

# *The Anvil's Horn*

A Publication of the Arizona Artist Blacksmith Association

Issue No. 208 January 2021



*Our section in The Exuberance! exhibit at the Tubac Presidio in Tubac, Arizona*

# President's Message

Hi Everyone!

Can you believe that this year has come to an end! (or will be soon at the time I write this) I hope that you have been able to enjoy the holidays in any way that you can. This has been a truly unprecedented year and hopefully we never need to experience something like this again. For most of us, we have not seen each other since last January at Winterfest and unfortunately we will not have a Winterfest this year.

Even though we're distant, we still have our blacksmith family. With the hard work from Steve Miller, we've had three video demos so far and there are plans for more to come in 2021. If you have not had a chance, make sure you check them out. They are very informative, very well done, and, unlike a regular demo, you can rewind or watch them over again as many times as you want. The links to each video are posted to the AABA site. You should also subscribe to the YouTube channel under the video so you will get a notification when the new videos are posted.

As we adapt to this new era, let us know how we can improve or maybe you have something to offer. We are always open to suggestions and won't turn down a willing hand. Let's look forward to a great new year and hopefully we will be meeting in person sooner than later!

Keep on forging!

*Jason LaBrash*

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Material submitted for publication in the Anvil's Horn may be edited or rejected by the editor. Material submitted must be your own work, not plagiarized. By submitting material, you agree to allow AABA to edit, print, or post on the AABA website. You also give permission for the material to be reprinted by other blacksmith publications (i.e. publications of ABANA and of ABANA affiliates). **Copyright.** The creator may retain copyright for the work. If we publish a copyrighted item, consent of the copyright holder will be obtained before publication. **Graphics.** High-contrast, high-resolution digital picture files and original drawings are preferred, but we can work with lower-contrast, lower-resolution graphics.

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## Demonstration: January 2021

A virtual demonstration  
A link will be posted on the AABA website.

### Demonstrator: Dan Smith Planning a Project

Dan will be showing a Damascus knife and a forged skull, but this will not be a step-by-step demonstration of how to make these things. Dan will deal with the thinking and planning that goes into a successful project.

A link to Dan's video will be published on the AABA website ([www.azblacksmiths.org](http://www.azblacksmiths.org)) when the video is posted.

That link will also be included in the March issue of *The Anvil's Horn*.

Dan Smith is an adjunct professor in the Welding Technology program at the Austin Community College ([www.austincc.edu](http://www.austincc.edu)) in Austin, Texas.

Dan said, I would like to convey the idea of how metal moves using the basic premise that what is above and what is below the metal determines the shape. I want to do a slightly more advanced demo because I feel there are plenty of videos geared toward beginners. I would like to show different projects that I make in the advanced metalsmithing class: a damascus knife and a forged skull. The goal is not to show how to make these individual items, but the thought process that goes into how to get started with selecting stock size and estimating weight. I am not forging a Damascus knife!! I'll be just showing the steps for how I think it should go. ... I think it is important for blacksmiths to know how much planning, thought and daydreaming goes into planning a project.

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## Interesting Web Links

### Screws - The Early Years

Threads, threading, fasteners, etc., and a description of Hero's machine for cutting internal threads  
<https://www.youtube.com/watch?v=yzMU8rH4PN8&feature=youtu.be>

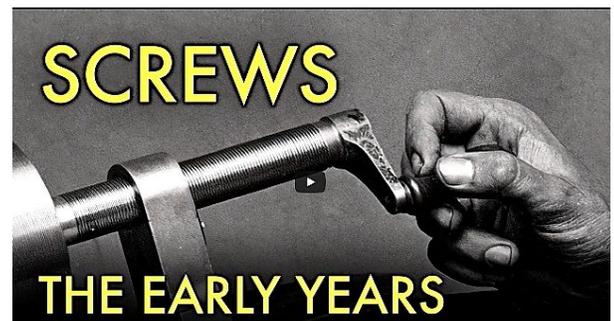
OR

<https://tinyurl.com/y47urdt>  
approx. 18:30

"The person who recorded us doing bloomery smelts at The Crucible just released a video about the history of the screw. "

" His video details a fascinating history. ... It's definitely relevant to our blacksmithing profession, and I think a lot of you would enjoy this video."

- Celeste Flores



# November Demo Report

Bill Ganoe

<https://youtu.be/LTCgKNRosjc>

About 37 minutes

This video was basically a tour of Paul "Dief" Diefenderfer's shop with Dief showing off some of his tools and using each one to make something.

Dief started his demo by making some bud grass. Bud grass is tall, gently curved stalks of (steel) grass with buds that are fairly easy to make and look good. But making the buds can be a bit of a challenge, especially with a power hammer. When you try to hold the stalk in the power hammer to form a bud, the hammer tries to kick the stalk out at you. Every so often, the fight between you and the power hammer results in a screwed up bud, so you have to cut off the botched section and proceed with a shorter grass stalk. Dief showed a jig that he uses to solve the problem. He said he's used his technique to make several fences and sculptures.

Dief then moved on to his fly press, which he uses to make, among other things, pooper scoopers for the Southwest Wildlife group to pick up coyote and bobcat scat.

Next Dief showed off his new 16-ton hydraulic press. He showed how he used the press to make tenons for mounting bud grass stalks - a process that goes faster with the press than with his power hammer.

Then he showed an interesting shear that he had found at a garage sale. He offered several tips for rescuing old, rusty tools that may show up at a garage sale.

Next, he used the hydraulic press to make an ocotillo stalk from a short piece of 1" sq. rod.

Finally, he made a neat hook with a leaf on each end of a 1/4" rod. He finished the hook with a brass brush and bees wax. He uses hooks like this as business cards when he's doing art shows.

He then give a brief tour of the house he's constructing out of shipping containers.

Questions? Dief said people can contact him directly at 602-509-1543 or email him at [dief@desertratforge.com](mailto:dief@desertratforge.com).

## Interesting Web Links

### Forging an advent candle holder.

<https://www.youtube.com/watch?v=8gujxvhOR0o&feature=youtu.be>

OR

<https://tinyurl.com/y6dzsbyb>

approx. 16:30

This candle holder presents an interesting challenge to slit-punch and drift the candle holes, and to fill the bottom of the candle holes with slugs.



## Other Events of Interest

(These events are still scheduled as of press time.)

**REGISTRATION WILL OPEN SOON - SAVE THE DATE!**

# CBA SPRING CONFERENCE 2021




## April 16 - 18, 2021 FRI-SAT-SUN

great educational program of essential skills for all levels

- ★ Hands-on Education!
- ★ Forging Games & Competitions!
- ★ Auctions!
- ★ Midnight Madness Forging!
- ★ Vendor and Tailgate Sales

- ★ On-site Camping & Food!
- ★ Nearby Lodging Discounts!
- ★ Iron-in-the-Hat!
- ★ Art Gallery

Vista Forge at the Antique Gas & Steam Engine Museum  
 2040 N Santa Fe Ave. Vista, California 92083 (760) 941-1791 [www.agsem.com](http://www.agsem.com)  
 For questions or to volunteer to help, email: [agsemblacksmiths@gmail.com](mailto:agsemblacksmiths@gmail.com)

More information at: <https://www.calsmith.org/event-3993514>

# ABANA

# Festival

IRON TO  
ART



2021  
JOHNSTOWN,  
PA

*For 47 years, ABANA has not had a place to call home.*

*In 2020, the Board of Directors voted to give ABANA a permanent home in Johnstown, PA.*

*Johnstown has a rich historical presence in the Steel and Iron industry.*

***You don't want to miss this!***

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**Demonstrators:**

<p><b>The Patient Order of Meticulous Metalsmiths</b></p> <ul style="list-style-type: none"> <li>• Tom Latane</li> <li>• Peter Renzetti</li> <li>• Kevin Clancy</li> <li>• Tina Chisena</li> <li>• Carl Close</li> </ul>	<p><i>Ellen Durkan</i></p> <p><i>Bruce Jarrell</i></p> <p><i>Jennifer Petrila</i></p> <p><i>Patrick Quinn</i></p> <p><i>Peter Ross</i></p> <p><i>Bob Valentine</i></p>	<p><b>The Teaching Tent:</b></p> <ul style="list-style-type: none"> <li>• Jeff Dunkelberger</li> <li>• Steve Hotz</li> </ul>
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This event will be held on April 22 – 24 of 2021.

In case Covid restrictions are still in place, the alternate date is October 14 - 16, 2021

More information at: <https://abana.org/abanas-iron-to-art-festival-2021>

## Frank Turley 1935 - 2020

Frank Turley died on November 14, 2020, in a nursing home in Taos, NM at the age of 84. He would have been 85 on December 10. *The Santa Fe New Mexican* published a very nice, detailed obituary. It can be found at: <https://tinyurl.com/y4h629rn>

Frank Turley started out as a farrier in the early 1960s, but he soon got into ornamental and architectural work and tool making. In 1970 he opened what has been known as the Granddaddy of Blacksmithing Schools. It is the oldest of modern blacksmithing schools. You can find details at:

<https://www.turleyforge.com/>. There is nothing on the web site about the future of the school, but Mr. Turley had other people teaching for him for the last couple of years. It has been reported that he reorganized the school as a foundation in 2019.

Over the years, Frank Turley has had a tremendous influence on blacksmithing as the craft rose from the ashes in the mid-20th Century. Many of the familiar names in blacksmithing today have passed through Turley's school at some point. For his many contributions, the Artist Blacksmith Association of North America (ABANA) awarded Frank Turley the Alex Bealer Award in 1982 and 2019. The Alex Bealer Award is given to honor the recipient for "service to the field of blacksmithing". He was the only blacksmith to receive that award twice. ABANA also awarded him the ABANA Heritage Award for his "lifetime contributions to teaching the art of blacksmithing".

Some AABA members attended class at Frank Turley's school and have offered some memories:

I took Frank's smithing course in 2007. It was one of the great experiences of my life. A few days into the course, we had to try our first "drop the tongs" weld. I was really nervous. Two irons in the fire, well fluxed; hammer ready, heart racing.

I pulled the irons out, flipped to the anvil, dropped the tongs, grabbed the hammer, landed a perfect blow, done!! I was in paradise. I was a real blacksmith! Frank ambled by my station, and I told him of my victory. He smiled, nodded, said "Great. Do it again."

Second weld, with him watching. Dropped the tongs, dropped the iron, knocked the hammer onto the floor, and so on. Total annihilation. Frank smiled, nodded, said "Yup. There is such a thing as beginner's luck."

- Eric Thing

I took Frank's 3 week class in November 1998. He seemed pretty ancient then, I remember hoping he would live long enough to complete that class. The shop, which had hosted classes for more than 20 years before I was there, had a dirt floor covered by 6 inches of coal dust and ash. If you dropped a tool you better keep an eye on where it landed because it would sink out of sight and you'd never find it. The walls and ceiling were covered in smoke, coal dust and Santa Fe dirt that absorbed all the available light which came from 25 watt bulbs. The second day of class I bought some 100 watt bulbs and replaced the 25's when Frank was in the house taking his nap. He wasn't very happy about the change probably because he was thinking of the higher electric bill. There was an outhouse with lots of holes in the walls for the Santa Fe wind to blow away any odor.

I had been blacksmithing for 6 years before I took Frank's class. I felt like I had holes in my skill set and wanted to learn the basics. Frank's class filled in those holes, and I learned things I would never have picked up on my own. I felt he had a good curriculum and taught it well. For many people learning in such a primitive setting would lead them to coal fires and hand tools. For me, it made me appreciate propane and power and in door plumbing.

- Peter Sevin

## Frank Turley 1935 - 2020 (cont.)

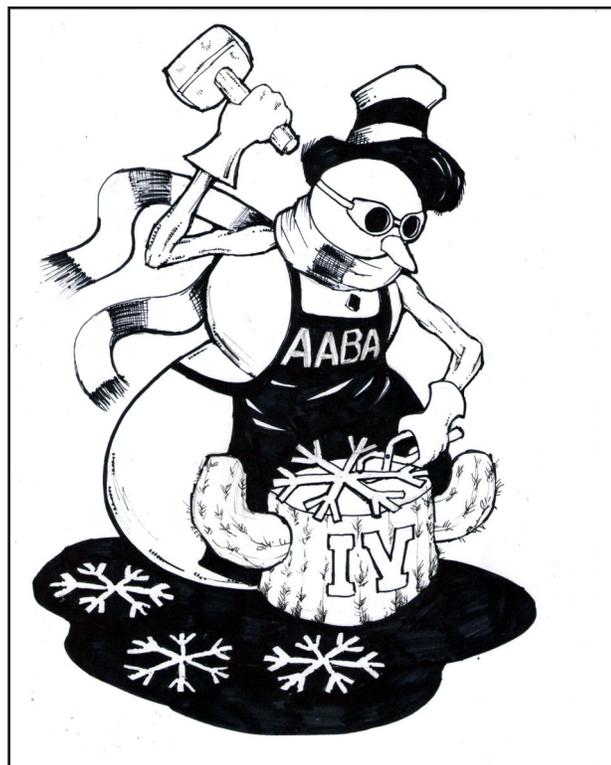
In addition to all of Frank Turley's other activities, he was a part-time conservator at the Museum of New Mexico. This gave him an opportunity to study early Southwestern ironwork. And that led to a book co-authored by professional historian Marc Simmons, *Southwestern Colonial Ironwork*. It was first published in 1990 and republished in 2007. That book quickly became the bible for blacksmiths doing historic re-enactments at places like the Presidio San Agustin del Tucson and the Old Town San Diego State Historical Park.

Beth Holmberg, one of the blacksmiths at Old Town, had this to say about Frank Turley and *Southwestern Colonial Ironwork*:

I recently got a book on ironwork in the collection of a respected museum. It is nearly useless! Because the curators approached the objects as, well, objects. Not things made by someone. The photos don't show what I need to see (welds vs tenons), and the write ups are just wrong (a piece with a welded collar described as being forged from a single piece of iron; decorative whitesmithing details having a bogus function ascribed to them...). Having Frank Turley working with an archaeologist to put together that book has made it so much more useful! His eye saw stuff a curator wouldn't, and he made sure the drawings and discussions made those things clear. What a gift to the historic smith and smithy!

## Winterfest IV is coming in 2022!

Winterfest IV was planned for January 2021, but has been postponed until January 2022 because of the continuing COVID-19 pandemic. Detailed planning and organizing will begin in February 2021. Standby until then for volunteer opportunities. We have some great surprises planned.

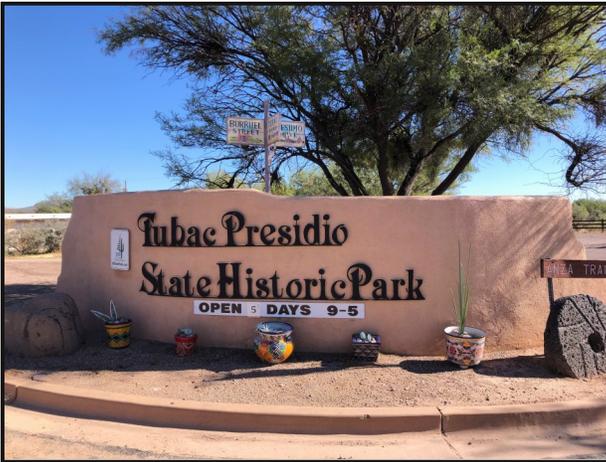


# The Exuberance!

Several AABA members are participating in an outdoor art exhibition in Tubac this winter. The exhibition is entitled "The Exuberance!: An Artistic and Botanic Experience" at the Tubac Presidio Historic State Park. It runs from November 14, 2020, to April 20, 2021. It is similar to the botanical Blacksmiths show at the Arboretum at Flagstaff, but this exhibition features works from artists working in many different media addressing several different themes. All pieces will be included in an online auction to be held from April 10 - 17, 2021. As we get closer to April you will be able to find the auction at: <https://www.charityauctionstoday.com/auctions/TheExuberance-16055>

Thanks to the efforts of our own Cathi Borthwick who worked with AABA members and Myrna York, the curator of the exhibit, there is an area designated "The Blacksmith's Garden" where pieces by seven AABA members are displayed. The exhibit can be viewed on site during the Tubac Presidio's normal operating hours, from 9 am to 5 pm Wednesday through Sunday, and is included with admission. For more details go to [www.tubacpresidio.org](http://www.tubacpresidio.org).

Here is a brief tour of AABA members' contributions to The Exuberance!.



*Denise Edwards  
Birds of a Feather*



*Cathi Borthwick  
Joy*



*Ira Wiesenfeld  
Pinnacle Plant*



*David Bridenbaugh  
Twisted Buttercup*

## The Exuberance! (cont.)



*James Schremp  
Reclaiming*



*Ira Wiesenfeld  
Secret Grotto*



*Roger "Grizz" LaBrash  
Wild Ocotillo*



*Liz Carlier  
Flapindipity*



*Denise Edwards  
When Mother Nature Said Enough*

## Calendar 2020-2021

Jan. 2021	Winterfest IV	Postponed to 2022	Tucson
Jan, 2021	Demo	Dan Smith	Online
Mar. 2021	Demo	Cathi Borthwick	Online
May 2021	Demo	Jodie Bliss	TBD

## Your dues for 2021 are due now!

Many of us renew in person at a demonstration early in the year. But those opportunities are limited this year. Please mail your renewal now using the form on page 19 or renew with PayPal on our website.

### MCC Blacksmithing & Welding

The Mesa Community College blacksmithing program is an excellent deal - over 60 hours of instruction including material and propane! Classes are on Wednesday during the day with instructor Richard Rozinski, Tuesday and Thursday evenings with instructor Dan Jennings, and on Saturdays with instructor Robert Ratliff. Blacksmithing is listed as WLD103 in the class schedule.

TIG, MIG, Arc, Gas, and Art classes are all available, as is certification in any of those welding methods at Mesa Community College, Southern and Dobson in Mesa.

Classes fill up early, but waiting lists may be available. For more information go to: [www.mesacc.edu](http://www.mesacc.edu)

### Sahuaro Ranch News

After being destroyed by fire on September 25, 2017, the reconstruction of the blacksmith shop at Sahuaro Ranch in Glendale is essentially complete. Jay Griffin and Ronald Wicklund were forging at the blacksmith shop on February 8, 2020. Watch The Anvil's Horn for upcoming events at the Sahuaro Ranch blacksmith shop.

### Deadline for the March 2021 issue

February 1, 2021 is the deadline submitting photos and articles for the March 2021 issue of the Anvil's Horn.

Send articles, pictures, etc. by email to:

[editor@azblacksmiths.org](mailto:editor@azblacksmiths.org)

or by regular mail to:

Bill Ganoe, PO Box 40233, Tucson, AZ 85717

### Welcome New Members

Sudha Achar	Fountain Hills, AZ
Sean Bruns	Tucson, AZ
Pablo Martinez	Tucson, AZ

### Classes at Pieh Tool Beginning/Intermediate Blacksmithing

• Beginning/Intermediate blacksmithing classes with Dylan Cook:

Jan. 15-17, 2021

Mar. 12-14, 2021

Apr. 30-May 2, 2021

Registration is \$570.

Students will make several simple projects to take home.

• Knifemaking class with Master Bladesmith, Ray Rybar:

Feb. 19-21, 2021

Students will make one knife.

For more details call 888-743-4866 or browse to [www.piehtoolco.com](http://www.piehtoolco.com).

### Workshops in Tucson

Sam Rivera is in the early stages of planning a couple of workshops at his shop in Tucson.

• Refacing old anvils

Sam is definitely going to run the anvil repair workshop. He's just working on the scheduling.

• Building a Ron Kinyon vise.

Sam is looking for people who would be interested in building a vise designed by Ron Kinyon. (see The Anvil's Horn, March 2012 .)

Sam hasn't worked out schedules or prices yet, but if you are interested in either or both, text Sam at: **520-591-4700**.

# AABA Website: [www.azblacksmiths.org](http://www.azblacksmiths.org)

## Open Forge: Tucson

We don't have a definite date to resume open forges in Tucson, but there may be some pick-up events now and then before we get back on a regular schedule. Check <http://www.desertmetalcraft.org>, for upcoming events at Desert Metal Craft. If you are on the email list for southern Arizona, you will get notices about any last-minute AABA open forges. If you aren't on that email list, send a request to [editor@azblacksmiths.org](mailto:editor@azblacksmiths.org).

## Open Forge: Grizzly Iron

Don't have a power hammer? Use one at Grizzly Iron, 1329 W. Lincoln St., Phoenix, 4:30 PM to 8:30 PM, more or less, . There are a lot of changes in dates, times, and restrictions, and those changes may be made on short notice during the COVID-19 pandemic. Keep checking the website:

<http://grizzlyiron.com/classes-and-workshops>

or the **Grizzly Iron Open Forge and Workshops** group on Facebook for current details.

## Open Forge: Desert Rat Forge (Phoenix area)

Paul Diefenderfer will host an open forge at Desert Rat Forge on Saturday, January 2 and Saturday, February 6, 2021, from 9 to noon followed by lunch (You gotta' buy your own.) at the world famous Big Earl's Greasy Eats in Cave Creek. Desert Rat Forge is at: 7645 E. Highland Rd., Cave Creek. 602-509-1543 or [dief@phoenixrockgym.com](mailto:dief@phoenixrockgym.com).

Directions: From the center of Cave Creek – 4-way stop at Cave Creek Rd & School House Rd. Head north on School House 1.2 miles to Highland Rd (if you get to the 4-way stop at Fleming Springs you've gone a tad too far) . Turn right (east) on Highland After about 1 mile the pavement ends. Please drive slow to avoid kicking up dust. As the gravel road makes a turn to the left there will be a single lane gravel road on the right with a sign for 7645. Drive down this road for bit until you see the big anvil. You are there! Park in the pullout if there is room – please do not park on top of any vegetation! If no room, return to main dirt road, park along the north edge, and walk the 700ft back to property.

## If You Are Attending An Open Forge...

These open forges are part of AABA educational activities, but AABA does not provide funds for these events. They are hosted by our members for all of our benefit. So if you participate in forging, welding, use shop materials, or accidentally damaged something, please put something in the donation box to help our hosts with their expenses. Thank you! From all of your open forge hosts. **You will need to wear safety glasses. Hearing protection is recommended.**

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**AABA Membership:** The AABA membership form has been moved to page 19.

## Classes and Events at AABA Members' Shops

### Desert Metal Craft

544 E. 24th St., Tucson, AZ

“Desert Metal Craft is the only school in the southwest dedicated to teaching blacksmithing, bladesmithing and fabrication together with the modern science behind the craft of metalworking.”

- Rich Greenwood

The schedule at Desert Metal Craft features a wide range of classes and workshops. Check the website:

<http://www.desertmetalcraft.org>, for on-line events, details of specific events, and to register for each class or workshop

### Grizzly Iron

1329 W. Lincoln St., Phoenix, AZ

The schedule at Grizzly Iron features a wide range of classes, open forges, and workshops. For the current schedule, prices, and registration check the website: <http://grizzlyiron.com/classes-and-workshops>, or the **Grizzly Iron Open Forge and Workshops** group on Facebook for current details.

# Thoughts on Designing Coal Forges

Eric Thing

Over the years, I've developed a strong interest in designing and building forges - forges that help me do traditional blacksmithing at home and on the road. Back in the 1980's my hobby was making medieval armor. I only used a forge to make the tools I needed to shape steel plate, since the tools I needed weren't really available commercially at the time. I had a coal forge that I used to make hammers and a few other heavy tools, since my little gas forge was not quite up to the heavy stuff. But I did not like it. It was a struggle to use: slow to heat, smoky, and cantankerous. I tweaked it and tweaked it, but I was never happy with it. To illustrate: I bought 1000 lbs of coal through a bulk order that AABA organized in the early 1990's. It took me nearly 20 years to burn it all. Fifty pounds a year! The coal forge was basically rusting away. So, during this time, from 1980 to the early 2000's, I did little blacksmithing in the traditional sense.

Then in the spring of 2010, I had a revelation. Bill Gano and I were asked to build an 18th-century Spanish forge at the reconstructed Spanish Presidio in Tucson.

Bill and I built the Presidio forge in the summer of 2010. It was (and still is) a very simple, small side-blast affair, with Spanish "concertina" double-lung bellows. Materials are adobe, clay, wood, and leather, with the only significant metal piece being a 1" black iron pipe as the tuyere.

This was the revelation. The adobe forge worked great! It burned hot (Bill and I once slit and drifted an eye in 1" square iron with little trouble) and was a joy to use. It was economical, too: about 10-15 lbs of coal was easily enough for a 3 to 4 hour reenactment day of smithing. I calculated that 200 lbs. was consumed in an entire reenactment season, or about 2 lbs. per hour. Using this forge actually made blacksmithing *fun*.



I have spent the ten years since 2010 trying out several coal forge designs at my home shop. I'll touch on a couple of these iterations, ending with a detailed description of my latest model.

## Home Forge Model 1: Large Adobe Side Blast

When I started reorganizing my home shop around 2012, I had two objectives:

- 1) Toss the old cast-iron firepot forge.
- 2) Design a new one that would work better, and could burn coke.

Why coke? I live in an R-4 residential area. I have neighbors, most of whom I get along with. I did NOT want to pour tons of green coal smoke out of my back yard, especially in summer, when the fumes would be sucked into my neighbor's swamp coolers and pumped into their houses! I had tried coke a few times, and really liked its almost total lack of smoke and smell. The times I tried it, however, made my old iron firepot glow bright red. It was a Centaur Vulcan, that I bought 40 years ago, and it was not made for burning coke.

So I decided to make a larger version of the Presidio Adobe forge at home. It was a strain physically, mortaring adobe blocks together, mixing my own mortar by hand twenty pounds at a time, but it was fun. I even welded up a super-sucker side draft hood for it (worked great, by the way). I just made the forge about 50% bigger in dimensions than the Presidio version. I also used an electric blower and a stainless steel tuyere pipe.

## Thoughts on Designing Coal Forges (cont.)

It was a flop. Not in pure performance, mind you: just like the small version, it fired up easily, burned hot, and did not consume much fuel. But it could not handle coke. This surprised me, to be honest. I thought, heck, refractory materials like clay and adobe should handle the fuel OK, even if 1/4" cast iron couldn't. But no: the coke fireball was so intense that it cracked the clay hearth, and fused huge globs of iron-hard slag to the clay substrate.

### Home Forge Model 2: Water-Cooled Side Blast

In retrospect, I may have given up too soon on the big adobe forge. But while I was brooding over the damage that coke fires did to it, I happened to attend an open-forge day at Harold Hillborn's old shop where a British-style side blast forge was running. I was all over that thing! You've probably seen the type online: big tank of water, supplying cooling mass to a double-walled tuyere, which sticks into a depression in a dry refractory bed (usually dirt or sand).

Harold's forge was burning coal, but I knew that British smiths use this type of forge for coke. I crawled the internet for a while, picking up hints on how to build and use water-cooled forges, then asked Harold to make a tuyere for me. I bought all the materials, and he welded it up. I installed it at home, built a big sheet metal box to hold the dirt bed (I used loose adobe soil), and fired it up.

For a good look at how a water-cooled side-blast forge is constructed, google Mark Aspery Side Blast Forge. You'll find a web article with photos, showing the tuyere design that Harold made for me. Shoutout to the **California blacksmith Association** for hosting the article.

It worked. In fact, it worked quite well. I used it for about a year, and I (kind of) liked it. Easy to start, and it gave a hot flame. But it had one tendency that bothered me: It ate fuel. Even when I tried to keep the fire compact, it consumed coke at a rate that I thought was excessive for the work I was doing (mostly small colonial hardware). Perhaps I should not have been surprised at this. Looking over videos of some British smiths online using this type of forge, I noticed they don't seem to mind building up huge fires to do their work. One smith, Rowan Taylor (he has some videos on YouTube) used volcano-sized coke fires to weld small bar stock. Fishing out saucer-sized clinkers two or three times a day doesn't faze him, either!

### Home Forge Model 3: Back to Basics

At this point, I realized that "going big" was not working out for me. The water-cooled forge was (at my scale of work) an industrial tool. Why did I need a forge that could weld truck axles?

So, I thought, how about this: Scale back, start with a blank sheet of paper, and design a forge small enough to cart around for demos, but with enough capacity to do hand-size work at home. If the tiny forge at the Presidio museum could burn 1-inch iron bar (don't ask me how I know) surely I could construct a little guy that could handle heating stock up to 3/4" square, without consuming mountains of fuel. After much thought, I decided:

1) Use a bottom-blast firepot. Yes, I had been fixated on side blast, because the Presidio design worked so well. But coke is really hard on side blast forges, unless they're water cooled, or you build them to be consumable. (This is not entirely true, as there are coke dirt-in-box forges out there.)

Youtuber and blacksmith Torbjorn Ahman has a good video on building and testing a simple dirt-in-box forge, using coke as fuel. He even shows how coke does a number on refractory hearth material. It's an easy-to-build uncooled side blast. So, maybe I did give up too easily! In YouTube, search for Torbjorn Ahman DIY Forge.)

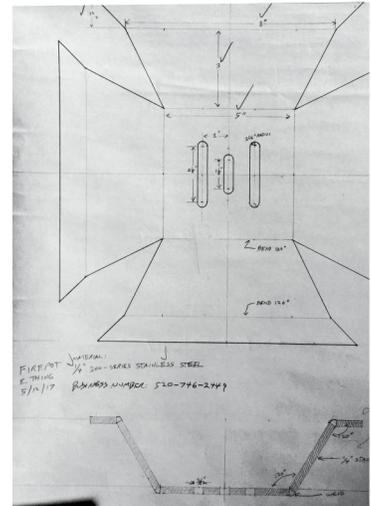
2) Make the firepot small. This would make it light and easy to move around, and hopefully economical fuel-wise. I settled on 8"x8" square pot size, 3" deep. Quite a bit smaller than industry standard, which is around 9"x11", and about 4" or more deep.

## Thoughts on Designing Coal Forges (cont.)

3) Make the firepot out of stainless steel plate. Harold Hillborn had turned me onto this; he fabbed a pot from 300-series stainless, and it worked quite well: I used it a couple of times, though with coal, not coke. I knew from experience that stainless could be heated to low orange heat many times with minimal scaling; I used stainless components subjected to severe heating in a gas forge for years.



4) Keep it simple. For one thing, no clinker-breaker! I hate 'em. Just use holes or slots for the air entry in the bottom of the pot. I was on the fence about this (I mean, clinker-breakers have been used in firepots for well over a century), until I saw a do-it-yourself firepot drawing online, designed by Bob Patrick. Bob is a terrific smith (he taught classes at



ABANA 2000 in Flagstaff) and his design was super-simple. Two major features: it was only 3" deep, and the air input was just a slot, 2.5" by 1/2"! No clinker-breaker. Just Google "Bob Patrick Firepot" and you'll find it.

So, I built a mockup of my firepot design in cardboard, held together with metal duct tape, to get an idea of what it would actually look like.

As specified, an 8"x8" cavity, 1" flange (for 10"x10" outer measurements), 3" deep, 5"x5" bottom plate. I did not want a 1/2" air slot, since coke does not stick together like coal, and I thought bits would tend to fall through a wide slot. So, I used three 3/8" slots, as shown in the drawings below. (I may have overthought this, as I tend to do, but the air supply has worked fine.)

I don't have the skill to weld stainless plate, so on the recommendation of a friend, I went to A-1 Fab in Tucson. They do water-jet cutting and welding, so I showed them my drawings and cardboard model, asking if they could produce the pot in 1/4" thick 304 stainless. They took the job, and fabbed it for (as I recall) about \$220. (This was about 2 years ago.) I was very satisfied with the cuts and the welding.

The photos below show the pot after about 40 hours of use. Note the cast-iron air elbow fastened to the bottom of the pot. It came from an old rusty Centaur farrier pot that I had in storage for many years. (Note:



Centaur still sells these elbows as a separate item for around \$100, with option of lever or sliding ash dump trapdoor.) It had two bolt holes already, so I just drilled holes in the firepot bottom, and attached the elbow with 3/8" stainless bolts. I gave the holes a tiny bit of slop, since I doubted 304 alloy and cast iron have the same thermal expansion coefficients, and I didn't want to risk cracking the elbow flange.



## Thoughts on Designing Coal Forges (cont.)



Here is the portable demo forge that I built to take the pot: The forge is very simple. The frame is 1" dimensional lumber of various widths, with 2x4 legs. The hearth is 12 gauge sheet metal, with an 8"x8" square hole cut in it. The pot just drops in, no fastenings. The hearth rests in a 1" angle iron frame, which in turn sits on eight metal clips screwed to the sides of the forge. No fastenings hold the hearth or angle iron frame; everything is just held together by gravity. I use an old crank blower for air, and the blast pipe is a 3" diameter flexible exhaust pipe from a local big-box auto parts store. (That was a real find. It works great, and is FAR better than flimsy aluminum clothes drier hose!) I clamp the pipe to the blower with a leather sleeve and hose clamps, and just jam fit the

other end in the firepot elbow. This forge can be carted in pieces, and assembled/torn down in minutes.

NOTE! I do NOT burn coke in this forge! The firepot can take it, but the wood frame is a problem. Not because of conducted heat – as intended, the many thermal breaks in the hearth suspension reduces that to a minimum – but because of radiation. The firepot gets so dang hot burning coke that the sides glow bright red in patches, almost a low orange. The wood starts to heat up; the inside surfaces facing the pot get almost too hot to touch. Therefore, I burn only coal in the demo forge. With coal, the firepot shows virtually no heat glow, and the wood frame gets only mildly warm.

I have to admit, I always thought the stories of “coke is way hotter than coal, you’ll burn your rig out if you try it” were, for the most part, tall tales. I don’t think so anymore! Why the difference? Coal and coke are both mostly carbon. About the only thing I can think of is that coal, when it cokes, exudes all that nasty tar, which outgasses and fuses the chunks of coke breeze together. As a result, the fuel nearest the firepot wall forms an insulating layer. Furnace coke, on the other hand, sits like a heap of white-hot, dry rocks (kind of like lava rocks in a gas barbecue), and the super-hot combustion gases can freely wash up against the firepot sides, heating them severely.

Cast-iron coke firepots exist, but are immensely heavy. One online supplier sells a pot that masses about 90 lbs. This is the primary reason why I went with stainless: I wanted a coke firepot that I could lift without spraining something.

I also paid Harold to weld up a simple permanent forge for my home shop. It’s almost identical in design to the wooden portable, but is made out of steel: 1.5"x1.5" and 2"x2" angle iron. It uses an electric blower. As with the demo forge, the pot just drops into a square hole in the hearth.

I have burned coke extensively in my permanent forge, using the stainless pot. It works great, and I don’t think my neighbors could even tell by the odor that I am burning anything. However... the pot still gets hot. Really hot. Red to low orange on all four sides after just 20-30 minutes of operation. I estimate that the wall temperature in the hottest spots is about 1400 degrees F, maybe a bit higher.

Now, heat resistance is why I decided to go with stainless steel in the first place. However, I still wonder if this firepot will last for very long. I would like to get several years out of it, but being cycled like this up to orange heat, over and over, must be tough even on stainless. Will there be permanent weakening or embrittling effects? Maybe cracking, long-term?

Well, I have the pot, so I am going to use it for a while. It performs very well: fuel consumption is modest, it easily reaches welding heat for mild steel bars, and it is very compact and light.

Any negatives? Well, besides the sidewall heating when burning coke, its fuel load is actually a bit light. I went with 3" depth because Bob Patrick’s design was that deep, and he seemed to think it was an adequate fuel bed. But in a small 8"x8" pot like this, the operating amount of coal/coke is so small compared to what

## Thoughts on Designing Coal Forges (cont.)

I am used to, that the fuel mass (and pot) cools off rapidly when I cut the blast. I expect this with coke: we are always told that coke needs a perpetual slow air blast to stay lit. But even coal seems to extinguish itself rather quickly in this pot, when I stop the air flow. (Once, during a session, I walked away from the forge to hit the restroom, and when I came back about 15 minutes later, the fire was nearly gone. I had to toss in a pile of wood chips and use my lighter to rekindle it.)

Another feature: No clinker-breaker. I don't think of this as a negative, though some folks might. I just stick a straight poker into the fire, find the air slots by feel, and poke and scrape around until they seem clear. It works fine.

### Next Home Forge Model?

I'm still looking for the perfect solution for burning coke. I may use this little pot to destruction, to see how long it can take the heat. But I still want to try other designs. Possibilities:

1. Bigger stainless pot. Why not? Add an inch of depth, maybe make the pot 9"x9", or a little bigger. If the air slots are kept the same, perhaps the fireball will be contained better, and impinge on the walls less.

2. A refractory fire pit, but bottom-blast, this time. This is sort of back to basics, again. As the British smiths show, you don't care about firepot damage if you have no firepot! I could try the classic old "duck's nest" thing. The forge is a box of dirt, again. The "pot" is a depression in the dirt, of any size or shape you want. But the air supply is a heavy metal bottom grate, with only a few square inches exposed to the fire, and is cooled by the air blast coming through it.

Here is a picture of a duck's nest elbow, made of cast iron, probably made in the early 20th century: I picked it up a couple of years ago, with no firm plans for it, but I've been thinking: this thing must have been made as a bottom-blast air supply for a clay or refractory brick fire pit.

The side supply tube is conical, made to fit a bellows nozzle, I would guess. True, it has a clinker-breaker, which I don't like, but what the heck. I might clean this up, and give it a try.

With this, I could try a wooden dirt box with a steel hearth bottom. Cut a hole, drop the elbow in it, put in a load of adobe soil, and make a nice 4" deep, 9" diameter conical pit around it. Hook up a blower, and try it! If it works, and I don't burn my shop down, I could have stainless steel version made.

So, the journey continues. I think I will always be tinkering with forge designs, but the journey is the destination. Or something. Till next time...



## Interesting Web Links

### I'm A Blacksmith

by Bethany Zill

[https://www.youtube.com/watch?v=\\_zDJFQ4fmk8&feature=youtu.be](https://www.youtube.com/watch?v=_zDJFQ4fmk8&feature=youtu.be)

OR

[https://youtu.be/\\_zDJFQ4fmk8](https://youtu.be/_zDJFQ4fmk8)

About 9:40

This might be a good introduction for young kids. The dialog a bit stilted, but it is easily understood. Daniel makes a J-hook with a twist for decoration.





## Artist-Blacksmith Association of North America

ABANA is widely recognized as the preeminent organization of blacksmithing in the world. Visit us online at [www.abana.org](http://www.abana.org) and like us on Facebook and Twitter. Join or renew your membership at: [www.abana.org/membership](http://www.abana.org/membership)

Blacksmithing, the cornerstone of all crafts for centuries, has come back to life. Once rendered nearly obsolete by the Industrial Revolution and 20th Century technology, this ancient craft has undergone a contemporary renaissance. A new appreciation of the honest, enduring qualities of forged metal has developed.

At the heart of this revival has been the Artist-Blacksmith's Association of North America, Inc., a non-profit educational association dedicated to the dissemination of knowledge about the art and craft. Started by a handful of isolated blacksmiths in Georgia in 1973, ABANA now serves nearly 4,000 members.

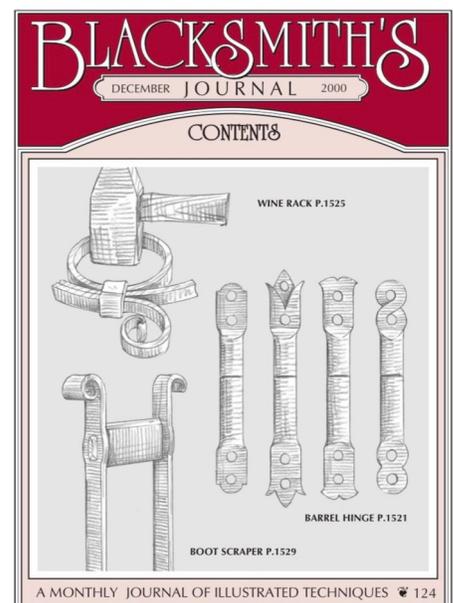
As part of your Membership Benefits you will receive 4 issues of the Anvil's Ring and 4 issues of the Hammer's Blow Magazine each year you are a member. These magazines can not be subscribed separately but are only received by our members. We have recently added a youth membership at a reduced rate, this membership available to those 18 or under includes a subscription to only the Hammer's Blow magazine.

### New Benefit of ABANA Membership

"ABANA has partnered with Jerry Hoffman of Blacksmith's Journal. We hope to make a new generation of smiths aware of this richly illustrated periodical that was published from 1990-2010."

Stay tuned to the ABANA website for bi-monthly articles, available to ABANA members only! (Note, this arrangement does not provide access to all of the contents of the Blacksmith's Journal. Access to all of the content of the Blacksmith's Journal can still be purchased through <https://blacksmithsjournal.com/>)

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Classified ads are free to members and can be submitted by email to: [editor@azblacksmiths.org](mailto:editor@azblacksmiths.org). Ads will run for 3 issues. You can renew your ad if you need to run it after the third issue. Please let the editor know when you no longer need to run the ad.

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1) IMS has space for member metal work to be put on display in a glass case and on top of the cut metal rack inside the store. Contact Steve Miller, [stevemiller.az@cox.net](mailto:stevemiller.az@cox.net), to get your items on display. These items may be for show only or they may be offered for sale. Artists are responsible for any financial exchange. IMS will make a nice card to identify the piece, the artist, and the cost.

2) IMS is offering a 10% discount to AABA members. The discount is available at the Phoenix and Tucson stores. You need to establish an account at IMS. It's free. No credit approval is needed. You can pay with cash. Give the staff your account name whenever you buy something, then request the education discount as an AABA member. If questioned, inform the clerk that they should have an AABA member list behind the counter.

Don't forget that AABA members get discount pricing at the Vern Lewis Welding Supply stores in the Phoenix area.

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- Terry Porter, AABA Secretary

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