MESSAGE FROM THE PRESIDENT

1979 promises to be a fine year for ABANA. The adoption of the revised by-laws will provide good continuity in the Board of Directors, with room for new blood each year. A directors meeting will be held in Memphis, Tennessee on May 1-2, 1979, to elect officers and carry on with current business. Ivan Bailey will present his enabling program for consideration, the first formal request for formation of an ABANA Chapter will be acted on, and one of two conference committees will meet concurrently. A second conference committee has been appointed, so we are looking ahead for the next two conferences. As I travel over the country on various workshops, I am greatly impressed with the resurgence of blacksmithing, and the important role that our organization is playing. With regard to the Anvil's Ring, I might quote "Ring out the old, ring in the new," with thanks to Alex and Dimitri.

Francis Whitaker
President

The ANVIL'S RING
March 1979 Volume 7 Number 1

Cover... a hoodless forge in action — For more, see pages 16-20. photography by Mary Gerakaris

3 Coming Events... exhibits, workshops, lectures, fairs, etc.

5 New Regional Activities

6 Letters

10 Yellin... photos of door hardware from Jack Andrews

11 Books reviews, reprints & news

13 The Medieval Hammer... a surmise

14 Photographing Ironwork: Selecting Backgrounds... by Mary Gerakaris

16 Starting a Fire... step by step with photos

19 The Hoodless Forge... construction details of two successful models

21 Tips & Techniques... from the members of ABANA including a two page feature: "Francis Whitaker's Super Railing Return Jig" beginning on Page 36

39 Tips & Techniques... from out of print books
James Fleming, Associate Editor

40 Beware the Anvil's Ring... health & safety from Stephen A. Mackenzie

43 Hammer Marks... from the pen and anvil of Mark Smith

Official Newsletter of the
ARTIST-BLACKSMITHS' ASSOCIATION
OF NORTH AMERICA
Upper Gates Rd.
N. Canaan, N.H. 03741

Dimitri Gerakaris: Editor-in-Chief
Mary Gerakaris: Managing Editor
Alex W. Bealer: Associate Editor
James Fleming: Associate Editor

EDITOR'S CORNER

CONGRATULATIONS, MEMBERS OF ABANA! Thank you for answering the call to participate. This issue is crammed with contributions from many of you ranging from health hints and book reviews to tips and techniques of all sorts! Keep up the fine work of contributing and we will all continue to learn and expand our horizons. Regardless of how long you have been doing this, you have something to offer which you find has been a help to you. Even if you disagree with this, you have a chance to ask questions. And let's see more photos of your work!

Once again, all of you who have contributed, we thank you. Keep up the good work.

The deadline for contributions, queries, book reviews, announcements of activities, ads, etc. for the June issue is April 7, and should be sent to your editor:
Dimitri Gerakaris
The Upper Gates Rd.
N. Canaan, N.H. 03741

THE ANVIL'S RING
COMING EVENTS

February 3-June 1... The National Ornamental Metal Museum in Memphis presents its first exhibit, "House Jewelry." An extensive survey of both historic and contemporary, architecturally oriented metalworks. The exhibit ranges from cast brass doorknobs to contemporary garden gates. A very substantial portion of the items on exhibit comes from ABANA members. ABANA members will get the cook’s tour and reduced admission fee. For details, contact: Jim Wallace, Director, P.O. Box 13222, Memphis, Tenn. 38113.

April 7-8. Dimitri Gerakaris presents at Peters Valley "icing on the cake" tricks learned from the late Fritz Ulrich, including locksmithing, damascus steel techniques, steel carving, inlaying, Prof. Ulrich's attitudes on design, etc. For details, contact: Peters Valley, Layton, N.J. 07851 or call (201) 948-5200.

April 7, 8 & 9 (previously 6, 7, 8)... Francis Whitaker and Tom Bredlow, plus some members of the California Blacksmiths Association (CBA) demonstrate at CBA Spring Conference at Sacramento State College.

April 12 and 13... ORNAMENTAL IRON EXHIBITION/SYMPOSIUM

Location: Wagner Complex of Southern Illinois University at Edwardsville. The Edwardsville Campus is located about 15 miles north and east of St. Louis, Missouri on interstate 270 and highway 157.

There is no registration fee.

Exhibition would be the "Samuel Yellin Collection" consisting of about twenty pieces of ornamental iron. The Yellin collection is housed in a museum in Philadelphia and is representative of some of the finest architectural ironwork created in the United States. Yellin ironwork can be found in the National Cathedral in Washington, D.C., and on numerous public and private buildings.

The symposium will consist of:

A. Richard Quinnell: Prominent English blacksmith who has done extensive restoration work for the British National Trust. Mr. Quinnell will show slides and give a lecture on English architectural ironwork from the Baroque period. Additionally, Mr. Quinnell will report on his recent Winston Churchill Award which took him to 25 blacksmithing establishments in Europe.

B. Jack Andrews: Well known artist/blacksmith teaching at the Philadelphia College of Art. Mr. Andrews has published an excellent text on blacksmithing, The Edge of the Anvil, and is now preparing a monograph on the Yellin Collection. He will lecture and show slides of the complete Yellin Collection including the presentation of the original 2 1/2 x 2 1/4" glass slides.

C. Dr. David Driskell: Full Professor at the University of Maryland, College Park, Maryland. He has published a catalog for the exhibition 200 Years of Afro-American Art. Dr. Driskell will lecture on blacksmiths and craftsmen in America.

D. Thomas Bredlow: Professional blacksmith with a shop in Tuscon, Arizona. Mr. Bredlow was commissioned to do the wrought iron gates for the National Cathedral in Washington, D.C. Bredlow will present practical demonstrations at the forge and anvil.

E. Eric Moebius: Professional blacksmith with a shop in Wisconsin. Mr. Moebius has created numerous commissions for architectural ironwork. Moebius will present a workshop of practical demonstrations at the forge and anvil.

For further information contact Thomas D. Gipe, Area Head, Sculpture; Department of Art & Design, Southern Illinois University at Edwardsville, Edwardsville, Illinois, 62026.

April 19, 20, 21... The Board of Directors and Officers of the Society of North American Goldsmiths invite all members of the society and interested parties to attend the 1979 conference to be held in Boston, Mass.

"Snag It In Boston"... Historical/traditional/temporary ideas in metal... will include viewing of permanent and specially selected collections at the Boston Museum of Fine Art, a tour of a manufacturing facility, visits and exhibits at the Boston Univ. program in artisanry, the Museum School and the Mass. College of Art, a panel discussion on working as a designer, technical papers and special lectures.

The conference headquarters will be at the Bradford Hotel in downtown Boston and convenient to all public transportation.

The conference fee of $50.00 for members of the society and $65.00 for nonmembers covers admission to all conference activities, luncheons and banquet.

For further information please contact conference coordinator... George D. McLean, 34 Stony Brook Road, Westford, MA. 01886

April 22-May 5... Jim Kroepelin, resident smith at John C. Campbell Folk School, Brasstown, North Carolina, 28902 (Tel. 704-837-2775), conducts a two week course in introductory blacksmithing. Limited to 5 students. $65 per week.

(continued next page)
April 28 and 29 . . . Manfred Bredohl and Ivan Bailey demonstrate at Bailey’s Forge, 221 East Bay St., Savannah, Georgia 31401 (Tel. 912-233-2348). There will, at the same time, be an exhibition of ironwork at the German Cultural Center Offices, Peachtree Plaza, Atlanta, Georgia.

Spring . . . New England blacksmiths’ get-together at Sam Facella’s shop (600 Essex St., Lawrence, Mass. 01841). Exact time and program yet to be determined.

For details contact: Sam Facella or David Court, Bay Hill Forge, Northfield, N.H. 03276.

May 1-4 . . . Manfred Bredohl will conduct a workshop under the auspices of the Memphis Academy of Art and the National Ornamental Metal Museum in Memphis. A reduced fee will be available to ABANA members.

Inquiries to: Jim Wallace, P.O. Box 13222, Memphis, Tenn. 38113.

May 2, 3 & 4 . . . Robert Griffith at Peters Valley presents slides, lecture and demonstration on the making of Damascus steel.

May 4-5-6 . . . Francis Whitaker will conduct a general blacksmithing workshop at the Stuhr Museum of the Prairie Pioneer in Grand Island, Nebraska. The class will be limited to twelve participants. Registration fee of $50.00; please send a deposit of $20.00 to reserve a place.

Camping is available at a nearby park for $3.00 per night for mobile units and $2.00 for tents, and Grand Island provides a number of motels. Send registration or inquiries to:

Warren Rodgers-Educational Director
Stuhr Museum of the Prairie Pioneer
3133 West Highway 34
Grand Island, Nebraska 68801
308-384-1380

May 27-June 9 . . . Jud Nelson demonstrates the fine art of wheelwrighting at Campbell School. Limited to 15 participants with previous blacksmithing experience.


June 30, July 1, 7 & 8 . . . The 3rd Annual AMERICAN CRAFTS FESTIVAL, Lincoln Center For the Performing Arts, New York City.

The American Concern For Artistry and Craftsmanship takes pleasure in announcing the 3rd Annual American Crafts Festival to be held on June 30, July 1, 7 and 8, 1979 at Lincoln Center, New York City.

Work must be original, handcrafted and expertly executed. Manufactured products, products assembled from kits, and imported products are unacceptable. Applicants are asked to submit 5 color slides for juried selection of work representative of that which will be displayed. The number of participants is limited to 125 per weekend. The number of participants in each craft area will be limited so as to provide a well balanced fair and give each exhibitor their maximum market potential.

The festival will include: limited entertainment, craft demonstrations, organic, ethnic and dessert food concessions.

The American Crafts Festival at Lincoln Center has demonstrated that New York City is one of America’s most hospitable craft markets. The 2nd Annual Crafts festival at Lincoln Center held in July 1978, doubled its previous attendance to 95-100,000 visitors. Participating craftspersons earned an average estimated $3,000 plus per weekend in the two weekend event. Specific wholesale figures were unavailable but representatives from major department stores, galleries and decorating firms contributed still further to the American Crafts Festival’s success.

There will be full security. Minimum booth size is 10’ by 10’. Extra space is available. Cash prizes will be awarded for Best Booth Displays and Fine Craftsmanship. Craftspersons may apply for one or both weekends.

The Fee for one weekend is $60.

The Fee for both weekends is $120.

For further information please write to: American Concern for Artistry and Craftsmanship, P. O. Box 20, Hasbrouck Heights, New Jersey 07604.


July 15-18 . . . Reggie Sullivan teaches Gunsmithing at the Campbell School. Class limited to 15 students with previous blacksmithing experience.

July 16-27 . . . Dick Sexstone, resident blacksmith at Peters Valley, presents a program with the emphasis on steel in combination with other media, concentrating on forging, pipe bending, & raising hollowware.

August 2 . . . Open to the Trade
August 3, 4, 5 . . . Open to the Public
March 24 . . . Application Deadline

AMERICAN CRAFT ENTERPRISES, INC., A Subsidiary of The American Crafts Council, and the Golden Gate National Recreation Area are pleased to announce co-sponsorship of the Third Annual Pacific States Craft Fair to be held at Fort Mason Center, San Francisco, August 2 through 5. The 1979 schedule includes one day reserved exclusively for the Trade, three public days and new hours on Friday, Noon to 9 p.m.

Applications in all craft media will be accepted from craftpersons living in: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming. Five color slides of the work to be exhibited and a $5.00 screening fee must accompany the official application packet. Applications may be obtained from American Craft Enterprises, Inc., P. O. Box 1106, Saratoga, CA 95070; or P. O. Box 10, New Paltz, New York 12561. Applications available now; deadline for submission of application, MARCH 24, 1979.

August 5-24 . . . Ivan Bailey, Al Paley and Francis Whitaker demonstrate for one week each at the Haystack School of Crafts. (Schedules not settled at the time of A.R. publication). Classes limited to 8 per session. Tuition $70/week + room and board. For details, write to: Haystack School of Crafts, Deer Isle, Maine 04627, or call: (207) 348-6946.

(continued)
August 6-17 . . . Frank Turley at Peter's Valley. "Simple Hardware."


October 6 — November 7, 1979 . . . FINE FORGERY, a National exhibition of contemporary ironsmithing is to be held at the Gallery of Peters Valley. The event will be juried by slides, with a maximum of four entries per individual. Up to two slides may be submitted per entry with a fee of $4 per entry. Deadline is April 27. For further information, contact: Suzanne Turino c/o the Gallery, Peters Valley, Layton, N.J. 07851.


The South East Blacksmith Artists (SEBA), recently formed, has a great range of activities plus a monthly newsletter. President is S. David Wall, Jr., The Forge and Anvil, 1200 Crest Valley Dr., Atlanta, Ga. 30305. SEBA Newsletter Editor: Bob Hall, 1094 Knott St. S.E., Atlanta, Ga. 30316; (404) 624-1338. Dues are $10 per year.

On Dec. 10, 1978, thirty West Virginia blacksmiths met at Jackson's Mill to form the Appalachian Blacksmiths Association. This regional group was formed to provide a local center of exchange for ideas and learning between novice and experienced smiths as well as to promote fellowship among members of the trade. The organization will sponsor workshops, plan exhibitions, host out of state demonstrators, and publish a newsletter to keep the membership informed of important events and communications.

Membership in the A.B.A. is open to all smiths, sculptors, and metal workers in West Virginia and its surrounding areas. Dues were set at $3.00 with the purpose of keeping the organization informal and based on volunteer help. A steering committee was formed to plan demonstrations, workshops, and an ABA constitution. This committee consists of:

Joe Costello — newsletter distribution
Pete Minier — newsletter editor
George Nichols — secretary
Boyd Holtan — treasurer

Dear Editor

On January 19, 1979 we held a meeting to organize an ABANA Chapter in Chattanooga, Tenn.

I realize that by the time this would appear in The Anvil's Ring we will have been organized. But it would be appreciated if you would put this notice in our News Letter. The area to be covered by our chapter hasn't been determined as yet, and possibly some will read this that will be interested in joining our chapter. We are trying to notify all blacksmiths that we are aware of in our area, but we are bound to miss some.

I wish to thank Francis Whitaker for sending the proposed regulations for organizing a chapter. Also, may I thank Dr. Van Arnim for his telephone call and assistance. Congratulations for The Anvil's Ring, which is getting better all the time.

Interested members please contact:

Joe Humble
5029 Montcrest Drive
Chattanooga, Tenn. 37416
PH: 615-344-9649

ERRATA

In the correction department, please mention that I am not setting up a Southern California Blacksmith Organization, but we are the Southern California Section of the California Blacksmith association.

George Martin
LETTERS FROM THE MEMBERSHIP

We happily received dozens of letters indicating approval of the last issue of The Anvil's Ring. Rather than take up precious space that can be better utilized for the exchange of ideas, we publish but a portion of one of our favorites:

Dear Dimitri & Mary,

...and I really liked your first issue...

Catherine Gerakaris
Palatine, Illinois

Thanks, Mom. Ed.

Dear ABANA,

I am a farrier's apprentice, in the process of developing blacksmithing skills. I look forward to each issue — keeping up with current events, and learning new techniques.

I have 3 questions. I would appreciate hearing from you as soon as possible.

1. What are the correct forging, annealing, hardening and tempering temperatures for the following high carbon steels: 1055, 1080, 1090, 1095?

2. Can H-13 (an alloy tool steel) grain be re-structured once a crack has occurred while forging?

3. I prefer to use a flat head hammer (without bevel) when smithing. Most hammers have bevels. Can you tell me a proper way to grind a head smooth without losing temper? This will be a last resort, if necessary.

Keep up the good work!
Sincerely,
Joanne Kaprelian
P.O. Box 202
Maple Plain, Mn. 55359

Dear ABANA,

I was lucky enough to be able to attend the conference at Southern Illinois University in 1976. I've just recently become a member of ABANA, and wanted to add a belated congratulations to all involved in the organization of that incredible week in October 1976. I've never felt so proud of my craft and my involvement in it. A memorable week in my mind, organized by a "class" group of people.

I'm writing to let the ABANA membership across the country know that there are blacksmiths in the Southwest, and we are alive and well and busy hammering away. It's time, I feel, to make a little noise!!!

Enclosed is an article which I wrote for the Adobe News — a fine periodical for builders and craftsmen. I feel we all as iron workers owe it to the craft and to ourselves to acquaint the public with iron and the dignity of this fine ancient art. This was my basic intent in writing the article. [That article will appear in the next issue of A.R. Ed.]

We've recently begun offering Creative Blacksmithing classes and opened our shop to an Apprenticeship Program. We've had 34 students attending classes the last 8 months, 3 of which were women, and at present have 3 apprentices enrolled. It has been tremendously gratifying.

I believe each school or workshop organized throughout the country contributes to the art of smithing, in that we can be exposed to differences in "attitudes" and "approaches" to the medium of iron. And this is essential to creative growth in all of us.

With the interest and knowledge of smithing growing in this area, we hope to organize a chapter of ABANA in the near future.

Rolando DeLeon
Santa Fe, New Mexico

BLACKSMITH WANTED: During the forthcoming parks season, May through October, we would like to hire a blacksmith for one of our county park sites. For details, contact:

Marcia Glesener
Cultural Arts
Lake County Parks and Recreation Department
2293 N. Main St.
Crown Point, Indiana 46307
Dear ABANA,

The purpose of this letter... concerns development of an authentic 1870's era blacksmith shop at Living History Farms. Operating as an open-air museum, the shop needs to be as historically accurate as possible, in all aspects from type of business, to clothing worn by the smiths. Would you guide me to members of ABANA who may have historic information for this time period. I'm thinking there may be a member(s) who considers himself an historian. This info may be in the A.R., but not having received any, I'm seeking your assistance. Also, would you guide me to members in Iowa.

Our Blacksmith Shop now is a varied collection of times and tools, techniques and finished products. The information will make my efforts a little easier. It's quite easy to develop one's skill (or relatively so) in smithing, but being historically, socially and technologically accurate in a specific time is quite a task. Thanking you in advance.

Martin Hildreth,
Blacksmith
Living History Farms
Rte. 1
Des Moines, Iowa 50322
or home address
Box 45
Spring Hill, Iowa 50245

Ed. Any member sending historical information to Mr. Hildreth may also wish to share a copy of that information with the A. R. for publication.

Dear Mr. Van Arnam,

Yesterday I received the information I have been seeking for over 5 months; ever since I found about the existence of the Artist Blacksmith Assoc.

I traced down a Mr. Fleming, Bonanza, Ore., and he sent me your address.

I would like to join ABANA.

Why? I was born in Vienna, Austria in 1930. Grew up in Holland, had my schooling there. After high school, I had 3 years of blacksmithing in trade school, plus 1 year night trade school. After graduating, I travelled for over 10 years all over the world. Came to New York in '57. Lived 15 years in Calif., established my own shop. Eventually, it became a corporation. I had 2 partners (stockholders), we employed 32 people. After 10 years, I threw in the towel. Bought from the corporation the important equipment, and liquidated the Co. This was 6 years ago.

My tooling and equipment I moved on 2 of the largest semi's to Oregon. I work now by myself. No partners, no employees. I try to do good work, but I can't. People do no longer know the value of artistic blacksmithing, nor lay the money out for it. Everything is bastardized, pseudo and make-believe.

Disney is as close as I can come to good work. 75% of all decorative lighting when they opened up Disney World in Florida is mine. I still work for them. I did not think anyone cared for the real art of blacksmithing. This is why I would like to join ABANA. I feel I may no longer be alone then.

Thank you,
Yours Truly,
Fred Wittenberg
McMinnville, Ore.

Dear ABANA,

Since you requested impressions of the SUNY conference in your June issue of the Anvil's Ring... as we winterize our home this November, we remember it fondly. For the information received, laughter spent, new and old friends well-met, and the feeling that was omnipresent.

The male member of our couple remembers back to an early meeting at Brockport in 1973, where a small bunch of blacksmiths got together to meet and work and talk. A sense of comradery was obvious and there was an openness regarding individual knowledge that was both apparent and remarkable in any artistic community.

This aspect of ABANA seems to continue, as was clearly demonstrated by the Purchase conference. It appears that among blacksmiths there are very few "secrets." Information is not only available, it is abundant... it flows freely and makes the energy of the organization quite unlike any other that either of us have ever been a part of... thanks for a great, great conference, we remain —

Sincerely,
C. Fletcher Coddington &
Debra Ellen Feiner
Nine Partners Lane
Millbrook, N.Y. 12545

Steve Kayne...

Skewer Set
1. Damascus letter opener consisting of 64 layers of tool steel and wrought iron made with the help of a striker. It took two men 8 hours to make the 5 cubic inches of Damascus steel.

2. Armillary sphere type sundial made of mild steel with brass inlaid numerals. The base is forge-welded — cold riveted to the bird. The brass was inlaid before the wing was heated and bent with no problem of mis-shaping or loss of brass. I found making sundials one of the most exciting projects and urge all members who have not tried them to begin as soon as possible. My best source of information was Sundials, Their Theory and Construction by Albert E. Waugh, Dover Press.

Please accept my compliments on the quality of your newsletter. As an ABANA member, I always look forward to the next issue.

There is one subject that I would like to see more work done on though, namely the possible effects of noise exposure which all too many blacksmiths fail to even consider.

To promote this topic, I have enclosed a short article on some preliminary studies in this area. This is not designed to be a definitive work, but rather a work to provoke more thought and hopefully more work on the subject by others.

I hope you can see fit to publish it. It would be particularly fitting for a newsletter with a title such as The Anvil’s Ring to be the first to publish a work on this topic.

I assure you the title is not meant to offend anyone.

Sincerely,
Steve Mackenzie
Sharon Springs, N.Y.

[Eh? What did you say? Oh, thank you, Steve! Your article appears on p. 40 of this issue.]

excerpt of letter from Randy McDaniel . . .

... Say, instead of cutting up our Anvil’s Rings, why can’t we have membership applications separate. When I go to craft fairs or teach a class, I get a lot of requests for info on ABANA and I’m sure other students must, too. If we had extra applications, we could probably increase our membership. I’ve been xeroxing copies for when I teach, and have signed up about 6 members.

After 6 years of blacksmithing, I have finally found a coal mine which has terrific soft coal! This past September I bought close to ten tons of this coal, selling some to other blacksmiths, and it works great! There is a lot of dust which cokes up even without wetting it down. I do a lot of forge welding and the coal really holds up. It’s sulphur content is .5%, and has 14,000 BTU’s. In April or May I plan to buy more of this coal. If anyone is interested in placing an order to buy some, I’ll be selling it for $45 per ton. You can even come to my shop and try it first. If you are interested drop me a line or call me at 301-346-7873.

I am still trying to find information on the background history of the M&H Armitage Mouse Hole anvils. Any info would be appreciated.

Keep the sparks flying!

Randy McDaniel, Blacksmith
RAM’s Forge
2501 East Mayberry Road
Westminster, Maryland 21157

You’re not the first to ask for separate membership applications, Randy. You will note with this issue that your pleas have not fallen on deaf ears. Ed.
Dear Sir:

I am a young man in search of a future in the craft of blacksmithing. From the different blacksmiths I have talked to in southeastern Ontario, I have gathered that the best, but certainly not the easiest, way to learn the smithing trade is through a traditional apprenticeship. At present I am trying to reconstruct a small farm forge and hand blowers and put a new face on my anvil. Like Jack Andrews, I am getting tired of throwing pebbles. I want my interest in blacksmithing to be steered in the right direction. What developments and opportunities are there for one such as myself to learn blacksmithing in the traditional way?...

If you can steer this fellow into an apprenticeship program, please contact:

Gary Bright
R.R. #1
Prescott, Ont.
KOE 1T0
CANADA

Dear Alex and Joan,

Since this column in a magazine is normally used for readers to express their thoughts; and, being managing editor, I read everything in this publication at least 3 times; I'd like to give you my personal “thanks.” I know how many hours go into putting out a publication, a fact which, through no fault of their own, most readers don't know.

We've received many letters of praise and congratulations, and I'd be a liar if I said I didn't love every one of them. But please read the ones published here as if they were addressed to you, too, because without your efforts, these new issues wouldn't even exist. Thank you for the foundation.

Sincerely,
Mary Gerakaris

Dimitri,

A friend just send us a copy of Parrers, Pinchers and Peens. I could not have expressed the art of blacksmithing better, except for the line “working with iron is not difficult.” The HELL you say! For a long time I have felt that a person acquires the quality of the material with which he works, and that is why I am such a “Stubborn, Old, Bastard”, but that does not make it any easier to master...

excerpt from a letter from Francis Whitaker

Copper and Iron
Decorative Wentervane
by
Steve Kase

Final blast ending Northeast States “Hammer In” at Ashoken, N.Y. The anvil finally went up instead of sideways.

Dear Editor and Membership,

I would like to thank “The Anvil’s Ring”, Jack Andrews, and Harvey Yellin for the new space dedicated to the work of the late Samuel Yellin. I have a few thoughts I want to share regarding the work of Mr. Yellin.

Needless to say, at first glance Mr. Yellin's work often baffles the most experienced smith. Most always ask, “How did he do it?” I suggest that we ask, “Why?”

Mr. Yellin was a genius at finding and disguising simple solutions to the mechanical/ornamentation problem. Often the thing that baffles us most is the ornamentation of the mechanical solution; in the best examples the ornament becomes the mechanical solution.

If we keep in mind, “Such things have to be done quickly, or better, not done at all,”* as we ask why then Mr. Yellin's work should not baffle any of us. Some of the why's might include: Was this element self jiggling? Does the ornamentation make the element self jiggling? Was this ornament to cover a simple rapidly executed joint? Was this element to supply a touch of class as it acted as a rivet? I feel that when we discover “why,” the “how” will be as obvious to us as it was to Mr. Yellin.


Sincerely,
Joel A. Schwartz
Forge Hollow Rd.
Deansboro, NY
YELLIN... door hardware

Photographed and submitted by Jack Andrews and currently on exhibit at the opening exhibit "House Jewelry" of the National Ornamental Metal Museum in Memphis.
BOOK REVIEWS

by George Martin
ORNAMENTAL IRONWORK
An Illustrated guide to its design, history and use in American Architecture
by Susan and Michael Southworth
Published by David R Godine, Boston, 1978 $20.00

The authors have divided their book into several main sections. The short introductory section is followed by a discussion of both forging and casting techniques. A summary of the history of American Ironwork leads into a descriptive section on regional 19th century iron and 20th century artists, amplified by a portfolio collection of miscellaneous work. Design discussion covers both visual aspects and practical considerations and a patternbook of sketches. The book concludes with a directory of ironworkers, an annotated reference list and an index.

The layout of the book is attractive and the 171 figures well photographed and legibly reproduced. However, the book falls far short of its self appointed goal of being a guidebook, especially when compared to available guides such as Geerling on architecture and Kuehn on design, or the monumental 5 volume patternbook by Cunningham. The latter two are not even mentioned. The book contains numerous technical mis-statements, such as, for instance, that sand moulds for sand castings are produced by pounding a pattern into the sand with a sledgehammer. Statements like that, combined with strong, even dogmatic, aesthetic judgements, make the text appear irritatingly presumptuous. As to the choice of illustrations, history preponderates. Of modern smiths, only Paley's and Bailey's works are shown. Some of Yellin's work is also illustrated, but most other illustrations show work in the 19th century classic style; scrolls. Photos tend to show overall appearance only and little information is given on dimensions and working details. The locale of the examples shown is limited to a few locations in the East and South.

The authors recognize the currently growing interest in good ironwork, but are apparently unaware of the existence of ABANA. The "directory of ironworkers" appears to be a haphazard abstract of the yellow pages, indiscriminately mixing craftsmen with large commercial manufacturers and purveyors of minimal standard weldments.

The book seems to add little to justify its cost to the library of a craftsman, designer or architect, except to show that a little knowledge can be a dangerous thing.

by John Dittmeier

Art Objects in Steel by Tula Craftsmen
Introduced and compiled by M. Malchenko

167 pages, 63 color plates, plus black and white, 8¾ x 6¾, hardbound, English-Russian text.
Available from Newbury Books, Box 29, Topsfield, Massachusetts 01983
$17.50 plus $0.50 postage

Here is offered a collection of Russian ironwork of certain interest to the decorative turner, the whitesmith, and all those whose imaginative handiwork treats steel as a jewel. Excellent photographs reveal the frequent features of Tula craftsmanship; exquisite inlay of gold and silver, chiselwork, chawework, faceted steel heads of high polish, and more. The rightful word of description is splendor.

The city of Tula, Russia and its national arms factory of the eighteenth and early nineteenth century were the home of master armourers, who often produced domestic objects and decorations of high artistic worth. In addition to small caskets, furniture, candlesticks, and the like, the range of articles within the book includes drawing instruments, pistols, and a halberd. Such were created for the Russian royalty, visiting foreigners, and wealthy patrons at home and abroad.

The text provides an historical and descriptive introduction and notes per piece on its date of manufacture, dimensions, and brief description of elements. The photographers have literally filled pages with enlarged views of details. The result is an intimacy with a special class of ironwork and a deep respect for Russian artistry.

DONALD STREETER working on book

Standards of excellence are often set by surprisingly few people to shine as guidelines for hundreds, or thousands, who would follow in their footsteps. Donald Streeter is unquestionably an artist-craftsman who has set the highest of standards for American blacksmithing and it is with the greatest of pleasure that we have received word from him that "I'm under contract now with Charles Scribners Sons to finish and publish my book on smithing, on which I've been working for several years... It will not be a book for beginners — there are plenty of them, nor a resource book — Jack Andrews has done a superb job there. Rather, it will deal with professional smithing of small ironwork (no gates, railings, etc., already amply covered) with step by step photographs of actual work as done, the special tools, jigs, and so forth, as I've worked them out in my experience. Nor is it intended to be a universal compendium of the one right way to do everything. It will, I hope, reflect one smith's experience, and pass on to others what older generous smiths passed on to me, in the only way I can repay them — in kind." The Anvil's Ring will keep you posted on developments.

March 1979
REPUBLICATION OF RARE BOOKS

The following books are being reprinted in photocopy form as part of a continuing effort by the Yonna Valley Forge to make available useful, rare blacksmithing publications at reasonable prices. The republication date for these books is June 1st, 1979, and all orders paid before that date will receive a 10% discount. Please enclose $1.00 with your order to cover postage and handling. Make all checks and money orders payable to Jim Fleming. Mail all orders to Yonna Valley Forge, Bonanza, OR 97623.

Coleman, George J. Forge Notebook. Milwaukee, Wisconsin, Bruce Publishing Co., 1921. 26 pages, illus. $4.00
This small work gets right to the point and covers much material in a concise, step by step manner. The emphasis is strictly on operations rather than projects. Covers tools, equipment, materials, stock calculations, forging operations and heat treatment. A very good introductory treatment of blacksmithing, though in no way adequate as a complete course.

A basic blacksmithing treatise intended to aid blacksmiths in and introduce students to the smithy. Begins with a survey of the equipment and hand tools of the forge including a good description of a foot powered Oliver type hammer. Next covered are the operations of drawing down, upsetting, punching and welding. A chapter on the structural considerations of forging including grain size and flow is followed by a section on bending and ring making including multiple weldings on rings and bridles. Two chapters on examples of forge work include tie rods, eccentric rods, chain links, a swivel and a crank shaft, as constructed both with and without the use of a power hammer. A chapter on making two homemade portable forges is followed by a section on heat treatment of steel. The book offers some unique and well considered information of use to the smith, particularly for usable ideas on shop equipment and tools.

Hasluck, Paul N. Bent Iron Work, Cassell and Co., Ltd. New York, 1902. 160 p., illus. and indexed. $8.00
A manual of ironwork focusing on scrolls and light strap iron which can be formed cold into a variety of products. Contains descriptions of the tools and techniques necessary to form leaves, flowers, scrolls, and sconces into lamps, frames, screens, grills, stands and candlesticks. The emphasis is on rivets and collars to hold work together rather than welding. Thoroughly explores scrollwork, offering many suggestions for designs in traditional blacksmithing. Also of value are the construction details of the various pieces which can easily be applied to forgework.

Johnson, Carl Gunnard. Forging Practice. Chicago, American Technical Society. 1938. 136 p. illus., indexed. $7.00
An industrial forging treatise intended to familiarize the reader with various processes and equipment used in mass forgings of steel. Background information includes brief discussions of the hand forge tools and operations, and power hammer tools and operations. Brief discussions follow on various processes including drop forging, bull dozer upsetting machines, hydraulic forging, cold and hot rolling, cold swaging, pressing and drawing, extrusion and spinning. Supplemental information on defects in forging, heat treatment, and identification of steel completes the book. This book is valuable as a reference book survey of many various processes with useful information for the smith in metallurgy and power hammer tooling.

Watson, John. Tables for the use of Blacksmiths and Forgers. New York, Longmans Green and Co., 1906. 88 pages, illus. $5.00
An elaborate set of tables intended to enable blacksmiths to calculate the length of stock necessary when forging from one dimension to another. Includes tables of weight per foot of round, square and flat bars and decimal equivalents of inches. Useful to the practicing smith working to dimension on complex forgings.

A series of formulas and recipes intended for blacksmiths as a reference book of a variety of chemical mixtures for special heat treating applications. Contains forty recipes for a variety of uses including hardening baths, tempering baths, case hardening compounds, welding compounds, and finishes for iron and steel to protect it from rust. An interesting and useful reference book for the smith. While some of the mixtures seem a bit outrageous others make more sense and are obviously useful.

Blacksmithing Books The following five photocopy reprints are available from Jim Fleming, Rt. 1 Box 784, Bonanza, Oregon 97623. Incidentally these books are out of print.
Farm Blacksmithing John F Friese $6.00
Practical Forging and Art Smithing Thomas Goegerty $7.00
Forging & Smithing Lynn C Jones $9.00
Forging Of Iron & Steel William Richards $9.00
Plain & Ornamental Forging Ernst Schwartzkopf $10.50
A FEW WORDS ON THE MEDIEVAL HAMMER

by Dimitri Gerakaris

If you look at the hammers depicted above and on the cover of your December, 1978 Anvil's Ring, you will notice one aspect which is very different from most forging hammers of today — different, as a matter of fact, from most hammers depicted since the appearance of George Agricola’s De Re Metallica published in 1556.

Many hammers appearing in illustrations up to the 15th and 16th centuries have a face which is wider than the body of the hammer. I doubt that this was done as a matter of expediency when forging the hammer; quite the contrary, it would seem easier to make the kind of hammer most of us use today. What I do suspect is that there are advantages to using this sort of hammer that have since been glossed over in the attempt to spend less time and effort in the making of a hammer — especially in an era of mass production where the manufacturer is primarily intent on maximizing profits, and even the smith has allowed the manufacturer to produce his hammer for him so he in turn can get on with making his own profits.

I have been working for the past year or so with a hammer that has a face wider than the rest of the body and all I can say is that it is a joy to use. This is not to say that I do not use more conventional shapes at times, but as an all-round forging hammer, it has a great many points to commend it. With this shape, it is easy to get into spots that might otherwise be difficult to reach, such as when necking a bar down to a smaller size. This imparts a clear, controlled look to the forging. This shape, held at a slight angle, imparts a finely controlled fullering effect. This sort of face, coupled with a long, massive and slightly curving body seems to pack a lot of "whallop" and yet provide a great deal of control, allowing the user a great variety of results with but the most subtle changes in the way the hammer is held and used. I am not suggesting for a moment that all other hammers be given the heave-ho; but if much of the ironwork that adorns Gothic cathedrals was forged with hammers like this, it may be worth another try.
PHOTOGRAPHING IRONWORK: Selecting Backgrounds

by Mary Gerakaris

It is very important for every artist to keep a portfolio. Your creations are usually around you for such a short time, and a working portfolio is good if for no other reason than to keep a record of your own progress. It is a tool to be used in many ways — showing work to prospective clients, having ready access to prints for publication or for use as an information exchange with other artists. People generally respond more positively to visual presentations, and the 3-dimensionality and texture of ironwork makes it an ideal subject for photography.

Many craftsmen prefer to do their own photography, so I have a few suggestions on backgrounds to make photos look more polished. We will consider only black & white here, because it is less expensive, it is easier to work with and because this magazine is printed in black and white.

It is probably true enough that any picture is better than none at all, but sometimes not much. The background chosen usually makes the difference between a snapshot and a photograph that does justice to the hours of work you have put into a piece. There are some very simple, but important, things to remember about backgrounds if you are going to do your own photography:

1) KEEP IT PLAIN. Unnecessary details such as trees, wrinkles in cloth, or furniture in a room, etc., detract from the detail of your work. See photo #1; this was taken outdoors. The background is busy, and you certainly do not notice the piece of ironwork first.

2) THINK BLACK AND WHITE. Remember that a brilliantly colorful background will be grey in a black & white photo. For instance, a red background, (see photo #2) which is very dramatic in color, is pretty useless in a black & white photo. You can pick up highlights on the ironwork; but overall, it is a pretty dull photo and does not provide the contrast needed to make the piece really stand out from the background.

3) CONTRAST IS IMPORTANT. Iron runs on the dark side of the grey scale, so the logical choice of background is a light one that is smooth and uninterrupted.

I prefer using “photogrey” paper or “studio grey”; the names are interchangeable. It comes in rolls of 4½ ft. and 9 ft. widths that are 36 ft. long, and cost approximately $10 to $17. Certainly a worthwhile investment, that lasts a surprisingly long time if you handle it carefully. It is a very pale grey and does not cause glare as white backgrounds can. You can mount it on an old broom handle or closet pole and hang it from the ceiling (or a tree branch if you don’t have indoor lighting facilities), and unroll it as you need it. Run it down the wall and over a table top so that it extends well behind the item being photographed and quite a bit in front of it. This will give you a continuous background, unbroken by horizontal lines, that fills the entire frame of the camera. (See photo #3) Your subject is the center of attention, showing up well against a light, uninterrupted background. Watch out for wrinkles and dirty spots — the camera registers them permanently if they are there.
There is a common error which occurs with light backgrounds and dark subjects — underexposure of the subject, resulting in a perfectly exposed background and the subject lacking in highlights and detail. It is most common in photos taken with a camera that has a built-in exposure meter. This happens because your meter reads the light reflected off the light background, (logical because the background comprises most of the picture area) which tells you to set your camera for that exposure, and not for the iron. You can compensate for this by setting your camera at a slower speed or larger aperture, until the meter registers a slight overexposure. It will not hurt the look of your soft grey background, and it will certainly help your ironwork. Experiment for yourself when you can spare some extra frames of film and a little time. I think you will find the results pleasing, and you will get photos that will keep clarity and detail even when reduced for reproduction in the Anvil’s Ring.

ON THE MOVE:

The Museum of Contemporary Crafts

A unique, offbeat museum is on the move: After 22 years, New York’s Museum of Contemporary Crafts is closing its doors at 29 West 53rd Street, and will reopen across the street in renovated space at 44 West 53rd Street this April. This move was prompted by the Museum of Modern Art’s purchase of the Museum of Contemporary Crafts building in October 1978 as part of MOMA’s expansion program.

When the museum reopens in its new location, the building will house, in addition to its exhibition space, a publications selling area, museum offices, the American Crafts Council library, and an area for the study of the museum’s Permanent Collection, which documents 20th-century American contemporary crafts. The American Crafts Council executive offices and the editorial offices of its magazine, Craft Horizons, which were formerly located in this building, have relocated to 22 West 55th Street.

“We will continue our pioneering program of organizing major craft exhibitions and touring them to art centers throughout the country,” commented Paul J. Smith, director of the Museum of Contemporary Crafts. “In 1979, our exhibitions will be presented in 22 locations across the nation.” The museum will reopen this spring with the premier of a new handmade furniture show sponsored by the Hardwood Institute and the National Endowment for the Arts. Simultaneously, larger facilities are being explored to eventually house the Museum of Contemporary Crafts and its parent organization, the American Crafts Council, in one location with expanded space for increased activities and a display area for the museum’s Permanent Collection.

The Museum of Contemporary Crafts was founded 23 years ago by the American Crafts Council, through the efforts of Mrs. Vanderbilt Webb, at a time when few institutions presented the work of American craftsmen and most people were unaware of the vitality and superb quality of American crafts.

“Since 1956, when the Museum of Contemporary Crafts was founded as the only museum in the United States devoted exclusively to showing contemporary crafts,” said Mr. Smith, “the work of over four thousand artists has been shown, many for the first time to a national audience.”

“There has been an explosion of interest in contemporary crafts,” said Samuel Scherr, President of the American Crafts Council. “Museums are beginning to acquire the work of contemporary craftsmen, and there is a growing recognition and appreciation of crafts by the arts community, by collectors and designers as well as the public.”

Mary Gerakaris studied Art at the University of Wisconsin at Milwaukee. She later studied commercial art and took a degree in commercial photography from the Ray Vogue School in Chicago. Mary currently is head copywriter and catalog graphic designer for one of the nation’s largest importers of hand crafted items.
Starting a Fire
by Dimitri Gerakaris
photos by Mary Gerakaris

It has been my observation that there are about as many ways of building and tending a fire as there are smiths. Although this is a very personal matter, I would like to share my method with you; first, because I have found that this method has worked well for me — with a hoodless forge as depicted here as well as with a hooded forge (to the degree that a hooded forge can be expected to work) and secondly, because this essay will introduce most of you to the manner in which a hoodless forge operates.

1) I begin by cleaning out the firepot down to the airholes (I normally do not clean out along the perimeter of the firepot; I have merely done so in this photo to show the relationship of the firepot to the smoke chamber orifice). The reason I clean out down to the airholes is that I want to ensure that no clinkers have fused themselves to the tuyere. On occasion, the parasites latch on around the air holes so tightly, that they have to be chiselled off. (I find the resulting pile of fines and ash that falls through the holes at this time, rolled up in newspaper and fastened with tie wire, makes an excellent supplement to the fuel in my woodstove.)

(2) I start my fires with a wad of newspaper, tightly balled up, a sheet at a time, one around the other (I find five such sheets from the N.Y. Times "Arts and Leisure" section provides all the hot air required). After igniting the wad, I first hold it for about five seconds by the orifice to initiate a movement of air up the flue (I found doing so with my previously hooded forge also made quite a difference). I then turn the wad upside down, so the flames come from the bottom of the ball, and place it in the tuyere.

(3) I quickly begin to rake coke from the last fire around the paper. I cover the burning wad around the perimeter and turn on the blast (when shutting down, to prepare a good quantity of coke for the next fire, I rake through the bottom of the fire with my curved rake for any large clinkers; I then pull aside any large cakes of coke from the top of the mound to the edge of the forge bed. I let this coke cool overnight and set it aside the next day in a large bag for future projects that might involve a great deal of welding.) I then repack the mound lightly with my curved rake. And finally, I cover the whole mound with a couple inches of wet, green coal, packing the whole thing tightly, except on top, with the back of my shovel (In this way, if the hot coals beneath cause a "burn through", it will happen vertically through the top. A vertical burn through eventually extinguishes itself leaving a large cylindrical wall of coke in its wake, whereas, a horizontal burn through seems to burn more coal and leave less coke.)
(4) After mounding up the coke ...

(5) I poke a hole to the burning wad in such a way that the hole is pointing in the direction that I want the smoke to go (smoke, like hot iron under the hammer, travels in the direction of least resistance)

(6) A flame quickly puffs out from the mound, the amount of smoke diminishes almost instantly, and I introduce wet, green coal from the side (the blower is still going).

(7) I pack the green coal in from the side with my curved rake. I pat it down firmly at a 45 degree angle to the forge bed toward the bottom of the fire. This movement of green coal pushes coke into the center of the fire, filling the void left by the now exhausted paper. Packing a fire this way builds the fire up from the bottom with coke making it rarely necessary to disturb the top and, therefore, the shape and cohesion of the fire is maintained. It promotes a deep fire and, furthermore, the direction from which the fire is packed dictates the shape. It is with this base packing, that the fire can be encouraged to arrange itself in a concentrated spot (pack from all around) or in a trench (pack from the sides only while pulling the top open with the rake at either end of the trench) etc.
(8) I turn the blower off at a time dictated by the size fire I want to begin with. If I want a small fire, I turn it off soon so that a concentrated spot is defined as the coke around it "knits up". If I want a larger fire, I let the coke burn outwards further from the center (while replacing the burnt coke with the 45 degree rake blows). When the fire reaches the size and shape I want, I turn the blast off for a few minutes for the coke to knit up.

(9) I fiddle around with the fire as little as I have to. I stick the iron in from the front side of the mound in a horizontal movement, disturbing the mound as little as necessary, with a layer or two of hot coals above the iron. And while doing this, I make sure I already know exactly what I want to do when I pull it out so the heat is not wasted.

SLIDES REQUESTED by N.E.A.

A cooperative program is now being developed between the Government Service Administration (GSA) and the Endowment in which craftspeople will be selected early in the design process of a building project to work in close collaboration with the architect. Crafts to be included in the building will be identified and the craftspeople would design and develop those areas. Examples of this collaborative effort might include wall or floor surfaces, hardware, fixtures, doors and gates, banisters, and other special features.

The NEA is preparing a list and slide collection of the work of craftsmen who have worked in collaboration with architects, or who have created architectural work. Slides are also being solicited from architects who have incorporated craftsmen's work in their buildings.

The Crafts Program is also preparing a presentation for the annual convention of the AIA in June of 1979. At that time a slide presentation will be made showing the work of craftsmen in architecture. In addition, symposia on artist-architect relations — ie, how do you locate an artist, what does the artist expect from such a relationship, contracts, and general business procedures — will be held.

For these two major projects, slides of craftsmen’s work in architectural usage should be sent to:

Eudorah Moore
Crafts Coordinator
National Endowment for the Arts
Visual Arts Program
Mail Stop 501
Washington, DC 20506

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example #1, from the forge of Robert Bourdon of Wolcott, Vermont

If you are tired of working in smoky conditions and/or tired of struggling with a hood when forging large, cumbersome shapes, the hoodless forge may be just the thing for you. Bob Bourdon says that he learned how to proportion this sort of forge nearly fifty years ago when he was a lad helping out George Charon, then the village smith of Woodstock, Vermont. Mr. Charon’s forge drew as clean as a whistle, and so does Bob’s.

Taken from a drawing by Robert Bourdon

It is very important to run the chimney at least four feet above the roof ridge. This long taper was made by making a wooden form and pouring it with concrete (be sure to build the form so it can be collapsed and removed from below).

34 — 36" wide or whatever

March 1979
These proportions were based on the forge of Robert Boudon. To see how well this forge draws, refer to the article in this issue of the A.R. entitled "Building and Tending a Fire."

Using this forge is a pleasure! Besides having practically forgotten what coal smoke smells like, I find that every couple of months, I remove at least a heaping scoop shovel's worth of very fine coal dust from the bottom of the smoke chamber. This is the dust that normally blows into the air with a hooded forge — the dust that settles on every horizontal surface in the forge, into every follicle in your nose and beyond into your own set of bellows. I, furthermore, find that having the tuyere next to the orifice has been anything but a disadvantage. I have built a 20 x 12 foot gateway using this force and found it remarkably versatile in dealing with large forms — especially with the aid of an overhead crane that is easy to use with no hood to get in the way.

With this sort of arrangement, I have found it not difficult to heat scroll-like forms that were over six feet in width, to forge 12 foot sections of 1½ inch bar into arch forms, to heat one foot wide sections of 3/16 inch plate without smoking up the shop, to linseed oil finish large pieces without a puff of acrid smoke, and to take a welding heat on a 20 inch diameter hoop of ⅜ x 1 inch stock set vertically into the fire and find that the smoke and flames shoot so horizontally into the orifice, that the top of the hoop can be grasped with a bare hand.

The Hoodless Forge

example #2, from the forge of Dimitri Gerakaris of North Canaan, New Hampshire
ORNAMENTAL SCREW HEADS
submitted by Rolando DeLeon
Santa Fe, New Mexico

With the use of a few small files; rounds, triangles, etc . . . some very interesting effects can be achieved with the standard hex head lag screw. The use of files does not damage or distort the hex shape of heads, so the use of a socket wrench to drive screws in is still possible. Zinc coated lags should be placed in muriatic acid (used in masonry work, and purchased at a hardware store in your area). Acid will burn off zinc coating. As with most chemicals, care should be taken.

After filing and acid treatment, run lags through forge fire or torch to achieve oxide scale, and wax while still hot. You will be surprised at this quick and easy way of obtaining a “worked” look to the standard wood lag screw. Try on other different types of screws . . . wood or metal, and bolts as well.

SWIVELLING CHOPPING PLATE
submitted by Rolando DeLeon
Santa Fe, New Mexico

We have all, upon occasion, worked on jobs where the process involved is that of hot-cutting and then forging . . . possibly numerous components to be used in the job. Something we came up with in our shop was a chopping plate or block, that is cut to the width of your anvil face, with the approximate length being ¾ of the face length. Two side tabs are arc welded to the plate extending no more than ¼” from the bottom of the plate, as in sketch. Instead of a peg of square stock being arc welded in place, which will fit into hardy hole, we weld a round peg of stock (the size of the hardy hole) to the plate. The tabs welded to the sides will keep the plate in place on the anvil face. The round peg will allow you to lift the chopping plate ¼” up and swing it out of the way so you can then forge the piece on the face of the anvil. Many times it is useful to have a chopping block that is 2/3 or ¾ the length of your anvil face, and you will find this tool a great time saver when you work on jobs . . . where the process involves alternating hot cutting and forging.

HOMEMADE RUBBER MALLET
submitted by Davie Court, Northfield, N.H.

I recently needed a one-inch rubber mallet to work a brass sheet, but could not find anything that small; and the smallest mallet I found cost $14.00. The answer was at the local hardware store. I ended up using rubber cane tips which come in sizes ¾” diam. to 1¼” diam. and cost $25.00 each. When slipped over one of my small shop hammers, they worked well, lasted the entire job, and can be put away in a paper bag.

STRIKING
submitted by Joe Volz
Silver Beaver Forge

To strike properly, the hammer should come down straight, not at an angle . . . to accomplish this and for better balance, the left leg should be forward, ahead of the right leg. The left fist must be up under the right arm to let the hammer come down perpendicular to the work to be done. Also . . . it is much better to swing the handhammer or sledge hammer in a relaxed manner. Let’s be happy.
KNIFE HILT FITTING
submitted by Karl Schroen
Sebastopol, Ca.

This is the first time that I have contacted ABANA except for paying for membership.

I am a professional cutter who forges all blades from a variety of carbon and alloy steels. I have been making knives since 1949. I learned the trade from my father, grandfather and use some of my great-grandfather’s hammers.

I am now completing a book to be out this year on knife making from the blacksmith’s point of view. I have for the past 10 years been developing forging and heat-treating techniques for all categories of modern alloy tool steels. The appendix of the book has a complete listing and flow sheet of the steels tested. This list will include hotworking steels also, such as, S-1, S-7, H-13. These steels are very good for making anvil tools. Thin, narrow hot punches may be made from these steels that do not soften when punching iron (mild steel). The water cooling bucket is eliminated.

The publishing date is still not set, but I will send out information when it happens.

One closing comment on a letter excerpt of Dan Maragni on knife hilt fitting. Dan suggests that silver solder is not good for knife hilt sealing, as the high heat draws temper. Dan forgets, or possibly does not know, that the blade may be protected by a heat sink.
(From high torch heat.) I use iron pieces 2" thick. I use stainless steel solder. All-State Dyna-Grip Solder no. 430 — both role-wire and paste. If the torch (oxy-acetylene) is used with a fine tip and the brass is evenly heated, it works fine.

Use a good flux for solder (430), i.e., Duzall
1. Fit brass tightly
2. Wedge hammered thin pieces of wire solder in back of guard.
3. Apply small amount of paste 430 solder on blade space.
4. Put yellow ochre + H₂O mixture on areas where solder is not desired.
5. With heat sinks in place, heat the brass guard uniformly until the flux begins to smoke and turn black. Then direct flame on blade guard junction briefly.
6. Let cool and remove to clean off excess solder.

Comments:
The steel, if properly protected will not lose its temper. Silver solders have a high melting point (1100° F) and are not acceptable as sealing agents.

Epoxy is fine for filling wood spaces, not only because of its non-shrinking qualities, but because it sets without oxygen present. Epoxy is not as durable as the low melt solder 430. Epoxy exposed will chip and flake if exposed to oxygen, and will decompose.

As to Mr. Maragni’s “gapless” fit, I do not believe it is completely spaceless as he says. If so, then why use epoxy to seal a gapless joint?

I have experimented extensively with both materials — epoxy and solders — the book will give a complete evaluation of both.

UPSETTING TIPS & FORGE BRAZING
submitted by Bob Patrick
Bethel, Mo.

I hesitate to send in any tips with such experienced older smiths in our membership; still, having made my living as a smith for the past twelve years, I have learned a few things: (That’s the spirit. We all have something to learn and to share. Ed.)

Upsetting Small Bars
A quick and little known method of upsetting small bars is the following: Heat the bar to a proper forging heat for that particular iron or steel. For a ¾" square bar, place the bar so that about 1" or a little less extends over the far side of the anvil and bend down at a right angle. The corner of the anvil in this case should have about a ¼" radius on it. Turning the bent section straight up and carefully directing your blows on it, hammer it down. You must be very careful not to get a fold in the metal. Properly done, this can reduce the time to upset, and properly scarf a piece for welding, to one heat for light stock. It is not suitable for all types of upsetting, and judgement must be used. The methods can be used for round stock if the work is done in a half-round swage.

A variant of this method can be used to upset the middle of a small bar for punching and welding. Make a bend as in the diagram and carefully hammer the bend down. These are great time savers, but involve some risk until sufficient experience in them is gained.

Brass has its place in forge brazing, as it melts at a somewhat lower temperature than copper, and most of the zinc can be burned out if the brazed joint is done directly in the fire rather than in clay, but brass is more brittle than copper. I also like to use coin bronze, which “copper” pennies are made of. I like bronze because it flows easily and makes for a very strong joint. It seems to be a little less affected by sulfur in the coal, which makes brazed joints brittle. For fine work it is best to use a charcoal fire.
LETTER TO GORO HATANAKA

submitted by Tom Bredlow
Tucson, Ariz.

Goro Hatanaka of Tokyo, Japan, and his partner, Taro Kurata, dropped in on the NEA workshop at S1U last Summer. In a letter, Goro later asked me some questions having to do with ironwork. The following is an excerpt from our exchange:

Goro’s questions were:
1. Cor-ten: what is it like to forge, and what are some of its characteristics?
2. Monel: what about it as a forging material?
3. Chisels: what are they made of for best use in holding up under a lot of work?
4. Hammering with hand hammers where the blow is struck from the shoulder instead of the wrist: what is the knack to it?

I wrote:
As to your questions — I’m not much qualified to say a lot but I’ll try to be helpful. I’ve never used Cor-ten, but like it very much under certain circumstances. There is a building in Chicago whose outside texture and color are provided by the red-rust “self-curing” of the Cor-ten, but involves no forged shapes whatever, only the milled H- and I-beams and angle that are welded or riveted together in the traditional structural steel methods, but the skeleton is all outside the building forming a very pleasing pattern of tall rectangles and diagonal bracing. Nearby is an enormous sculpture in Cor-ten that Pablo Picasso gave to the setting and has the look of being quite brilliantly picked from cutting scraps where something was being made of 2- or 3-inch plate at a nearby steel complex, for which Cor-ten was the necessary material. Well, whatever was being cut out for its own purposes left a Baboon-like head in the scrap, arms intact, (enormous scrap, I might add) and Picasso picked up on it and made it into a wonderful thing. Or if it wasn’t scrap at all, he may simply have decided to take off on what could have been scrap from such an operation. At any rate he was working from the attitude of what one might find nearby, whether he waited for the exact right thing to come along, or had them cut the way he wanted. The application was not forgework, but that of a cutting torch — the kind wielded by large sensitive machines that can cut a beautiful finished edge in even very thick material. So it feels to me Cor-ten works the best when treated as boards to be cut and joined (like plywood and two-by-fours) rather than as a substance to mush around like clay. Its matte finish could take away from careful forgework. It could be exciting in some of the forms many of the Europeans have been trying for decades, and if anybody can come up with a marriage between that flat red-brown surface Cor-ten develops, and just the right kind of bold free forging (large masses and very strong cross-sectional changes, as with an enormous power hammer or press) it’s bound to be you. So see what you can do. I’ll be very interested to see the result.

Monel seems to be more like stainless and according to Yellin and a couple others who needed the nickel finish for some application where the richness of their forgework needed brightness as well, the stuff is a bastard to work. The selection of Cor-ten or monel (or any other material, for that matter) seems to be based upon the finish that looks most appropriate for the application, rather than just an experiment plugged in just to be different. If it was these competent gentlemen’s judgment as designers that monel was the necessary material, they would simply go to the trouble to use it. The best usages have been at the hands of real designers who had to be adventurous to stay fresh, but would not risk using a material whose color or texture did not go with the shapes that were best for the surrounding. There’s nothing worse than to go to all the hard work of a very tough material and then have to finish it artificially to a look that could be gotten from mild steel or wrought iron, because the natural state of the tougher stuff didn’t go with the job. But you have to try it and see. You and Taro have taste, and that will tell you how the result will appear to others; and many times you have to do the thing all the way through before you can see whether it will work or not. So I encourage you to follow your inclinations with the material, and I’ll bet you come up with something.

I really don’t have a formula for chisels so that they hold up under all conditions, but I have learned that long handles are the place to start so that you don’t get burned and can take your time. I used some steel at Carbondale, Ill. this summer that was very good for lots of cutting in hot material with a wierd shaped edge, and it must have been one of the red-hard steels, but I didn’t catch its name and number, so I know that there are steels that will hold up because of their content. Since I don’t look upon tools as permanent things (for one thing, I lose them frequently, so I make simple edges that are easy to dress, or replace; the other advantage is you don’t end up with a favorite punch that shows up in all your work) so mine are whatever convenient water hardening chisel stock that seems suitable, shaped simply. If some very thin slices are to be made, (of course the chisel has to be more V-shaped than U-shaped), but too thin for very deep cuts in large masses that heat the chisel red while it is being used will cause the curling that is
destructive to smooth work. So for the bold cuts that go on and on — chiseled lines and deep cuts for stock removal, I use a somewhat rounded shape (1) so the edge is sharp but won't fold over, and so that the blade, (2) curved upward at the ends with the same sharpness going around the "corners" and up the sides a ways (3) will "run" without putting square bites in the work as with a cold chisel; that is, if a long line is necessary. There are some places where the bites (where the chisel blows overlap) are part of the design and that can't be done with this dressed version, but this one is pretty useful. (4) For thinner cuts a steeper angle with

only a slight rounding is useful, but a deftness at employing it is necessary to keep from ruining it. That comes with experience. For cold work, polishing the edges doesn't hurt, and in any case, filing or stoning the extreme knife-edge off a freshly sharpened chisel helps it hold its edge a whole lot. It's only going to wear to that anyway, so why not start out with it like that? Any hardenable steel is good for chisel stock, provided the head of the tool can be annealed, so it doesn't tear up the hammer face or cause chips to break out. I stay away from the steels that won't anneal easily, but found some of them hold up under intense heat. I just make tools that are easy to dress, use them so they don't ruin, and expect them to wear; but the easiest way to keep tools sharp is not to expect too much of them, and get used to what they will do well. Experience, in other words. If you have any trouble let me know — I'll send you a couple that work for me and see if they will do the same for you.

As to the knack of hammering from the elbow or shoulder: it may be graduating to a heavier hammer, that works tiresomely from the wrist, and then relaxing to what it gets you to do is the best thing to try. I don't know much about it technically, from a trade school standpoint, (and helper-type striking in the accepted style is impossible for me to catch on to, but I can still strike for someone now and then) but the smaller leaf-hammers whose control seems to come from the wrist work okay for me, while larger hammers requiring stouter blows tire me when swung from anything short of the shoulder or elbow. Placing medium hammer blows where the swing is restricted can come successfully from the wrist, but I hope I don't have to do very much of that.

It may be that those of you who have had experience with Cor-ten and monel, or with either of the subjects of the other questions, would want to share your experience with Goro, Taro, and the rest of us. If so, I'm sure the Anvil's Ring would be happy to publish your thoughts on these matters.

A DEAD-FLAT HAMMER FACE

A frequent American hammer is the elongated cross-pein with a slightly convex face and with rounded corners of the pein. The removal of sharp edges and corners prevents mars and folds on the workpiece. There are, however, advantages of a dead-flat hammer face with rounded edges of one sixteenth inch radius or less. The consequential indentation of one blow becomes the reference point for the next overlapping blow, which removes the previous dent and imparts another for the third strike. This face offers a superbly smooth surface without folds, sharp outside corners, and a hammering technique of increased accuracy and speed of execution. Such rationale is similar to that of the flat dies of a power hammer, expecting the ability of the smith to vary the angle of his handhammer blows. The above discourse was offered to me by Mr. Robert Sidaway of the West Midlands, England, a blacksmith of the Black Country.

SCROLL FORM
submitted by Bob Bergman
Blanchardville, Wisconsin

Here's how I make a scroll form: 1st, draw full size chalk pattern; 2nd, freemally, follow chalk slowly, making sure there are no flat spots; 3rd, if scroll material is heavy, clamp in vise and hammer hot piece for form into the first scroll; 4, weld scroll form to angle iron and clamp in vise to use. If scroll material is too springy to remain undistorted by hammering, make scroll form directly from chalk, but remember that you have to stay on inside edge of curve, undersize the thickness of the scroll materials.

To Southern Blacksmiths, be thankful for warm feet, it's been a cold winter here.
CUT-OFF TIP &
SCROLL JIG

submitted by Bob Walsh, Minneapolis, Minn.

ABANA Members,

I have a couple of procedures that I’d like to pass along thru the “tricks of the trade” column, as hopefully someone else may get some use from them.

The first is a two-pound brass hammer for use with the cut-off hardy. If I over-swing there’s no problem ruining the cutting edge of the hardy.

The second procedure is on scroll jigs… Make your conventional scroll jig that you’d ordinarily make to drop into the hardy hole; only, instead of making provisions for it to drop into the hardy hole, weld it on a plate of steel, then weld an old socket ratchet, opening side exposed, on the bottom in the center. (Fig. A)

Now weld a rectangular plate on your ratchet so it can be held firmly in your vice. Drop the scroll jig on the ratchet and presto!

I find this very handy being from Minnesota and learning to work in small quarters in the Winter time — half-filled garages that sometimes feel like phone booths! — where with a stationary scroll jig, the long tail of the unmade scroll is always bumping into something.

I have made larger scroll jigs (up to 3’); on those I use a similar ratchet affair, except I mount the jigs vertically on the leg of my workbench. (Fig. B) In this application you must use a rotating pipe in a fixed pipe arrangement to hold the extra weight.

With this set-up you can bend enormous scrolls in a very limited space, as the tail of the unfinished scroll just goes up and down. Another fringe benefit is that because you’re pushing down on the vertical scroll, you’ll never hurt your back. My arrangement bends a nice 3⁄8” × 2” scroll by hand, cold, with no back strain — and I weigh 160 lbs.

Someone once said that with enough leverage you could move the world — although with this kind of a set-up I’m sure the ratchet would probably fail.

I hope someone can find these procedures useful. If you don’t completely understand, or have any questions about bending cold, please drop me a note.

Sincerely,

Bob Walsh
2953½ Lyndale Ave. So.
Minneapolis, Minn. 55408
BENDING: UNIFORM WAVY BARS; WIDE FLAT STOCK IN A VICE AND A BICK STAND  
submitted by Randy McDaniel, Westminster, Md.

Fellow Smiths,

I have just completed five, 3 ft. x 7 ft., window grilles for a home in Washington, D.C., which incorporated wavy bars of ¼" square stock. The problem came in bending steel of that size, and uniformly, on all five window grilles.

I started by drawing a full size pattern and making one bar of ¼" square to align with the inside curves of the pattern for a bending jig. Then I electric welded a piece of angle iron on the bottom, down the center, to stop the jig from bending out of shape in use. The lower edge of the angle iron can be clamped in the vise. I made an adjustable bending fork by taking 2 ft. long x ¼" square stock, rounding off the end about 2" back and bending at a 90° angle at that point. The other end was rounded off about 6" long for a handle. When I wasn’t able to get enough leverage, this handle also fits in the inside of a pipe 3 ft. long. The adjustable time of the bending fork is just a piece of steel ⅛" thick with a 13/16" square hole at the top and a ¼" dia. end 3" long which simply slides up and down the tool to where ever you need it. Tension holds it in place while bending. I used ‘hammer on clamps’ to hold the stock while bending. These are just U shaped pieces with handles which are turned over and hammered on over the jig and the piece to be bent. Now to make the wavy bars, heat up the stock, lay it on the jig, hammer on a clamp, use the bending fork to make the first curve, hammer on another clamp and proceed down the piece.

Here are a few other tips for around the shop. Sometimes while bending flat stock in the vise, the bend goes crooked because the vise jaws are not as wide as the stock being bent. I simply drop 2 pieces of angle iron, as wide as the stock, in the vise jaws and put the piece I’m bending between them and clamp the vise shut and make my bend. If you have a large stake or bick that you need a stand for, I have found that a brake drum or clutch disc off of some farm machinery works great. Heat up the center hole and drive the spike of the stake into it. They’re heavy enough to give it stability yet can easily be moved around the shop, and they’re cheap! In the article I did in the March ’78 Anvil’s Ring there is a picture of this arrangement in the picture with the anvils, in the upper left corner. I have found old buggy axles to be very useful. I use the low carbon ones for the vertical bar on fireplace cranes. They are about 1" x ¾” and have a collar welded on about 5” from the tapered spindle ends.

Adjustable Bending Fork

Hammer-on-Clamp

Side View Vise with angle iron jaws

my bend. If you have a large stake or bick that you need a stand for, I have found that a brake drum or clutch disc off of some farm machinery works great. Heat up the center hole and drive the spike of the stake into it. They’re heavy enough to give it stability yet can easily be moved around the shop, and they’re cheap! In the article I did in the March ’78 Anvil’s Ring there is a picture of this arrangement in the picture with the anvils, in the upper left corner. I have found old buggy axles to be very useful. I use the low carbon ones for the vertical bar on fireplace cranes. They are about 1" x ¾” and have a collar welded on about 5” from the tapered spindle ends.

This collar makes a good stop, like a tenon, for the lower end of the crane support. I always spark test the axles for carbon content. Some have a lot of carbon. These I even use for hardies, again using the collar as a stop like a tenon in the hardie hole in the anvil. The spindle ends can be tapered to a point for a small mandrel, or bent near the collar for a bick — especially handy for making tapered, welded candle cups.

FORGEABLE BRASS AND BRONZE INFORMATION  
submitted by David Zatz, Brooklyn, NY

About a year-and-a-half ago I placed an inquiry in the Anvil’s Ring regarding this matter and came up with nothing at all. Fortunately, being in New York there are tremendous volumes of information at hand if you’re willing to do all the telephone work necessary. In any case, here’s an assortment of what I’ve been able to gather to date.

General info:

As many of you may have discovered by now, you can’t pick up any piece of brass and hot forge it! Most of what you’ll find will turn to cottage cheese on your anvil when you get it hot and hit it! The primary factor in forgeability is the absence of LEAD! Amidst all the hundreds of copper alloys, a tremendous number of them contain lead for its advantages in machining. So, the first consideration is, be sure that you have an unleaded alloy. If so, there is a good chance that it will be forgeable.

Pure copper is quite good for forging and you are assured good results with this if you can’t locate anything else. It is critical that you be careful not to overheat any copper materials as they will just disintegrate in the fire without giving the kind of warning that iron does … once you see the green tinge to your flames in the fire, it’s gone. Pure copper can be forged nicely at a red-orange heat on down through black heats till it begins to work harden and must
be reheated. While you have a far narrower range of incandescent working time then with iron, you'll find that you can do a whole lot with the copper or brass while it is black. Just watch out for over working or it'll start to get brittle and crack.

As you begin increasing the zinc content of a brass you significantly reduce the melting point and sensitivity of the material. **TOBIN BRONZE**, also known as **NAVAL BRASS** (alloy #464) is a guaranteed forgeable, composition as follows:

- Copper — 60%
- Zinc — 39.25%
- Tin — .75%

This alloy is available in squares, rounds, flats, hexagonal bars and sheeting, (and in specially handled shafting in diameters of up to 6") Its melting point is very low ... approx. 1,500 degrees ... don't take it above red heat! I've found it somewhat nerve wracking to work such delicate material in a coal forge where the heat can vary so much and where you have to bury the work in order to obtain the desired heat. It might pay to set up a small gas furnace for forging copper alloys where you can better control the temperature and always see the work.

A couple of other things I've observed are ... for jib bending and scrolling on a form, I've found spot heating with a torch much better than forge heating. While the stuff is quite malleable below incandescent heats, it is not flexible and you've got hardly any time to get it out of the forge and set in your jig before it's too cold.

While I have not handled any other alloys, there appears to be no particular reason why any straight copper-zinc-tin or simple copper-zinc alloys wouldn't be forgeable. The Yellin workshop frequently has work to do in brass, and during a visit there last year, Harvey assured us that this is indeed the case. Other recommendations which I have not tried but will, in time, are:

- #220 “Commercial Bronze” — 90% copper, 10% zinc
- #230 “Red” or “Rich-low” Brass — 85% Copper, 15% zinc
- #240 Yellow Brass — 63% Cu, 37% Zn
- #280 “Muntz metal” — 60% Cu, 40% Zn

The numbers given are alloy numbers standard within the trade.

For comprehensive alloy information, you should acquire the following:

**Copper, Brass and Bronze catalog from:**

T. E. Conklin Brass and Copper Inc.
322-324 West 23rd Street
NYC 10011

This has complete listings of available types, shapes, sizes, etc., plus tables of compositions and properties.

Far more extensive information is available from the Copper Development Association. Write to them and request their seven Sourcebooks:

1. Tolerances
2. Alloy Data for Wrought Mill Products
3. Terminology
4. Engineering Data
5. Sources
6. Specifications Index
7. Alloy data for cast products

*Number 2 is the most important for anyone interested in forging. It contains detailed information on every alloy including a rating for hot forgeability on a comparative scale 0-100% (for "forging brass"). [Now here's the puzzle ... "forging brass" . . . Alloy #377 is a lead bearing alloy! ????]. Perhaps the "forging" they mean is closed die forging where the material would be subjected to entirely different stresses than in hammer and anvil work.

Copper Development Association Inc.
405 Lexington Avenue
New York, NY 10017

As to costs, depending upon quantity and nature of material purchased, prices can vary from $2 to $6 per pound. Generally the straight zinc-copper alloys are the cheapest, pure copper somewhat higher, and the specialty alloys such as silicone, manganese and phosphor bronzes are the most expensive. (These may be forgeable).

There are some copper alloys which can be brought to exceptional hardn esses and have application in tools and so forth. Among these are beryllium and tellurium coppers. I do not know if these will lend themselves to hot working, but I have been advised that beryllium is a highly deadly material and anyone interested in investigating the uses of these materials should be sure to get good advice and take all necessary precautions.

Good luck to all!

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SHOP COAL

(A presentation given by Alex Bealer III, author, during the October 7-8 Conference of the South Eastern Blacksmith Artists).

Shop or metallurgical coal, according to Alex, has variable characteristics and his presentation covered elements present in high quality forge fuel. Bituminous coal, preferred for forging, was demonstrated as having a shiny appearance and was easily broken with the fingers. It also has a low sulphur, phosphorus and ash content. Anthracite coal is acceptable, but it burns faster, causing greater fuel consumption and produces excess heat and gas toward the smith. Steam coal is unsuitable for forging operations. Sulfur dioxide, a toxic gas, produced by poor coal yields sulfuric acid, a corrosive agent.

Alex then presented the Geological Survey of Alabama specifications for good quality shop coal. Moisture: 2.5 to 3% (dampen it before use for greater economy); Ash: none is ideal, 3 to 6% is acceptable; Sulphur: again, none is ideal, 1 to 2% is good; Volatility: 25 to 30% is medium, the lower the volatility, the better the quality; Carbon: 55 to 60% is acceptable; BTU: 13,500 to 14,500, with 16,000 being preferred, since coal of less than 13,500 is undesirable because it is so difficult to work. (A British Thermal Unit or BTU is a measure of the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit; Coking Button Range: about 7, so that coke forms a hard mass, this effects the speed at which coal turns into coke. As the fire dies, heat is concentrated in coke for working steel.

When buying, Alex advises that you get verification of the specifications given above from the seller. Ask for metallurgical or 'met' coal when ordering. In Georgia, there is a good source from a mine in Dade County, near LaFayette. Good coal is difficult to locate in Florida, but there is some available in Jacksonville. Find a local supplier, if possible, since the cost of shipping often exceeds the cost of the coal itself.

March 1979
A METHOD FOR FITTING HINGE JOINTS
submitted by Arden Fate, Ann Arbor, Mich.

I have re-invented a method of fitting hinge joints that use only a hammer and a simple tool; the hand-file is eliminated. I say "re-invented" because the method is so simple and obvious that it must have been used by other smiths, ancient and modern. But it has worked so well for me that I want to pass it on.
The hinge joint under consideration is shown in Fig. 1.

![Double Eye Leaf](Fig. 1)

The fitting tool I use is shown in Fig. 2.

![Single Eye Leaf](Fig. 2)

The fitting tool should be at least as heavy as your hammer. It is important that the ends of the tool be perpendicular to the axis of the longitudinal hole. If you have a lathe, drill the hole using it and then face the ends of the bar. Otherwise file the ends appropriately. The nominal size of the set-screw should be a little smaller than the diameter of the hinge pin. Point the end of the set-screw so that it beds firmly in the center of a hinge pin rod inserted in the tool.
The procedure I use is to hammer up both parts of the hinge-free hand as accurately as I can and drift the eyes with a section of hinge pin rod. Make the spacing of the double eye a trifle oversize so that the hinge can be easily hand-assembled. (The fit is sloppy at this point). The set-up for final fitting is shown as a sectional view in Fig. 3.
The single eye leaf is clamped cold in a vise, and the hinge assembled cold with hinge rod through both fitting tool and hinge. Arrange the hinge rod so that it lacks ¼" to ¾" of clearing the far side of the hinge joint, and clamp it firmly in the fitting tool with the set-screw. Disassemble the hinge and take a forging heat on the double eye. Reassemble the hinge and alternately hammer the joint home and work the hinge. Do this until the double eye reaches black heat.
Let the hinge cool and test for fit. If there is a little wobble or slop due to thermal expansion effects, disassemble the hinge and adjust the double eye (cold) as shown in Fig. 4.
Don't overdo this — one light blow usually renders the fit so tight that the hinge joint must be hammered together.
If you hot-wax the hinges, do it before assembly and get plenty of wax in the interior of the hinge joint — it's a good lubrication. Otherwise oil the joint.
I have fitted strap hinges as long as 30" using this method. When one attempts to flex the hinge perpendicular to the usual open-close direction, no wobble is evident at the end of the hinge. If we define detectable wobble as, say 1/32" (I think I can easily see this much deflection), simple trigonometry shows that the "angular wobble" of the hinge is no larger than 0.06 degrees! Few people can file to this accuracy.

![Fig. 3](continued)
USE OF AN AIR IMPACT CHISEL

submitted by Jim Wallace
Memphis, Tenn.
& Phil Endicott
Pittsburg, Ka.

Enclosed are 2 photos for possible enclosure in “Anvil’s Ring.” It is the “standard animal head,” but there are some outstanding features in the forging sequence.
The stock size is ¾” x 1¼” mild steel . . . the entire head was done in two heats including all the mane on the neck.

Fire Tending

submitted by Peter Minier
courtesy Appalachian Blacksmiths Assoc.

Some members at the first meeting asked about maintaining the fire. I will attempt to share what I know about this subject with the hopes that others will add to it.

The first and most important criteria is good coal. No matter how you keep your fire, if it’s high in sulfur and impurities it will give you problems. The extra miles you drive to obtain good coal will pay off at the forge. Deep Mine low-sulfur coal is the best. I use strip-mine Sewell which has little clinker and cokes well but has a fly ash problem. I think it is no coincidence that the first question you hear between two blacksmiths is “Where do you get your coal?” Keep trying different kinds till you find one that suits you.

The next step I will quote from an old smith. “Dry coal is for your home. Wet coal is for the forge.” Use your sprinklin’ can every time your coal starts to dry out.

As for tending the fire, I think it would be safe to say that it needs constant tending, but at the same time too much is not too good. I’ve seen some beginning smiths work their fire so much that all they did was push coke through the tuyere and coal in the pot producing little heat and lots of smoke. Keep coal around your fire but not in it. Let it coke before you pull it toward the center. The fire is tended lightly with the poker by raising it gently rather than poking down at it. The rake pulls green coal in from the sides which pushes the coke into the center. Fit the size of the fire to the size of the job. A big fire while making nails only wastes coal and effort. When clinker builds up and cuts off air to the fire, let it cool for awhile and remove from the fire with as little disturbance as possible. This takes lots of practice.

Maintaining a good fire is the achievement of a lifetime of smithing, so don’t get too discouraged. One of the impressions left on me by master smiths is their ability to accomplish so much work in one heat. This is the best way to beat the clinker.

Phil Endicott is the smith, (Phil’s Ornamental Iron, Pittsburg, Ks.) and he uses an air impact chisel. He uses standard chisels, which are modified slightly to do the job. The first heat does all the hammer work, i.e., forging offset for the eyes, bend in neck and spreading out for the neck mane. Second heat does all the punching and chisel work, using the air chisel.

I feel that Phil’s attitude and thoughts on production are important to disseminate to ABANA members: he runs a production shop, dealing with standard fabrication to forge work. He has been into forge work for only two years, but really understands hot iron. He will be one to watch in the future.
METAL CHEMICAL TREATING: Phosphating

Courtesy of SEBA Newsletter

A demonstration presented by Stan Strickland, SEBA Vice President, during the SEBA Convention October 7-8, 1978

Phosphate coatings, Stan explained, are rated by weight measured in milligrams per square foot of base metal. Iron phosphating will run from 40 to 80 milligrams per square foot of base metal; zinc, from 150 to 400 mg., and manganese up to 2000 mg. per square foot. Coating weights are only useful as a general identification of the type since they tell you nothing about the structure or nature of the crystal. The higher the concentration of solution, the faster the coatings are applied.

Work must be thoroughly cleaned, Stan continued, or the phosphate coating will not develop. Using the water break method of testing for cleanliness, when water beads and runs off the surface it is unsuitable for coating; when it sheeted and clings the surface is ready for phosphating. BASF Wyandotte products were used for the demonstration and are available from Ashland Chemical in Doraville or Savannah. Nuvat LT, a low temperature cleaner for oil and soil removal was shown, with the recommendation that loose scale be wire brushed away prior to application. As with any cleaning procedure, agitation, brushing or wiping makes the process more effective. If metal is very greasy, solvent cleaners or steam cleaning may be required before application of the solution.

Rusty metal, Stan noted, may require pickling or acid cleaning of the surface. The acid reacts with the metal, releasing hydrogen bubbles which agitate rust from the surface. Acids used in pickling include: sulfuric, muriatic, hydrofluoric and nitric. Stan recommends sulfuric applications on mild steel up to .60% carbon and muriatic for high carbon steel. Heavy rust deposits will cause excessive pickling time, hydrogen embrittlement or excessive loss of metal. Sand blasting, wire brushing or use of a high speed rotary flail are recommended in this case. Since pickling produces hydrogen which is explosive when exposed to spark or flame, it should only be done in a well ventilated area. Different acid solutions work at different speeds so observe your work carefully to prevent metal damage.

Phos-It, a combination cleaner and phosphatizer was used for Stan’s demonstration of the chemical treatment of metal. On lightly soiled or oily metal, you need only mix with water according to directions and apply to the piece being treated. Stan noted that he usually applies this solution with a plastic pump sprayer. Sometimes a scrub brush may be needed to remove dirt or oil. Allow this solution to remain on the metal for 3 to 5 minutes but don’t let it dry; rinse thoroughly with water such as with a garden hose. Immediately apply a chromic acid solution such as Lock-Rinse and allow the metal to dry. Paint immediately after the metal has completely dried for best results. Phosphating iron can reduce the need for repainting by as much as three times over non-treated items.

For those who put a lot of time and effort into iron work, phosphating is a simple step toward preserving that work and creating customer satisfaction. Stan suggested that metal craftsmen contact the nearest BASF Wyandotte Corp. distributor for further information and advice about any particular application.

Serious-minded craftsmen will be interested in the Metals Handbook Vol. 2 published by the American Society for Metals, Metals Park, Ohio 44037. Stan said the book contains a wealth of information including chemical and mechanical treatments for most metals, painting and polishing information and equipment layouts.

Stan began by stressing safety precautions needed to protect one when chemically treating metal. Carefully read and abide by all directions and cautions on the labels of chemicals used or stored in your shop. Safety goggles and rubber gloves are essential when handling corrosive chemicals used in treating metal. Should any of these solutions be splashed on the skin, hold the exposed area under running water for 3 to 5 minutes or until any burning sensation is gone. If an acid solution should get into the eye, immediately begin a flowing water rinse. Cup the hands around the eye area and allow water to flow around the open eye, to rinse away as much of the acid as possible. Then, seek immediate medical attention.

Practical industrial applications of phosphating date from 1906 when Thomas W. Coslett was granted two patents in the area, Stan noted. Refinements in the process include: reduction in processing time, improvements in corrosion resistance, refinement of grain or crystal size, and the simplification of control measures. Zinc phosphate coatings are applied to iron, steel, zinc, galvanized steel, cadmium, and aluminum surfaces. The coatings are used as a base coat for paint, rust-preventive oil, lubricating oil, wax, stain, drawing compounds or other finishes; with preparation for painting representing the largest market.

Phosphating, according to Stan, is a process in which a layer of phosphate crystals with modifiers are deposited on the metal surface. The coating protects this surface from corrosion and it is porous, providing an ideal condition for subsequent treatments with paint or other coatings. Chemically, the process involves an acid attack on the base metal which decreases the surface acidity, causing the precipitation of an insoluble coating containing crystalline phosphate. Phosphating also provides a surface that will restrict rust, but not prevent it. If the paint is scratched, rust will occur along the scratch but will not spread under the paint to the surrounding coated area.

The two general types of phosphating were then discussed by Stan. Iron phosphating involves three steps: applying phosphate to a clean surface, a rinse and a chromic acid inhibiting rinse. This process is better adapted to large pieces since a solution, such as Phos-It can be sprayed or brushed onto the surface. Zinc and Manganese phosphating requires: cleaning the pieces, a rinse, dipping or soaking in the phosphate solution, a rinse, and a chromic acid inhibiting rinse. This process imparts a better coating than the iron phosphate method, but it is better adapted to dip or soak applications.

TIPS and TECHNIQUES courtesy Ohio Artist Blacksmiths Association. (OABA)

MAKING A LEAF submitted by Barry Wheeler
Akron, Ohio

The easy way to make a leaf. During an after hours impromptu demonstration at the '76 ABANA conference at Carbondale I happened by Max Segal. With hammer in hand Max was passing on a few tricks of the trade. Among them was what has to be a very unique way of making a leaf. To him I feel deeply indebted.
These leaves are particularly pleasing to the eye and require no more than a cross peen hammer, hardie and anvil. They are a very good exercise in the use of the peen and all parts of the anvil. So many beginning blacksmiths tend to go “tool crazy” by spending more time looking for unique tools rather than exploring the usefulness of the simplest yet most unique tool a blacksmith can possess... the hammer.

The procedure is as follows: Start with a piece of strap say ¼ in. wide by 1/16 in. or so thick (about 12 guage) and about 18 in. long. By starting with a long piece you won’t have to worry about holding as 90% of the leaf is formed while attached to the parent stock. (I will digress here a moment and mention that this is a good practice to follow when forging any piece which may be difficult to control or hold. By doing this you have a pair of “built in tongs almost up to the last moment”.)

![Diagram](Image)

**Step #1.** Draw a taper (not very much) on the end to a blunt point, being careful to maintain the original thickness. The length of the taper should be about twice the width of the stock. Of course different proportions will apply to different leaf types.

**Step #2.** Fuller in the rudiments of the stem using the cross peen of the hammer and the edge of the anvil which has been ground to match all the peens of your hammers. Everybody seems to rave about how sharp an anvil’s edges are when in truth all you really need is an inch or two of “good” edge. This fullerizing is best done at a relatively low heat, say a cherry or so. Fuller should start just after the taper, i.e. on the section of the strap as yet untouched. Try not to fold the iron. Some flat blows may be necessary. The fullerized section should end up about ½ in. by ¼ in., no less.

![Diagram](Image)

**Step #3.** By now you should have something which looks like an “arrow head.” Again using the peen of the hammer fuller the “arrow head” so as to increase the width of the “head” by about double. The direction of the peen must run the same direction of the strap. Be careful not to hit in the stem area, because as the “head” widens it will also become thinner. Don’t worry about the peen marks.

**Step #4.** Start to fold the arrow head in half. This is done with the peen of the hammer on the table or step of the anvil. The fold or angle will end up around 90 degrees or so.

![Diagram](Image)

**Step #5.** To complete the fold take a good heat but watch out the tip doesn’t burn. Fold the arrowhead completely in half starting at the point and working back. Be careful to keep the fold centered. Take your time lest you weld it shut. The fold should be tight at the crease and slightly open at the edges. This is done by striking the piece as shown in the picture — note angle of hammer to anvil face.

**Step #6.** Start to reopen the folded piece by placing it over a hardie and tapping lightly. Spread the piece enough to where you can lay it on the anvil “V” up and spread gently.

![Diagram](Image)

**Step #7.** By folding and unfolding the piece the vein of the leaf is formed front and back. Now is the time to add any embellishments to the leaf, such as notches or serrations, etc., while it is still flat.

**Step #8.** Make the leaf blade come to life by giving it some dimension. This is done by placing over the hardie and striking gently in the center with the corner of the peen. Then flick the tip over the rounded edge of the anvil.

![Diagram](Image)

**Step #9.** The leaf is nearly completed now and is ready to be trimmed from the stock piece. Cut the leaf just after the fullerized stem section on the hardie.

**Step #10.** From the remaining triangular shaped piece attached to the leaf blade, draw the stem down as shown. Now you must use tongs. Draw out square with the taper going toward leaf blade then round off the corners. Don’t try to make a longer stem by cutting the piece further back. That’s an awfully hard way to do it. Instead simply weld a rod to the stem if a longer one is called for.

Good luck ... once you get the knack of it they go very quickly and are very forgiving as far as mistakes go.

March 1979
FERRO FINISHING FORMULAS

About a year ago a suggestion was made to publish iron finishing formulas developed or improved by CBA members. Seven smiths sent in their favorite finish, which may be useful in your work too. If you wish to share your formula, please send it in for future publication.

BARRY BERMAN, Goleta, Ca.

Taught to me by Russ Le Croix Van Norden, an 82 year old blacksmith and a fine friend.

Take an old tin can and melt some beeswax in it — then pour in some turpentine and mix it up, about two parts wax to one of turpentine. Be careful pouring turpentine into can, so it won’t explode. When the mixture hardens, you have a good paste. What Russ did was to rub the paste on the piece with his fingers, using an old toothbrush for the hard to get spots. He then would rub the whole piece in very fine Humboldt County dusty dirt. Then he’d take an old nylon stocking and rub the piece down, it would look like it was 300 years old. I’ve seen some of the pieces, 10 years old, they still looked fresh, like he just finished them. You have to have the fine dirt, I haven’t found any here in Santa Barbara, guess I’ll move.

CARL JENNINGS, Sonoma, Ca.

The following is a rust finish for decorative iron work. Iron tends to return to its natural state, iron oxide, if it isn’t protected. If left alone to do so on its own it isn’t always too attractive. I prefer to control the rusting and speed it up, I do it with a solution of copper sulphate. Brush it, hit or miss, on oil free steel. Allow to set overnight, preferably outside. Rinse off next morning. After the work is dry, warm and apply Johnson’s paste wax or polyurethane.

DOUG CARMICHAEL, Petaluma, Ca.

My most used finish for iron work I learned from Carl Jennings. It is very satisfactory for interior work.

Powdered Blue Stone (copper sulphate) ¼ cup
Water 5 gal.

Strong solutions on clean, wire brushed iron will do a light copper plating effect. Weaker solutions left for short time will just darken the iron; left for longer periods will turn the iron red. Waxed rust.

ROBERT OWINGS, Point Reyes Station, Ca.

1) Clean metal with electric powered wire brush or sandblast.

2) Warm, using rosebud tip torch to a heat that is comfortable to touch, but uncomfortable to hold for extended periods. This evaporates the moisture on the metal surface and down in the pores and aids in the finish to flow across the surface allowing excellent penetration.

3) Apply finish directly onto the metal while the metal is still warm.

4) Wipe off excess with rags.

5) Finish may be later repeated cold to cold iron to build up coats. Avoid heating metal too hot with rosebud, it will: a) cause temper colors to appear. b) burn finish materials, change chemistry.

Finish mixture:
Approximately ½ boiled linseed oil and ½ marine type polyurethane. You can supplement this mixture with Johnson’s paste wax or beeswax or plain paraffin, clear shoe polish, etc.

Be generous in applying the finish, excess is easy to wipe off. Be sure to get down into all the cracks and crevices. Try different mixtures, experiment and maintain records of what works best for you in various conditions. You’ll have to go back over your work from time to time with this finish. It’s easy and quick. It’s an easy recipe for your customers to learn and maintain their own iron. With age and the building of layers of the finish, the metal takes on a beautiful antique-patina.

GEORGE ERB, Frazier Park, Ca.

I learned the following formula from a 72 year old blacksmith. Bring your iron to an even 600° F and quench in pure raw linseed oil. Let it soak for awhile, then wipe off. Now dip in the water for proof and watch the water bead on the iron as though it were a duck’s back.

The iron at 600° should absorb enough oil to give its own iron texture and water resistance that will last, according to the 72 year old smith, forever. I have been using this technique for some time with success, but I doubt it will last forever. I’ve discovered it is important not to be too much over or under 600° F in order to get maximum absorption of the oil.

JIM CONVERSE, Grants Pass, Oregon.

The formula I use is made up with diesel engine lub oil (Delo) or equivalent 30-w; not any mixed weight class. Cut with 10 to 15% kerosene, no substitutes. Bring work to temperature warm to the touch, but not hot. Brush on light covering of oil mix with paint brush, allow to stand ten to twenty minutes, then wipe off excess with cotton rag. This is good for non-salt air climate on most items in shop or under cover.

Ask a body and paint shop operator to mix ½ pint of clear automotive enamel, cut it with some flatter to reduce the gloss, add a little dryer or retarder to allow 1½-2 minute brushing time. Experiment with a couple of mixes to get the effect you want. Brush only, do not spray. Brush on completely a thin coat, set aside or hang on a wire to dry. This finish is excellent and strong, brings out the beauty of the iron. It hides nothing. The mix soaks deep into the pores and scale. After some trial and error you will get just the right amount of flatter in your formula to give petina elegante. Have your metal at ‘warm to touch’ temperature and clean.

E. A. CHASE, Ben Lomond, Ca.

For my traditional finish the following works very well; 1 lb. beeswax (paste Tree Wax or Simonize can be substituted), ½ pt. of turpentine — this amount depends if you brush or wipe — heat wax and turpentine together slowly, mix as required, do not overheat, maintain enough heat to keep mixture fluid. Heat your iron to 200-300° F, brush or wipe mixture on, buff with soft rag when cool. This finish is good for indoors only.

The following formula is for a rich greenish brown finish: copper sulfate 50% by volume, sodium thiosulphate 50% by volume, and water. Add chemicals to water and bring to boil. Apply the solution hot to preheated and well wire-brushed iron. Iron should be hot enough to boil off water. Brush solution on with successive applications, keeping metal hot, until desired color is achieved. Rinse thoroughly with water and let dry. Be certain all solution is removed, it is corrosive. After drying, wax for indoor use or varnish with a good quality urethane for outdoors. The color will darken with final finish.
THE BIRD submitted by Tom Bredlow
Tuscon, Arizona

½" ROUND

WELD

CUT

WELD

CUT

STRAIGHTEN

WELD

QUITE LONG

CUT

STRAIGHTEN

Paint it black and stick it down in somebody's garden as a surprise.
Control of Electrically Blown Forge Air
submitted by Frederic N. Lattin
Old Mystic, Conn.

Dear Dimitri:
Before proceeding with the subject of this letter, please allow me to introduce myself briefly. I am fifty-four years old, a Registered Professional Engineer in Connecticut, and have been employed as a mechanical engineer and middle management type for twenty-three years by Electric Boat Division of General Dynamics in Groton, Connecticut. I became interested in smithing about three years ago and decided to take it up as a part-time and ultimately a retirement avocation. I learned of ABANA and became a member about two years ago. I have acquired some equipment and a little know-how in the past three years, and am currently in the process of erecting a 16' x 24' smithy in Old Mystic, Connecticut. I attended the SUNY conference last April, which I found an outstanding experience . . .

I have repeatedly read requests in the ANVIL'S RING (including yours) for input of tips, methods, etc., to share with other smithing members of ABANA, and I have always said to myself, "I am an amateur and a neophyte and have nothing to contribute." I finally realized that although I may be an amateur with the hammer, perhaps I do have something of value to share and am enclosing descriptions of two devices for control of electrically blown forge air which I use on my forge. Since both these applications to smithing are original, I thought perhaps others would find them of use.

I am looking forward to the next ANVIL'S RING and the next regional or national get-together with interest and anticipation.

The two devices described below have been successfully used in controlling electrically blown air on my forge, and other ABANA members may find them useful.

I use a small centrifugal blower for air, originally part of a commercial beauty shop hair dryer. It is driven by a 1/10 HP universal motor, has a 4" discharge, and cost me $5 in the local junkyard in running condition.

Two problems arise in using such a small blower for forge air supply: precise regulation of the blow, and ability to turn the blow on or off rapidly (without waiting for the blower to come up to speed, or coast to a stop).

To solve these two problems I use an electrical speed control to regulate the basic speed of the blower, and a mechanical "switching" device to direct the air flow either into or away from the forge.

The electrical control is a simple modification of a wall-type lamp dimmer, which enables it to handle the inductive load of the blower motor. The circuit is shown below. All connections should be soldered and insulated with electrical tape. The parts should be obtainable at any good electrical and electronics store. I use the push-on/push-off type dimmer as being simpler to use than the turn-on type, although it really makes little difference.

![Diagram of electrical control circuit]

This modification will work for motors up to about 1/4 HP, and provide smooth speed control from stop to approximately full speed. In use, set the speed to the right blow for the fire in hand, and then basically leave the speed control alone.

![Diagram of mechanical "switching" device]

The mechanical "switch" for control of where the air goes is merely two damper units mounted in connecting ducting and linked together so that a single lever operates both.

The air ducting is arranged in a branched configuration, with one leg attached to the forge air inlet, and the other leg vented to atmosphere at a suitable location (where it won't blow dust in your face!). Each leg contains a regular stove pipe damper which are linked together so that when one is open, the other is closed and vice versa. With this rig a single lever travelling through a 90° arc will provide a complete range of control from all of the air to the forge to none of the air to the forge, or any desired point in between. The control can be instantly flipped "off" between heats, and just as rapidly returned to any desired level of blow.

My rig is made from 4" aluminum dryer vent pipe and fittings with two 4" dampers in a "T" configuration. A tighter air seal can be obtained by gluing circular pieces of felt carpet tile to the damper disc.

Other configurations are possible, of course, always remembering that you need two dampers working together, one opening while the other closes.
TOOL STEEL OR WHAT TO USE FOR MAKING THAT TOOL

submitted by Phillip Baldwin, Carbondale, Ill.

I have noticed that many blacksmiths are still using old leaf or coil springs for making tools, damascus, knives and other implements that are hardened. I'm not sure if this is due to the fact that most of the old blacksmithing books recommend using "spring steel" for fine tools or if it is out of romanticism or for the reason that old truck springs are cheap.

The meaning of "spring steel" has changed in the last fifty years. It used to mean tool steel that had been melted in a crucible and was therefore homogeneous and relatively free of slag inclusions. Now it means a hardenable, low alloy structural steel of medium carbon content. It does not get very hard and the analysis tends to vary considerably. You may have noticed difficulty in welding truck springs; this is due to the fact that most have a small percentage of chromium.

Steels may be divided into three main categories: structural, tool, and special purpose high alloy, which includes stainless steels. Structural steel is what buildings, gates, fences, etc. are usually made of and is, in the form of mild steel, what most blacksmiths use. You've probably noticed that you get laminations, cracks, hard spots and a host of other undesirable traits in mild steel. This is the nature of structural steels and they are of the lowest quality.

Tool steels, on the other hand, are very carefully manufactured to ensure homogeneity and high physical qualities. You know what you're getting and so can anticipate the correct treatment of the material. Sure, tool steel is more expensive in dollars per pound, but it's a lot cheaper in headaches and loss of time because of failed tools or returned work. Also your customer deserves the best you can give and old truck springs have been fatigued, and are of improper analysis to make a really good tool.

There are many different types of tool steel but only a few are suitable for blacksmiths. Most require very careful temperature controls and special equipment to be worked properly. This author has found the best all-round steel for the shop is W1 and W2 drill rod of approximately 1% carbon. This is readily available, relatively cheap ($1.20 to $2.00 per lb.), easy to forge weld and has a wide range of applications depending on the temper. You can even make excellent springs with it. It can be made very hard, it is quite tough and is great stuff to work.

If you're interested, there are many books on tool steels and their heat treatment and if you're interested in making fine tools, read them. Metallurgy has made great strides in this century and there is no reason why our profession should be left in dust, using 19th century metallurgy.

submitted by Larry Wood
Dayton, Ohio

When welding two bars in the forge by yourself bend one end into a loop so you can handle both bars from the same side of the anvil, instead of hanging one on the other side. Then after the weld bend the bar back out straight.
FRANCIS WHITAKER'S
SUPER RAILING RETURN JIG

submitted by Dimitri Gerakaris
North Canaan, N.H.

Francis Whitaker demonstrated the use of a most handy device at a gathering of New England smiths held last October at the Brotman Forge in Lebanon, New Hampshire. It is a jig used to avoid the high number of possible headaches which could easily occur when forging railing returns. This is applicable at transitions between stair and landing railings, at transitions where stair railings bend through a 90 degree arc or an 180 degree arc, or just about any other related situation.

Potential problems abound when bending a return due to the fact that a compound curve is being dealt with. For example; if you take a flat bar of iron and bend it 90 degrees and then bend it so it no longer lies in a flat plane, you will notice that the original bend is no longer a 90 degree angle; it will have tightened into a smaller angle. Therefore, what must be done is that the initial bend must be made at an angle other than the angle which is ultimately sought in order to compensate for the effects of the second bend (i.e., that bend which takes the bar out of the flat plane). This is not in itself difficult; what can be frustrating is figuring the exact amount of compensation required. Enter the Whitaker jig.

What the jig does is provide you with a device for constructing a PATTERN which can subsequently be used to gauge the correct, initial, compensatory bend of the actual hand rail. This pattern can be made of very light material, such as ½" × ½" stock, and can easily be altered in the necessary trial and error stages of the process, leaving the guesswork out of bending the heavier bar of which the rail is eventually made.

On this page you see some illustrations, the first of which was drawn by Harvey Brotman (see fig. a). It shows the components of this jig. I add that Francis has indicated it significant that the top flat guide be terminated close to the point of tangency with the pipe (see fig. b) whereas the bottom flat guide be extended about an inch beyond the pipe (see fig. c).

![Figure a](image)

![Figure b](image)

![Figure c](image)

bottom guide projects about an inch

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LIST OF MATERIALS FOR THE WHITAKER STAIR RETURN GUIDE

(A) 1 pc. 1½" O.D. heavy wall sq. tubing. 30".
(B) 2 pcs. 2" O.D. heavy wall sq. tubing. 2" ea.
(C) 2 pcs. 1" I.D. standard pipe. 7" ea.
(D) 2 pcs. 1½" I.D. standard pipe. 1½" ea.
(E) 2 pcs. ¼" × 1½" × 12".

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![Fig. A](image)
To use the jig, proceed as follows: Set it up so that the guides are the same distance from the central shaft of the jig as you intend the railing to be from the wall to which the railing will be installed (see fig. d, distance “x”). The distance from the top guide to the bottom guide (measured from the lowermost edge of the top plane of the top guide to the uppermost edge of the top plane of the bottom guide, whew!, see fig. d, distance “y”) should be equal to the distance between the stair treads. And, of course, the angulation of the guides should be equal to the angle of the railings.

If everything looks just right, next flatten this piece on your anvil with a hammer and PRESTO you have a guide for the correct amount of edge-bend required of your actual piece of hand rail before it is bent to accommodate the pitch required. And, hopefully, you have spared yourself from having a tremendous migraine headache — which is more than I can say to you, Francis, for letting me try to put all of this into words.

Making sure that all these spatial relationships correspond to the desired result, take a section of your light pattern stock (say 1/8” x 1/2” x 2 1/2”) and GUESS what the first angle should be (remember, if you are carrying a return through a 90 degree arc, your first bend should be much greater than 90 degrees; also keep in mind, you are constructing a medium line for your railing). This trial edgebend can be done with a combination of stationary and hand held bending forks. Next, clamp the top section of the pattern stock to the top guide of the jig (a vice grip or two will do nicely) and begin tweaking the piece around with a couple of tongs until the other half of the pattern lies flat on the bottom guide (see fig. e). Care should be taken that the bend be even and that a straight-edge laid perpendicularly across the rail be horizontal throughout; this is important for an even and uniform transition. If by the time you reach the bottom guide, you find that the angle is too great or too small, adjust the pattern with bending forks and “re-tweak” until all comes out right. You can lay this pattern on the stairs and see if it corresponds in pitch, curvature and distance from the wall.

Do it EVENLY. Hold and tweak; hold and tweak. You can do a little Samba with your butt if you prefer to keep the rhythm. Hold and tweak; hold and tweak. (South American blacksmiths are very good at this.)

SMOKELESS EXHAUST

submitted by Larry Smith, Plano, Texas

The December issue was fantastic. This has been my first year of membership, and I’m really impressed with the quality our magazine contains.

I do have a tip you may include in a future article. My hometown of Plano, Tx. has a city code which allows no open fires other than cooking fires. Well, someone called the fire dept. about coal smoke from my residence. The fire dept. and I had some words, and I was shut down without any blacksmithing future. The fire marshall, city code inspector, city health officer (violation of state air pollution laws) agreed to overlook me if I made no more smoke. I used charcoal with little success. Finally I made a trip to Birmingham, Alabama and bought 1,000 lbs. of coke for $47.58 from the Smokeless Fuel Company. That amount fit easily in my half-ton pickup. The result has been plenty of hot iron and no smoke.
The following tidbits collected from out-of-print books appear through the courtesy and efforts of Associate Editor, Jim Flemming. We hope you enjoy them.

From Hand Forging and Wrought Iron Ornamental Work, Googerly, 1911.

Spirals.—In Fig. 52 are shown a number of spindle-shaped spiral twists made from round stock and formed by hand with the aid of the hammer and anvil. Spirals of this kind may be used as embellishments in grille work, as finials, or as the tendrils required in some foliated designs.

The method of forming these spirals is very simple. The main thing in working them up is to have the twists true and uniform in spacing. In forming a spiral a piece of ¼-in. round soft steel is first heated on one end, and a considerable part of its length is drawn out with the hand hammer, giving it a long taper to a point at the end. The amount of stock required for the spiral is found, then measured from the point along the bar, bending it at right angles. About an inch of the point is also bent at right angles. The part of the bar that is to be formed into spiral shape is now heated. Starting at the point, it is rolled up by striking it with the hand hammer until one-half of the bar is coiled. The other half of the bar is now heated, and, starting at the corner of the bend, the rest of the bar is rolled into a coil until it overlaps the first coil.

![Fig. 52. Spindle-Shaped Spirals](image)

Fig. 53. Method of Forming Spirals

The illustration in Fig. 53 fully shows at A the method employed in this operation. The entire piece is now heated, and, catching the point and the stem with a pair of tongs, the coils are pulled apart as shown at B. The spiral is again heated, and, setting it in a bottom swage, it is hammered with a light hammer to round it. If any of the coils are too close or too far apart they may be trued with a tool like a screwdriver and which has a wide blade. This done by heating the spiral and pressing the coils together, then pressing the blade of the tool between the coils, giving it a twist, and thus forcing the coils apart. It is best to start at one end of the spiral and continue to the other end, moving each coil that needs it with the tool.

Two spirals of this kind may be twisted into one another, afterward welding the stem together. The points may be twisted together also. A spiral of this kind is shown at A in Fig. 53.

From Forge Notebook, G. J. Coleman, 1921.

1. Face.
2. Horn.
3. Hardy-Hole.
4. Pritchel-hole.
5. Heel.
7. Table.
8. Anvil block.
10. Straps to fasten anvil to block.
11. Rounded here.

Fig. 3. The anvil is indispensable, for upon it the smith can shape or form nearly any kind of forging work. The shape seems to be fitted for all requirements, and has not been changed for centuries. The best anvils are made of wrought iron. They are composed of three pieces: First, the base which is forged to required dimensions; second, the top which includes the horn and the heel. These are welded together along the lower broken line. Third, the face of tool steel which is welded to the top at the place shown by the upper broken line. The face is finished and hardened, and is then ground perfectly true lengthwise but slightly convex crosswise to help in drawing out metals. The corners are slightly rounded a distance of about 4° from the end of the end nearest the horn.

THE ANVIL'S RING
From The Practical Blacksmith, Young D.W., 1897.

Latest and most valuable welding compound for any kind of steel, Bessemer, cast steel, spring steel, steel to iron, iron to iron; excellent for brazing. It will also restore burnt steel and make it tough and good. It alone is worth the price of the book.

Take 200 oz. of pulverized borax,
2 oz. of sal ammoniac,
1 oz. of prussiate of potash,
1 oz. of yellow resin.

Put borax in iron pot, boil perfectly dry, after which put in crucible — or leave in pot — and fuse. When all melted to a strong red mass, add the rest (have all well pulverized first), stir well, then pour on sheet-iron pan. Keep from dust or dirt. It is claimed by the inventor that one pound of it is equal to four pounds of borax, and it will do twice the work of any other compound, if properly understood. A clean fire is the first thing needed.

Directions: — Heat to a red heat, scrape the cinders off clean with an old file, heat to nearly welding heat, applying a small portion of compound each time, heat to a good white heat, and weld as usual. Immature what sort of weld; cast steel to iron without welding heat. For ordinary use in cast steel welding, such as axles, springs, etc., you need not fuse borax. Use same ingredients, pulverize all fine together after borax has been boiled dry, then add 40% of iron filings or chips, and you will have an excellent and cheap welding compound, which will do good work. Apply No. 4 compound on welded part reheated, which will toughen and strengthen same.

Tempering Fluid to Make Very Hard.

Take 20 pints of good vinegar,
10 pints of rain water,
2 oz. of arsenic,
1/8 oz. of salt petter,
8 oz. of cream of tartar,
4 oz. of dragon’s blood.

Mix all well together. Shake up each time before using. It will make very hard, and is only used where extreme hardness is desired. It is excellent and has gained a great reputation in the German and Swiss machine shops. It will only require a short time to get thoroughly acquainted with the merits and use of this great composition. Testimonials from wherever used.

Compound for Case-Hardening Cast and Wrought Iron.

Take 1 oz. of lampblack,
1 oz. of chromate of potash,
1/8 oz. of aloe,
1/8 oz. of dry salt,
1/8 oz. of pulverized charcoal,
1/8 oz. of ox claw powder (burnt or baked hoof),
1 oz. of slat petter,
1/8 oz. of potash.

Powder and mix well, heat cast or wrought iron to a cherry red heat, then burn off in powder; repeat three to four times, then take same heat and plunge into cold water. No. 47 has been tried instead of water with good results.

From Practical Forging and Art Smithing, Googerty.

CASE HARDENING. Case hardening is a process of hardening or carbonizing the surface of wrought iron or machine steel, thus enabling the manufacturer to use a cheaper grade of steel for certain parts of machines where it may be made to answer the purpose. There are various methods of case hardening, of which one of the commonest is known as the “box method.” In this, the parts to be hardened are packed in a cast-iron box with ground bone and burnt leather; then placed in a furnace and heated. The depth of the hardening depends upon the length of time that the pieces are kept hot. Sometimes they are kept hot for as long as eight hours. When the box is removed from the fire, the contents are dumped into a tank of running water. Another and very excellent method consists in heating the steel in the forge to a red heat, covering it with pulverized yellow prussiate of potash, heating it again to a red heat, and then cooling in brine.

From Forging Practice, C.G. Johnson, 1938.

Characteristics of Common Metals with Their Annealing and Hot-Working Temperatures

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<td>Aluminum</td>
<td>Very good</td>
<td>900</td>
<td>650</td>
<td>600-900</td>
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<tr>
<td>Brass</td>
<td>Very good</td>
<td>400</td>
<td>1000-1250</td>
<td>*1000-1600</td>
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<td>750</td>
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<tr>
<td>Manganese</td>
<td>Excellent</td>
<td>Below room temp.</td>
<td>Anneals itself</td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>Fair</td>
<td>1110</td>
<td>1100-1750</td>
<td>1500-2300</td>
</tr>
<tr>
<td>Steel, Structural</td>
<td>Fair</td>
<td>900</td>
<td>1100-1400</td>
<td>1500-2300</td>
</tr>
<tr>
<td>Steel, High Carbon</td>
<td>Poor</td>
<td>1000</td>
<td>1100-1400</td>
<td>1400-2000</td>
</tr>
<tr>
<td>Silver</td>
<td>Excellent</td>
<td>390</td>
<td>500-1000</td>
<td>*</td>
</tr>
<tr>
<td>Tungsten</td>
<td>Excellent</td>
<td>Below room temp.</td>
<td>Anneals itself</td>
<td>*</td>
</tr>
<tr>
<td>Wrought Iron</td>
<td>Poor</td>
<td>900</td>
<td>*</td>
<td>1650-2450</td>
</tr>
</tbody>
</table>

*Usually worked at room temperature.
*Wrought iron is not cold worked.
*Perfectly pure copper may recrystallize at temperatures as low as 212°F. after severe cold working.

This table can be used for a general indication as to the proper steel to use for any given application:

- 0.06-0.12% Carbon — Used for welding work and automobile brake linings.
- 0.16-0.22% Carbon — Very tough. Used in building materials and machine parts.
- 0.25-0.30% Carbon — Slightly better quality of steel. Used in machine parts, gears, shafting, etc.
- 0.35-0.40% Carbon — Responds well to heat treatment. Used for connecting rods, crank pins, etc.
- 0.45-0.50% Carbon — Used in car axles, auger bits, screwdrivers, etc.
- 0.60-0.70% Carbon — Soft tool steel. Used in tools where a keen edge is not necessary, but which must withstand severe shock, as drop-hammer dies, etc.
- 0.70-0.80% Carbon — Toughness combined with hardness. Used for anvil faces, wrenches, etc.
- 0.80-0.90% Carbon — Used in hammers, hand chisels, shear blades, etc.
- 0.90-0.95% Carbon — Used where hardness is necessary, as knife blades, spring steel, etc.
- 1.00-1.15% Carbon — Used for axles, flint drills, etc.
- 1.10-1.25% Carbon — Used for tools where hardness is a prime consideration, for example, ball bearings, cold cutting dies, twist drills, taps, etc.
- 1.20-1.30% Carbon — Used where a keen cutting edge is necessary, as for brass and wood turning tools, etc.
- 1.30-1.40% Carbon — Used for boring and finishing tools, razors, etc.

A metals engineer once proffered a hint: if you know what kind of steel is commonly used to make something, you have a notion of how scrap might be utilized, e.g., according to this table, the same sort of steel, .45-50% carbon, is good for car axles and screwdrivers. It therefore follows that if you wanted to make a batch of screwdrivers, a section of scrap car axle might be just the thing. Ed.
health
and
safety

BEWARE THE ANVIL'S RING

by Stephen A. Mackenzie

The romance between the blacksmith and the general public has been a long and well documented one. The factors which attract the public the most seem to be both visual and auditory. The sound of the anvil can draw people off the street and seems to have an almost magnetic hold over some. When this is combined with the visual stimulæ of coal fires, falling hammers, the sparks and flying flux associated with a good forge weld and the changing color of the metal, the appeal is almost universal.

It is not too difficult to imagine some potential health hazards which the blacksmith should guard against. Excessive inhalation of coal dust, burns, particles of metal flying up into the eyes, and even undesirable radiation from the coal has been known to cause problems (Aubrey, 1977). These are not only of concern to the blacksmith, but also to anyone who spends much time in the shop, even if he does nothing more than hold a horse for the farrier (a farrier is a blacksmith who specializes in the care of horses feet). Unfortunately the factor which has received the least attention is the sound of the anvil, commonly referred to as the anvil's ring. It is the one factor which you are guaranteed to be subjected to when you enter a blacksmith's shop.

Listed in Table 1 are the results of sound level tests run on two farrier styled anvils of different manufacture. The tests were conducted in and outside the Farrier Shop of the State University of New York, Agricultural and Technical College, Cobleskill, NY. All tests were conducted using the same 2½ pound rounding hammer and the same #1 Diamond Rim Shoe. Figures represent the sound levels, in decibels on the A scale, recorded while standing next to the anvil. The show was put through normal shaping and leveling procedures which necessitated using the horn, face and tail of the anvil. It is interesting to note that the sound levels differed, depending upon which section of the anvil was being used. The tests were then repeated with both shop doors open to see if this would help reduce the sound levels. No substantial differences were noted. Lastly the tests were repeated outdoors with the anvil on the tailgate of a pickup truck. Many farriers work under these conditions when their customers do not have blacksmith shops. Sound levels under these conditions were higher, possibly due to the effect of the tailgate.

Perhaps of more interest to the horse owner, groom or visitor in the shop is the information listed in Table 2. These readings were taken inside the shop at the position where the horse’s head would normally be, approximately 15 feet from the anvil. Although the readings are slightly lower than those taken next to the anvil, none are below 90 dB(A) and some are above 100 dB(A).

<table>
<thead>
<tr>
<th>Doors Closed</th>
<th>Centaur Anvil</th>
<th>Hay-Budden Anvil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horn (or Beak)</td>
<td>110 dB(A)</td>
<td>108 dB(A)</td>
</tr>
<tr>
<td>Face</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Tail (or Heel)</td>
<td>109</td>
<td>108</td>
</tr>
<tr>
<td>Using tongs at the Tail</td>
<td>115</td>
<td>108</td>
</tr>
<tr>
<td>Using center punch at Face</td>
<td>114</td>
<td>100</td>
</tr>
<tr>
<td>Doors Open</td>
<td>Centaur Anvil</td>
<td>Hay-Budden Anvil</td>
</tr>
<tr>
<td>Horn</td>
<td>110 dB(A)</td>
<td>106 dB(A)</td>
</tr>
<tr>
<td>Face</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Tail</td>
<td>109</td>
<td>108</td>
</tr>
</tbody>
</table>

| Outside on Truck Tailgate | Centaur Anvil | Hay-Budden Anvil |
| Horn | 116 dB(A) | 108 dB(A) |
| Face | 103 | 98 |
| Tail | 120 | 114 |

Table 2 — Sound Levels Taken Near the Horse’s Head. All readings were taken in decibels on the A scale.

<table>
<thead>
<tr>
<th>Doors Closed</th>
<th>Centaur Anvil</th>
<th>Hay-Budden Anvil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horn</td>
<td>102 dB(A)</td>
<td>107 dB(A)</td>
</tr>
<tr>
<td>Face</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Tail</td>
<td>98</td>
<td>100</td>
</tr>
</tbody>
</table>

The maximum level of sound allowed by the American Conference of Governmental Industrial Hygienists for continuous noise is 90 dB(A). Noise is considered to be continuous if it is interrupted for a period of one second or less (Olishifski and McElroy, 1971). It was noted during the tests that while working the shoe, hammer strikes came at intervals of less than one second and the needle of the recording meter never dropped more than 2 dB(A) at any time during these intervals. Under these conditions, the anvil's ring should be considered a continuous noise. Noise levels above 90 dB(A) are allowed, but for much shorter time periods as is indicated in Table 3. Caution should be used when considering these guidelines. Nowhere is it stated that lower sound levels or shorter time periods are perfectly healthy. Therefore we should not assume this unless future studies so indicate. What these guidelines do suggest is that sound levels and time periods in excess of those listed in Table 3 are so clearly detrimental to our hearing that even the Federal Government felt compelled to restrict the exposure of its workers to them. This in no way implies that lower levels or shorter time periods are completely safe.

Since anvils of different manufacture may ring at different sound levels (see Table 1) and there probably are many variables involved with the level of sound produced; perhaps each blacksmith should have tests run on his own equipment and compare his conditions to those listed in Table 3. If he finds that he is anywhere near these guidelines, he would be wise to consider using some form of hearing protection. Excessive noise exposure can cause what is known as sensorineural hearing loss, which is almost always irreversible (Maritime Safety Institute, 1977). What this really means is that you may go partially deaf with no chance of ever getting that part of your hearing back.
This study is, at best, preliminary. Much more work needs to be done, not only on decibel levels, but also on the frequency of the sound. However, this study should serve as a warning to all those who spend much time around blacksmiths at work. Under certain conditions, the ring of the anvil can reach sound levels far in excess of the allowable limits set by safety agencies and even the Federal Government. Until this phenomenon can be studied in more depth, we would be wise to find ways to safeguard our hearing. It is possible that in some cases the anvil’s ring may cause irreversible hearing losses in humans. What effect it may have on a horse is anyone’s guess.

Table 3 — Permissible Noise Exposure. (Taken from the Occupational Safety and Health Administration, Standards Table G-16 1910.95)

<table>
<thead>
<tr>
<th>Duration per day, hrs.</th>
<th>Sound level, dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>1½</td>
<td>102</td>
</tr>
<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>½</td>
<td>110</td>
</tr>
<tr>
<td>¼</td>
<td>115</td>
</tr>
</tbody>
</table>

REFERENCES CITED

ACKNOWLEDGEMENTS
The author wishes to thank Mr. Ron Nielsen, Safety Director for S.U.N.Y. at Cobleskill for assistance in recording sound levels.

ABOUT THE AUTHOR:
The author is a former self employed farrier-blacksmith with experience shoeing all types of performance horses. He has been the farrier for the State University of New York, Agricultural and Technical College at Cobleskill, NY for several years and is presently serving as a Lecturer in their Animal Husbandry Department.

NEW TRENDS NOTED AT WINTER MARKET SCREENING

NEW PALTZ, N.Y. Several interesting trends were noted as judges completed a rigorous two-day screening session recently to select 350 craftspeople for exhibition space at the third annual Winter Market in the Baltimore Civic Center, February 21 to 25. More than 1,100 craftspeople who live and work in states east of the Mississippi submitted 5,500 slides in the competition for space in the exposition which is organized by American Craft Enterprises, Inc.

"Attending these screenings over the years," said Ms. Sedstrom, President of American Craft Enterprises, Inc., "I am impressed by the continuous innovative quality seen in the work of craftspeople..." For example, the combination of forged iron with ceramics was unusual this year. We saw slides of a hanging flower pot suspended in a forged iron bracket, and a ceramic teapot with a forged iron handle. These works exhibited a sure command of both media."

Sled in Mild Steel and Wood. 17" × 37". by James Wallace, Memphis, Tenn.
NOTICE
Some of the December issues of the Anvil's Ring were returned due to incorrect addresses. If you are in contact with any of the following people, please have them contact us with their proper address:
G.R. Carlock
William B. Pratt
Dave Plowman
Richard Dyer
Wayne J. Mullineaux
Alice's Forge
Pat Ann Feinberg

Coming Next Issue!
—Tom Bredlow initiates his new column, “Burbles from the Slack-Tub”
—Dr. Raymond Sobel, probably the world's only practicing Psychiatrist-Blacksmith, writes on the psychology of creativeness (presented at the S.U.N.Y. Conference as a speech).
—Jim Fleming presents information on the tooling, operations and maintenance of the power hammer.
—Yellin photos
—Some information, with photos, on the Japanese blacksmith shop.
—Hammer Marks by Smith
—Tips and Techniques
—And, of course, much more.
—Extensive coverage, with photos, of the opening exhibit “House Jewelry” of the National Ornamental Metal Museum (Feb. 6 — June 1).

Remember, all material, be it questions, tricks, opinions, ads, photos, whatever, for the next issue, which shall appear next June, should be received no later than April 7 by your editor:
Dimitri Gerakaris
The Anvils Ring
The Upper Gates Rd.
North Canaan, N.H. 03741
HAMMER
MARKS
by Smith
1979

Not available in any store

The songs of SUNY

Lost.

Great work songs.

Ballads from the conference in purchase, as:

* Count'n Holes in my flannel shirt.
* Drawn out tales of steel.
* If you can you can rag.
* There's steel in my pennies or forging slugs in '43.

* And the disco hit!

Scrap like that.

March 1979