STUART HILL JOINTS

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HAMMER’S BLOW

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ON THE COVER: Patent drawings of the Stuart Hill Joint,
sent by Paul Boulay... story on page 17.

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NOTICES

From Your Editor

By the time you read this, the ABANA conference will be another one for the history books. But since it hasn’t happened as I write this, it gives me a chance to make a prediction, and you can tell me if I’m right.

First prediction: something will go wrong, and you’ll hear about it loudly in no uncertain terms from several sources. It will probably be a simple mistake, obvious with the benefit of hindsight. At the time, it may seem like a huge deal. It’ll be regrettable, but the show will go on, and we’ll all survive to read my little note here.

Many aspects of ABANA conferences are handled by individuals who are, more or less, brand new at the job. It is such a huge undertaking that we’ve never had a conference chair who has said, at the end of the show, “that was great... I can’t wait to run another conference!” You’re far more likely to hear sentiments like, “I’m never doing that again!”

We also have a core group of volunteers, notably the setup crew, who have done several conferences. Their experience is invaluable, and we can’t manage without their help.

So each conference is put together by a large number of people who-at their core- are motivated by a simple love of blacksmithing. Sure, there are some other factors depending on where you look... the vendors want to make a living by selling more, so they help out to increase the numbers. Demonstrators will often want to promote their own work to a wider audience, and rightly so. But the vast number of people working on a conference are there for altruistic reasons, and simply want to help make our craft and our organization better.

These contributions are far too often underappreciated, and it is an unfortunate truth that complaints will echo the loudest after the conference.

If you went to the conference, it is my deepest hope that you had a fantastic time, everything exceeded your expectations, and you’re ready to renew your ABANA membership and start a special savings account for the next conference.

But if it fell short in any way, I hope you remember to think about the people who have donated so many hours of their time to put this conference together. It is a huge undertaking, and it never goes perfectly.

The conferences are an important part of ABANA and the fabric of the blacksmithing community. Just as this conference was different from conferences past, they will continue to evolve to meet economic realities. I hope that you’ll support ABANA and the conferences by attending whenever you can... I hope to see you there.

Brian Gilbert, Editor

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SPRING 2010
Iron In The Blood
by Frederick John Pope
Illustrations by Emma Douglas and Barrie Pennell
Softcover, 312 pages, $29.99
Published by TuCan Books
Reviewed by Brian Gilbert
This book is a personal narrative and autobiography by blacksmith Bob Oakes, who works under the alias of Frederick John Pope. It’s not a technical book— you won’t learn much about making tenon joints here—but you can learn about the experiences of an individual who has been a professional blacksmith for over forty years.

One of my favorite passages deals with some of the surprising questions that blacksmiths often endure while demonstrating. Perhaps you’ll remember these classic favorites:

“What do you do for a real living?”
“This is a craft that died out long ago.”
“Do you make everything out of horseshoes?”
“How many times a day do you set yourself on fire?”
“Look at this funny man dressed up as a blacksmith!”

While this isn’t my usual first choice for reading, I am enjoying this book more than I thought. It is somehow satisfying to read of someone who has had similar experiences in professional blacksmithing. While the situations are of course vastly different, some of the experiences are similar. Mr. Pope has worked in England, and being born shortly after WW2, belongs to a different generation than I. But it’s still a fun read.

This book can be ordered via Paypal at www.teachblacksmithing.com, or for more info, email: boboakes@teachblacksmithing.com

The Smithy’s Craft and Tools
by Otto Schmider
Softcover, 128 pages, $58.00
In English, German, and French
Published by Wasmuth, 1981
Available in the US from Blue Moon Press
www.bluemoonpress.org
Reviewed by Brian Gilbert
This book is one of my very favorite reference sources. The late Otto Schmider was a classically-trained German blacksmith who worked in Austria. He wrote four books: Werk und Werkzeug des Kunstschmieds, (Work Methods and Tools of the Artists—Blacksmith) Der Kunstschmied Otto Schmider, Schmiedearbeit am Haus, (Wrought Iron for the Home) and Für den Kunstschmied (For The Artist, Smith, sometimes translated as Wrought Iron Artistry). His books are still in print and available from various sources, which is a real testament to the quality of his work. Schmider’s shop in Vienna is preserved as a museum at #9 Schonlantergasse street.

This particular book deals with the work methods and tools of the artist-blacksmith. It is primarily composed of drawings of the various tools he used and how they were applied. There are photos as well that show various views of his shop, his tools, and his designs. There isn’t a huge amount of commentary... most of this consists of captions... and these are written in English, French, and German.

But in many cases, commentary isn’t needed, as Schmider’s designs stand on their own. His work appears simple at first glance, but upon closer examination you see a graceful, flowing character that was clearly years in the making.

This is one of those classic volumes that belongs in every blacksmith’s library. One of his other books is available from Blue Moon Press (Für den Kunstschmied) and others can be found at Artisan Ideas (www.ArtisanIdeas.com). All are highly recommended.
SHOP TIPS

Alternative Quench Buckets

Douglas Linn, Adams, Wisconsin

While reading the article about hot oil and plastic buckets, the thought came to me that many metal buckets are soldered and would melt at the temperatures the oil might raise to.

A good alternative that can be found without much cost are the enameled canning vessels; these come with tops that can be used to smother a fire if it breaks out. They can be found at resale shops, yard sales and auctions. They are big enough to handle most parts you will be quenching. They are bigger around than a plastic bucket and do not have joints that will come apart.

More about Soldered Joints

John Zile, Indiana Blacksmiths Association

Blacksmithing brings many dangers into our shops, not the least of which is fire. This article reminded me of a fire in the shop of a well-known and respected smith in the Midwest.

While quenching jack hammer bits in a 5-gallon bucket, the quench oil flared and was covered to smother the flames. The oil was so hot, though, that it melted the solder from the seam in the bucket. When the oil leaked out it re-ignited, flowing to the walls of his shop setting it aflame, burning it to the ground.

Any bucket used for quenching, I believe, should be of welded construction. Firefighting equipment should be evident in all shops, and all should know what to use on different types of fires, before a fire starts.

This story happened a long time ago, and was told to me by the owner, and others, and it’s related here as best I remember.

Many will know of this incident, but it is not my place to name the person. He is a fine person, a very well respected smith, and a very professional craftsman. It was an unforeseen accident, but one that all smiths should be prepared for.

Dues Decrease for Two-Year Sign-ups

Due to these difficult economic times, ABANA has discounted our rates for two-year memberships. Effective October 1:

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SPRING 2010
NOTICES

Visiting Assistant Professor of Art-Metalsmithing/Jewelry

Deadline August 1st. Kansas State University. Three-quarter time, nine-month, non-tenure track position, with a possibility of contract renewal up to 5 years. Required qualifications: MFA, knowledge of historical and contemporary concepts in metals, good organizational and communication skills. Strong exhibition record and college-level teaching beyond graduate teaching assistantship is strongly preferred. KSU is an equal opportunity/affirmative action employer and actively seeks diversity among its employees. Background check is required. Contact: Elliott Pujol, 785-532-6605, hepujol@ksu.edu, http://www.k-state.edu/art/

Kolbermoor Biennale Blacksmithing Conference

I hope to be in time with some information about the Biennale of Artist Blacksmiths in Kolbermoor, Germany 5th to 8th of August 2010. The program is about to be finished and will be published on www.metall-aktiv.de

What I can tell you today is that there will be several forging workshops on the program with master blacksmith Helmut Brummer with the new bronze "Ecoform." It was developed by a big German factory (Wieland Werke) - primarily for industrial use. But Helmut discovered this bronze is very good for forging-it is "smooth like butter," as he factory and Helmut says.

The workshops in Kolbermoor will be held on Friday, 6th of August, and Saturday, 7th of August, at 9 a.m. and 3 p.m. - and if necessary on Sunday, 8th of August, 11 a.m.

There will be the regular auction in Kolbermoor - if a blacksmith donates a piece for it (worth around about 25 Euro), he will get free entry to the festival. Spread the word!

Besides others, Heiner Zimmermann will give a lesson about the Stenebyskolan in Sweden, where he has worked as a professor since autumn 2009. Those who do not have a "Matura" diploma can study blacksmithing and metal design in Steneby from this year on without an academic background. They only need good knowledge (and ambition) in metal design and forging.

And there are many many more things to happen in Kolbermoor, e.g., the HEPHAISTOS bookstore (with over 300 titles of books about blacksmithing and metal design or the Angele suppliers store). On our website www.metall-aktiv.de you can find the address of Christian Potsch, city of Kolbermoor, who can help with hotel room reservations this year. Or call me +49 (0)8379/728016.

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Tobias Schumacher, HEPHAISTOS

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An Eight-Bar Grille- Part 2

by Kent Hepworth
Powell, Tennessee

Hole Spacing Adjustment Process:

This is the most crucial step in the elements’ adjustment process. Spacing between each of the pairs of pierced holes of each element must be nearly identical. A small tolerance is permissible for assembly; however, the larger the tolerance requires larger pierced holes resulting in a sloppy and loose-fitting grille— or to put it bluntly— poor craftsmanship! Each punched hole must be sufficiently large to allow a hot-rolled 3/4" bar to slide through, without binding or producing an interference fit; but, with no more clearance than just sufficient to allow slippage of the 3/4" bar.

I find it is easier to lengthen the spacing between the pierced holes (i.e., draw-out) than to shrink the spacing (i.e., upset). Hence, it is important to find the element with the maximum spacing between its ‘near’ and ‘far’ pierced holes. To accomplish this task: 1) Place all the ‘near’ punched holes of each of the elements on an 18" long, 3/4" bar; 2) Now examine the location of each element’s ‘far’ pierced hole to identify the element with the widest pierced hole spacing; 3) Select a second element with the next-widest spacing (with reasonable luck these two elements’ hole spacing will be nearly identical). Using these two widest-spaced elements: 1) Place their ‘near’ pierced holes on one of two 18" 3/4" ‘check bars’ (used to check the alignment and spacing of the pierced elements) with the pierced elements widely spaced on the space check bar, approximately 1" from the ends of the check bar; 2) Take the second check bar and pass it through the ‘far’ pierced holes of the widest spaced elements, again leaving approximately one inch extending from each pierced hole; 3) Carefully measure the distance between the ends of the check bars passing through the pierced holes (it makes no difference if your measurements are inside, outside or between the check bars, centers). If the distance varies more than a few thousandths it is best to take the shortest of the widely spaced element and draw it slightly to make the element’s hole separation distance more nearly equal. The method to draw (or increase) an element’s pierced hole spacing is to evenly hammer the element all around the periphery between its pierced holes (note— it does not take

many hammer blows to draw a few thousandths of an inch; however, be sure to distribute your hammer blows evenly around the element’s periphery between its ‘near’ and ‘far’ piercings!).

When the hole spacing distance is equal, insert the element back onto the two 3/4" check bars. Now repeat this drawing process for the remaining six elements by carefully drawing out between the pierced holes, so that each element will easily slide on the check bars. Note: If there is a flyer in your batch of the eight elements with its pierced hole spacing exceeding the other seven elements, then it may prove prudent to upset the spacing between its pierced holes to bring it in line with the other seven elements.

This upsetting process is accomplished by using two short lengths of 3/4" cold-rolled bar placed in each of the long element’s pierced holes, then place the element in a post vise with the far hole’s 3/4" rod resting on top of the vise jaws. Heat the space between the holes to a good forging temperature using a fuel/oxygen torch heating tip (I use propane as my fuel; however oxy/acetylene or oxy/propane would be just as good). Keep the pierced hole walls as cool as reasonable. Then with the two 3/4" bars in place, use appropriate hammer upsetting blows on the elements end to upset (i.e., narrow) the space between the piercings.

When all eight elements fit on the check bars you have completed all the steps in the straighten, alignment and hole-spacing adjustment of the 8-bar grille, see Photo #8.
Fitting the Elements Together

The final step in completing the project is to put the elements together to form an assembled 8-bar grille. This step is easier to visualize than verbalize. Form two 4-bar sub-assemblies as shown in Photo #9.

The two 4-bar sub-assemblies are brought together to form the 8-bar grille, as shown in Photo #10. Unless you have done an absolutely masterful job of straightening, twisting and spacing adjustments there will be some binding, along with friction, to overcome but with a little encouragement using a hammer and possibly some assistance using bar clamps, the 8-bar grille assembly will go together as shown in photos #10 and #11. Use either a ‘gauge block’ (sized to correspond with the inside spacing between the pierced ‘near’ and ‘far’ holes of an element) or tape measure to get the grille spacing properly adjusted (remember... tweaking can take forever, so stop when good enough!). The 8-element grille is assembled in Photo #12.

Decorating the Assembled Grille

The final step for the 8-bar grille is your personal artistry in forming the ‘vine and leaf’ or other custom decoration. As discussed earlier, a choice is made as to whether to leave the two longer elements with the extension for the vine and leaf on the ‘near’ side (i.e. close to the pierced holes) or on the ‘far’ side. Travis chose the ‘far’ side while I chose the ‘near’ side. As discussed earlier, my rationale was to allow me to fully draw the vine stem and form the leaf before grille assembly. Travis had the luxury of having plenty of helpers to hold his assembled grille while he did the forming of his vine's leaf. (Remember for the ‘far’ side, selection of the ‘leaf bulge’ must be sufficiently small to allow it to pass through the piercings). The vine and leaf have a function, in addition to providing decoration, which is to fix the assembled grille in its final position. As seen on Photo #13, I wrapped my vines around two of the sliding members to absolutely secure the grille. Travis used his vine to further bind the grille without using its stem as a wrap, see Photo #14. Note: in reality there is little concern about the grille changing position due to the binding and friction resulting from the 16 pierced holes and the inherent distortion due to the many blacksmithing operations performed in the construction of the grille. If one is concerned about the possibility of the grille subassemblies moving, another alternate simple fix is to drill a hole through a pierced hole and its pass-through element and insert a pin.

Building a Display Frame for the 8-Bar Grille

One way to display the 8-bar grille is to construct a platform, or a frame. At the Annual 2006 Alabama Forge Council (AFC) September Conference at Tannehill Historical State Park, McCalla, Alabama, Tsur Sadan demonstrated the making of an 8-bar grille assembly out of 5/8” cold roll and he mounted his grille assembly, using pierced standoffs, to a piece of plywood. Tsur demonstrated two basic options for fabricating standoffs: 1) a round-headed standoff; and, 2) a rivet-headed standoff. Sadan’s standoffs are illustrated on Photo #15.

A frame system was chosen to showcase my 8-bar grille, see Photo #1. In keeping with the Renaissance period theme of this grille project, I chose a rough cut frame constructed of Purpleheart. To maintain the Renaissance theme a half-lap joint system was used to form the Purpleheart frame’s joints. Rivet head standoffs were constructed to secure the grille to its frame. The rivet head standoff’s construction is similar to that for the grille elements piercing, as shown in Photo #16: 1) a 4 1/2” length of 3/4” hot-rolled is first pierced with a 3/4” hole; 2) then a hardy hot cut is used as a butcher to form a collar; 3) using a
3/8" spring swage, a tenon is drawn. To form the rivet head: 1) place the standoff in a post vise; 2) insert a short 3/4" hot-rolled rod in the pierced hole; 3) then with a fuel/oxy torch, locally heat rivet stud to a forging temperature and hammer in the facets for the rivet head. A file is used to form a sharp collar shoulder; alternatively, a monkey tool could be used for this purpose. A 7/16 x 14 tpi die was used to form threads on the standoff’s tenon. I constructed square 1 1/2" x 1 1/2" washers from 1 1/2” x 3/16” hot-rolled flat stock with a centered 7/16” punched hole and the edges of the washer chamfered (see Photo #17).

Concluding Remarks

The AACB 2nd Annual Teaching Workshop project to build an 8-bar grille was very challenging due to the fact that it required planning. Its execution mandated using just about all of the blacksmithing fundamental procedures: cutting, bending, twisting, punching, drawing, upsetting and heat treating (the only fundamental not required is forge welding). This project emphasized precision in measurement, but gave us procedures to correct our inconsistencies in applying the blacksmithing fundamental procedures. At the workshop we learned and practiced all the processes and procedures required to build necessary tools and use them in the construction of a grille. We gained sufficient skills and the confidence to complete all of the tasks involved and we were well equipped to take any unfinished portion of the grille back to our home blacksmithing shop to complete the project and teach the fundamentals learned to our local guild colleagues. The workshop was well planned and executed. Travis Fleming used the teaching process of first demonstrating a task, followed immediately by the participants performing the task under his guidance. All materials and adequate equipment were furnished by the Fiddlers Grove Blacksmithing Association and sufficient helpers were available to assist the workshop participants. We were even treated to sumptuous lunches both days of the workshop. I thoroughly enjoyed my time there and feel the blacksmithing project and information presented were at a professional level. I certainly know my blacksmithing skills were challenged and my fundamental blacksmithing skills were sharpened. I feel I am prepared to take back the skills and techniques learned in order to train my local chapter members in applying the abilities honed at this workshop.

Acknowledgements

Appreciation is expressed to Travis Fleming for all his hard work in teaching and keeping all us "renegade blacksmiths" heading in the same direction. Travis was well prepared, good humored and truly helpful to all us participants.

I wish to thank my wonderful wife, Paula, for serving as my blacksmithing assistant during this AACB Workshop. Paula held the grille elements for me during all 16 hole piercings. She made sure I held the sitting chisel in perfect alignment and maintained its vertical stance, as well as insuring I followed proper drift operation protocol! Her admonitions were always correct and delivered with her typical good grace and humor.
Controlled Hand Forging Conclusion

By Dan Nauman

Kewaskum, Wisconsin

Many of us learned to forge through the proverbial "School of Hard Knocks." We may have gone to conferences, workshops, lectures, bought books on forging, joined ABANA, and joined ABANA affiliates. We may have sought out individuals whose work was intriguing to teach us. Personally looking back, I had no clear direction, no course of study, and no path to follow. I realized, through conversations with many others, that something needed to be done to address these problems. But what?

In 2001, Bob Fredell and I were on the ABANA Board of Directors. Both of us wanted to see ABANA offer a series of forging lessons to the membership. At a meeting in La Crosse, WI, the idea was approved by the ABANA Board. The result was a grass roots committee consisting originally of Jay Close, Bill Fiorini, Bob Fredell, Lou Mueller, Dan Nauman, Peter Ross, and Doug Wilson. We met at my home in Kewaskum, WI, to discuss just such an idea. The outcome was a commitment to author a series of lessons to be published in the *Hammer's Blow*. A lesson syllabus was formulated by the committee, addressing nine basic forging units consisting of: Drawing out, Upsetting, Punching, Drifting, Cutting, Joints, Bending, Twisting, and Forge Welding. Along with several lessons in each of these units were dialogues on shop safety and layout, and several forging exercises involving multiple units. The aim was to provide lessons in forging process... not our ideas of design.

The target of these lessons was to teach a learning smith how to execute a form at their home forge, without the need of a teacher looking over their shoulder. Step-by-step instructions lead the student through the processes, and also warn of potential problems. If problems occur, the lessons reveal how to correct the situation. Forging dynamics, or what happens to the metal during the forging process, are also discussed, allowing the student to be more aware of what is happening to the material while forging.

The lessons also have specific goals, or targets, which are listed at the end of each installment. Graphics, provided chiefly by Tom Latané and Doug Wilson, coupled with photography, aid in the understanding of these lessons. In essence, our goal was to teach the learning smith to "see," a term coined by Peter Ross, meaning not only visually recognizing aspects of process and development, but also developing an intuitive understanding of such, while refining one's own workmanship.

Often, designing by committee can be a nightmare, but in this case, it became a gem. Each lesson was initially written by one committee member. It was then submitted to the rest of the committee for content, accuracy, understanding, sentence structure and word usage. This is where the power of these lessons lies, as each resulting lesson was not out of the mind of one person, but out of the minds of many seasoned smiths from around the country. The information was carefully critiqued, dissected, massaged, then often rewritten several times before being released for printing.

This process of critiquing often took several weeks and many hours on e-mail before the lesson was considered complete and ready for printing. Often, committee members would themselves learn valuable lessons during the exchange of ideas and thoughts.

The result of over nine years of hard work is 26 lessons, along with a handful of other installments and dialogues. Along the way, we lost, but also gained committee members. The current committee includes Jay Close*, Bob Fredell*, Dereck Glaser, Tal Harris, Tom Latané, Dan Nauman*, Peter Ross*, and Doug Wilson*. (Those with an asterisk by their name are charter committee members.)

With Lesson #26, (Hammer's Blow, Vol. 18, #1, Winter 2010) we come to the end of our curriculum. As committee chairman, I must applaud the endurance, and dedication from all the committee members for seeing this endeavor to the very end. It is rare for a committee to be so productive, let alone cohesive for so many years... and it has all been accomplished without harsh words or confrontation. This is a fine group of individuals, who have given a large piece of themselves to fortify the forging process. Might I add that not one committee member has ever been paid for any of their contributions. Personally, I am proud and honored to have served with all of these fine people.

So, where do we go from here as a committee? There is a renewed commitment to see these lessons compiled into a book. However, the lessons in the book will be different to some extent, as they will be reviewed, edited, and may have added content... everything will be revised in some manner.

The book will be arranged with the lessons in a meaningful order, and coupled with a study guide that gives the student some needed direction. There will be a glossary, and perhaps a small section with definitions of words and terms.

In closing, it has been a long but fruitful road. Before we start the book, we are all going to take a breather, as many of us need to spend some needed quality time running our businesses, with our families, and other aspects of everyday life. In the meantime, all of the lessons may be accessed and downloaded via the ABANA website, www.abana.org.

I would be remiss if I did not mention the hard work of the *Hammer's Blow* editor Brian Gilbert, who worked with us the full nine years, and did a fine job presenting these lessons in our association's instructional magazine.

All of us on the Controlled Hand Forging committee hope that the efforts we have made over the last nine years continue to help and inspire those who are dedicated to bettering their workmanship, and hope that these lessons also help you to pass the proverbial torch to others.- Dan Nauman, CHF Chair
Clay Spencer Gate Workshop

Ernie Dorrill

Madison County, Mississippi-Mississippi Forge Council

Based on a survey conducted by the Mississippi Forge Council in early 1998 of all members regarding their areas of preference, those responding indicated that ornamental/architectural outdoor applications were relatively high on their list of interests. As a result, the Mississippi Forge Council contacted Clay Spencer to determine his willingness to lead a workshop to build a gate. Clay graciously agreed and discussions began at the ABANA Conference in Asheville, North Carolina, in June of that same year. Clay suggested a proposed design be submitted to him with dimensions of all material for his review and subsequent additions, deletions or other changes that might improve design and structural integrity.

Over the next several months a preliminary design was developed with all structural components dimensioned and mailed to Clay. He suggested a few dimension changes and a final design was developed for a double gate with overall dimensions of 7'9" high and 6' wide. We also concluded the center of each gate would have dogwood stems, leaves and flowers as one of the signatures of Clay Spencer. Several black-line copies were made at actual size for Clay's final approval. Clay's comments were, "It's do-able." Six months had transpired from initial contact with Clay to final design, at which time advertisement, material purchase, scheduling, cost to participants, etc., proceeded.

The workshop was then scheduled for May 31-June 4, 1999 to coincide with and immediately follow the Mississippi Forge Council Annual Conference in Jackson, MS (approximately one year from concept). The workshop was to be 5 days, limited to 15 participants, and assistance was requested from Chris Marks and Glen Jarreau of Louisiana. Processes taught would include layout, forge welding, tenon development, slitting, punching, scroll development, twists, swaging, chiseling, chasing, repousse', collar development, riveting, etc. All components would then be assembled and finished along with recommendations for installation and maintenance.

There were no prerequisites for the workshop and there was a good mix of all levels of expertise and plenty for each individual to accomplish in developing the finished product.

Most participants took a week of vacation and paid a fee of $200 (not including travel, lodging and meals) for the opportunity to be led in the development of a pair of traditionally constructed gates by one of the finest architectural blacksmith instructors in the world.

The second gate of the pair was assembled after the workshop concluded with valiant efforts from Steve Paulson, Steve Norquist and Jim Pigott. Hinges for the gate were developed later by Tom Clark and the Brazeal Brothers (see Tom's touch mark on the gate), with the gate installed at the entrance to the Blacksmith Shop on the grounds of the Agriculture & Forestry Museum in Jackson, MS.

Through the legendary efforts of Clay Spencer and all participants, the artistic beauty of hand-forged ironwork has been preserved for future generations to see. We in the Mississippi Forge Council are humbled by such selfless enthusiasm and dedication to the art and craft of blacksmithing. (Photos chronicling gate development were formatted and digitally enhanced by Tommy Ward.)
Corneal Foreign Bodies

by Tom Pliura

Le Roy, Illinois

This article will focus on corneal injuries associated with the craft of blacksmithing.

Vigorously striking metal against metal occasionally causes small pieces of metal to fly into the air. Such activity is notorious for causing eye injuries. If you happen to be watching without the benefit of safety goggles, you are at risk for having a small piece of metal projected onto/into your eye. A small flake of metal in your eye is commonly referred to as a "corneal foreign body". It is not uncommon for blacksmiths to use high-speed grinders or metal brushes to finish their work. These are also common sources for corneal foreign bodies.

Corneal foreign bodies come in all shapes and sizes. They are often made of metal, but can also be wood, sand or any other material. They are usually very small, often less than 0.5 mm. They are commonly difficult to see with the un-aided human eye. The cornea is the outer layer of the eye over your pupil. Arguably, it is one of the most sensitive tissues in the human body, with lots of nerve fibers providing sensation to the eye. See Figure 1.

"I got something in my eye"

The instant that you incur a corneal foreign body, you will know it. Because of the profuse network of nerves supplying the cornea, the very moment the tiny fleck of foreign body strikes the cornea, you will instantly know it. You often feel intense pain. While small in size, it frequently feels like a wooden fence post has been shoved into your eye. The cornea is relatively soft and malleable. When a small fleck of metal strikes the surface, it often lodges firmly onto the corneal surface. See Figure 2.

The cornea can be described as having the consistency of a hard boiled egg that has had the shell removed. Imagine a small fleck of metal moving at a high rate of speed and then striking the surface of a peeled, hard-boiled egg. The metal flake "sticks" to the surface of the egg, ever so slightly embedding itself onto the surface. Even if the foreign body does not stick to the eye, it can cause a painful scratch on the surface known as a corneal abrasion.

When the foreign body strikes the cornea, the smith immediately knows it. Almost reflexively, the smith (or anyone else), will attempt to rub the eye in a vain attempt to remove the foreign body. Rubbing the eye actually makes matters worse. The eye "begins to water" profusely. Very quickly, the white portion of the eye (conjunctiva) becomes reddened and inflamed. If not removed within the first few hours, metallic foreign bodies can actually start to rust, further aggravating the matter. This can cause a "rust ring" even after the foreign body is removed.

Occasionally, the foreign body will not embed itself onto the soft cornea but instead becomes lodged under the eyelid. The underside of the eyelid is very soft. It, too, is conducive to having a foreign body adhere firmly to its surface. When the foreign body lodges onto the inside of your upper eyelid, each time you blink it has the potential to scratch the surface of the eye. In most cases, it feels like someone is rubbing sandpaper over your eyeball each time you blink... not fun at all. To find the elusive foreign body, you need to evert the eyelid and inspect the underside of the eyelid. See Figure 3.
Penetrating High-Speed Foreign Body

Rarely, high-speed foreign bodies can actually penetrate through the cornea and enter the inside of the eye. This is very, very bad, even if you don’t think so at first. If this type of unfortunate event occurs, very serious problems often result. If a foreign body penetrates into the inside of the eye, blindness can result. All foreign bodies which penetrate completely through the cornea and into the inside of the eye require immediate evaluation by an ophthalmologist (eye specialist), or you risk serious problems, including blindness.

Treatment

Unless the corneal foreign body is quickly removed, specialized medical treatment is often required. Most hospital emergency departments are equipped to treat and remove corneal foreign bodies. The doctor will likely use medication such as ophthalmic or similar eye drops to numb the eye. These eye drops give instantaneous relief from the eye pain caused by a foreign body. If a rust ring has formed on the cornea, a high-speed drill may be used to remove the rust deposit. Antibiotic eye drops may be prescribed to decrease the likelihood of infection. An eye patch is often recommended for the initial 12-24 hours.

Prevention

The potential for eye injuries from corneal foreign bodies can be greatly decreased by wearing protective safety goggles. Safety goggles are cheap and effective. They are a lot cheaper than a $500-$700 trip to the emergency room. Every smithy should have several pairs of safety goggles, readily available to prevent eye injuries.

About the Author:

Tom Plitura, M.D., lives in Le Roy, IL. He has been an emergency department physician for 27 years. He is just now taking lessons in the blacksmith trade as a hobby. He is being patiently taught by Mark Gardner of Flood Plain Forge, Farmer City, Illinois. Tom has recently learned it is very wise never to attempt to pick up metal lying on or near the forge with ungloved hands, even if the metal is not red hot. He has learned that black hot metal can burn!

Nelson’s Quickie Block

A cover for the anvil for straightening twists quickly.

By Mike Nelson

Marion, New York

1. Measure width of anvil.
2. Obtain wood block of similar width, mine worked with a 2x6. Cut to desirable length (mine is about 14 inches). I did not feel I needed to cover the entire length of the anvil.

3. Obtain some handle material. (I had some tines from an old rake.) Bend them over the anvil, leaving some length for handles. Groove the bottom of your wood to inset the handles and screws, and then attach the metal to the bottom of the grooves.

I have mine in a wall alcove just above my anvil for quick and easy grabbing.

I have been pleasantly surprised at how good an idea this was. I was a bit frustrated over finding a good wood block and how much room it took up. This solution came to me, and it really works great. I thought I should probably name it so as to get proper credit, and so I came up with Nelson’s Quickie Block! If anyone has already thought this one up, I would not be surprised—it seems so obvious to me now.
A Forged Corkscrew

By Jeremy Knipple
Merrifield, Minnesota

Here is the forging process: I start with a 5" piece of 3/8" round stock. The ends are upset for enough material to forge a 1/2" ball on each end. The balls get flattened slightly along with half a 3/16" diameter on one side for a linear depression (for the pivot lock).

I then forge the steel between the balls down to 1/4" round, this will yield approximately 8-3/4" total length. Next, the handle is shaped and the ends are aligned.

Another piece of 3/8" was upset for a 1/2" ball. This is the center piece that has the "worm" on it. Once the ball is forged I taper the other end from the edge of the ball. The diameter is drawn out to 1/4" round, tapering to a fine point for the shaping of the worm. The total length, including the ball, is approximately 4-1/2".

Editor's Note: Forging the "worm" can be tricky. Using some sort of mandrel probably won't work, since the finished screw needs to be fairly small. Most wine bottles are a little over 5/8" inside diameter at the neck, so the screw part should be less than 1/2" outside diameter. Forge it hot, over the edge of the anvil. It’s best if this piece is filed and polished as smooth as possible to prevent tearing out corks.

If forging this part gives you fits, it’s possible to cheat by buying an inexpensive corkscrew and using the worm part. Cut the forged ball off short, drill a hole, and silver solder the screw into the hole. Wrap the screw in a damp rag while soldering, though, or you’ll have to re-harden and temper.

Then I use a spring swage to form the raised grooves for the pivot lock. I drilled a hole through all 3 ends for an axle rod (3/16") which keeps the pieces in place during pivoting, while the handle acts as a spring to hold the position open or closed. The outer handle was drilled a drill-size larger for clearance, and the pivot pin was center punched in the middle for a press fit into the central worm part.

A grooved spring swage matches the other forging tool. A perfect fit can be had if you make this tool first, then use it to forge the pad used in the previous tool.

The forging sequence of the corkscrew parts. The top five pieces are the handle at various stages, while the bottom three parts form the center screw.
Forging Acorns From Steel Pipe

By Steve McGrew

Spokane, Washington

To forge acorns from 1" pipe, you need two important tools: a "pipe stake" and a "spring pipe fuller".

Tooling- A Pipe Stake

A pipe stake is made by welding two 5" sections of 1.5" round bar to a flat plate, and welding a 3" piece of 1" x 1" bar to the plate to serve as a tang to fit your hardie hole or to clamp in your post vise.

Spring Pipe Fuller

The spring pipe fuller jaws need to match the size of the pipe you will be forging. The width of the opening needs to be about 1.5 times the pipe diameter, and the height of the opening should be about one-fourth of the pipe diameter. The edges of the jaws should be rounded. The shoulders of the tool, which will meet when the tool is closed, should also be rounded. The pipe stake can be mild steel. The spring for the fuller can be water-quenched mild steel, but it's a good idea to use tool steel for the jaws of the spring pipe fuller, because it takes quite a beating.

In order to forge pipe, it is important to hit simultaneously from at least three directions, toward the axis of the pipe. The pipe stake ensures this, providing two "anvil" supports that hit upwards as the pipe is struck downwards by your hammer.

A spring pipe fuller actually hits the pipe from four directions (provided the opening is sufficiently V-shaped).

It's possible to forge a pipe using the step between the horn and face of your anvil, too, because the step provides two impact points.

Materials:

About 8" of 1" black iron pipe.

WARNING: Do not use galvanized pipe! It produces toxic zinc vapors when heated, which can cause "metal fume fever." A well-known blacksmith has died from complications due to zinc poisoning.

About 12" of 1/4" diameter mild steel rod.

Forging the Cap Overhang

The first step in forging an acorn is to forge the overhanging part of the cap.

Use the spring pipe fuller to neck down the pipe at an orange or yellow heat about 1-3/4" back from the end of the pipe. Always rotate the pipe about a quarter turn between blows. If you let the necked-down portion get too far out of round, it may be difficult to correct. Neck it down to about half its original diameter.

WARNING: When you quench pipe, make sure it is pointing in a safe direction, i.e., away from your body. It is very likely to blast scalding water for 10 or 15 feet! To prevent this, always plug the end of a pipe before heating with some form of cap. A wad of dry...
paper stuffed into the pipe works, and can be burned out when the forging is finished. If left unplugged, the pipe can conduct hot gases towards the smith when heating in the forge, as well as direct hot steam up the smith's arm when it is quenched.

At an orange-to-yellow heat, quench both ends of the pipe. The end that will be the nut should be quenched all the way to the neck, and the end that will be the cap and stem should be quenched not quite to the shoulder above the top of the neck. Work quickly at this point, because the neck and shoulder will cool quickly. The purpose of quenching is to minimize distortion of the pipe except at the shoulder that will become the acorn's cap.

Now drive the cap end into the nut end. The hot shoulders of the cap end will swell slightly and roll down over the cooled nut end.

Now use the pipe stake to forge the short end of the pipe down to a shape suitable for the nut of the acorn. As soon as the hole at the end is nearly down to 1/4" diameter, insert a 1/4" rod through the pipe, then forge the nut all the way to its tip. Just forge the tip of the nut down small enough to clamp the rod firmly in place. The rod gives your acorn some extra strength, prevents a hole from remaining at the tip of the nut, and helps if you plan to forge weld the acorn's stem to a branch and leaves later.

To complete the acorn, form the stem on the cap. Do that by using the spring fuller to neck the pipe down again, just above the rolled-over portion. Neck it down as far as it will go in the opening of your fuller, then move to the shoulder of your pipe fuller to neck it down to the final size.

Draw out more of the pipe to form a longer stem if necessary. Cut off the unused portion of the pipe.

Finish forging the stem and the tip of the nut, using the edge of your anvil. Forge the tip thinner and thinner until the end of the rod drops off.

Sand or grind the scale off the nut, leaving the cap rough. If you want to get really fancy, you can use a suitably shaped bolster to hold the acorn, and a "V" punch to texture the cap further. Apply wax or acrylic spray to prevent rust, and you're done!
The Stuart Hill Joint

by Paul Boulay

Campbell, California

Around 1980, designer and artist blacksmith Stuart Hill of Suffolk, England, invented a means for connecting two bars or tubes meeting at right angles. The Hill joint is strong and quick to produce and results in a distinctive design at the joint location. Stuart was granted British and US patents for his "Method of Forming Forged Joints" (U.S. Patent 4,631,797 issued Dec. 30, 1986.) I have heard some of our senior members mention that this joint was patented. What I had not heard in those conversations was that the patent was no longer in force. (Actually the patent lapsed in the US in 1998 due to non-payment of the year 12 maintenance fees. The patent has expired in Britain as well.)

The figure above, taken from the patent, shows the component parts of the completed joint. Items 10 and 11 are of course the bars to be joined. Item 12 is a stub of round or square tubing – roughly 2 times the diameter of the tube in both length and diameter. I am going to call this short length of tubing a collar. This seems an apt description of what it does but it is clearly not the sort of collar that traditional blacksmithing would recognize. The joint is made with the bars being joined cold and the collar at red/orange heat. The joint is pressed together until the bars touch. Then the collar is immediately cooled. This cooling causes the collar to shrink and lock the assembly tight.

Figures 1 through 3 from the patent illustrate the sequence, as the tubular stub is progressively deformed in order to lock the 2 bars together.

The collar can be made of either square tubing or round. Also the proportions can be varied somewhat to change the aesthetic result.

Stuart's patent teaches a second design. This design makes a "T"- joint between a bar and a larger diameter tube. This time there is no separate collar piece, but rather the larger diameter tube is plastically deformed to become a sort of self-collar wrapping around the crossbar.

Figures 4 through 7 show the steps in making the "T"- joint. Here the end of the large tube is heated and a saddle for the smaller tube to sit in is formed. While the end is still at red heat, the crossbar is presented and quickly pushed down to cause the ears of the large tube to wrap themselves around and lock it in place. As with the first design, as soon as possible the joint is cooled and the contraction locks the elements together.

These joints are obviously not traditional blacksmithing design patterns. But under the right circumstances they would be right at home in contemporary designs.

Well, that's all I have time for this time. Next issue I will report on my experiments. There will be some ideas about tooling with photos of trials with square and round collars, varying the length and diameter ratios, and some more about Stuart Hill.

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Klaus Pracht, Metal Works: Stuart Hill. (c) 1999, Ernst Wasmuth Verlag Tübingen, Berlin.
Using Files

by Brian Gilbert

Chattanooga, Tennessee

In the Southeast, we have a person who makes the rounds at the tailgate area of local conferences. He works at a file factory, and has access to a bunch of "factory second" files that he sells at great prices, and I managed to score some new files at this year's ABANA conference in Memphis.

Now I've been using files since I was young, Dad had the wisdom never to let me use his good files, as I had all the technique of a bear scratching his hindquarters—in other words, rub like crazy until you get the job done.

Of course, I've since learned that this is all wrong. My good friend and mentor Marsha Nelson taught me that you always use a file in one direction only, and you lift the teeth off the work on the backstroke. But it turns out there's far more to it than that, and I'm certainly no expert on filing. So I did a little research and came up with "Some Hints on Using Swiss Hand Files," by the Grobet File Company (reprinted in The Anvil's Ring, April, 1975), and Nicholson's Guide to Files and Filing. These articles are the source for much of what follows.

Before you start:

1. Your work must be firmly supported at the correct height.
2. The file must be clean and sharp.
3. Hold the file correctly, using the right amount of pressure.
4. Which file for which job? Generally, a "bastard file" is used for rapid stock removal, a "second cut" is finer, and a "smooth file" is finest and used to finish a job. (Swiss-pattern files are graded by number—#1 is coarsest, #2 has finer teeth, etc.) A "single-cut" file has rows of parallel teeth. A "double-cut" file has a second set of finer teeth cut at an opposite angle, resulting in diamond-shaped teeth. Double-cut files are used with heavier pressure and removes material faster than single-cut files. A "rasp-cut" has individual teeth cut in the face of the file, as in a farrier's rasp. These are good for hot filing or extremely rough work, such as the removal of mill scale. (Mill scale is extremely abrasive and should be removed with an overnight vinegar soak, sanding, or an old dull file. Never use a good file on hot-rolled steel without first removing the scale.)

A handy file to have in your collection is one with a "safe edge," or one side of the file with no teeth. These can be used in a slot, for example, to widen it without deepening it.

The most important thing to remember when filing is to avoid any sort of rocking motion as you stroke, which causes your work to develop a convex shape. Mounting the vise at the correct height and clamping the work properly helps you to develop a flat stroke.

The "correct height" varies according to the job. For most work, it should be clamped in the vise so the top of the work is about level with your elbow. If you need to do heavy work, you'll want it a bit lower. For precision filing, you will want the work mounted higher. Pad the jaws with wood or leather to avoid gouging the work.

There are four basic filing operations: straight filing, draw-filing, lathe filing, and fine precision filing.

Lathe filing uses a long file held while the work rotates. You could try it in a drill press. Keep the file moving with long, gliding strokes—this helps prevent chip buildup and clogging the file.

The type of work you need to do determines how you should hold a file, and there are several different ways to do this properly. For normal straight filing, the hands are placed for maximum pressure and average stock removal...Stand comfortably with your feet well apart to obtain a free swing from the shoulders, avoiding any separate wrist or elbow movement.

Heavy stock removal with a coarser file requires coarser teeth and a lower workpiece. Wrap your lead hand around the end of the file with your thumb pointing forward.

In filing, "feel" is an important part of the process. One of the quickest ways to ruin a good file is to apply too much pressure, or too little, on the forward stroke. Apply just enough pressure to keep the file cutting. If allowed to slide over the harder metals the teeth rapidly become dull. Too much pressure increases "pinning," where the file's teeth are clogged with metal. This leads to gouging and scratching of the work surface. Pinning can be prevented by keeping the file dry and free of oil. Rubbing chalk well into the teeth of the file helps; sidewalk chalk is inexpensive and large. In some cases, keeping a file stored in oil and used dripping works; I do this when lathe filing.
Flat filing requires an even pressure along the length of the file. Mount the work low, and spread the thumb and fingers widely. On the return stroke, lift the file clear of the work on all but the very softest metals. Even then the pressure should be very light, never more than the weight of the file itself.

Drawfiling is a different technique where the file is held perpendicular to the work, like a drawknife. The file is alternately pushed and pulled across the work surface, giving a shearing cut. When done correctly, drawfiling produces a very fine finish—finer than straight filing. Normally, a standard mill bastard file is used for drawfiling. For faster stock removal, a double-cut flat or hand file will work faster, but this leaves ridges that will have to be removed using straight filing.

Precision filing is often done with a finer range of Swiss pattern files. This requires a slow, smooth stroke and a light touch. When using round or half-round files, filing in a clockwise direction results in a deeper cut and smoother finish. Small "rifflers," often curved and pointed, are held in much the same manner as a pen or pencil. Larger rifflers are held with your index finger along the back to provide gentle cutting pressure.

Filing thin stock requires a fine-toothed file—there needs to always be several teeth in contact with the surface of the work at any time, otherwise the file will bind and the teeth will be damaged. Most files have teeth that are not designed to be driven against a hard, thin projection, and this sort of work will damage a standard file. A "foundry file" is made with sturdier teeth and can better withstand filing thin materials.

Be very careful when filing a sharp corner or point. This can cause "shelling," or breaking off individual teeth at the base. Just as with filing thin material, multiple teeth should be in contact with the work. Use a fine file, and stroke the file parallel to the direction of the corner first, until a flat has formed that is sufficiently large to contact multiple teeth.

A file should never be used without a handle. Handles can be purchased or made from numerous materials—I have a section of an old hickory shovel handle that I cut into handles as needed. I can get a pile of file handles from a single shovel. But just about anything can work. Hardwood drawer pulls, hardwood tree branches, old golf balls...just use your imagination. But never hit the file with a hammer to mount the handle. Instead, tap the handle against your anvil, letting the weight of the file set it firmly.

Good files deserve proper care, and tossing them in a box where their teeth can rub together can make even old, dull files completely useless for anything other than forge-welding into a tomahawk head. They should be kept mounted in a rack, or with their tangs placed in a row of holes drilled into a block of wood. They should be kept in a dry environment to avoid the possibility of rust, and stable temperatures will lessen the chance of condensation forming on the teeth, which leads to rusting. Wrap a file in a cloth whenever it needs to be transported. If you want to really baby your files, sew a nice cloth case, similar to a mechanics wrench roll, and keep them rolled up.

Keep the teeth clear of metal shavings with frequent use of a file card or a wire brush. Some smiths advocate using a flattened end of a copper or brass rod, bent into a hook shape, and drawn along the teeth. The copper quickly conforms to the tooth profile and clears away the metal shavings.

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