Blacksmiths of Central Texas

President's Corner

August 2010

Rolling Through a Hot Summer
More Successes for Balcones Forge

Our Mighty Hot July Summer Demo was a big success this year! Dan Smith put on a great show, teaching the finer points of hand forging to an appreciative audience. We had a big crowd, a good barbeque lunch, plenty of watermelon and cold drinks, and an unexpectedly profitable auction! We don't expect to make any money on the Free Summer Demo, but it's really nice when we do! A big "Thank You!" to everyone who made it all happen.

After we wiped away the sweat, folks generally agreed that the 2011 Summer Demo would be better as a Fall demo! The old traditional Winter Demo now takes place in the Spring, so why not move the Summer Demo to Fall, when it will be about thirty-five degrees cooler? Sounds good! Look for it next year!

This month, we will be getting in some personal hammer time at Conservation Plaza in New Braunfels. The trade item is a corkscrew, perfect for opening a bottle of Summer wine! Remember, you have to bring one to take one, so get out there to the shop and do a little hammering! See page 3 for plans.

We will have cold drinks and hands-on forging instruction at this month's meeting. Members have asked for more forging instruction and opportunities to blacksmith this year and we are trying to make that happen! Conservation Plaza has some nice shade and a fine forge and we will bring along a few more portable forges and anvils. If all that hammering makes you hungry, don't worry. Cooper's Barbeque is right down the street!

Looking toward next month, Balcones Forge will be in Georgetown, participating in the Williamson Museum's "Up the Chisholm Trail" longhorn cattle drive and ranch rodeo! Any event like that needs a few good blacksmiths working at the old anvil! Put it on your calendars for Saturday, September 18 and plan to bring the family!

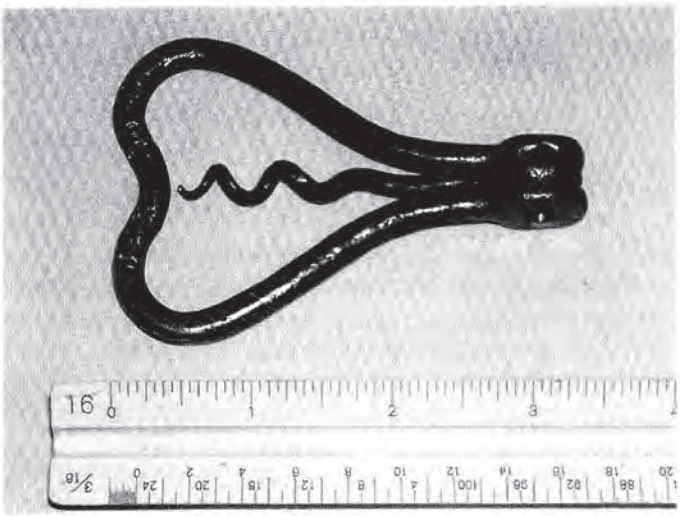
John Crouchet, President

Summer Demo Pictures

Thanks to Dave Koenig, we have some great pictures of the activities and people at the Summer Demo hosted by Carolyn and John Crouchet at their Sycamore Creek Ranch. Following this link -- each of the nine pages has multiple pictures. Enjoy!

http://gallery.me.com/marilynkoenig#100444&view=mosaic&sel=0

A Forged Corkscrew



By Jeremy Knippel

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.

A special tool for flattening the ball ends of the handle. The two blocks on either side are "kiss blocks" that limit the forging to the proper depth.

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- BG

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.

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.

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.

Bellows Construction

Figure 10 – The Bellows installed

Figure 11 – Bellows in Ed's garage

The bellows, as built consists of three major components and structural supports. The four major components are the 1) bellows, consisting of the lower and upper boards, the 2) cross plenum connecting the two bellows, 3) the running plenum connecting the cross plenum to the forge firebox, and 4) supporting structures. The bellows includes the upper and lower bellows boards, the bellows bag, and the lifting handles attached to the top board. Supporting structures included the rear legs that supported the cross plenum and the front legs that also acted as the hinges for the lifting handles. An additional piece was the plate that mated the running plenum to the existing wooden forge box. Remember that this design required local building materials and a design that could be completed quickly with a minimum of equipment.

The materials used included

7pieces 1" x 6" x 8' pine boards
3 pieces 1" x 8" x 8' pine boards
3 pieces 2" x 4" x 8' pine boards
4 pieces 1/8" diameter x 48" long metal rod for stays
2 pieces ¾" diameter x 12" long dowel rod for hinges
2 pieces 1/8" x 5" x 7" hardboard for intake valves
2 pieces 1/8" x 4" x 5" hardboard for check valves and plenum end
3 pounds paraffin (use bee's wax, canning paraffin, or candles, whichever is cheapest in your area)
3 inch hole saw for a power drill
400-500 Brass Tacks for attaching the canvas or leather.
32 ounces Waterproof Carpenters Glue
1 Pint Stain/Finish of builders choice
½ sheet of ½ inch thick plywood or particle board (to make four 16" diameter pieces)
9' x 6' of 8 ounce (minimum weight) canvas drop cloth (or you can use pliable leather)
Woodscrews as desired for extended use.
Small hand power drill
Hammers (claw, ball peen, and tack)
¾" diameter wood drill
3/8" diameter wood drill
Screw driver if wood screws are used
Cheap paint brush
Disposable tin or tray for melted paraffin

3/8” x ¾” x 3’ foam insulation tape

The Bellows bottom plate was a piece of ½ inch thick plywood or particle board some 16 inches in diameter. This might be adjusted down one or two inches to ensure that only one sheet of particle board is used or it might be adjusted up several inches if more air flow is desired. Several inches from one edge of each bottom plate drill a three inch diameter hole. This is the intake air hole. One the opposite side of the bottom plate from the intake air hole drill two three inch holes. The holes in this construction were slightly overlapped but they can be unconnected. These are the air discharge holes. The discharge holes must be located where they can discharge into mating holes on the cross plenum box. One can either cut these holes in the bellows bottom plate and then use those holes as patterns when cutting the holes in the cross plenum or then can attach the bottom plate to the top of the cross plenum and cut the holes through both boards at the same time.

The intake valve should be placed on the top side of the bellows bottom plate so it will be inside the finished bellows. When the top bellows plate is pulled upward, the valve should open to allow air to enter the bellows. As the top bellows plate is lowered, the valve should close to trap air in the bellows. The actual design of these valves in period pieces is not known so they were made by placing a 1/8 inch thick 4 x 7 inch piece of hardboard over the hole. The valve is secured in place by a piece of leather or canvas that is glued to the top of the hardwood and to the top surface of the bellows bottom plate. The hinge should be on the side of the intake valve towards the center of the bellows bottom plate. This plate needs to be light so it does not restrict air flow. Experiments might be made to see if a single piece of leather without the wooden block might work. If canvas is used, it will not be painted with paraffin.

The bellows top plate will be the same diameter as the bottom plate. This plate will be attached to the lifting handles as part of the final assembly.

The bellows bag should allow for 16-24 inches of lift as measured from the center of the bellows. This bag will be one layer for leather bags but a canvas design may be either one or two layers. For cost, the bellows were made of canvas. Two layers were used. One-eighth (1/8) inch diameter metal rods for the two stays on each bellows. Plates cut slightly smaller than the endplates might be used for the stays if the stay plates have large interior holes so air flow inside the bellows is not restricted. If plates are used for stays, they should be tacked to the bellows material as is shown on the San Juan bellows above. Stays may not be required but they do make for a more picturesque bellows.

If the bellows are made of canvas, the canvas might be painted with paraffin to make it more air tight and more insect resistant. It will be easier to do all of your sewing and tacking before painting with paraffin. Whether painted or not, two layers of canvas will be more efficient in trapping air than a single layer of canvas. The paraffin should be melted in a double boiler. Once melted, the canvas may be painted on the canvas using a normal hair or nylon paintbrush. if the canvas is painted,




(Left) Inside of bellows showing stay pockets on the inner bag. (Center) Assembled bellows and lifting handle. (Right) Cross plenum showing twin three inch diameter holes for air discharge from the bellows. Note the dowels holding the supporting legs in place.

Upholstery tacks come in a variety of lengths from 3/8 inch to 7/8 inch in 1/16 inch increments. A number three (3) tack is the shortest length and a number 18 is the longest length. These tacks are sold by the pound so you get more tacks if you order the shorter lengths of tacks. Tacks come in a variety of head styles and colors. For spacing the tacks, I recommend the "Quick Nail Spacer" that holds 5 tacks. It is a $7.00 tool that allows the tacks to be started on an even spacing. After the bellows bag is sewn and stay hoops have been sewn in place, tack the bellows bag to the two end plates. If using stay plates with a leather bellows, tack the lower bellows plate and then tack in each bellows stay before adding the top plate.

The cross plenum connects the two bellows to the running plenum so air is carried from the bellows discharged holes to the forge. The cross plenum was constructed using four pieces of 1" x 8" board set edge to full side so no cutting or beveling has to be completed. The pieces would be dowelled with 3/8" dowel rods and glued together. For extra strength, the sides might be screwed together. Stock eight foot boards were used but two pieces were cut short to make endplates for the cross plenum. The endplates might be held in place by dowels and glue. Air leakage here did not seem to affect our operation but a silicone seal here could make the cross plenum more air tight. Using the bellows bottom plate as a guide, mating three inch diameter air transfer holes are cut in the top of the cross plenum. The bellows were made portable so 3/8" dowels (pins) were installed to locate the bellows bottom plate with the cross plenum. We found during operation that we needed screws between the cross plenum and the bellow bottom plate to keep the bottom plate from lifting off the cross plenum when the handles were lifted. If the bellows does not have to be portable, the bellows bottom plate might be fastened to the top of the cross plenum. A 6" x 6" opening in the center of the front side of the cross plenum was cut for placement of the running plenum.

The running plenum connects the cross plenum to the forge box. This was made using four pieces of 1" x 6" x 8'. Like the cross plenum, this was set with the edge to the full side of each board for ease of construction. Because this rig was to be portable, the running plenum was pushed into the cross plenum some six inches. This was no problem as there was plenty of air gap for the air to enter the running plenum. To seal the interior gap a 3/8" x ¾" segment of insulating foam tape sealed the gap between the two plenums. For period pieces, leather stripping might be used to seal this gap. If the bellows does not have to be portable, a silicone seal on the inside of the cross plenum might also be used for sealing this gap.

The handle for the bellows was attached to the supports for the front of the running plenum using ¾" dowel rods as hinges. The bellows were put at the far end of the handles from the dowel rod hinges. Ideally the handles should be just below knuckle height when in the down

position. With this set of bellows, we were handicapped by a slight slope at the forge location so we were standing downhill from the forge by several inches.



(Left) Running plenum with faceplate for interface to forge box. This shows the cross support for the front of the running plenum and the “U” shaped legs that also support the handle hinge dowels. Support structures will have to vary with each application. (Center) 3/8” dowels holding cross plenum to rear support legs. (Right) Bellows as installed.

The roman anvil is described as being square. It was probably similar to small portable anvils that have a spiked bottom for installation on any handy stump. A square anvil was made for this project by cutting the horn and heel off a 55 pound (cheap) anvil.

Bellows Operation

The event that we were invited to covered the Saturday and Sunday of two weekends. The village was the prime money making event for the Church food collection program. The entry fee was a can of food. I was not able to attend the first weekend. Because of the cold, attendance was scant. However, Ed was able to set up this forge and bellows and was able to operate it by himself.

We deviated from the image of the blacksmith at the time of Christ in that we both wore safety glasses. We both have prescription bi-focal glasses. This disagrees with the description of a blacksmith by the Roman poet Virgil, who said that blacksmiths wore an eye patch over one eye to protect one eye from sparks.

We didn’t want to use coal since that fuel was not common to Palestine during the Christ time period. At the local grocery store B&B lump hardwood charcoal and Kingsford briquettes were located. We know that briquets were not invented until the patent of Ellsworth B.A. Zwoyer of Pennsylvania in 1897. However, it was Henry Ford who made the product popular in the 1920 by making briquets from scraps of wood used in building his automobiles. The operation was eventually turned over to a Ford distributor and distant Ford cousin, E. G. Kingsford.

In the course of the two weekends, this forge was used at a leisurely pace as a lot of time was spent answering questions for the spectators. However, five sickles and four chisels were produced and heat treated. The sickles were produced from flat stock 1/16” x 1” x 12”. First one end was pointed and then pounded into a handle that already had a predrilled hole. The sickle was then slightly pointed in its length and then curved on the square anvil. We both spoke of how much easier and quicker this construction would have been on a modern anvil with its horn. The chisels were made from auto spring steel and then heat treated with a water quench. The chisels were said to be Roman tribute to be used to work local limestone. We demonstrated their use to several groups of spectators.

Because of the downward slope at the site of the bellows, we were standing in a hole so the handles of the bellows were about six inches too high. This height made prolonged high speed operation of the bellows very strenuous. Once we got the fire going, a rhythm of 25 to 30 beats a minute worked well for most blacksmith forming operations. This was not a hard beat to maintain, at least in the short bursts when we had spectators present. It only took a few minutes of use to pick up the click of the intake valve when the bellows arm was raised.


(Left) Ed showing sickles that he made. Note the block of sandstone on the corner of the forge which was used for sharpening the sickles. Two were ready to go. (Right) Pontificating on blacksmith topics for the spectators.

On the last Sunday, we decided to try making a weld with this bellows. We know that the fire box is more than capable as it has welded chain links several times in demonstrations. We first put two pieces of 1/16" x 1" x 24" pieces in the hardwood charcoal fire to heat them up for the weld. After about 10 minutes of pumping at 50-60 beats a minute, I took the two pieces out of the fire and they were loosely welded to each other on the corner where they touched. However, when we broke them apart and tried a hammer weld it did not take. We then realized that we did not have brushes or flux to assist our welding effort. We tried twice more to make a weld with no success. We then thought of making a sand flux which Ed was able to do using one of the chisels and our block of sandstone. The sand was poured on both sides of both strips as they were reinserted into the fire. On the fourth try, with the sand flux, we got a solid but not pretty weld. At the end of the weld experiment, we took the biggest clinker that either of us has ever seen out of the fire.

The bellows were left with the church as they would like to make their own firebox to use with this forge. I am sure that both of us will be working with them on this project in the future.

Summary of Fuels

My favorite fuel of the weekend was Cumberland Elkhorn Coal and Coke. This is a standard blacksmith coal that we buy in fifty pound bags from a local farm store or from Centaur Forge. Although we get some smoke with this fuel, I always say that it is the smell of industrial progress. It packs well and makes its own coke so it can be used for welding. This brand does not have a lot of trash so we got almost no popping or spitting. This is the fuel I first learned to blacksmith with and I still prefer it.

Ed like coke better as a fuel. He has to ignite the coke with coal but once the coke "lights off' it makes a hot, smokeless fire. It packs well and it ideal for welding.

One of the local grocery stores offers lump charcoal. Since this is imported from Argentina, Ed and I wondered what the carbon footprint of this fuel was. It lit easily but gave off a lot of sparks. In fact, there were so many sparks that it was very hard to tell when the metal was ready for welding. We considered this the poorest of the four fuels that we tried but half or three quarters of a bag would last about an hour. This was working out to about 9 pounds per hour. This fuel packed poorly which could be because of its inconsistent size. However, we were able to weld with this fuel even though we only had sand rubbed from sandstone for flux. We also noted that after we had made our weld, the forge had the biggest clinker that either of us had ever seen.

Ed also brought along some Kingsford charcoal briquets. They have a good heat to weight ratio and have almost no sparking issues. They light easily and have almost no smoke. They pack fairly well and they do

provide enough heat for welding once the briquets began to break down. We noticed no problem with clinkers using briquets.

Vocabulary

Charcoal – fuel made from a control burn of wood. This fuel has much better heat to weight ratio than wood and was the preferred fuel source for blacksmiths before coal became popular.

Coke – fuel made from a control burn of coal. This fuel has the best heat to weight ratio of the four fuels we tried. This is a popular blacksmith fuel if it can be found. It is required for industrial steel smelting.

Plenum – a space or passage used to transfer air at pressures greater than atmospheric pressure.

Tuyere – an opening through which air enters a forge or blast furnace

Sources

Biringuccio, Vannoccio, The Pirotechnia of Vannoccio Biringuccio, Dover Publications Inc, Mineola, New York, 1990

Davey, C. H., Some Ancient Near Easter Pot Bellows, http://www.aiarch.org.au/bios/cjd/SOME_ANCIENT_NEAR_EASTERN_POT_BELLOWS.pdf

Derry, T. K. and Trevor I. Williams, A Short History of Technology from the Earliest Times to A.D. 1900, Dover Publications Inc, New York, New York, 1960

Hoover, Herbert Clark and Lou Henry Hoover, Georgius Agricola De Re Metallica, Dover Publications Inc, New York, New York, 1950. (Source of Figure 7)

Muhly, James D., How Iron Technology Changed the Ancient World and Gave the Philistines a Military Edge, http://members.bib-arch.org/publication.asp?PubID=BSBA&Volume=8&Issue=6&ArticleID=5

Scheel, Bernd, Egyptian Metal Working and Tools, Shire Egyptology, Shire Publications, Cromwell House, Church Street, Princes Risborough, Aylesbury, Bucks, HP17 9AJ, United Kingdom 1989. (Source of Figure 2)

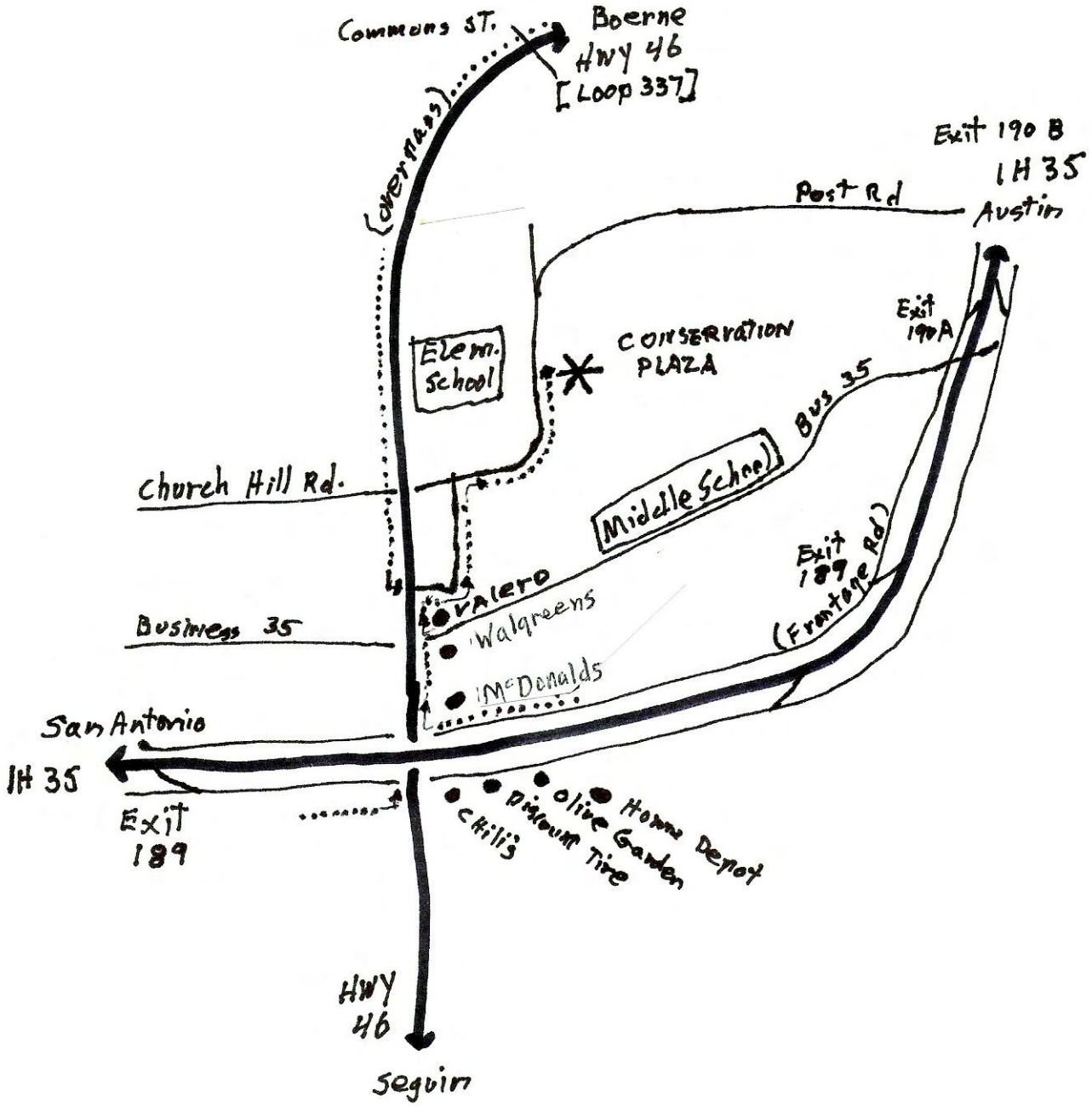
Simmons, Marc and Turley, Frank, Southwestern Colonial Ironwork: The Spanish Blacksmithing Tradition from Texas to California, Museum of New Mexico Press, Santa Fe, New Mexico, 1980

Yamauchi, Edwin, Metal Sources and Metallurgy in the Biblical World, http://www.asa3.org/ASA/PSCF/1993/PSCF12-93Yamauchi.html

http://www.aiarch.org.au/bios/cjd/12_Davey&Edwards.pdf Figure 1, Egyptian Relief
http://www.historyforkids.org/learn/science/mining/iron.htm Figure 4, Greek Vase
http://www.fao.org/DOCREP/W8794e/p118a.jpg Figure 3, African Metalsmith
http://www.lonelyplanet.com/syria/hama/sights/452187 Figure 5, Hama Mosiac
http://hist-met.org/hmsnews60.pdf Figure 6, Viking Forge
http://hist-met.org/hmsnews41.pdf Figure 8, Spanish Indes Forge
Http://www.science.jrank.org/pages6488/steel.html

CONSERVATION PLAZA, NEW BRAUNFELS

Watch carefully for the abrupt right turn on the side of the Sac-N-Pac/ Valero station (Business 35 & Hwy 46 (Lp337)). You must be in the far right lane in front of Valero to make the turn. Proceed to the stop sign at Church Hill Rd. Turn right, go around the corner and then enter the Conservation Plaza on the right at the two stone pillars. For inclement weather our meeting will be indoors at the Plaza's Forke Store.



Secretary's Report

Balcones Forge Summer Demo July 31, 2010

Balcones Forge recognized two long standing & well respected member for all their contributions to Balcones Forge…….Roy Bellows & Harvey Wise.

Upcoming Meetings:

August 28th at New Braunfels' Conservation Plaza

September 18th at Georgetown's San Gabriel Park (note early date)

October 30th at Bob Pheil's shop in Llano

Trade Item for August; ABANA corkscrew. Jerry Achterburg provided copies of the info sheet for those at the meeting. The info is posted on the Balcones Forge website so we all can make the same item.

Daniel Smith was our featured demonstrator. He is a graduate of Illinois Carbondale School of Blacksmithing. He resides in Austin, Texas and currently teaches at Austin Community College and at the Waldorf School. Daniel proceeded to discuss and start the construction of a fireplace tool set. I really like one of his comments; "welding is not a sin". The tool set included a stand, shovel, poker and tongs. The demo encompassed techniques such as drawing a flat taper, short sharp taper, near side & far side anvil work, air cooling of steel, fullering, flattening, spreading, spreading from a square to a flat oval shape, establishing a shoulder and much more. It was a very good demonstration and he survived the heat. He also generously donated a beautiful fireplace set to the auction.

Special thanks go to Carolyn Crouchet, Helen Wise, Dave & Elise and everyone else that helped make refreshments and lunch a very enjoyable success.

The Auction. Vince did his magic of withdrawing money from our pockets without ever actually physically touching us. He just has that touch! Don't believe me…….the guy that bought Dan's fireplace set doesn't even have a fireplace! See!!!

The auction, donations and money from Fredericksburg totaled $2,472.00. Expenses were $1,697.37. We banked $744.63.

The board has approved the expense of a new wireless microphone for the PA system and some other small sound related purchases.

Jim Elliot, Secretary

Keeping Your Cool.....Summertime Forging in Texas

There is a real temptation here in Texas to just put away the old hammer until Fall. Larry Crawford, a veteran of many long hot summers in the forge, often told me that “Blacksmithing is a winter sport!” He certainly has a point! When the temperature is over 100 degrees and the forge fire is heating your backside, it gets hard to remember why you wanted to come out to the shop.

This is a good time to change your strategy. Start early. Very early. Maybe even very, very early! Even on scorching days here in central Texas, the temperature at five or six in the morning is likely to be in the low seventies. You have a few nice hours before nature begins the bake cycle. Use them.

Add a shop fan. Add a misting setup, hooked to your garden hose. Wrap a cold, wet bandanna around your neck. Most of all, drink a lot of water. Then drink more.

I have gotten a lot of use out of the trick of running my oxy/propane torch for spot heats instead of firing up the gas forge. This works even better if you have a treadle torch set up to turn off the torch flame every second you are not using it. (I see another Balcones Project coming up!)

I am lucky to have my gas forge on wheels. I can run it for a short while and afterward just wheel that hot nasty thing outside, so it doesn’t continue to heat up my shop. This is an easy thing to rig up and will be well worth the effort.

Of course, by ten o’clock, it’s getting toasty under that old tin roof. That’s when you remember the other part of this strategy: a nice long nap under the fan until late in the afternoon!

John Crouchet

Return Service Requested

Vincent Herod
Spotted Dog Forge
166 Granite Road
Paige, TX 78659-4922