heater basically generates an electric field across two plates and with the insulator in the middle, turns the whole package into a large capacitor. This high frequency electric field oscillating back and forth generates internal friction inside the material kind of like magnetic hysteresis but based on the charge of molecules inside the material, not their magnetism.

This is the end of Part I. I hope it's helped demystify how induction heaters work a little bit and all of this information will be important to understanding the information in Part II about the heater itself and the principles of coil design. If you're interested in more, check out my YouTube video or the book "High Frequency Induction Heating" by Frank Curtis. See you in Part II!

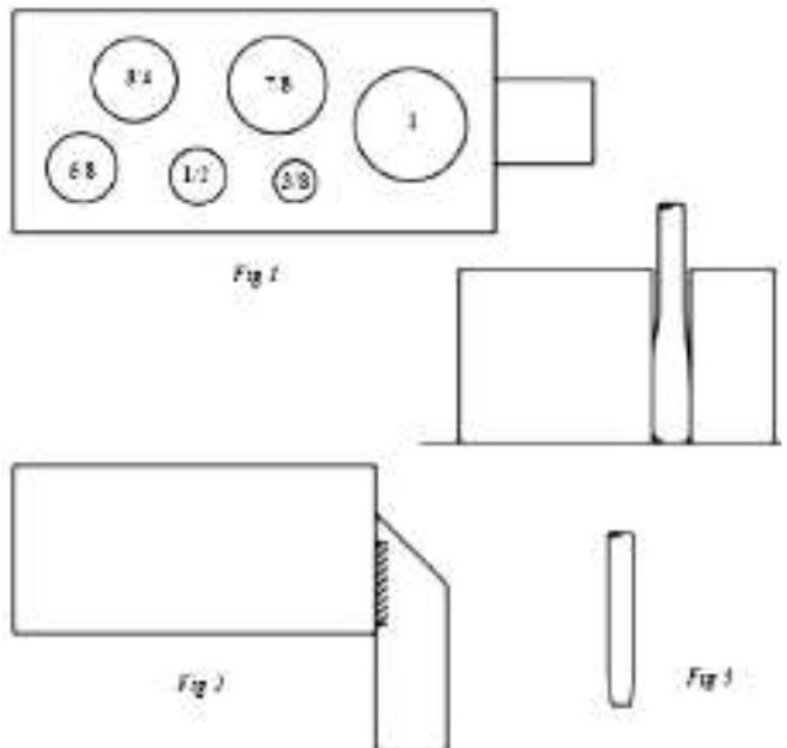
From The New England Blacksmiths newsletter, Winter 2021

PROJECT NOTES - UPSETTING BOLSTER

Author: Jr. Strasil. Reprinted from the December 2000 newsletter of the Prairie Blacksmith Association

Upsetting can be a time consuming and frustrating task to perform. With a simple bolster or upsetting bar, it can be quick and easy.

- Start with a piece of 2" square hot-rolled bar about 5" long and drill six holes as per drawing in figure 1. Hole sizes are 1", 7/8", 3/4", 5/8", 1/2", and 3/8".
- All holes should be 1/64" to 1/32" oversized, and very lightly chamfered on both sides.
- Remove any burs from the cut ends and weld on a square shank to fit your hardy hole at the end with the largest hole (see figure 2).



To use, take a yellow heat on 1-1/2" to 2" of the end of a piece to be upset and taper slightly as in figure 3. Stick the end in the upsetting bar, using a hole about 1/8" larger than the material. Hammer the end of the material. Remove from the block and realign the upset with light blows, so that you don't undo the upsetting. If a larger or longer upset is needed, taper the end before heating and repeat the process.

Upset only 1/8" at a time to control cold shuts and bending of the end. If it sticks in the hold, wait a little while, as it will shrink as it cools, after which it should slip out easily.

Tool for holding sockets for bending radii

Reprinted from December 2022 edition of the Blacksmith Association of Missouri newsletter

This is a tool I came up with 15-20 years ago. It enables me to make hooks or bend rod or flat narrow stock into a variety of radii. It is made out of an old junk adjustable crescent wrench I had. I cut it off and welded it to a piece of heavy tubing that fit my hardy hole. I ground one side to hold a 3/8" socket of any outside diameter and welded a small piece of spring steel to the other side for length and ground it into a piece to hold a rod or a curl on a hook. I adjust it for whatever I am bending. The pictures should explain things well enough for anybody able to electric or torch weld and use a grinder. After I welded the spring steel on I heated the area welded with a torch to red heat and let it air cool. I used a mig welder, but it could be welded however you normally weld steel.

In the photos I took two piece of 1/4" round rod, pointed them and forged a curl on one end. I adjusted the tool for the rod I was bending and then heated the rod. Since this rod was mild steel I cooled the curl in water before bending, and you pull hard on the rod towards you when bending to get a nice bend. I can change sockets and bend to any size in a socket set. I was going to make a better one, but this one worked so well I have just used it. I have an adapter to use 1/2" sockets on it as well. While I invented this myself, I am certain this type of tool has been made by many smiths as we are an inventive bunch. Doing production work gives a person a lot of time to think while doing repetitious work.

Bob Patrick 11/2/2022





The FORGE FIRE
Newsletter of the
Indiana Blacksmithing Association, Inc.

Rob Hough *Membership Secretary*
9790 N Sharp Bend Rd
Albany, IN 47320

First Class Mail

Address Correction Requested
If Undeliverable return to
sender

April 15 Hammer In
Bob Hunley's Shop

258 N CR 800 E, Sullivan, IN 47882

Driving Directions: The best way to come is to go to Dugger first. Then turn North off highway 54 on 800 E. near the train tressel and the liquor store. (at the juncture of 54 and 159). Go North through 2 stop signs and we are out in the country on the right. We are 1.2 miles from highway 54. It's a newer tan house with a tan and black pole barn. The Blacksmith shop is in the pole barn.

Chili, beans & corn bread. Please bring a side dish or dessert

May 20 Hammer In
Rob Hough's Shop

9790 N Sharp Bend Rd, Albany, IN 47320

Driving Directions: From IN28 turn south on CR 550E (N Black Cemetery Rd) by Muncie Dragway. CR 550E will turn to the right, becoming Sharp Bend Road. Shop is about 1/2 mile on right side.

Please bring a dish or dessert