

SOFA SOUNDS

FEBRUARY/MARCH 1987

SOFA
SOUTHERN OHIO FORGE & ANVIL

Artist-Blacksmiths Association of North America

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NEWSLETTER EDITOR/1987 QUAD-STATE

COORDINATOR:

Ken Scharabok (513-252-3001)

MARK YOUR ABANA CALENDARS: Unless otherwise noted, all meetings will be held at the Studebaker Family Homestead on Rt. 202, four miles north of I-70. Please don't park on the grass or block access to the production buildings. Donations for the newsletter support raffle are always welcome.

February 7th, 1 PM

BUSINESS MEETING followed by a demonstration by Larry Gindlesperger on making B-B-Q utensil sets.

February 14th, 9 AM

Group trip to see the Samuel Yellin: Metalworker Exhibit at the Allen Memorial Art Museum in Oberlin, OH. See details in this newsletter.

February 21st, 9 AM

March 14th, 9 AM

April 11th, 9 AM

May 16th, 9 AM

Work on the homestead gate wings. Hot dogs and beans lunch to be provided by SOFA. This is an excellent opportunity for members to learn intermediate-level blacksmithing.

March 7th, 1 PM

BUSINESS MEETING followed by a demonstration by Larry Wood and Hans Peot on making an anvil stake. See the April/May 1986 newsletter.

April 4th, 1 PM

BUSINESS MEETING followed by a demonstration by Dick Franklin on making hinges.

May 2nd-3rd

Annual conference of the Northwest Ohio Blacksmiths at the Seven Eagles Lodge near Toledo. Contact Don Witzler at 419-874-6576 for details.

May 2nd-3rd

Annual conference of the Indiana Blacksmith Ass'n in Nashville, IN. Contact Danny O'Brien at 317-675-4807 or Ron Porter at 317-689-8450.

May 9th, 1 PM

BUSINESS MEETING followed by a demonstration by Ken Scharabok on making ram's head pokers. Note this is the second Saturday due to earlier events.

Chapter of ABANA

MEETING NOTES:

The December 6th meeting was standing room only. I didn't count, but I estimate we had 50 to 60 members and guests present. We must be doing something right as the meetings are usually well attended, we pick up a couple of new members each month and our renewal rate is high.

Hans Peot announced that Tipp City member John Salley won an impressive award from Blade magazine for a sword he had made. Hans had also brought along samples of the beautiful blades and handles he is now making.

The 1987 ABANA calendar is now in and the homestead gate is featured as the September photo. Hans said it is the nicest photo in the calendar and I tend to agree. Also in the calendar is a photo of the Michigan team taken during the tongs competition at the last Round-Up. These calendars are available for \$3.00 at the meetings or \$4.00 by mail from the Editor.

The raffle brought in \$57.00 to support the newsletter. Greenville member Robert Ream won a ram's head poker donated by the Editor. This was a trial one using the gas forge. Troy member Tom Zeigler won the belt buckle and Joe Abele won the squirrel cooker, both made by Duane Wegley at the last meeting. Guest Cheryl Tucker won an air hammer bit donated by Waynesville member Dennis Hoffer. These bits are excellent for making hardy tools. New Carlisle member Hans Peot won a package of bees wax donated by Greenville member Ron Van Vickle. Guest Steve Treon won a demonstration item made during the last Round-Up, as did Dayton member Owen Vance and Kettering member Ham Hammond. Columbus member David Kentner won a hardy donated by Emmert Studebaker, as did Covington member Ben Wunder. Fairborn member Brian Thompson and Sidney member Ron Thompson won a blacksmithing-motiff postcards donated by Findleyville, PA member Robert Morris. Ron Van Vickle and Dayton member Pat O'Neill won small horseshoes donated by Medway member Bob Zeller. Dayton member Art Holz won a razorblade knife donated by Cleveland Heights member Art Wolfe. New Carlisle member Richard Knopp won a postcard featuring iron work also donated, I believe, by Art Wolfe. Bob Zeller won a rear tire shaft donated by Richard Knopp and Tom Ziegler won a twisting wrench donated by the Editor. Thanks goes to those who donated items for this and future raffles. We would not have the newsletter we do now without these raffles as the club would not even breakeven on the amount of dues we charge otherwise.

I would especially like to thank Cheryl Tucker for bring doughnuts and Owen Vance for bring coffee for the refreshment table.

For the demonstration, Beaver Creek member Paul Kuenle demonstrated several types of candle holders, both freestanding and hanging. Paul is a school teacher who has built his blacksmithing business until I understand he wouldn't object that strongly to being laid off. While he mostly makes candle-related items for arts and craft shows and special order, he has also done restoration work on various projects.

Since the items he was demonstrating involve fairly basic blacksmithing procedures, I will try to highlight some of the tips from him:

- He cuts the teeth on his trammel hanging lamps with a bandsaw. He said he could use the edge of the anvil to put these in but the bandsaw makes smaller, more precise teeth.

- He uses two hammers predominately, a ballpeen and crosspeen. He said he preferred the ballpeen since it was perfectly balanced and the face was perfectly flat, giving him more flexibility in working the metal.

- He charges in the neighborhood of \$25 per light for an electrified candelabra and \$10 - \$15 per candle for regular candle holders, price reflecting the additional work over a basic design.

- When spreading the feet on his stands, he noted the natural tendency is to pull the material towards you since your hammer is coming down in an arch. To compensate for this, when the metal is hottest, he intentionally pushes while spreading and then pulls when the metal has cooled off a little.

- For a flux he uses a combination of 10% sal ammoniac (salt of ammonia) and 90% borax. He buys the sal ammoniac in small bricks and breaks it up into a powder, noting that the sal ammoniac in his borax seems to greatly help the weld holding quality. Sal ammoniac can be purchased at some hardware stores. Ron Thompson noted that sal ammoniac is also available at some pharmacies as powdered ammonia chloride. Paul noted, however, that the sal ammoniac somehow adversely affects the finish applied at the point of the weld. He further noted that if you are using the new "mild steel" of A36 or so, you can weld at a lower heat due to the higher carbon content.

- When possible, he likes to bend the arms on his candle holders cold using a jig. He said he had a wall full of various bending jigs he has made for various style and sizes of fixtures. His bending jig was a circle with a leg welded to the inside to hold it in the position. He then welded a "—" piece across the bottom to provide a place to start and stop the bend. The legs usually need to be adjusted slightly to sit level.

- His legs have some type of foot attached. He likes to taper the leg to the foot area and does this by tapering the end, using a spring fuller to make a shoulder and then tapers away from the shoulder. The initial taper is spread to become the foot. He noted he could make the shoulder using the edge of the anvil but a spring fuller makes the process much easier.

After the demonstration Rushsylvania member John Jacobs passed around a door knocker he had made using railroad spikes. The knocker was a ram's head with the spike head as the knocker point. He did a beautiful job including mounting it on a piece of wood. He noted he had great difficulty holding the spike while making the knocker part and said in the future he would probably weld on a handle to the spike head, cutting it off and grinding off the weld afterwards.

Also after the demonstration it was decided the group would start on the wings of the homestead gate after the first of the year. We want to continue the basic design in the gates into the wings. We may do something like working on the second Saturday again with SOFA providing the Editor's famous beans and hot dogs lunch.

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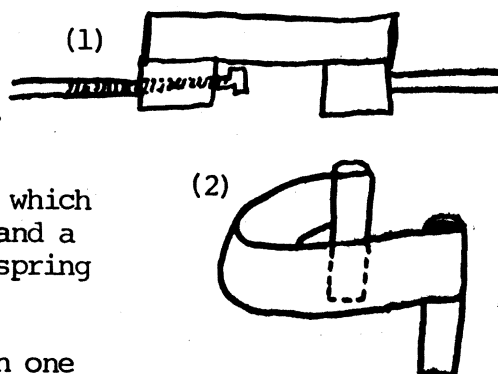
The Board of Directors met prior to the January 3rd meeting to discuss potential demonstrators/demonstrations for the next Quad-State Round-Up, tentatively scheduled for the last weekend in September. Potential demonstrators were identified and will be contacted to determine their interest. If you would like to see a particular demonstrator or demonstration, please let one of the group officials know as we might be able to arrange it at the next or one of the future Round-Ups.

The short business meeting prior to the demonstration briefly covered the upcoming Round-Up and a reminder that 1987 ABANA calendars and SOFA baseball-type caps are available at meetings for \$3.00 and \$4.00 each or \$4.00 and \$5.00 each, respectively, by mail from the Editor.

The newsletter support raffle brought in a record \$82.00. Sidney member Ron Thompson won a guillotine fuller die donated by Sabina member Henry Smith. Beaver Creek member Gene Schulz won a beautiful anvil-shaped belt buckle donated by Fairborn member

Brian Thompson. Mt. Blanchard member Ed Hulihan won one of the pair of tongs made during the tongs competition at the last Round-Up. Miamisburg member Scott Shoemaker won a large meat fork donated by Rushsylvania member Ralph Van Buskirk. Springfield member Joe Weiss, Sr. won a pair of large tongs donated by Englewood member Steve Roth. Quincy member Steve Fleckenstein won a small meat fork also donated by Ralph Van Buskirk. Findlay member Dave MacDonald won a cut-off hardie donated by Emmert Studebaker and a candle holder donated by Troy member Tom Zeigler. The Editor won several screwdrivers donated by Hillsboro member Gene Ludwick. Lynchburg member John Patton won a hunk of beeswax donated by Greenville member Ron Van Vickie. Huber Heights member Larry Wood won a welding pamphlet and soapstone donated by Kettering member Ham Hammond. Germantown member John Dupps, Sr. won a jackhammer bit donated by Pandora member Lynn Spalling, Vandalia member Dennis Dunn won a twisting wrench donated by the Editor. Gene Lurwick won a small can of welding flux donated by Terry Carson at the last Quad-State. Dayton member Joe Abele won a postcard featuring ironwork sketches from the Timberline Lodge in Washington. Guest Cheryl Tucker, Greenville member Robert Ream, Vandalia member Ray Montgomery and Dayton member Duane Wegley all won a "blacksmith shop hours" poster. As you can see, we had a wide variety of items donated by a fair number of members. I understand the next raffle will include one of the heads and workholder featured on the back page of the last newsletter, among other items.

The group President, Hans Peot, gave an excellent, informative demonstration on decorative twists in several sizes of stock. Hans is a mechanical engineer by hobby and it is not unusual to hear that he has made his own tools, such as shapers, needed to making tooling. He had along a twisting wrench he had made out of lengths of pipe which tightened by twisting one of the handles (Illustration 1) and a spring clamp (Illustration 2) to allow close twists. The spring clamp fit into the postwise jaws.



The first twist was to simply twist 1/2" square stock in one direction, put it in the spring clamp and then twisted it in the opposite direction, resulting in closely spaced twists in opposite directions. To determine how many times to twist stock, or how many times it was twisted, you can use the rule of thumb of one ridge created per every one-quarter turn on square stock (e.g., six ridges would indicate the stock was twisted one and one half times). Larry Wood pointed out that when twisting go past the desired number of turns by one-eighth twist and then reverse the twist by that one-eighth. This releases the stress produced by twisting and will help prevent the twist from untwisting slightly if quenched.

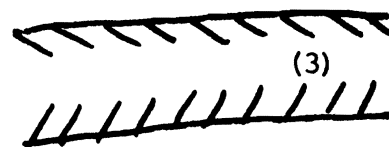
For the second twist Hans used a sharp, handheld hot cut to put in grooves on all four sides of the square stock and then twisted it. This created the illusion of four small square bars twisted together. The third twist was similar except before twisting he used the hot cut to put a series of "v"s on one corner for an interesting effect once twisted.

The fourth twist produced a diamond effect. Hans put in four opposite grooves like the second twist, twisted it, flattened the ridges and cut four more grooves. When it was untwisted one-half the number of times as the original twist, a diamond pattern appeared.

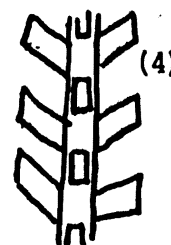
The fifth twist was made on six-sided stock without any grooving. For the sixth twist, Hans put grooves on two opposite sides one-quarter in from the sides and then knocked off the corners on the two opposite corners. When twisted, this produces the effect of a slightly raised ridge following a spiral.

The seventh was made by flattening on the corner from two sides to about one-half the thickness of the original stock and then twisting. This produced a spiral effect.

The eighth twist was very interesting in that Hans had used a bandsaw to put cuts in the side of a piece of rectangular stock (Illustration 3). When twisted, it produced a tree-like effect (Illustration 4).



For the ninth twist Hans used four pieces of 1/4" square stock to produce a basket. The tenth twist was in 1/4" x 1" stock to produce a spiral shape and the eleventh was made by using a fuller (blunt) chisel to put a rounded groove on two sides and then a blunt punch was used to put in dimples on the other two sides the length of the groove. This produced an interesting effect when twisted.



Dave MacDonald also demonstrated using 1/4" x 1" angle iron to show how, when twisted, it produces a spiral by closing on itself. Dave has used these twists in gates.

Hans pointed out the variety of decorative twists is limited only by your imagination. Several of these twists are in the homestead gate sections.

Following the demonstration one member requested a demonstration on making cow bells and another requested a demonstration on making wood splitting mauls (perhaps from an old sledgehammer head) and wedges. If you would like to demonstrate any of these, please contact the Editor. Personally, I would also like to see Ralph Van Buskirk demonstrate making meat forks.

GROUP TOUR OF SAMEUL YELLIN: METALWORKER EXHIBIT:

The group tour of the Sameul Yellin: Metalworker exhibit at the Allen Memorial Art Museum at Oberlin College, Oberlin, OH will be on Saturday, February 14th. Carpools will leave from the employee parking lot at Process Equipment Company at 9 AM. Members with vans, etc. are encouraged to bring them.

We will meet members from the Indiana Blacksmithing Ass'n at the Campus Restaurant on Highway 58, between Vine and East College Streets between 11:30AM and 12:00AM for lunch. Following lunch the group will go to the museum about a block away. SOFA members who go up separately are also encouraged to meet us for lunch. Museum hours on Saturday are 1PM to 5PM.

Photography will be permitted without use of flash, bulbs or tripod. You will need to inform a guard before starting to take pictures.

We will have a tour guide for opening remarks about the exhibit. They indicated they want to learn about Yellin's techniques themselves, so be prepared for questions from the tour guide or museum staff.

Please RSVP to me at 513-252-3001 (evenings after 5PM or weekends) so I can alert the museum and restaurant on how many to expect.

CRAFT FAIR!!!!

Emmert Studebaker, at the January 3rd meeting, suggested the group sponsor a craft fair dedicated to ironworking to increase interest in blacksmithing in the area and to assist area blacksmiths by providing a sales outlet. Ham Hammond has volunteered to check out, and then set up if feasible, a demonstration/sales booth at the next Montgomery County Fair over Labor Day Weekend. What is envisioned is two demonstration forges surrounded by sales tables. We would need both demonstrators and sales people. Booth space cost and a small percentage to SOFA for setting it up would come out of sales. If you would be interested in demonstrating and/or selling your blacksmithing products here, please contact Ham at 2883 Red Oak Road, Kettering, OH 45432 as soon as possible so he can determine interest prior to proceeding too far as this will

(Cont. on page 7)

ORD Kelvin once stated "I often say that if you can measure that of which you speak, and can express it by a number, you know something of the subject. But if you cannot measure it, your knowledge is meagre and unsatisfactory."

In the field of maintenance welding, the evaluation, or identification, or measuring of a metal is of great importance. In a modern factory, hundreds of different machines are used and these contain a myriad of different metals.

When one small part breaks, the cost of downtime is great until that part is restored to useful service by welding, or else replaced. Replacement is usually out of the question because spares of thousands of parts simply cannot be stockpiled for economic reasons alone, not to mention space limitations.

When a part fails in service and must be repaired, the welder must identify the analysis of the base metal before he can establish a welding procedure. In the case of imported machinery, second-hand machinery, and old machinery it is almost impossible to have the analysis of every part on file.

Since maintenance is usually a "now" situation, it is imperative that the maintenance welder makes a reliable assessment of the base metal analysis promptly — generally without outside assistance.

If the welder incorrectly identifies the base metal, a costly weld failure is likely to occur. If the welder mistakes alloy steel or carbon steel, and welds with a mild steel electrode, the welding is certain to fail.

If he mistakes zinc die cast for aluminium and welds with an appropriate procedure for aluminium, the base metal will surely sag and collapse. The weld attempt will be fruitless since zinc die cast collapses at a temperature below that necessary for aluminium welding.

To differentiate between metals is sometimes easy but in some cases requires real "detective" work. Nevertheless, it is vitally important in a maintenance department to correctly identify metals since there is generally a major difference in the welding techniques involved in repairing different base metals.

The purpose of this paper is to provide information that can be used as guideposts in identifying different metals accurately in plants where laboratory equipment is not available, or not adequately portable.

Some of the different "detective" systems used are:

1. Identification by hardness.
2. Identification by colour.
3. Identification by melting.
4. Identification by chemical tests.
5. Identification by spark tests.
6. Identification by chip tests.
7. Identification by sound.
8. Identification by magnet tests.
9. Identification by weight.

We will cover these systems one at a time.

HARDNESS TEST

A test by use of hardness testing equipment. Use three small segments of a questionable steel. Heat

Simple methods for identifying metals

By L. D. Richardson

all three to a red-yellow colour and quench one piece in oil, one in water, and one in air. The hardness of the water hardened piece will determine the carbon content as per the following schedule:

Carbon Content in percent	Rockwell C Hardness (water quenched)
.15	44
.20	49
.25	52
.30	55
.35	58
.40	60
.45	62
.50	64
Over .50	65-68

If the oil-quenched specimen has the same hardness as the water-quenched piece, the piece of steel is oil hardening. If the air hardened specimen has the same hardness as the water hardened piece, the steel is air hardening. (This is true if the pieces are of similar thickness and size.)

Another hardness test is a file test:

FILE REACTION	BRINELL HARDNESS	STEEL
1. File bites easily into metal	100	Mild Steel
2. File bites into metal with pressure	200	Medium Carbon Steel
3. File does not bite into metal except with extreme pressure	300	High Alloy Steel High Carbon Steel
4. Metal can only be filed with difficulty	400	Tool Steel
5. File will mark metal but metal is nearly as hard as the file and filing is impractical	500	Hardened Tool Steel
6. Metal is harder than file		

WHAT THIS ARTICLE IS ABOUT

Modern conditions demand that a maintenance welder be able to quickly identify base metals without outside help. Mr Richardson, Managing Director of Magna Alloys and Research Pty Ltd, outlines nine basic "detective" systems.

The tensile strength of a metal in pounds per square inch is 500 times its Brinell hardness, knowing the Brinell hardness will give the tensile strength. Conversely, if the tensile strength is known, the Brinell hardness is calculated by dividing the tensile strength by 500.

A steel ball, such as a ball bearing, if dropped on a piece of metal, will bounce. A simple hardness calculator can be made by using a glass tube and dropping a steel ball bearing inside the tube. Calibrations can be made on the glass tube by measuring the bouncing height on base metals of known hardness.

This home made device, after the calibrations are made and the tubing marked, becomes an accurate hardness testing instrument.

COLOUR TEST

1. Copper has a reddish brown colour.
2. Manganese steel is "blue" when in service and copper coloured when in storage.
3. Zinc, magnesium aluminium, tin, and lead are whitish metals.
4. Brass is yellow if it contains a high percentage of zinc but reddish otherwise.
5. A chip of high carbon steel has edges which are lighter in colour than those of low carbon steel.
6. White cast iron is white and silvery if a small segment is broken out.
7. A fracture of grey cast iron will appear dark grey and if rubbed with a finger the finger will receive a grey graphite streak.

TORCH OR HEAT TESTS

1. When a sharp corner is heated on a white metal casting with an oxyacetylene torch, if the casting is aluminium it will not melt due to the high dissipation rate of aluminium. If the casting is zinc, the sharp corner will melt since zinc is not a good conductor.

2. When a sharp corner is heated on a piece of copper, if the copper is deoxidized the corner will melt. If it is electrolytic copper the sharp corner will not melt.

3. To determine if a bronze alloy contains lead, melt one small section. If it contains lead, the lead will boil. If no boiling occurs, the metal is not a free-machining, or lead bearing bronze.

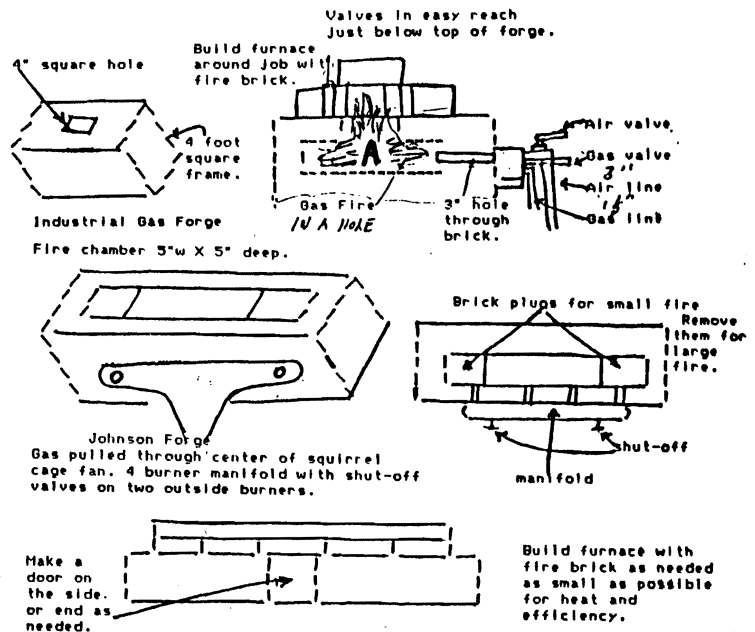
4. To distinguish magnesium for aluminium take some filings and heat with a torch. Magnesium will burn with a sparkling white flame.

require a good bit of effort to bring off. This could become an annual event. Other chapters are doing something similar, with success, and a couple even have permanent booths built.

MORE ON GAS FORGES:

In reply to my request for assistance at the end of the gas versus coal forges article in the last issue, Gary, IN member Clifton Ralph sent in the following:

"I am not a 'gas engineer', but I have worked with gas forges for the most part of 30 years. We had an eight foot long, four burner furnace and five gas forges (see illustration). The air for all of these fires was furnished by one very large fan. When we used these forges for welding, we made a small brick box around the 4" square hole. As the forges became burnt out to an 8" or 10" hole, it was much better for heating a four foot (inside diameter) ring for straightening. We did this by placing four fire brick (pieces) around the hole and placing a brick cover over them to baffle the fire, to make it spread out enough to get the four foot ring red hot. We also heated furnace door heaters (or water boxes) which were fabricated from 1" plate. These were 20" to 24" square and 40' or 50' long. They would pull crooked while welding. We used heat, the weight of the box and a crane to straighten them. Two, 4" square pieces, 8" to 12" long were heated in these forges a lot of times. I guess what I am trying to say is that these forges had the capacity to burn a piece of steel up, with a wide range of heating possibilities. I don't know about efficiency, the company paid for the gas.



The "A" hole (illustration) was about 10" square and 24" long, this made the fire come out of the 4" square hole on top, evenly and well-mixed. The gas and air went into a cast box or mixing chamber,

I have a two top burner Mahkel furnace with doors on the front and back (6"W x 6"H x 16"L). I took the top off and added a row of brick. The furnace is now 6"W x 8 1/2"H x 16"L. You can get a larger object in the furnace, and the heat is spread more evenly over the furnace bottom. I use this furnace most of the time. I can heat twenty pieces of 1" x 2" x 4 3/8" at one time, or put one in and take one out to keep the heat I want. The furnace is handy with the two doors and reasonably efficient. It's almost impossible to burn a piece in it, but it can be done.

I also have a four burner Johnson (illustration). This furnace is a lot more versatile for heating all knids of shapes and sizes, it will also burn a piece of steel up. I don't think it is quite as efficient as the Mankel. It will heat large or odd shaped objects and by closing the outside valves, and building a small fire chamber, you can get all the heat you will ever want for welding.

For a gas forge you need good gas and air volume, on the gas line a pressure guage, and control valves on both gas and air lines. You can shut them down with the valves, but you can't use gas or air pressure or volume you don't have. I replaced the motor on the Mankel fan with one 150rpm faster. The furnace will get 100° to 150° hotter, I think, as I don't have a pyrometer on the furnace.

I run each furnace with two 100 pound propane tanks, hooked together. I usually have 5 to 10 pounds left in the tanks. When using one tank, I usually had 20 pounds left. When one tank is low, it will draw the gas off about as fast as the liquid will turn to gas. Two tanks will provide enough pressure and volume to run the Johnson, wide open, with all four burners.

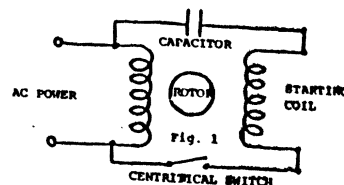
I have seen several exotic burners but I haven't been convinced that they are any more efficient or provide any more heat than a mixing box, similar to the industrial forge or the Johnson.

(EDITOR'S NOTE: I was able to raise the temperature noticeably by building a chamber with the air flow out the top, similar to that described by Clifton. I am right at forge welding temperature and think I would be OK by sealing between the bricks and buying a few more insulated bricks of higher temperature tolerance as the bricks at the fire hole are beginning to burn away. Insulated firebricks are available from Plibrico Sales and Service, 1500 Humphrey Ave., Dayton - 513-253-9356. Humphrey Ave. runs south off of Linden Ave. between Smithville Dr. and Woodman Dr. near the Easttown Shopping Center.

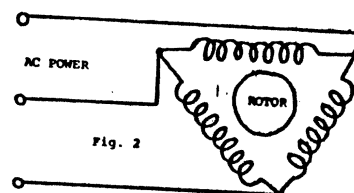
The December 1986 issue of the newsletter of the Mid-Atlantic Smith's Ass'n contained an article on building a gas forge with a castable refractory burner unit. For a copy of the article send me a 22¢ stamp. On forge welding it noted: "The furnace atmosphere can be tuned one of three ways. Excess gas (reducing fire), equal gas and air (neutral), or excess air (oxidizing). Running a welding fire in the oxidizing state will ruin the flux and burn the steel (turn it hot short). So you want to run a reducing fire. Because of this type of atmosphere, you will not see any sparking, rather you want to watch for the flux to become watery. Welding heat for this furnace should be in the area of medium orange." They had the same experience as me in getting 4 to 5 hours of operation out of a 30 pound propane bottle. However, this could probably be stretched to 7 to 8 hours by turning off the gas as you take an item out of the forge. The forge will relight when the gas is turned back on. This assumes you are not working two pieces at once.)

RUNNING A THREE PHASE MOTOR OFF OF SINGLE PHASE (by Hans Peot)

In order to start a single phase motor a second coil in the motor is required with an appropriate phase shift in the applied voltage. Without a second coil (starting coil), a single phase motor will not start. It will just sit there and hum. To get a phase shift in the second coil either resistance is added or a capacitor is hooked in series with the second coil providing a phase shift. This phase shift causes a rotation of the magnetic field which, in turn, causes the rotor to turn. Once rotation has started and the motor is up to speed, there is no longer a need for the current through the second coil. To turn the current off to this coil, a centrifical switch is provided which opens the circuit at an appropriate speed. See Figure 1.

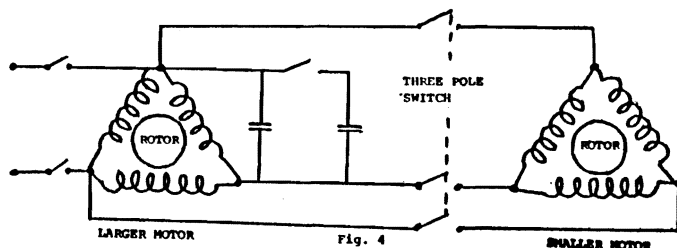
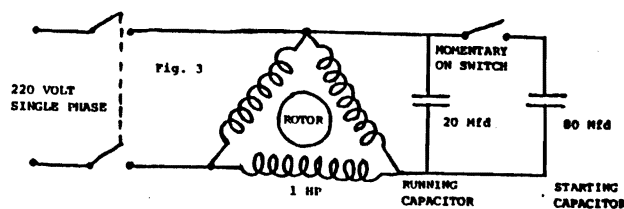


In a three phase system, the power which comes in is on three wires. Across any two wires there is the same voltage, the difference being each phase is 120° different from the other. In a three phase motor there are three sets of coils which the power is applied to. With the built-in 120° phase shift you automatically end up with a rotating magnetic field which turns the rotor with no need for any switching or starting coils. The direction of rotation can be changed without letting the motor stop first just by interchanging two of the connected phases. See Figure 2.



You can see right away there is no way of hooking up a three phase motor to a single phase source without providing some way of getting a phase shift.

In order to run a three phase motor off of a single phase source you can add capacitance (condensors) to get a phase shift to the third coil connection. Since we cannot get a true 120° phase shift between the three phases, the motor is not as efficient and additional capacitance has to be added during starting. A general rule of thumb on a 220 volt hook-up is you need 20 microfarads of capacitance per horsepower for running and 80 microfarads of capacitance per horsepower in parrallel with the 20 microfarads for starting. Since the motor does not have a built-in centrififical switch to switch in and out the starting capacitor, a momentary switch has to be provided for you to switch this capacitance in and out. See Figure 3.



Capacitors (condensors) can be picked up at Mendelson's Surplus or Granger Supply on Needmore Road, both in Dayton. It should be pointed out that there are two types of capacitors - oil-filled conventional and electrolytic. Electrolytic are much smaller for the same or larger rating; however, these cannot be used continuously because they will get hot and explode. Therefore, the running capacitor should be an oil-filled capacitor and the starting capacitor can be electrolytic or oil-filled. The voltage rating on the capacitors when used on a 220 volt circuit should be at least 330 volts to take into consideration voltage transients during switching.

A three phase motor run this way will give you approximately 75 percent of the rated horsepower shown on the label and the motor will not have near the starting torque which it would on three phase.

You can use a larger three phase motor as a phase converter once you have it running to run smaller three phase motors of the same voltage rating. This allows you to gain the benefit of three phase, i.e., quick reversing, and also opens up the use of many machines which are run on three phase. A good rule of thumb is to never run a small motor which exceeds 50 percent of the larger three phase motor being used as the phase converter. Always start the larger motor and have it running before switching on the smaller motor. See Figure 4.

In all the examples, I didn't show a ground wire. Always connect the ground wire throughout the hook-up to the frame of the motors.

HEAR YE! HEAR YE! HEAR YE!:

For a great shop storage cabinet check used office supply equipment outlets for IBM card storage cabinets. These are becoming available as programs are switched from card control to direct terminal access. Most have twenty roller supported drawers the size of a card by about 28" deep. Drawers roll easily even when heavily loaded. I bought two of them and was amazed at the amount of tools, parts, etc. which can be stored in them.

"May your forges burn clean and hot, your hammer strike true, and your workload be beyond your wildest dreams". (By F.J. Markkola from the newsletter of the Arizona Artist-Blacksmith Ass'n).



Members desiring to display their work at art shows, etc. in the local area, or to be considered for commission work, are encouraged to join the Miami Valley Art Council (P.O. Box 95, Dayton, OH 45402-0095). Basic membership of \$10.00 per year includes announcements of visual art shows, a newsletter, and all support services. They maintain a slide catalog of area artist works and a directory of craftsmen members. A review of the 1987 Directory shows only two involved in metalwork, both casters. Call 513-228-ARTS for a recording of events in the Miami Valley area.

The Greenville Treaty (Boy Scout) Camperee would like a blacksmith demonstrator the afternoon of May 16th. For further details contact Leroy Schindler (513-277-9482). I'm told the Boy Scouts are always a fun group to demonstrate for.

Clip-on didymium glasses are available through mailorder from Thomas Scientific Co., Box 99, Swedesboro, NJ 08085-0099. Order Nr. 5774-C60-F02C03 for \$31.00 plus \$2.00 S&H.

Paid up members of a chapter and of ABANA may receive a 20% discount on the purchase or use of an ABANA service or goods. Specifically this will apply to the purchase of books, goods, and back issues of The Anvil's Ring marketed by the ABANA office and rental slides from the Slide Library. Applications will have to note which chapter he or she belongs to. It is recommended your order be sent via the Secretary/Treasurer of SOFA for endorsement of local chapter membership. Members of ABANA chapters may also join ABANA at \$5.00 below the regular or family member-rates, i.e., \$30 and \$35, respectively. This discount will be applied to each membership on a one-time basis only.

Emmert has acquired a resupply of the West Virginia coal. Prices: ABANA members, \$7.25 cwt; SOFA members, \$7.25 cwt; non-members, \$7.75 cwt; and to ABANA or SOFA members by the ton, \$7.00 cwt. All prices are subject to 5.5% Ohio sales tax (unless tax exempt). Purchasers are requested to bring their own bags or containers, and to fill and weigh them. Coal will be available at each SOFA meeting. Smiths wishing to buy coal at other times are requested to make prior arrangements with either Ruth, Emmert or Jane Studebaker at 513-667-4451 or 223-3102. Please make checks payable to Emmert Studebaker.

Via a Christmas card to the Editor, Francis Whitaker wished happy holidays to all of his friends in SOFA.

We would like to have at least one meeting a year set up to get the members hands-on at the forge, such as we did for the beaver trap workshop. We would have about eight forges set up. A possible item to make is hardy cut-off tools since two-man teams can be effective on them. Does anyone have a source of cheap jackhammer bits? We would need about 16 of them in assorted shaft sizes. We would also need to borrow striking hammers, flatters and tongs with bits large enough to handle the shaft sizes.

During Paul Kuenle's demonstration one of the members requested we have someone demonstrate sheath making (leather working) at one of the future meetings since many of the members are now into knifemaking. If anyone is interested in demonstrating leather working, please contact the Editor.

Does anyone know of a source of 1/4" square hot rolled steel? If so, the club may be interested in making a group purchase for resale as this size in hot rolled seems to be impossible to find locally. ATTENTION OTHER CHAPTER NEWSLETTER EDITORS, can you help us out with a source?

The next Early 19th Century Blacksmithing Workshop at Connor Prairie (just north of Indianapolis) will be held March 21-22, 1987. This is the workshop at which the wrought iron body, steel head and peen hammer described in SOFA SOUNDS was made.

Francis Whitaker will be holding an Advanced Blacksmithing Course at the John C. Campbell Folk School, Brasston, NC from April 5-18, 1987. Learn with the master. The school has a full summer of courses lined up led by some of the best in the business, including Nol Putnam, Jim Batson, Jim Rubley, and Peter Ross.

A compact sand blaster (including shoulder strap, rustproof polyethylene hopper with a built-in hose compartment and a 30 pound capacity, a 5' material hose and siphon-fed aluminum sandblast fan with a hardened steel nozzle) is available for around \$40 from Campbell Hausfeld, 100 Production Dr., Harrison, OH 45030. Works with most air compressors 1-hp or above. Cheap enough to have handy in your shop.

BASIC BLACKSMITHING CLASSES: Larry Wood will hold basic blacksmithing classes at his shop on Fishburg Rd. when he can get a class together. Contact Larry at 233-6751.

"Iron is dead metal and it is fun to bring it to life". Quote by Sameul Yellin.

The Samuel Yellin Foundation is introducing the first of a series of posters which will be dedicated to the education and training of artist blacksmiths. Drawing #1 is a new drawing, the Firey Dragon, drawn by Joe Macetti. Drawing #2 is an early drawing in pen and ink with a slight wash. Drawing #3 is of the gates for the Packard Building in Philadelphia. Drawing #4 is a charcoal study for the Federal Reserve Bank of New York (which contained 200 tons of decorative wrought iron). The price for the set of four posters is \$22.50 postpaid or \$6.00 postpaid individually. Send order to the Samuel Yellin Foundation, 6620 Arch Street, Philadelphia, PA 19139.

The Blacksmith's Gazette (a bi-monthly magazine devoted to the beginning blacksmith) now has a new Editor and expects to stay on their publication schedule in the future. Cost is \$14 per year to P.O. Box 1268, Mt. Vernon, WA 98273.

The demonstrator list for the Southeastern Regional Blacksmithing Conference, to be held at Madison, GA., on May 15-16, 1987 are: Dorothy Stiegler (Washington), Russ Maugans (Washington), Nol Putman (Virginia); Danny Boone (Maryland), Charles Fuller (Tennessee) and Travis Daniel (Georgia). I understand this is an excellent conference which gets better each time and that used blacksmithing tools sell very well.

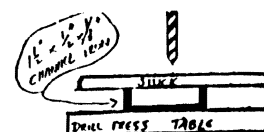
The Blacksmith's Cookbook: Recipes in Iron by Francis Whitaker is available from Jim Fleming Publications, Box 1211, Vail, CO 81658. Price of \$31.50 includes S&H.

SHOP TIPS AND TECHNIQUES: (In most cases, these tips and techniques have been paraphrased from the original write-up or illustrations for consistency of format. While the information presented in this section (and elsewhere in the newsletter) is believed to be accurate, SOFA and ABANA bear no responsibility for injuries or other adverse actions which may result).

- **UNIVERSAL TONG BITS:** The tong bits illustrated fits all sizes of angle iron, round pipe, and square tubing. (By Mike Person from the newsletter of the Western Canada Blacksmiths' Guild).



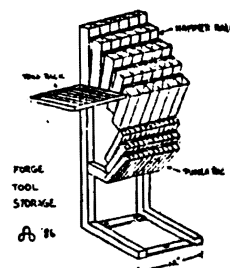
- **TIP FOR DRILL PRESS:** A short length of channel iron placed between your drill press table and stock (e.g., 1 1/2" x 1/2" x 1/8") will help the stock stay level and off the table. (By Francis Whitaker during the 1986 ABANA Conference, from the newsletter of the Western Canada Blacksmiths' Guild).



- **REMOVING LABELS:** If you need to remove a dried-on label, tape or nametag, spray it with WD 40. This will dissolve the glue.

- **TONG RIVETS:** When making a pair of tongs, make one of the holes for the rivet square. That way the rivet will seat permanently on one side of the tongs while the other side will pivot freely. Keeps the tongs from being too sloppy or too tight. (From the newsletter of the Arizona Artist-Blacksmith Ass'n).

- **TOOL RACK:** This tool rack is from the newsletter of the Blacksmith Ass'n of Missouri. The hammer rack is made from 2" tubing with 5/16" x 3/4" spacers between the rows. The lower chisel and punch rack is made from 1" tubing with 1/2" rod stock spacers. The side tongs rack is made from 5/16" x 3/4" stock with what appears to be 2" spacing between the inner spacers. I would recommend a brace on this rack down to the frame. The frame is made out of 1 1/2" tubing. The entire affair bolts to the floor. I would guess overall height to be 4' to 5' with the hammer and chisel/punch tubes 6" to 8". Width is 12" excluding the tongs rack.

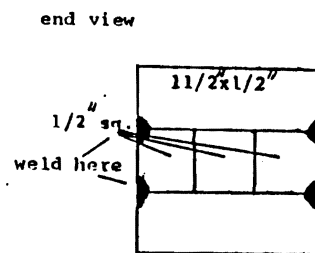


- **WROUGHT IRON SOURCE:** Keep an eye out for old railroad tracks being ripped out, as some used wrought iron spikes. They rust in the characteristic fiber pattern, but there is a good slug of material left on them. (From the newsletter of the Mid-Atlantic Smith's Ass'n).

- **LAYOUT SCALE:** Bob Wozniak has devised a way of keeping the dimensions accurate when working on small pieces which have ears, points, etc. Bob keeps a 18" x 24" piece of rabbit cage screen with 1/2" square mesh on his layout table. After he initially forms his piece he lays it on the screen and aligns it on the grid. This way he knows exactly what needs to be done to make the sides uniform. This can take a lot of guess work out of a project and you can always transfer the dimensions to a larger scale if need be (e.g., making samples). (From the newsletter of the Indiana Blacksmithing Ass'n).

- **SHARPENING TIP:** For putting a keen edge on thin bladed tools, such as knives, small chisels or scribes, etc., use silicon carbide sandpaper -- 260 or 320 grit. Place the sandpaper on a piece of glass or a piece of flat steel. The surface must be smooth or the tool will cut through the paper. You will be surprised how fast it sharpens. (From the newsletter of the Guild of Metalsmiths).

- **MONKEY TOOL:** The quickest monkey tool I know how to make is laid up of square and flat stock. For a 1/2" square monkey tool, take three pieces of 1/2" square scrap sandwiched between a couple of pieces of flat stock. 1 1/2" x 1/2" is good, but any piece which is thick enough will do. Weld up the joints on the side, then punch out the middle piece and square up the ends on the bandsaw. The business end may also be cut at an angle for angled tenons. (By Johnathan Herz from the newsletter of the New England Blacksmiths').



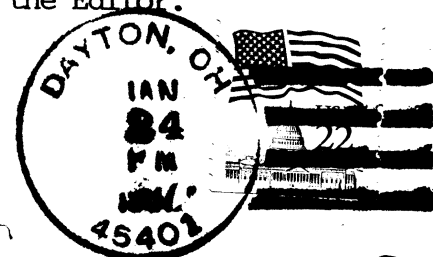
SOFA SOUNDS is the bimonthly newsletter of the Southern Ohio Forge and Anvil (SOFA) Chapter of the Artist-Blacksmith Ass'n of North America (ABANA). Other ABANA Chapters may reprint non-copyrighted material as long as proper credit is given to the original source. Unless otherwise indicated, the material herein was provided by the Editor. Membership in SOFA is \$5.00 per year payable to S.O.F.A. in care of the Editor.

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NOTE: Your SOFA memberships expires with issue

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