



# Blacksmiths of Central Texas

President's Corner

July 2010

## **BALCONES FORGE ANNUAL FREE SUMMER DEMO**

**SATURDAY, JULY 31 – DAN SMITH**

Following Dan Smith's great piece in "The Anvil's Ring", a lot of Balcones members asked about the possibility of getting him here for an instructional demonstration. Well, folks, here it is. Our annual Summer Demo will feature Dan teaching hand forging techniques.

A big "Thank You!" to Dan for coming out and sharing his talents with all of us!

This great day of blacksmithing will all happen at my family's place, good old Sycamore Creek Ranch, right here in the beautiful Texas Hill Country. We will have lots of cool drinks, cold watermelon, good old Texas barbeque, plenty of ice tea, and a bunch of friendly fellow blacksmiths here for a good time. If you get here real early, you might even see the big flock of wild turkeys that have been hanging out behind my shop lately.

Anyone who wants to show up here Friday and camp down by the creek is welcome. We have a nice shady place to pitch your tent and a great swimmin' hole! That way, you don't have too far to drive on Saturday morning!

Bring your family. Bring a friend. This is a good opportunity to show someone what blacksmithing is all about. Just like every year, this is all free, courtesy of Balcones Forge and the many volunteers who do the work to put it on. Thanks, folks!

John Crouchet  
President



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Photos by Gerald Pollard

## BALCONES FORGE MEETING

July 31 - 9:00 AM

Here is what Dan has to say:

I will be forging a fireplace set, consisting of a shovel, poker and tongs. I will be using all traditional techniques including riveting, tapering, spreading, forged square corners, etc. I will also be introducing new ideas, such as sheet metal forming and power hammer use.

If I have time, I will also demo a latch with a carved Texas Long horn.

A subtopic of the meeting is "How to be less awkward at the anvil." Similar to dancing in 6th grade as opposed to dancing later in life.

It should be interesting.

Dan



## TRADE ITEM

There is no trade item this month! Please bring something (related to metal work) for the auction.

## FOOD

Carolyn Crouchet has arranged for Bar B Q form Pete Mesquite so bring a few bucks to help your organization pay for the cost.

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## **VOLUNTEERS**

Balcones Forge runs on volunteers. That's how all our events happen. If you want to be part of that effort, plan to join us on Friday afternoon, July 30 at Sycamore Creek Ranch to set up for the Free Summer Demo. We will be cleaning up the shop, setting up the equipment, moving in the bleachers, putting up tables and chairs, and doing everything necessary before the big event on Saturday.

If you want to help, email me at:

[jac@sycamorecreekranch.net](mailto:jac@sycamorecreekranch.net)

and I will send you the time, directions, and details.

John Crouchet

## **MEETING INFO**

Meetings are open to everyone -- you do not have to be a member to attend.

Meetings are usually held on the last Saturday of each month, but subject to change.

Bring your safety glasses (required).

Other things to bring:

Hearing protection

notepad

camera

folding chair/bleacher seat cushion

drinking water

returning library book/video

"Iron in the Hat" auction item

trade item

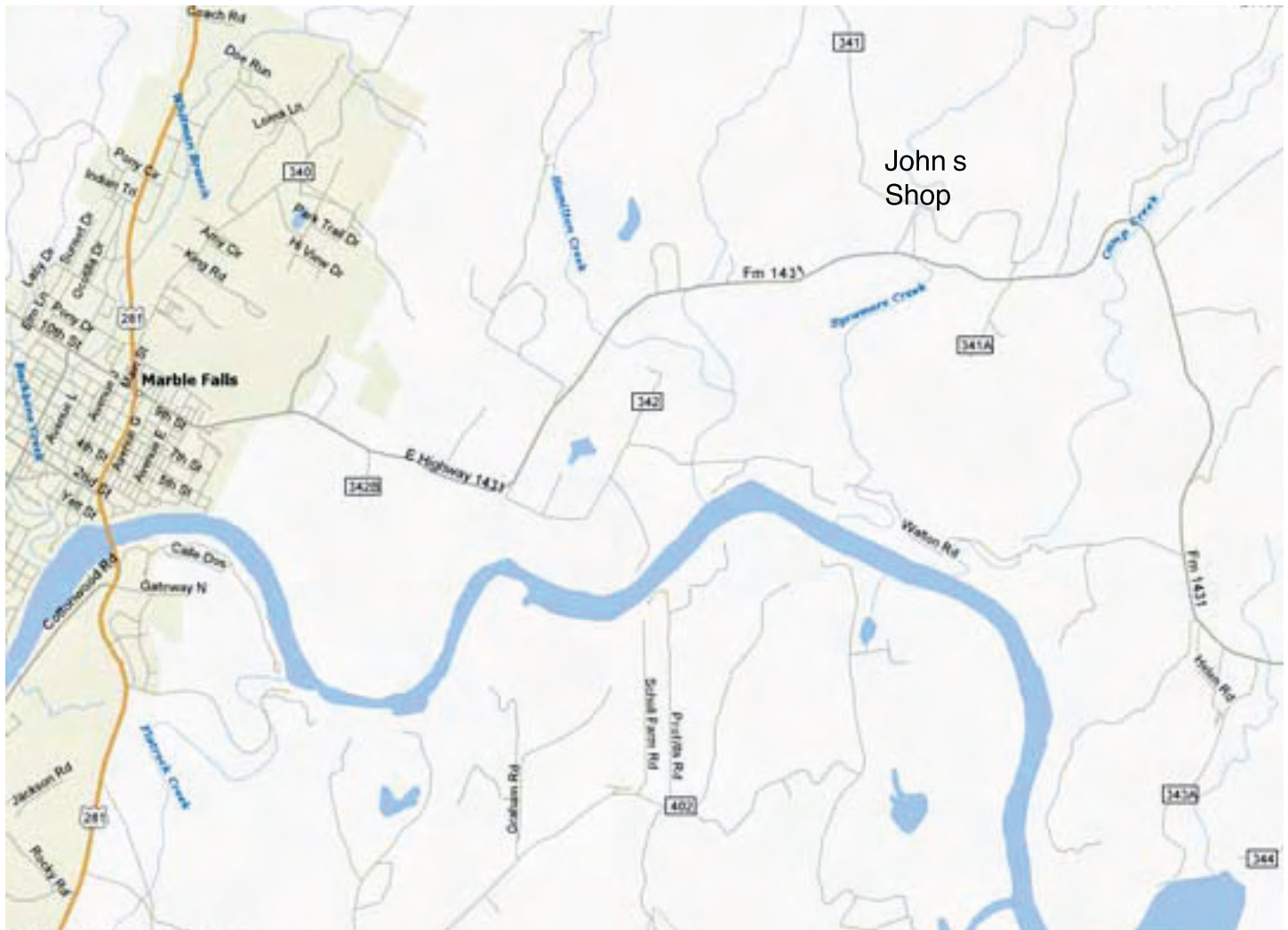


## **AUCTION ITEMS NEEDED**

We like to claim the Balcones Annual Free Summer Demo is free. Of course, it's not. It costs a heap of money to rent the port-a-potties, buy the cold drinks and ice and watermelons and all that good barbeque and all the other things that somebody has to write a big check for in order to make this happen.

You know how we get the dough? Yep, the good old auction. Folks get a chance to buy some interesting stuff or needed blacksmithing equipment, and Balcones Forge gets the money to make another event happen. It's a good deal all around. Help us do it. Bring some tools or a hammer or two or three old anvils. Make something for us! Don't leave it to "everybody else". Pitch in and help make it happen!

Rudy will be collecting auction items when you arrive Saturday morning. Thanks.



## **OPEN UP, REACH OUT!**

I saw a lot of old friends at the ABANA National Conference last month. Even better, I saw a lot of new, fresh faces; folks who had never been to a National Conference before. It was a sure sign that blacksmithing in America is alive and well!

Part of our mission as a blacksmithing organization (other than having a great time ourselves!) is to reach out to others and bring blacksmithing to the rest of the world. We do that partly through public demonstrations at Zilker Park and the Pioneer Museum and at the annual Texas Natural and Swing Music festival in San Marcos each year. Our best chance to really show someone the world of iron forging, however, is to bring them to a Balcones Forge meeting. Let someone see what we do right up close!

Remember, Balcones Forge has NO “closed meetings” or “members only” events. Your family and your friends are welcome at everything we do and we sincerely hope you will bring them along! Speaking of which ..... The Annual Free Summer Demo this month is a terrific opportunity for you to bring someone new to a blacksmithing event. Bring ‘em along to watch Dan Smith’s exciting demo. This is great time to bring someone to a meeting. Think about it. Make an effort. Thanks.

John Crouchet

# **DIRECTIONS TO THE FREE SUMMER DEMO**

**9:00 AM, SATURDAY, JULY 31**

The Summer Demo is at the usual location: John Crouchet's Sycamore Creek Ranch, outside Marble Falls. **Lost? Need directions? Call John's cell phone at 830-798-3710.**

**From Austin,** Take Hwy 71 and go north. You will pass through Bee Caves, over the Pedernales River, through Spicewood, over Double Horn Creek, and eventually come to the turnoff to the right to Marble Falls at Hwy 281.

**From San Antonio,** Take Hwy 281 North all the way to Marble Falls.

**When you cross the Colorado River into Marble Falls, begin counting stoplights. The fifth stoplight you come to will be Ranch Road 1431. This is the biggest intersection in town. Turn right (east) onto Ranch Road 1431. (Check your odometer. You will go 5.5 more miles to our gate.) As you head out of Marble Falls on 1431, you will notice that you are on a winding, two lane blacktop road with no shoulders. At the top of a long, winding hill, the road changes and suddenly has shoulders. Go fifty yards further and turn left into our driveway between the red reflectors. (Look for the "Anvil" signs.)**

**At our gate, you will see a large oak tree to the left and a small sign to the right that says, "Sycamore Creek Ranch, 5828 East Ranch Road 1431". If the gate is open, just drive on in. If the gate is closed, then there are cattle in this pasture, so please close the gate behind yourself once you enter.**

**Continue on down our driveway for one mile. You will cross four (count 'em...FOUR) cattle-guards before you see the big metal shop on your left.**

*(On the way, you will pass our little green cabin. Wave as you **slowly** go by and do **NOT** run over my wife's pet chickens!!!)*

**Welcome to the Summer Demo!!!**

Okay, for you folks who want to come in from somewhere up north: Just take Hwy 29 from Georgetown (or wherever you get on it) and head to Burnet. At Burnet, take Hwy 281 south to Marble Falls. In the middle of Marble, turn left (east) onto Ranch Road 1431 and head for our gate.



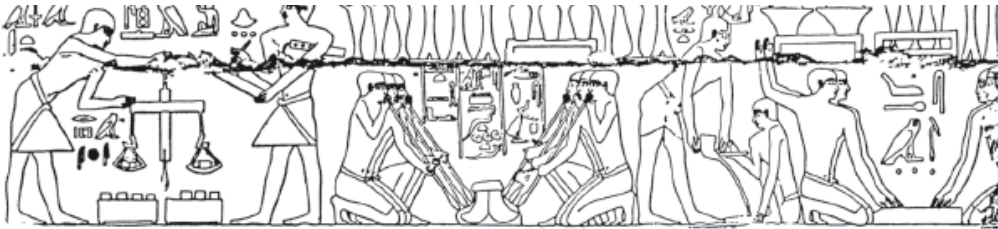
Railroad spikes were the material of the day at the June meeting of Balcones Forge. Photos by Vince Herod.



# Construction and Use of a Primitive Bellows for working Iron

## Ken McElroy

Ed ( a hobby blacksmith) was recently asked by a local church if he could be a blacksmith at a historic village that they were trying to develop. The village was to represent Bethlahem at the time of Jesus. He has a portable coal forge that uses a two stage heart shaped bellows but knowing that such a bellows was developed in northern Europe about the 16<sup>th</sup> century and it would not be time appropriate for the Jesus period. But what type of bellows would have been used during the Roman era?



**Figure 1**

The earliest known air assist for metal working was the clay tipped reed blowpipe. The earliest depictions of blowpipes on Egyptian reliefs date from the 6<sup>th</sup> Dynasty of the Old Kingdom which is roughly 2200 BC. Figure 1 is a rendering from the tomb of that era showing copper smiths. On the left, material is weighed. In the center, six artisans use the blowpipes to force air into two side by side crucibles. Blowpipes were used worldwide for metal and glass production. The Aztecs and Incas were still using blowpipes when the Spaniards arrived in the Americas in the 16<sup>th</sup> century.

Although this method of stoking a fire was adequate for low melting temperature metals in small amounts, it would not have been adequate for working iron. Besides, we couldn't find six people to work the blowpipes (dispite living in the state capitol with all of the politicians). Archaeological research indicates that copper workers in the Middle East, were the first to develop the dish bellow.



**Figure 2**

The tomb of the governor of Thebes, Rekh-Mi-Re, dated about 1300 BC is the earliest depiction of a dish bellows.

The above hieroglyphic relief from the governor's tomb shows two men on the lower left of the picture using the dish bellows with goat skin bellows and the attached strings for raising the goatskin to fill the bellows with air. The man on the lower level bending over is standing over a dish bellows that shows the strap attached to the top of the bellows. Above the bending man is another man use the bellows. Dish bellows allowed two men to provide more air than six men could with blowpipes.

Dish bellows came in three types. In the first, the leather goatskin has a valve that opens on the upstroke to allow air to enter but closes on the down stroke as the air is forced out of the bellows and through the tuyere into the furnace fire. The second type has a gap between the bellows and the tuyere and air is sucked into the bellows through this gap. A third type has the two bellows attached to a single tuyere. Dish Bellows have been found at numerous Bronze Age archaeological sites but seems to be far less numerous in Iron Age sites. These bowls are often mistaken for crucibles by archaeologists. They typically are 0.3 to 0.6 meters (12 to 24 inches) in diameter and 0.13 to 0.23 meters (5 to 9 inches) tall (Davey). Experiments with pot bellows have shown that copper may be melted if two bellows are pumped at 60 strokes per minute for thirty seconds (Yamauchi). While copper may be melted at 1083°C (1981°F), iron requires temperatures of 1260°C (2300°F). It is questionable if the pot bellows can be used to achieve the higher temperatures required for working iron.



**Figure 3**

Dish bellows are still found in some areas of Africa as is shown in Figure 3. However, this application is not ergonomically for two modern smiths in their 50s. We needed something that we could stand up at.



**Figure 4**

The Greek poet, Homer, was familiar with working iron in the 8<sup>th</sup> Century BC when he wrote in the Odyssey "...As when a man who works as a blacksmith plunges a screaming great ax blade or adze into cold water, treating it for temper, since this is the way steel is made strong,..." (Yamauchi)



A Greek vase from the fifth century BC Bronze Age, See Figure 5, shows a metal smith with a type of bellows that appears to have a bottom board that the apprentice works by raising with a cord. This is an ergonomic advancement and offers the potential for have a top or bottom board to work the bellows. The use of the board also allows for larger bellows air capacity which is a major factor in achieving higher temperatures. This Greek vase shows a set of tongs above the seated man and a sledge hammer above the standing man. Both of these tools are more in typical of iron working than copper or bonze work which usually cast.



**Figure 5**

The Hama mosaic, recently discovered from 4<sup>th</sup> century AD in Syria, shows women playing a pipe organ powered by two angels using foot bellows that seem to have wooden tops. Like the Greek image, the wooden bellows top would hint at bellows with increased air capacity, necessary for higher temperature fires. This mosaic shows another variation of

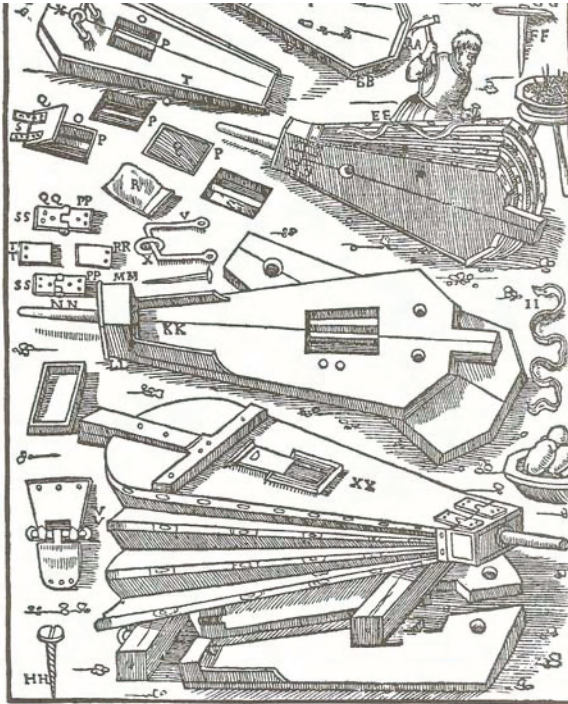
bellows and if they were used for music, they would also have been available for metal working. This mosaic also hints at the early development of pipe organs like those found in nearly all Christian churches.



**Figure 6**

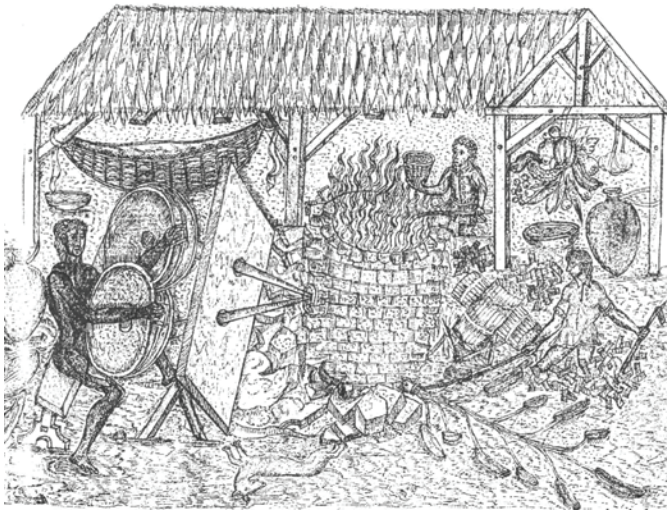
Figure 6 shows a demonstration of scholars using a portable small Viking style furnace. This was certainly after the Roman period and it shows definite improvements in

technology. This type of bellows used boards for both the top and bottom. The size of the boards would determine bellows capacity. This design of single acting bellows has an air intake on the top board and both bellows flow into a single pipe that goes to the tuyere. These bellows also point to future improvements such as the two stage bellows documented in the 16<sup>th</sup> Century.



**Figure 7**

Figure 7 shows a worker building a set of bellows like most Americans are used to seeing. This print is from Georgius Agricola that was printed in 1556. A less accurate sketch of similar bellows appears in The Pirotechnia of Vannoccio Biringuccio who died in 1539. These bellows were two stages in that a lower bellows supplied air to an upper bellows which used the weight of the upper board to force air into the tuyere. Americans are used to seeing bellows of this type six to ten feet in length which supply an enormous amount of air to a fire. Practical experience has shown that these larger two stage bellows can go through charcoal or coal at a ravenous rate.



**Figure 8**

Figure 8 shows a Spanish forge in the new world that was used for melting gold and other metals for the King. This sketch is from the 16<sup>th</sup> century book, Historie naturelle des Indes. The Spanish were still using smaller bellows just one step removed from the pot bellows. This drawing indicates that each bellows had its own air pipe to the tuyere. Because French and Italians were already a more efficient design, I can only image why the

Spanish kept using the older technology.

The Spanish Mission San Juan Capistrano in San Antonio, Texas (see Figure 7) has a reconstructed bellows similar to the one shown in the 16<sup>th</sup> century sketch. These bellows were installed by Balcones Forge, the central Texas blacksmith society. These

bellows were based on research presented in the book, Southwestern Colonial Ironwork. These bellows have a much longer stroke than is found in pot bellows which greatly improves their efficiency. These San Antonio bellows are only 16 inches in diameter which is smaller than those shown in the 16<sup>th</sup> century sketch but they can heat small pieces of iron to a welding heat.



**Figure 9**

Ed, who did all of the fabrication work, decided to combine the bellows design of San Juan Capistrano with the vertical motion approach shown in Figure 4. He needed to modify the bellows air passage, plenum, to fit the existing portable firebox (he uses it with his portable heart shaped double acting bellows but that might be another article). He also needed to make sure that both the firebox and the bellows would fit with the existing brick pit furnished by the church.

*Look for Part Two in an upcoming issue of the Balcones Forge Newsletter.*

### **Did you know...?**

Centaur Forge, Staples, Blacksmiths Depot, Grainger, and Pieh Tool are just a few of the participants in the ABANA Member-Only Discount Program. Become a member -- it pays!

[www.ABANA.org](http://www.ABANA.org)

***Check out page 39 in the Spring 2010 edition of the Anvil's Ring.***

***Why???***

***Because our own Larry Crawford has a railing pictured on that page.***

***It is good to belong to ABANA!***

# Balcones Forge Auction

**Donor Name** \_\_\_\_\_

**Item** \_\_\_\_\_

**Description** \_\_\_\_\_

\_\_\_\_\_

**Thank you for your donation!**

**Winning Bidder** \_\_\_\_\_

**Winning Bid \$** \_\_\_\_\_

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