Rocky Forge News

Volume 8, issue 6 – June, 2009

Meetings

It has been a very busy month since our last meeting in May. Many of us have worked several days to plan, build and execute the finishing touches to the kitchen utensil holder and the utensils for an outdoor camp site. It is now complete and will be judged at the IBA conference June 6th and 7th. If we are judged the winner then our entry will be transported to the Pontiac, Illinois show for auction. If we do not win then we will bring it back home and sell raffle tickets for a drawing at the Illiana Steam and Power Show in July.

Notice: There will be **no June meeting** for the Rocky Forge group; we will see each other at the June Conference and convene for a meeting July 11th to plan our show time at the Steam and Power Show.

Ted Stout

Blacksmith Vises :

Solid Box, Post or Leg Vise or Vice (British)

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The blacksmith leg vise or "solid box vise" is one of the most important tools in the blacksmiths shop. It firmly holds hot iron while it is hammered, chiseled or twisted. These are the only vise that is designed to take this kind of use day in and day out. A small 30 pound blacksmith's vise can survive pounding that would wreck a much heavier cast iron bench vise.

Three things make a blacksmith's vice special. One is that they are forgings, not cast iron. The second is the leg which provides support at the floor or from a sunken post. The last is the hinge, while not a perfect way to construct a vice the pin joint is durable and can take a considerable beating. If sheared it is easy to replace. These things all combine into a tool that can take decades of heavy use and abuse. Most in use are one to two hundred years old.

Some of these vises were made by specialists such as Atwood of Stourbridge England, Columbian in the U.S. and others were made in anvil manufacturing plants such as Mousehole Forge and Peter Wright in England and Fisher-Norris and others in North America. The design of these vises right down to the last chamfer seems to have been perfected in the 1600's and remained more or less the same until the 20th century. The bodies are forged wrought iron or mild steel and they have hard steel surfaces welded into the jaws.

Around the turn of the 20th Century during the hey-day of the blacksmith shop in North America these tools were considered so standard a commodity that they were sold without reference to manufacturer. Very few were even marked with the maker's name. Size is best defined by weight as there is some variation in jaw size from manufacturer to manufacturer. They were sold by the pound and are still best judged by the pound.

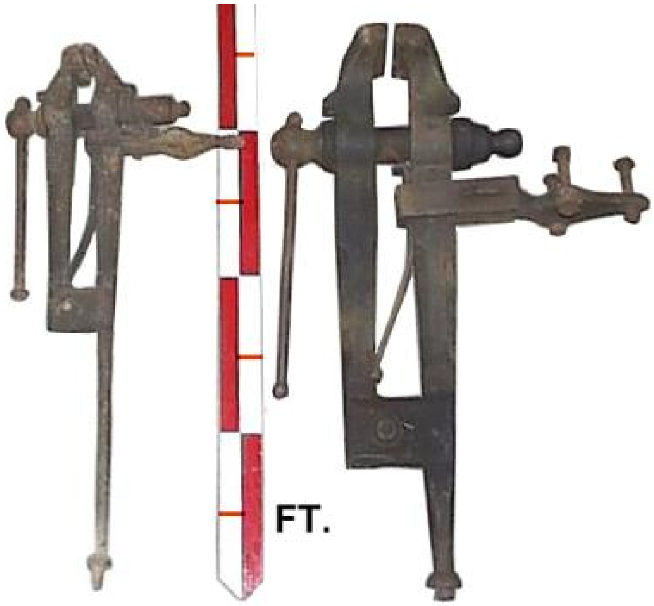
Note that new manufacturers no longer follow these "standard" proportions and a modern Indian made 8" vise only weighs 120 pounds compared to the 200 to 250 pounds of the old vises.

Vise Size and Weight:

In my 1894 catalog, the leg vise weight and jaw width are listed thusly (chart below), and I believe they are referring to the Peter Wrights. [chart moved below]

As Jock pointed out, there are going to be variations, even by the same manufacturer. For example, I saw in Scotland a Peter Wright vise that had a 6-7/8" jaw and a 20" long spring. The legs had a very slight chamfer. I have one with the same jaw width and a 17" spring. The chamfering is much more pronounced.

Frank Turley - Saturday, 06/21/03 12:34:25 GMT



Two size vises - graphic by Jock Dempsey

60 pound English vise and 200-250 pound American vise showing the difference in proportions. The 60# vise has 5" wide jaws and a 50# American vise in my shop has 4.5" jaws both matching the chart. However, a 125 pound English vise in my shop has 6" jaws (smaller than the chart).

The height of all these vices from the top of the jaws to the flange on the leg is 39" (990 mm).

English Solid Box Vises

Weight	Jaw	Weight	Jaw
30	3.5	100	6
35	3.75	110	6
40	4	120	6.5
45	4.25	130	6.5
50	4.5	140	7
55	4.75	150	7
60	5	160	7.25
65	5	170	7.25
70	5.25	180	7.5
75	5.25	190	NA
80	5.5	200	8
85	5.5		
90	5.75		
95	5.75		

Weight in Pounds Jaw width in inches.

Mounting Leg Vises:

Sturdy is important. When I have a chance to mount a vise on a bench the bench is anchored to the wall and the floor first. Then I make a plate to anchor to the wall with a piece of angle iron extending from it. This is mounted under the bench top and has a hole for at least one of the vise bolts to go through.

The foot of a leg vise needs a load distribution pad. Usually a metal plate with a hole for the spike OR a good hard stone as Thomas has suggested. The load pad can rest on concrete, wood or brick. On a dirt floor it was common to set a post deep in the earth next to the vise mounting post for the foot to set on. These were cut above the floor OR below as needed. Use a good creosoted or salt treated post. In a permanent shop with a dirt floor you may want to also seal the post with tar for longevity.

The two stands shown here were designed for portability. The new steel stand works very well but needs some ribs to extend out on the base plate to reduce springiness. The reason the vise is set to the back of the plate is so that you stand on the plate when using the vise. You CAN NOT make the vise move when you are standing on its base! This baseplate is some 3/8" scrap I had. It would seem stiff enough without ribs or diagonals but it is not. I suspect that 1/2" or thicker is needed to avoid the springiness.

The stump mounted vise looks cool but was a bad design. It acts like a rolly-poly clown toy and is not very steady. One twice as big might have been OK. Over the years the edges of the stump have worn round making the problem worse. My plan is to mount this stump on a piece of plate like the other vise. The larger wheel base will prevent tipping and be very solid. It will also prevent further wear on the stump.

Portable vise mounts either need to be large OR heavy. I think most brake drum mounts are too small and light. Avoid welding to the vise if you can.

One very interesting vise mount I saw recently was on a hitch receiver. Slip off the trailer ball and slip in the vise. Anchoring to the bumper on a heavy vehicle is about as solid as you can get.

- guru - Thursday, 06/19/03 03:27:23 GMT

Types and Age of Blacksmith Vises:

Few of these tools were marked by the manufacturer but there were some general differences in style. The old English vices had more and finer decorative lines. The chamfers on the legs were deep and produced a square section turned 45°. The nuts and screw were turned and had decorative molding and lines. The oldest vises had a rectangular tenon on the bench bracket that pierced the back leg and spring. A pin in front of the spring held the vise to the bracket.

Later vises (after about 1838) had wrap around strap brackets held in place with a clip and wedge system. Some of the latest American vises had U-bolt mounts. These bench brackets were three different types. One that is definitely English is a tapered diamond shape with bean ends for the bolts. The drop forged American style is a simplified version of this. Then there is the split "rams horn" type bracket that was derived from the early tenon type.

Most surviving American made vises tend to be the late drop forged types and some have cast parts. There is less decoration on the late American vises, no or low chamfers on the legs and no turning on the nut and screw.

-guru

Identification of Vises:

It is more difficult to find out about old leg vises than anvils, because there were fewer markings. When Peter Wright did mark their vises, they did so on top of the screw box body with P.WRIGHT PATENT SOLID BOX. These were in three lines, stamped in small, serifed letters and were often obliterated by wear and rust. The stamped letters were a matter of pride and the result of a break through in technology. The earlier boxes, I assume throughout Europe, were composites made up of multiple "rings" forge brazed around a forge welded tube. The square threads consisted of a coil brazed inside the tube. Normally, brass spelter was used rather than copper, as the brass melts earlier than copper. After brazing, the internal threads were cleaned and the external box was lathe turned. On close inspection, one can see evidence of brass and/or slight separations where the rings are joined.

The Peter Wright firm figured a way to eliminate all the composite brazing business, and was able to make a solid box with internal threads.

The Peter Wright vises exported to the U.S. most often had deeply chamfered legs. When I was in Australia, the PW vises most often had very slight chamfers on the legs. Some of the Australian PWs had the royal coat of arms stamped on them. I suspect that the Australian imports were made at a later date that the U.S. ones. In all other respects, the Australian and U.S. Peter Wright vises appear to have the same conformation.

Frank Turley - 05/29/08

Parts:

Missing from the laid out parts is the screw - my mistake. The vice to the right is a tennon mount type from Old Millstone Forge in New Jersey, USA and dates from about 1820. This vice has been repaired by replacing the screw handle with a bar with nuts threaded onto the ends. Someone recently cut off the foot to clear a new floor…

Vise Screws:

Vice Screws and Boxes by Jock Dempsey

These are the Boxes and Screws from two vices that Dave Baker and I photographed one evening. One appears to be a solid box and the other obviously a pieced box that has missing parts.

The tube of pieced box is actually rolled from about 1/4" thick material. You can see the weld line in the bottom view. The anti-rotation key is missing but you can see where it fit into the first ring of the stack that was the back of the box. The short coarse thread screw fit this box. The fine (worn out) screw fit the other box.

The fact that these parts were made by a combination of forge welding and brazing is pretty amazing. At this time the screw threads were probably hand turned on a lathe. Even when Maudslay first started making his geared screw turning lathes the master screws were made by hand. He used knife edges to make a spiraling line the length of the screw then followed it by hand making it deeper with multiple passes.

The "Solid Box" patent was probably based on Wrights early use of steam hammers and dies in their trade as his anvil patent shows. This "invention" was more the result of advances in manufacturing machines than an advance in vice design.

Machine Methods:

The solid box shown has been center drilled in the knob end. To support this piece in the lathe it would need to be supported in a steady rest and tied against the drive plate with leather thongs (a common method of the time). Note the area in front of the key that has been turned down. This is a trued surface for the part to run in the steady rest. Otherwise there would be no reason for machining this surface.

SO, the order of operations to make this solid box as thus.

1) Forge the solid blank
2) Center drill both ends
3) Machine a clean area for the steady rest.
4) Setup with a center and steady rest
5) Drill the hole.
6) Thread the screw hole (tap or chase).
7) Stamp name or ID.
8) From one advertisement for Peter Wright Solid Box vises, case harden

The only marked box I have seen is one I have with a Brooks & Amritage marking in an oval. This required a rolling marking die to put the large logo on a curved surface.

Vise Heights and mounting:

There are different heights for different purposes. The normal for general work is to have the top of the jaws at about 39" (990 mm) for work while standing. This is the height of most blacksmith leg vises and is good for sawing, chiseling and heavy filing. Blacksmith vises of all sizes are usually this height from jaw to leg flange. If the leg flange is set on something above the ground the height will be a little higher. If you are shorter or taller than average then the vise may want to adjusted to suit.

One of the handiest most used vises in my shop is a heavy 6-1/2" 130 pound Prentis chipping vise mounted on a 39" (990 mm) tall bench. This puts the jaws at 49" (1245 mm). This is a high vise but it is convenient for close work or things like planing a board that you want to "eyeball" for straightness and for heavy bending at shoulder level where you pull with your all. I've moved this vise and bench twice and set it up the same way because I always liked it. Note, I am 5'9" (1753 mm) tall.

This most important thing about mounting vises is that they are on a sturdy immovable stand or bench.

For work sitting you may want a vise as low as 28" (711 mm) or as high as 36" (914 mm). However, if sitting on a tall chair the standard 39" height works well.

Note that a good portion of the work done at a blacksmith vise is hammering. Bench vises will not withstand this type of use. Even the very expensive unbreakable forged steel vises will end up with bent guide arms or broken screws.

A little 30 to 50 pound blacksmiths leg vise will withstand abuse that takes a 120 to 150 pound HD bench vise to withstand. Blacksmith vises generally survive to wear out where most bench vises end up broken at the end of their much shorter lives.

Vise Lubrication:

Vise screws are often overlooked when lubricating machinery and the result is a hard to use vise or worn out screw. High pressure lubricants such as Never-Seize work great on vise screws. Don't forget to put a little under the thrust washer.

Leg Vise Rebuild

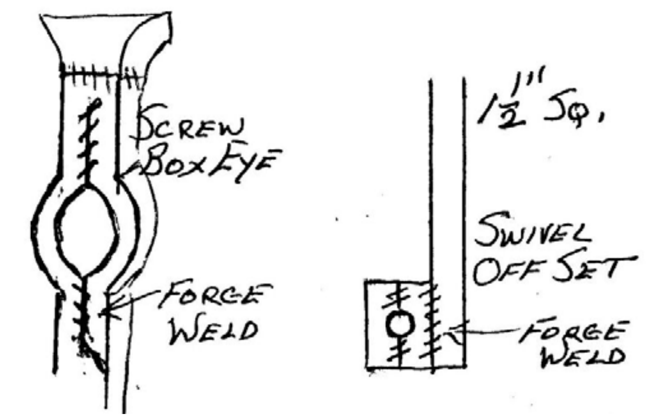
An Adventure in Leg Vise Rebuilding

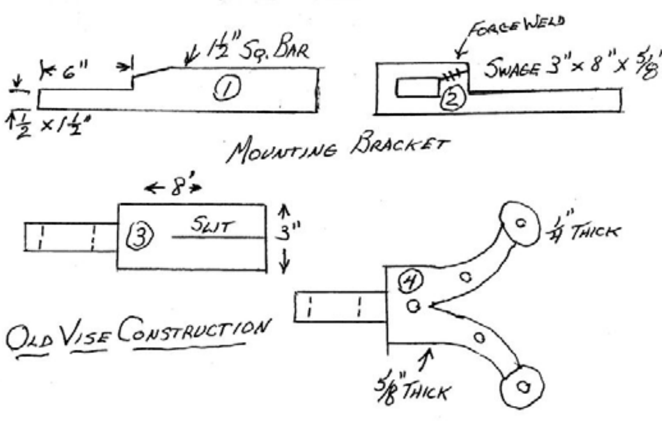
Article written and contributed by Tim Suter

Reprinted with permission From the New Jersey Blacksmiths Association

I happened upon a very old leg vise at a garage sale, that attracted my curiosity. Naturally it was ridiculously high priced, which I questioned and received the standard qualification that "it is old". (So am I but I'm not worth more.) Tactfully I explained that I doubted that it would bring that price as I had seen others in much better condition at venues where there were interested buyers who would never pay that much. Looking it over, it had no spring, the handle was a piece of 3/4 bar, bent over at each end and the screw moved erratically. Leaving. I decided that I would like to have it for the challenge, if the price was right. I kept my eyes on it for the next three weeks and it hadn't moved. I felt the time was ripe so, approaching the seller with tempting green in hand, I boldly asked him if he was ready to part with it for a realistic price. He asked what that would be, I said $25, he said $30. Quick as a hootie owl snatching up a June bug I slapped the green in his hand and the good, stout, young fellow even lifted it into the pick-em-up truck for the congenial old gentleman.

Getting it home I promptly tore it down for clean up and closer inspection. This was indeed an old and very interesting vise. It appears to have been made by hand, hammer and anvil, without the use of a mechanical hammer. The screw box eyes were formed by the leg stock (1 1/2" X 1 1/2") being forged out to 5/8 X 3 X 16 inches, folded over at about eight inches, the eye formed around a mandrill and forge welded back into itself, then forged to octagon to round and with the usual upset at the bottom. The jaws themselves are a separate forging, forge welded onto the top of the legs. At the bottom of the movable leg is an offset for the pivot bolt hole. It appears to have been made with two pieces of the 1 1/2" square stock 3 1/2 inches long stacked at the inside bottom of the leg and forge welded together. A possible explanation for the 1 1/2" square stock is that it was a common bar stock size produced by wrought iron finery forges before various standard rolled bar stock shapes became readily available late in the nineteenth century. It was not uncommon for iron bars such as this to be transported to market from remote Pennsylvania mountain forges by being bent to conform and carried over the backs of pack horses. The pivot bolt is 7/8 but tapered for a solid fit into the hinge side plate, the nut was blacksmith made.

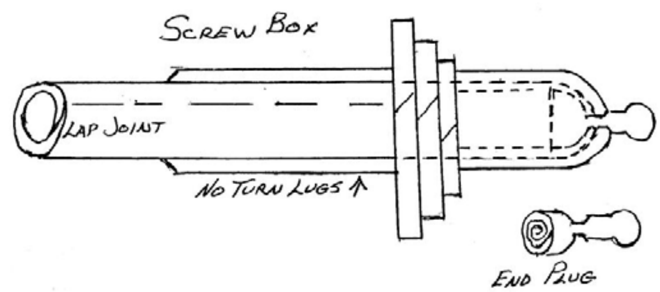




The screw box itself was made up of nine parts. The barrel was a rolled tube 1 1/2" ID X 2" OD with a lap seam, the bell at the back was made the same with a 2" ID. These two pieces were then forge welded together at the end and forged over into a recess in the end plug. The plug itself appeared to have been made with a roll up of thin plate and simultaneously welded as it was forged to shape. The three thrust rings were forged of 5/8" square bar with a lap joint. This joint was not welded. I think the purpose was to have a tight fit but one that could be forced onto the barrel. This was all brazed together as a unit along with the female screw thread inside, and no turn lugs.

I put the screw box assembly in my gas forge and brought it up to bright orange to melt the brass, expecting to easily extract the worn and damaged screw thread. Not so, the thread was distorted and tangled and refused to come out easily, so I bumped it on the pavement several times which promptly distorted the tube to a point of no return. Now I had to take it apart to salvage the thrust rings, end plug and no turn lugs. This was more difficult than you might think. It seems to me that things that have been together a long time like it that way.

To make the screw helix, I formed that with 3/16" key stock, the dimensions came out compatible with the screw thread depth and 1 1/2" ID pipe for the barrel. I wrapped the key stock into the screw threads, carefully correcting a twist that wanted to develop as I progressed. This was done cold so the helix could spring open a bit to have a more comfortable clearance with the screw. Six foot of key stock yielded about eight inches of helix. Next I made a sleeve of .040" brass that fit snugly around the screw helix. (When soldering or brazing remember mothers admonition "cleanliness is next to Godliness") I thoroughly cleaned the inside of the pipe and the brass sleeve, fluxed them with a paste flux and put the thread helix into the sleeve.



I wanted to put the screw into the helix in order to assure a proper thread alignment. The problem would be, how to keep the brass from fluxing onto the screw. This was solved by coating the screw liberally with high temp 1500° spray paint. I cured the paint according to the instructions and ran the screw into the helix. Then the brass sleeve, helix and screw were coaxed into the pipe as a unit, it was a very snug fit. The four foot length of pipe was not cut as I wanted a good handle on a piece that would, otherwise, be awkward to handle with tongs. The eight inch depth of my forge was just right for the heat zone I needed, with the screw excess through the back door. The piece was put in the forge, the forge lit and brought up to heat along with the piece. As it came up to heat I could observe, at the end, the flux get fluid then the brass, next the helix come to color and finally the brass flow to the helix. This happened at a bright orange approaching yellow. I rotated the piece slowly arid soaked it at this temperature for several minutes before turning off the forge. (I wouldn't hesitate to try this in a coal forge at another time.) When it returned to a black heat, I took it from the forge and put it in my vise.

Now for the moment of truth, would the screw be free? I tried to turn it with a bar, no movement, don't panic! I bumped the bar with a hammer, again, again, a barely perceptible movement, again, more movement, a sigh of relief. Continued teasing and the screw was out. After fully cooling the screw was teased in and out several times and as the flux residue was broken up the action became increasingly smoother. The pipe was cut to length and the end forged over and into the groove of the end plug, using a torch and localized heat. A short piece of 2" ID tail pipe was forced over the 1 1/2" pipe to form the bell, forged over and gas welded to the 1 1/2' then planished to a nice transition into the contour of the end plug. The thrust rings and no turn lugs were brazed individually to the assembly with the screw back in place to assure preserving thread alignment.

I used a 3/4 X eighteen inch piece of 5160 for the new screw handle. A band of 1/4" X 1/2" was arc welded with a generous fillet at both sides then forged into a suitable ball at each end. The purest could do this in his forge by making a half round with 1/4" X 1" in a swage for the bands. Some jaw mis-alignment was corrected with heat and hammer work at the hinge lugs. The jaw spring of course was no challenge to make.

I had an educational experience, I have a good post vise from virtual junk and best of all I had fun.

Tim Suter.

Smoke and Noise

Articles from e-mail and the Internet

Compiled by David Childress

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From: David E. Smucker
Date: Fri, May 1, 2009 at 8:11 PM
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Tempering colors come from the transparent oxide coating that forms on the steel. The colors are dependent on the 1/2 wave length reflected through the oxide coating. As the coating thickness varies so does the color. The coating thickness varies with temperature and time at temperature. Without the reflection of the "shiny" surface you will not see the colors. (or not see much in way of colors.) You had a mat surface that breaks up the light.

Another place where you see the 1/2 wave length effect is when you look at the coating on camera lenses. This has nothing to do with blacksmithing / heat-treating but is an example of the same 1/2 wave length effect of reflected light.

Try polishing your steel, and you should see the colors.

Dave

Announcements

The Rocky Forge News is available by E-mail and on our website (`http://www.rockyforge.org/`). If you wish to receive the newsletter via E-mail sent Dave Childress a note at `trollkeep@gmail.com`, or e-mail directly to `rocky@rockyforge.org`.