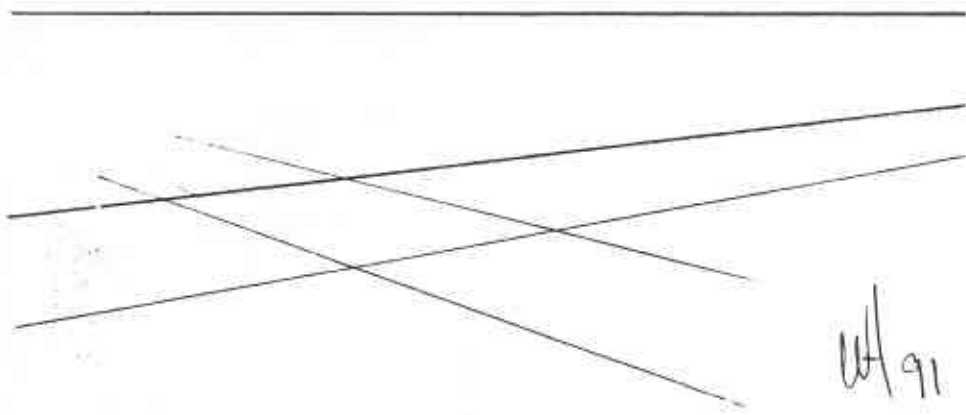
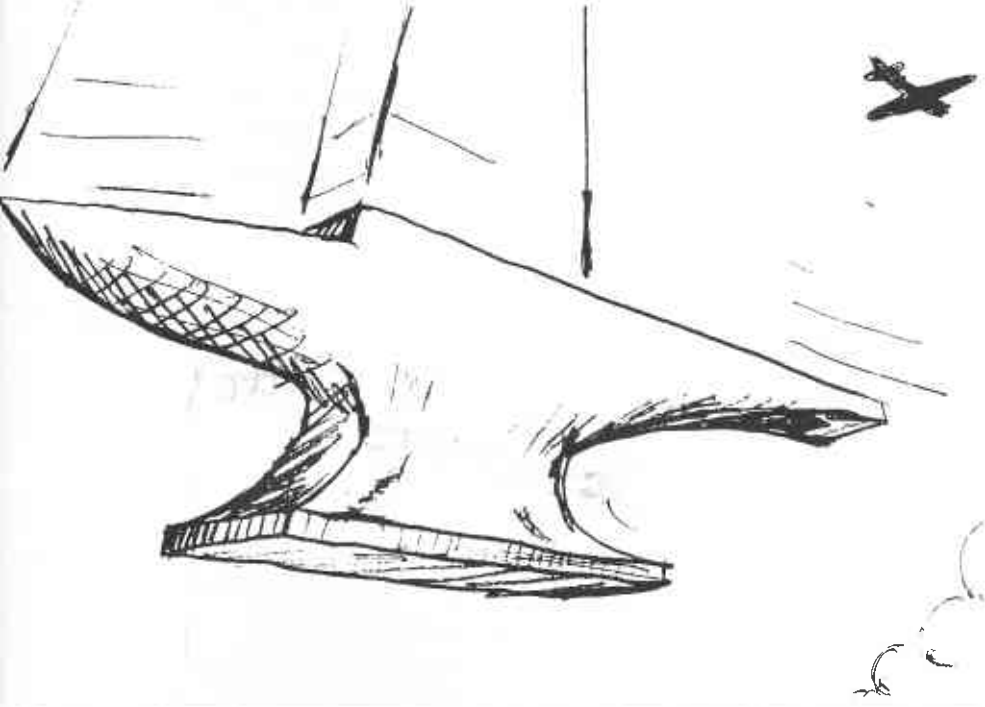


OCTOBER / NOVEMBER 1991

Newsletter ^{of} the Blacksmiths Association of Missouri



VOL. 8 NO. 4

The Blacksmith's Association of Missouri is a chapter of the Artist-Blacksmiths' Association of North America, and is devoted to the preservation and advancement of blacksmithing and to communication among blacksmiths in Missouri and surrounding areas. BAM's newsletter's goal is to support these aims. Letters to the editor, Tech Tips, tools for sale, or anything else which furthers these ends will be considered for publication.

Occasionally some material included in this publication will be copyrighted and may not be reproduced without written consent of the author. BAM welcomes the use of any other material printed in this newsletter provided the author and this organization be given credit.

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Art Director

Jacque Waller
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House Springs, MO 63051
(314) 942-2529

BAM Membership Application

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

Telephone: _____

New Member: _____ Renewal: _____

Memberships are for one year from receipt of dues. Dues are \$20, which includes a subscription to the bimonthly BAM newsletter.

Please make checks payable to Blacksmith Association of Missouri.

SEND CHECKS TO: Steve Austin

44 N.E. Munger Rd.

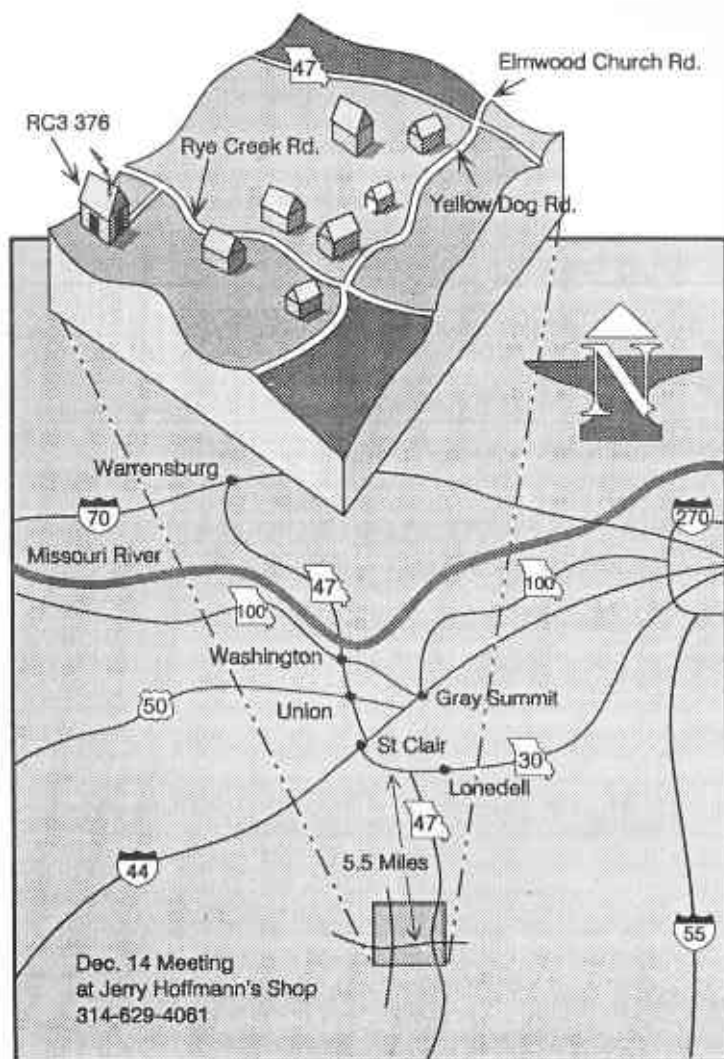
Claycomo, MO 64119

Membership Renewals

Be sure to check the date on the label of your newsletter. This is your membership renewal date. We will include a renewal reminder in your copy of the newsletter when your membership is due to expire. If the date on your newsletter label is not correct, please notify Bernie Tappel as soon as possible.

Next Meeting

Our next meeting is Dec. 14 at Jerry Hoffman's near Londell, MO. Not at Stan Winkler's as previously reported. Trade item: Hinges. Check with Jerry at 314-629-4061. Follow this map.



Clifton Ralph Tapes

If you haven't had a chance to see these tapes yet, get on the list by writing or calling Doug Hendrickson,
314-637-2576
RR1, Box 16D
Lesterville, MO 63654

When you're done with the tapes, send them to the next on the list. Please only keep them two weeks. Remember, you can get back on the list. Here's the list as of now:

Gary Koberman
2337 Wiltshire
St. Louis, MO 63129

Doug Hendrickson
RR1, Box 16D
Lesterville, MO 63654

Ken Markley
RR1, Box 346-C
Sparta, IL 62286

When sending the
tapes, be sure to insure
them for \$200.00.

Dues

The date on your mailing label is the date you should have paid your dues. Do check, eh?

News has come of the death of BAM member Gregg Howard, of Warrensburg, on August 27 of this year. Our condolences and prayers are offered to family and friends.

ABANA Membership Application

Name: _____

Address: _____

City: _____ State: _____

Phone: () _____ Zip: _____

New Member Renewing Member

How did you learn about ABANA? _____

- Regular Member\$35.00 yr.
- Family Membership (one Vote)\$40.00 yr.
- Senior Citizen (age 65)\$25.00 yr.
- Overseas Membership\$45.00 yr.
- Contributory\$100.00 yr.
- Library\$25.00 yr.

I _____ hereby apply for membership in
the Artist-Blacksmiths' Association of North America and enclose \$
_____ as my annual membership dues for one year.

MasterCard VISA Check/Money Order

Card Number

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Exp. Date (Required)

	/	
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Checks must be in U.S. currency

SEND RENEWAL TO:

ABANA

(812) 988-6919

P.O. Box 1181

Nashville, IN 47448

Dues Distribution:

1 Year Subscription Anvil's Ring: 68.5% \$24.00

Adm. Offices & Other ABANA projects (Conferences, etc.): 31.5% \$11.00

ABANA

Artist-Blacksmiths' Association of North America



1992 INTERNATIONAL ABANA TOUR TO THE LIGHT INDUSTRIES & HANDICRAFT FAIR MUNICH, GERMANY-MARCH 15 TO 22



The sixth ABANA tour in 1992 will be to Munich, Germany. It is designed for those that are interested in the business, as well as the technical aspects of iron work. The major focus will be the International Light Industries & Handicrafts Fair (Handwerksmesse). There will be about 1700 exhibitors, with 20% non-German. All aspects of the production and sales of wrought iron are covered. In addition Munich, while more famous for its beer, has a very high concentration of wrought iron work on public buildings and private homes. Manfred Bergmeister, who's shop we will visit, has put up many of the gates and fences in and around the area. He will personally conduct a tour for the ABANA group. In addition, we will also see one or two other local workshops and some world famous museums. Hotel accommodations are presently planned in a small, recently built, Bavarian style hotel south of Munich.

Included in the price of the tour will be R/T airfare fr. NY, some meals, admission to the fair and museums, travel insurance. There must be a minimum of 15 people or the tour will be subject to cancellation. It is anticipated that the cost will be approx. \$1500. See final tour offering and itinerary, now in preparation, for complete details. For more information fill out the request form below or call (914) 739-5475.

SERIOUS INQUIRES ONLY. PLEASE !!!!!!!!!!!!!!!

Leonard and Lilo Masters, PO Box 343, Crompond, NY 10517

Please send me complete details on the 1992 ABANA tour.

Name _____ Address _____

City _____ State _____ Zip _____

Tele. No. (_____) _____ Number of People interested _____

October Meeting

by Dr. Iron

Beautiful cool sunny day in Sparta, IL, home of Ken and Kathy Markley. Perfect weather to do what we do whatever that is. Ken's shop is nicely laid out. It's a 40 x 32 (or so) metal building with 3/4 of the floor being concrete (everyone needs a flatspot in their life). The other quadrant is dirt. The spacious forging area is situated (naturally) in the dirt. One very nice feature of Ken's shop is his tool, parts, machine shop, and finishing area which is walled off on 3 sides with a storage loft on top. Organization, space, and good design make Ken's shop ideal for both work and meetings.

The meeting consisted of several impromptu demos. Bob Miller was working on a Damascus billet which he said would develop into a spider web pattern when finished. Bob and Daryl Meyer did their pattern welding thing. Daryl is a master of pattern welded steel, Bob is a rising star. Doug and Tom started double-striking a pair of tongs. They did the jaws and boss, J.K. Reynolds finished up the handles.

Tom Clark forged a set of miniature pitching horse shoes. Tool selling, story telling, bean eating and beer drinking finished off a fine day at Ken's place in Sparta, IL.

ABANA

Artist-Blacksmiths' Association of North America



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

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

PRESIDENT'S MESSAGE

November 1991

Dear Fellow Blacksmiths,

In many parts of the country, the trees are displaying a panoramic view of color and the cooling temperatures invite us into our forges with renewed enthusiasm. I hope you are taking advantage of this wonderful time of year!

The election ballots are in and the final votes have been tallied. I want to thank all of you who voted within our pressing time frame. 24% of the membership voted this year with a total of 692 ballots that were postmarked by the October 10 deadline. The results are:

*	Bill Callaway	628	Those that have an
*	Toby Hickman	582	asterik are the new
*	Jim Ryan	560	ABANA Board Members
*	David Norrie	551	and will join us at
*	John Pollins, III	542	the November board
	Joel Schwartz	477	meeting in Tipp City.

Congratulations to those who will be taking their places on the ABANA Board. Thanks to all the running candidates in this election. We would like to see more candidates on the slate for next year, so please be thinking about nominations from your chapter's group who might be interested in running.

The drawing from the ballots for a free ABANA membership resulted in a winner from Mooresville, North Carolina; Rick Hartline, a member of the North Carolina Chapter of ABANA and the Alabama Forge Council. Congratulations Rick! We have extended Rick's membership to include a free year of benefits and subscription to The Anvil's Ring. Rick didn't think he'd ever win anything from a drawing but we're glad he sent in his ballot anyway!

There will be more news in the winter issue of The Anvil's Ring about the upcoming 1992 ABANA Conference being held June 18-22 at Cal Poly University in San Luis Obispo, California. Previews of demonstrators, lectures and events will give you an idea about this exciting and valuable opportunity next summer. We are looking forward to being within a ten minute drive of the ocean this time. You may want to consider ABANA's national event, located in an area of great sight-seeing, to be included as a part of your family vacation planning. If you think you may be taking family members to the conference, don't forget to renew your ABANA membership at the Family Member rate to get a discount at registration.

We will be giving you a summary of the ABANA Board Meeting in the next chapter mailing. Thanks to the ABANA Chapter officers who have given their input to the Chapter Liaison Committee for this meeting.

Warm regards,

Dorothy Stiegler
ABANA President

DES/jgf

October Business Meeting

by Dr. Iron

Dear Walt

You missed a small but intense meeting at Ken's. Tom Clark held his first meet as pres and laid out his agenda. Al Stephens and I both took notes of the meeting. Hope you can piece it all together. Here, in no special order is approximately what we talked about.

Tom reviewed the upcoming Clifton Ralph and Fred Caylor workshops. He explained that only a few could participate due to the fact that they would both be hands-on, but that the info/insights would surely trickle down to the rest of the membership.

The newsletter, its function, format, and the position of editor were discussed. Tom deferred entertaining any motions on the following until next meeting to give us time to digest these ideas.

1. Tom feels BAM should pick up the conference fee for any events that the editor can find time to attend. Not expenses, just the fee. The idea is that the editor will then relay his experiences to the membership.
2. Tom would like to pay the editor \$100 per issue. This would in no way be considered a fee, rather a reimbursement for the phone, mail, copy machine, pencil and paper expenses.
3. Newsletter format change from the little book it presently is to 8 1/2 x 11. Several ideas were discussed - punch the pages to fit a loose-leaf notebook and mail it in an envelope. Tom feels the newsletter editor should have a major word in deciding whether or not the format should be changed.
4. The pres would like to send a copy of the newsletter, prior to the Ozark Regional Conference (more on that later), to a

continued

greater audience, perhaps ABANA members from surrounding states, to advertise and possibly take on new members. Tom belongs to several ABANA chapters just to receive their newsletters. He feels our newsletter is right up there at the top and others would do same (become BAM members) if they were only aware of us and our publication.

Tom called it to our attention that 35% of us are delinquent in our dues and encouraged us to pay up.

The March Memphis bus trip was discussed. Al Stephens had checked with several charter companies for us and came up with the figure of around \$2000 for one bus. No vote was taken but it seemed the general concenses to put the March trip on the back burner. It was felt that to deplete the treasury at this time was probably unwise.

Ken Markley feels it would be nice to have BAM caps made. He showed us examples of silk screen patches, embroidered patches, puff printing directly on the cap and discussed the relative expense. At Ken's request Jerry Hoffamn did several possible designs. Doug Hendrickson recalled our original logo, the old wood cut that Steve found and said he'll bring a copy to next meeting for further discussion. Ken also feels a tee shirt might be nice. Members present responded favorably and it will be taken up at the next meeting.

President Clark feels a questionnaire is in order to help him more fully understand the nature of BAM's membership. When developing the list of members with big hammers for the Clifton Ralph workshop Tom realized how little he really knew about the casual members. He feels he can serve us better with more info. Pat McCarty and Earl Campbell volunteered to develop a questionnaire.

The big news is Tom's idea for a large 2 day meet called the Ozark Regional Blacksmith Conference. It's going to happen April 25-26. Demonstrators have already been contacted. Robb Gunther, the designer of the recuperative gas forge and a great demonstrator, will be there along with Clay Spencer. Clay is a treadle hammer wiz with tooling and tricks that will make you run right out to your

continued

shop and build one for yourself. These two fine demonstrators, Dr. Tim Ryan (an alround character and auctioneer) and an anvil blowing by Mr. Daniels of Madison, GA will be the backbone of the conference.

A specific site for the conference has yet to be nailed down. Tom is even considering erecting a pavillion for it at his place in Potosi. Those present seemed to feel a weekend barn raising to help get it done would be in order.

Watch this space for more info on the Ozark Regional Blacksmith Conference.

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 Willits, CA 95490

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 Willits, CA 95490
 (707) 459-1934

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 Number of kits at \$475.00
 Five or more kits at \$465.00

Subtotal _____
 CA residents add 7.25 % tax _____
 Total _____

Kits are shipped F.O.B. Willits, CA

Gas Forge Building Workshop Announcement and Registration

In 1990 and 1991 Rocky Mountain Smiths sponsored successful workshops at which a total of 68 recuperative gas fired forges of the type developed at Sandia National Laboratories were built. Because of the tremendous interest in this forge Rocky Mountain Smiths will again hold a workshop to build these forges in 1992.

This forge reaches working heat quickly, is very quiet and conservative of fuel, is capable of a solid welding heat, and provides essentially a reducing atmosphere thus minimizing scaling. A number of improvements have been incorporated into the forge over the last year and the workshop will be based on the latest forge design.

This special forge building workshop will commence at **9:00 am on Friday, April 3, 1992 and end by 3:00 pm on Sunday, April 5, 1992.** It will be held at the welding shop of Laramie County Community College in Cheyenne, Wyoming under the direction of Robb Gunter, Randy Calhoon and Ray Rossi. **This will be a hands-on workshop in which each individual will be expected to contribute to the construction of the forges.**

A advanced registration fee \$145.00 (\$85.00 non refundable) is required. The total cost of the forge is estimated not to exceed \$250.00. The balance due will be payable at the workshop upon receipt of the completed forge. To obtain a forge you have to pay the advance registration fee and participate in the workshop. In the event you register and cannot attend the workshop \$60.00 of your advance payment will be refunded. In the event the workshop is cancelled you will receive a full refund.

To register for the workshop complete the registration form and send it along with a check in the amount of \$145.00 made payable to Rocky Mountain Smiths to Ray Rossi, RMS Workshop Coordinator, at the address shown. Registration is limited to one forge per participant and is open to anyone interested in building their own forge.

To obtain a forge you must pre-register, pay the advance fee and participate in the workshop.

Registration forms and prepayments must be received by December 15, 1991. **The workshop will be limited to the first**

continued

thirty (30) registrations received so don't delay your registration. Information regarding housing accommodations will be sent out in January 1992.

If you have any questions give me a call at (303) 750-0786.
Ray Rossi, RMS Gas Forge Workshop Coordinator
1652 S. Vaughn St.
Aurora, Colorado 80012

Gas Forge Building and Workshop Registration

To register:

1. Complete the form below providing all requested information.
2. Make check in the amount of \$145.00 payable to Rocky Mountain Smiths.
3. Put in envelope and send to the address shown below.

Registration must be received no later than Dec. 15, 1991.

Your Name: _____

Your Address: _____

Your Phone: (_____) _____ - _____

I, _____, agree to the terms and
(SIGNATURE)
conditions of this workshop as outlined on the announcement.

Please send to: Ray Rossi
Gas Forge Workshop Coordinator
1652 S. Vaughn St.
Aurora, Colorado 80012

Note: Copies of this form may be made for use by other individuals.

More from the Knifemaker's Workshop

Remember the knifemaker's workshop back in March, and how I promised to try to bring it to you in bits and pieces? Well, I'm still trying. The trouble with BAM is that we produce more neat stuff than I can assimilate. Herewith some old notes and new conversations with Bob Miller. Bob, I hope I don't mess this up too badly; corrections are welcome as always.

Bob and I talked about the testing of knives and the contributions of heat treatment and blade geometry. It went something like this:

Q: Do you test every knife you make?

Bob: Yes.

Q: At Edwardsville we saw you bend a knife till it broke, nearly 180°. Surely you don't test every knife this way.

Bob: No. Obviously you can't break a knife you mean to use or sell, but you do try to get an idea of how good an edge the blade will take, how well it will hold it, and how tough the blade is.

Q: The tests we saw you do at Edwardsville includes cutting a one-inch hanging rope, chopping a 2 x 4 in half, and shaving hair off your arm. Where did these tests come from?

Bob: These are the tests that the ABS uses for its journeyman bladesmith qualification. You also have to bend the blade through 90° without its breaking.

Q: What does all this mean?

Bob: It shows that the blade will take a very good edge and hold it through a certain amount of abuse.

Q: What makes a blade able to do all this?

Bob: Blade geometry is critical for a test like cutting the rope. A sabre grind or flat grind may be very sharp at the edge, but

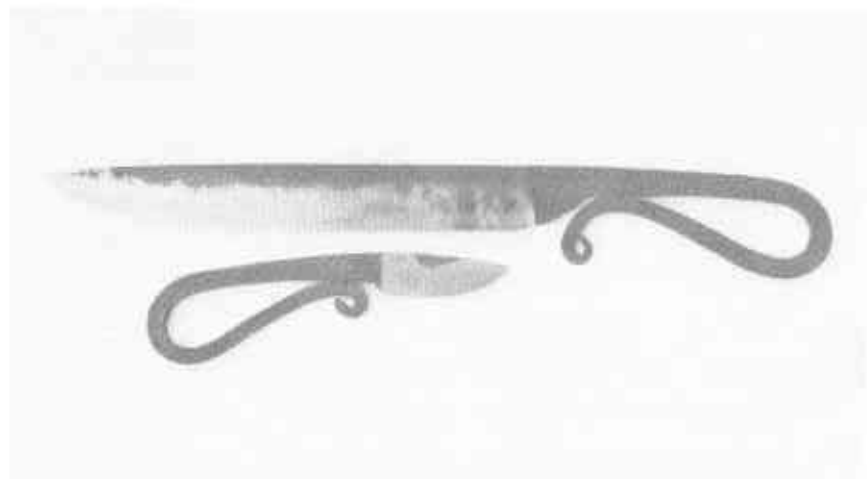
will present too much thickness behind the edge to let the blade move through easily. I prefer a flat/convex grind, which gives some body right behind the edge but then flattens out quickly as you go toward the spine so you don't get a "wedge" effect. [See the BAM newsletter for June-July '91 for details of grinds — ed.]

Q: How about heat treatment?

Bob: That's also extremely important. When I last talked to you I was using differential heat treatment, quenching only the edge to leave the rest of the knife softer but tougher. Lately Hank Knickmeyer and I have been trying something called "ausquenching."

Q: What's that?

Bob: In ordinary "slack" quenching, you quench the steel until it is completely slaked, or cooled. When you do this the steel is converted to Martensite, which is hard, but brittle. In ausquenching the steel is cooled from critical to about 450° and then held there for 2 1/2 hours or more. Then the steel converts to a structure called Bainite which is both hard and tough.



All metal knives make a good project for smiths who don't want to get into handle making. By Bob Miller.

Q: Sounds pretty complicated.

Bob: I really don't understand it very well. Metallurgy is like a foreign language. There's a lot of terminology to learn before you can begin to understand it. But this kind of procedure looks very promising in terms of the blades we've made.

Q: So now you're giving the same heat treatment to the entire blade.

Bob: Yes. I think it gives us stronger blades with better wear resistance.

Q: Do you go the rope and 2 x 4 routine with every knife?

Bob: No. For my own testing mostly I will cut Osage orange, especially the knots. Through experience I can get a good idea of the blade that way. Also, it's a very tough test. Sometimes I will cut a piece of cigarette paper to see if there are any irregularities in the edge.

Q: Thanks, Bob, for all the tips. We'll be seeing you at Jerry's.

Fluxes

Some of us, including me, have been having trouble with recent versions of E-Z and Crescent fluxes. For those who don't already know, the Anti-Borax Co., makers of these fluxes since the memory runs not to the contrary, was purchased by the Superior Flux and Mfg. Co. of Cleveland, OH in 1988. Shortly thereafter people started having trouble with the fluxes. I got a can of Crescent that proved literally to be worse than no flux at all. Discussions with Bill Pieh of Centaur Forge yielded credit for the can and the news that they were working on it. I was trying to weld fluxless or with borax when I got the following letter from Dan Nauman:

"FLOUNDERING IN YOUR FLUX?"

Greetings fellow smiths!!

If you've been having problems getting consistent results from recently purchased E-Z Weld (EZ), you're not alone.

Superior Flux Co., who several years ago bought the Anti Borax Co., makers of the good old EZ, ran out of some of the ingredients used in that flux compound, and tried to duplicate those ingredients, but with limited success.

Several smiths, including myself, have been tearing their hair out after "missing" forge welds using the "New" EZ recipe.

As Superior Flux hasn't any facility to test their flux, I volunteered my services, as I was desperate to find a suitable flux.

The desirable traits of the old EZ were that you could weld at an orange-yellow or higher heat, it was consistent, protected the steel, and produced a seamless weld. These were the criteria for my search for a good flux.

Well, after several samples, several months, dozens of unsuccessful welds, and much trouble shooting with Blair Chidin, (Superior's new chemist), it appears we now have a flux on which we can produce welds in a manner and consis-

tency worthy of replacing the old EZ. It's sample number is #D1-68 and it's ingredients are in good supply at Superior Flux Co.

As with any new product, this one needs the blessing of a trial period, and lots of tests under different conditions and people. But, I am indeed impressed with this flux, and believe it is the answer to our forge welding woes.

If you try this new flux, please write to me at the above address, as I would like to know what the results are that other smiths encounter.

Thank you and happy forging!

Daniel M. Nauman, Bighorn Forge, Kewaskum, WI

I wrote Dan, and he gave me the number of Linda Cohen, inside sales manager at Superior. She sent me Crescent and EZ in sample sizes and the accompanying letter:

Dear Walt:

Superior Flux & Mfg. Co. bought the Anti-Borax Compound Co., on May 31, 1988. We transferred the operations from Fort Wayne, Indiana to Cleveland, Ohio and continued making their products according to the Anti-Borax formulas. Both EZ and Crescent contained a special slag, which comprised up to 50% of the formulas. A carload of this slag was purchased in 1966 and lasted until 1989. The company that sold Anti-Borax Co. this slag was no longer in business and all efforts to find a comparable raw material were unsuccessful.

Work on the EZ formulation has been continuous since we ran out of the old slag, but until recently modification of the EZ formula met with only limited success. The newest formulation EZ (D1-68HW) has been tested in the field by several blacksmiths and we are receiving great reports from the field.

Two letters, one from Dan Nauman sent to all ABANA Subchapters and one from Dave Stasiak, are enclosed for your review.

We hope the problem with EZ (D1-68HW) has been solved. A free sample is available for your evaluation by calling Superior Flux or your local distributor.

Have a good day and best regards,
Linda D. Cohen, Inside Sales Manager

I have tried the new samples several times and find that I weld easily, seamlessly (If my fit is good) and in one heat. I drug out a little of my cache of the old EZ, and like it marginally better (the weld heat seems to last a little longer). On a couple of welds (1/2" ∇ scarf weld to 1/2" ∇) I tried the Whitaker twist-in-the-same-heat test, and they failed, but I never was much good at that.

The forge welding flux was only a tiny part of Anti-Borax' business, and Anti Borax is but a part of Superior. It would have been easy for them to blow us off, and we owe them some thanks for the trouble they've gone to. Give Linda a call at 216-461-3315 and get your sample, and share your results with them. They've been very responsive so far.

— WH

Classifieds

WANTED: _____

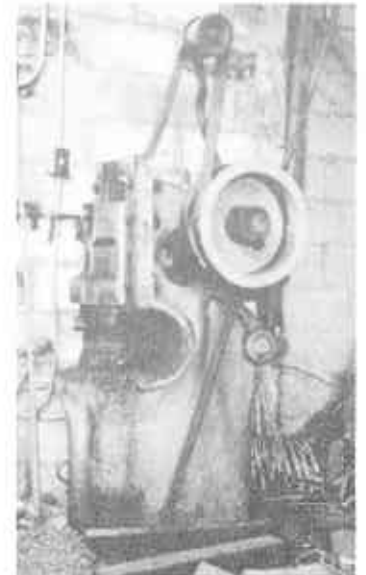
TIRE BENDER. Contact Roger Scott, P.O. Box 180, Union, KY 41091, 606-384-4122.

FOR SALE: _____

3 new-in-the-box **Dillon torches**, \$225. Colin Campbell, 1350 N. Springfield Ave., Union, MO 63084, 314-583-3512.

Post Vice, 43" tall with 3" jaws, good condition, \$35. **Pipe Vice**, cast steel base mount, opens 12", holds 6" pipe, \$40. **Peter Wright anvil**, 110#, \$110. Larry Mulligan, Rt. 1, Box 205, Naylor, MO 63953.

50 lb. Power Hammer for sale. (no-name) very good working condition, brass bearings, includes many extra dies (drawing, split, texturing, open face, forming tenons, etc.) Also includes a 3 horse single phase elec. motor, belt drive system. It is currently set up so you may come by and try it out. Cost: \$1,500. For more information contact Craig at Kaviar Forge, 147 Stevenson Ave., Lou, KY 40206, 502-561-0377.



Steel, Brass & Stainless Wire Cloth can be purchased in all sizes and in small amounts from Fenway Wire Cloth Inc., P.O. Box #1, Fenton, MO 63026, 314-677-3666. I dealt with Clarence Tamborski and he was very helpful. — Al Stephens

APPRENTICESHIP: _____

Blacksmith Apprenticeship. Shop produces forge iron and bronze furniture, candle holders, architectural elements and sculpture. Work would include: grinding, welding, forging, both by hand and power hammers, finishing (patina and painting), general maintenance, and maybe traveling to shows. Salary \$150 per week min. one year commitment. If interested contact Craig at Kaviar Forge, 147 Stevenson Ave., Lou, KY 40206, 502-561-0377.

YES! I want to subscribe to THE POWERHAMMER at \$12 for 6 issues.

The newsletter on the use, tooling, repair, types of hammers, bladesmithing, history and people associated with them.

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Address: _____

Payment Received: _____ Date: _____

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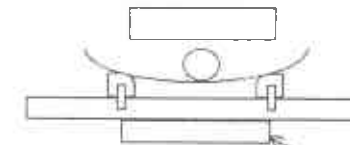
Partial contents:

- Disassembling
- Rebuilding Bearings
- Hammer assembly
- Toggle arms
- Toggle assembly
- Adjustments
- Motor mounting
- Pictures and diagrams
- History of the Little Giant Company

by
RICHARD R. KERN

Reprinted from *Bituminous Bits*

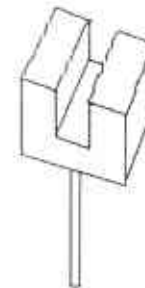
Big Hammer Tools and Techniques



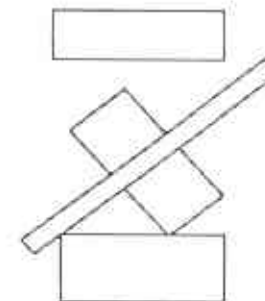
Dovetail welded on



PADDLE 5/8" thick
Used under top die for straightening
rail road springs

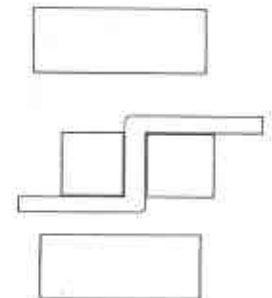


OFFSET BENDER



HEADER TOOL

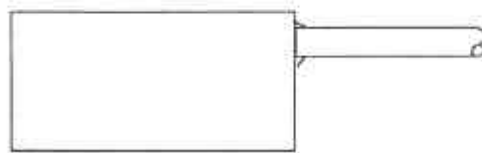
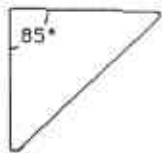
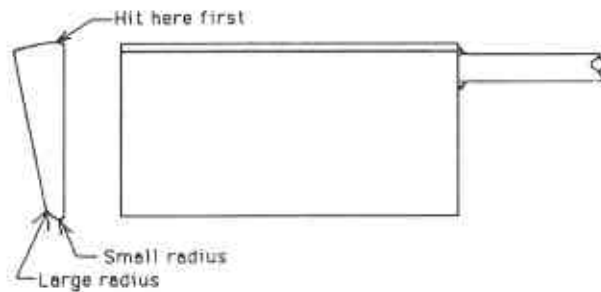
Countersunk



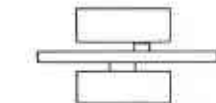
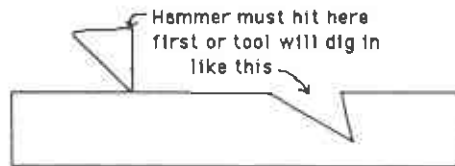
CLAMP

Cutting and Fullering

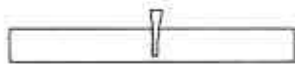
SIDE CUTTER, RIGHT and LEFT



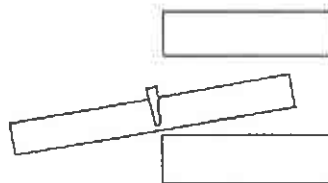
SIDE FULLER, Right and LEFT



Cold shearing with two snappers
slight overlap of snappers
more overlap for thicker material

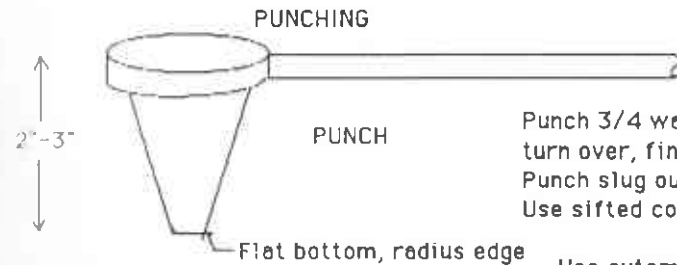


Cutter stuck in work



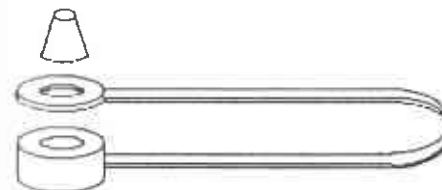
Free by bending with PH
WATCH FOR KICK

Punching

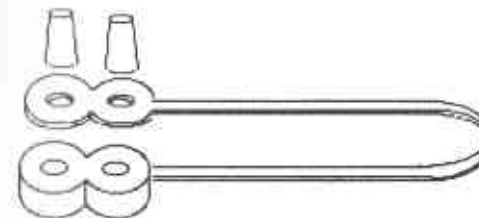


Punch 3/4 way through from one side
turn over, finish from other side
Punch slug out over doughnut or bolster
Use sifted coal dust for lubricant

Use automotive knucklebuster to pry
out stuck punch

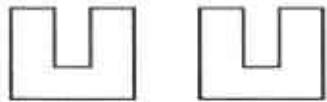
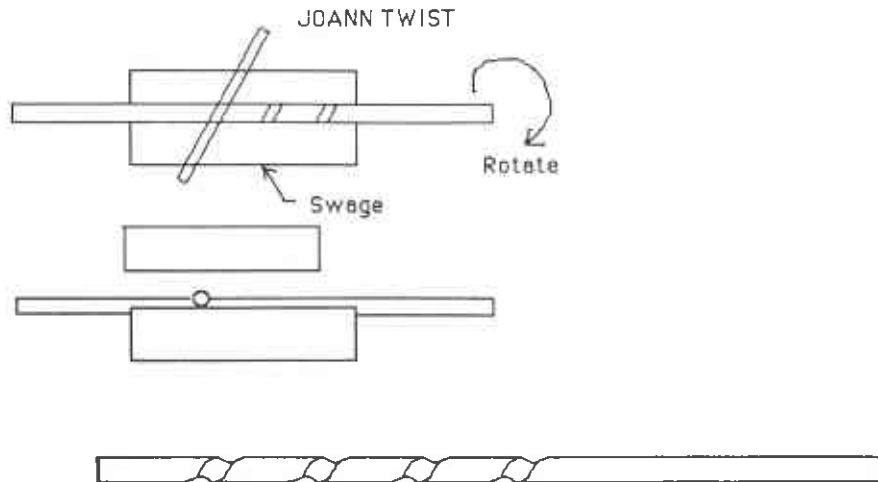


DROP OUT PUNCH

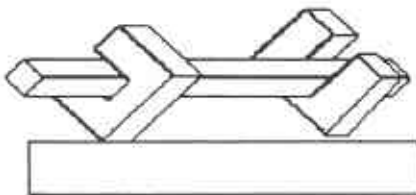


DROP OUT PUNCH, two sizes 1/2", and just smaller than 1/2"

Big Hammer Twisting

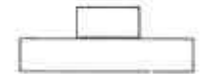
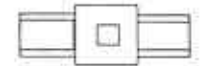
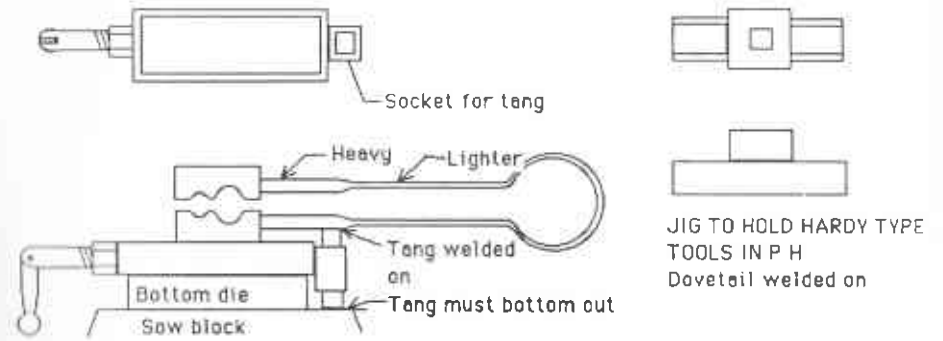


POWER HAMMER TWISTER

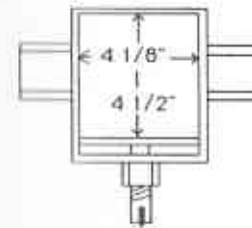


Big Hammer Jigs

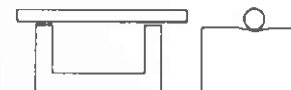
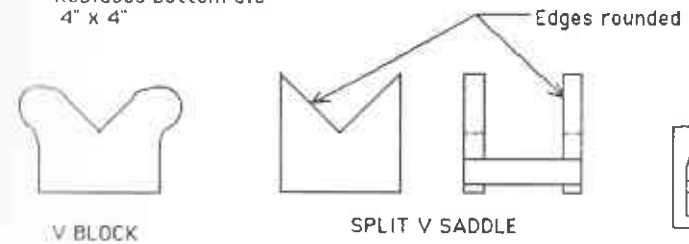
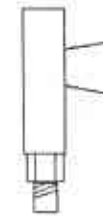
POWER HAMMER JIGS



JIG TO HOLD HARDY TYPE TOOLS IN P H
Dovetail welded on

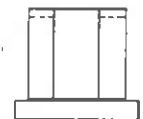


LARGE TOOL HOLDER
Replaces bottom die
4" x 4"



BRIDGE
Use to work forks, rings,
eyes with mandrel

All these tools have 4" x 4"
bottoms to fit tool
holder



U SADDLE