

# **RESTORING HANDSAWS**

**By Bob Garay**

Handsaws made during the time woodworkers used hand tools are better than many saws for sale today. Not that there are not good handsaws today but the few that do exist are very expensive, and of these most are back saws. Thus restoring saws to bring them back into usefulness is beneficial for the woodworker. Some saws are considered rare and restoration should not be attempted unless it is to insure the integrity of the saw. I would say saws before 1870 fit into this category. Thus saws made during the 1870's up until the 1950's are good candidates for restoration for use. There are many makers of good saws especially the larger makers such as; Disston, Atkins, Simonds, Richardson, Peace, Wheeler Madden & Clemson, Bakewell, Woodrough & McParlin, and Bishop are a few. There are many other great makers of saws and many of the Warranted Superior saws are good quality saws as well.

It is often said that you can't end up with a good saw unless you start with a good saw. That is pretty much true in most cases. Following is a list of factors to consider when rating a saw for purchase or restoration:

1. Is it good quality steel - This can often be told by knowing the different models of the different makers. The

Disston No.12, Atkins No.400, Simonds No.4 are considered some of the finest saws made. Looking over the different maker's catalogs will help identify which of their products were of higher quality. As most saw companies made both high quality saws and second rate cheaper saws it is best to put your time and efforts into one of the quality saws made. Often woodworkers will tap the saw, called "thumping" while bending the blade in a "S" curve. It will give a fine ring that changes pitch as the curve is tightened. A good solid tap with your thumb will produce this ring in a good quality spring steel. I can also tell the hardness of good quality steel as soon as I start to file the teeth. A sharp file will cut hard spring steel but it is a different feel than soft steel.



Above saw plate has rusting that is going to severely add pitting to the saw.



The above saw has a broken tooth, this will cause extra work when sharpening.

2. Is the saw plate straight - This is one of the first things I do when picking up a vintage saw. I sight down the blade looking for straightness. If it has a kink or severe bends I usually put it back down. A slight bend I can

straighten by bending in the opposite direction. A kink takes special hammer work and is tricky to get right.

3. Is there pitting on the saw plate. Surface rust can be easily sanded off, pitting in the saw plate not only looks bad but lessens the integrity of the saw and if it is by the teeth will effect their cutting capabilities.

4. Is the etch visable - This is not the most important factor but is one to consider. Buyers want a saw that has the makers etch with the model number readable. It may be under the rust and it can also be darkened if light.



Sighting down the saw blade reveals a bent saw.

5. Are the teeth shaped well and are any missing - The teeth condition will affect how much work you will have to do on the saw. Sometimes the teeth are well shaped and sharp and only need a touch up sharpening. Other times teeth are mis-shapen, irregular spaced, or some are broken. All this can be fixed but takes time and skill. Broken teeth also could be a clue to a saw plate with improper hardening. This will cause trouble later as teeth re-break while setting. I have even had saw plates snap and break while bending to take out a bend.



The saw above has a broke top horn and missing screw.



The saw plate above has a good strong etch under the accumulated tarnish.

6. Is the NIB present - Not at all a major factor but again like an etch it is something buyers look for in a vintage quality saw. A new nib can be filed in during restoration.

7. Handle cracks or short horns - Cracks can be reglued and new wood can replace broken horns. Sometimes a little wood filler can fix a minor problem. Sometimes rotten wood or severely damaged wood will nessitate a replacement of the handle with another one.

8. Saw screws and medallion - Split screws are harder to remove and replace while newer raised screws are easily replaced with matching ones. Special raised screw nuts or maker's medallions are sometimes hard to find that match the originals.

Lastly, how do you quickly spot a good vintage saw. One that

has the vintage handle style with the hump in the handle, made of applewood, with long flowing horns with brass screws. The saw plate will have a good width, with a nib and etch, light rust or none and be straight with good teeth. Of course this is what I look for first, then a closer look for the hidden gems. Some have elaborate etches, some are main manufacturer's "seconds", some are Warranted Superior yet of good quality.



This No.7 panel saw is a good candidate for restoration. Can you spot all the necessary characteristics?

## STARTING WITH THE HANDLE

Restoration starts with decision about whether to take off the handle or leave it on the saw.



Leaving the handle on is easier if the saw plate is in decent shape. If it is badly rusted or the handle needs work you may want to take it off.



Handle removed to sand rust off saw plate. The handle is also easier to refinish when removed.



A modified parallel wood clamp is used to remove a saw nut that has a slipping screw. The screw is pressed in and clamped tight on the other side. On this side the clamp is cut out to allow screw driver access.

A problem I sometimes encounter when removing the screws is when you turn the nut the screw on the other side spins - not engaging or locking onto the wood. To fix this I use a modified parallel clamp to hold the screw from spinning while removing the nut.

Split nuts are the hardest to remove. I have broken the thin brass screws trying to remove them or stripped the slots. I use a home made spanner wrench in a small Spofford patent Frey brace. That way I can apply even strong pressure to the screw nut. I go slow with a slight counter clockwise and clockwise motion. Slowly a little at a time.



Spanner screw driver in brace frame for split nuts. The spanner is made by taking a regular screwdriver bit and filing out the notch in the middle.

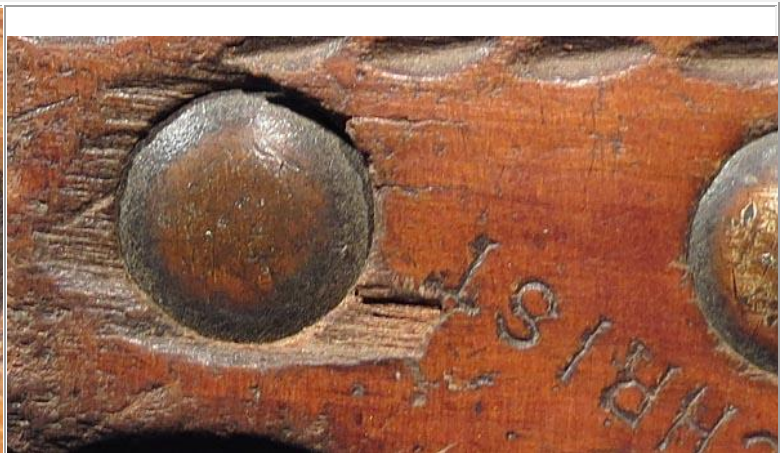


The brace gives control and strength to remove these screws. A back and forth screwing motion is best to remove the nut safely to prevent breaking the thin brass screw.

When removing the more common sawnuts from the 1880's and newer saws you may find the wood has swelled over the brass saw nuts. It is important you use an exacto knife to cut the wood around the screw hole to allow the screw to freely release. If not then often chunks of wood is splintered off when removing the screw. Thus remove the screw slowly and watch for the splintering. If you see this occurring stop and trim the wood, Small chips that do splinter off should be reglued immediately.



Above shows the wood swelling around the screw, some chipping is evident.



Above shows what happens when saw screws are forced off the saw when the wood is swelled over the screw.

Below You can see I have started to chip the wood from the handle. I gently place the wood



back down and use thin super glue getting up under the wood to secure it down. Sometimes a tweezer is needed to place the small pieces back into place. A disaster can be stopped if caught and action taken in time.



Above you can see the wood has lifted when removing the screw. Catching it at this point can help restore it.



Above is the same saw screw to the left that has been restored. If you look closely you can see the edge of the chip, but not to bad.

Now it is time to remove the handle. Go slow as often the rusty blade makes for a tight fit. This tightness is also attributed to how the saw plate had the holes punched while on the handle. It leaves burrs under the handle that grabs the wood. Now when you get the handle off you may discover makers marks. I have found

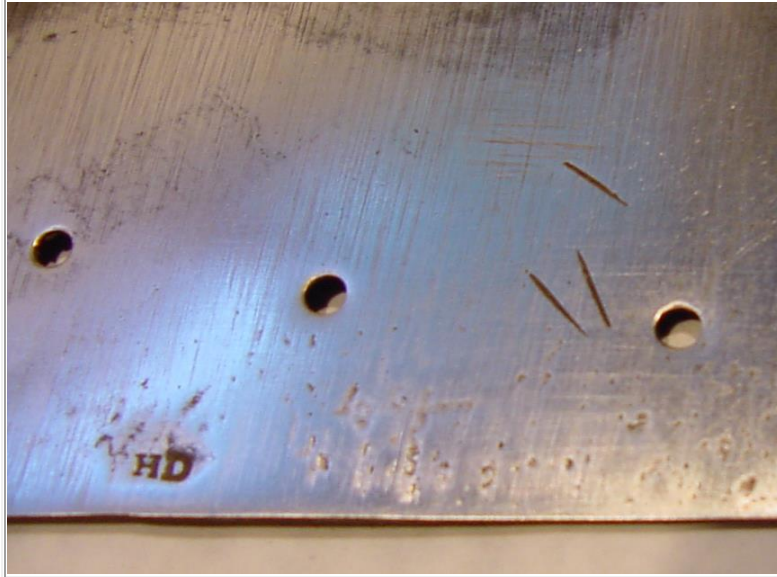
initials, maybe from the maker, also an "X" on most Disston No.12 saws. And many more makers marks to match the saw plate to the maker's model. It would be interesting to do a study of the different marks found under the handles.



Above you can see why it may be difficult to remove a saw plate from the handle. The build-up of rust has made it hard to remove.



Above with the rust sanded away you can see some pitting that will not effect the saws restoration. Hopefull you will see only the original holes that line-up with the handle. Telling you that the saw and handle are an original mate. Also above you can see an "X" in the corner - stamped only on No.12 saws for the extra processing.



Above is a 1865-70 Disston & Son No.7 saw with the handle removed. I was surprised to find the "HD" stamp under the handle. Could it have been Henry Disston or maybe his son Hamilton. I have never seen another saw with the "star" stamp in the corner.



Here is another saw with a "CS" stamp. I feel that sometimes the maker would stamp their initials on a saw he made.

Once the handle is off the saw plate you can easily restore it. It is always best to leave the old finish on a handle if it has a good coating. If you are lucky all you may need to do is steel wool the finish with x-fine steel wool and revitalize the old finish. Actually if this is all that is needed, often I would not take the handle off the saw plate. If the saw has a vine carving I like to use a small sharp tool or small soft brush to dig out some of the aged gunk that has collected in there over the years. This cleaning of the carving should be done carefully but it is an

important task to bring that "snap" to a restored saw. Using denatured alcohol when fine steel wooling will help to clean and blend in the old finish. Many companies make an amalgamator that is made specifically for this job. I use Mohawk finishing products and after the amalgamator will buff in a light coating of their "Lacouver, French Polish" padding finish. This is a finish Herb Kean recommends for refinishing wood in his book "Restoring Antique Tools". Sometimes when the handle is devoid of any finish and has a dry look I will use a "special" french polish I make. It is a blend of equal parts of Boiled linseed oil, denatured alcohol and de-waxed shellac. I rub this into the wood and apply a few coats. The linseed oil soaks into the wood and really livens it up while the shellac adds a fine protective coating that looks good. It dries quickly so a few coats will apply quickly.





Above is handle with second application of stripper to remove the green paint.



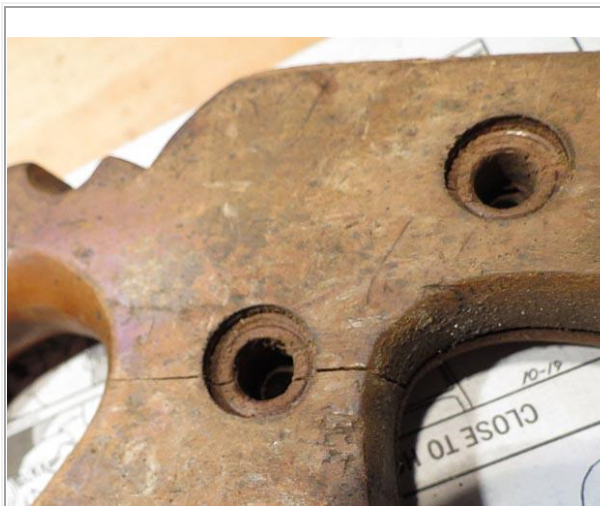
Top beech wood handle sanded and steel woolled. Bottom photo is the handle with light stain applied and two coats of Lacover French Polish finish

Now if the old finish is not restorable than sometimes it is best to strip off the old finish and completely restore the wood. For this step it is best to have the handle off the saw plate. I use a paint stripper that has the smell of oranges. As

I often do my work in the basement this keeps my wife happy. Any stripper should be used in a well ventilated area and the use of rubber gloves is recommended. I brush on the stripper and let it sit for 15-30 minutes. Then to the sink and using a scrubby to help remove the stripper and old finish with a water flush. I then use a heat gun carefully to dry the wood and see if another coat of stripper is needed, or can I use steel wool and sandpaper to remove the remaining finish.

The aged applewood, beech or other fine hardwood is a pleasure to restore. I use fine sandpaper to sand out all scratches and steel wool to finish off the wood before refinishing. If the wood has fine checks I will fill them with putty and sand smooth. If there are any cracks I will see if glueing them with Gorilla glue will hold them closed. Often the wood has aged and split at a screw hole and glue will not hold the crack but maybe a 2-part epoxy will. Sometimes nothing will help, then filling the crack with

putty is an option. The same with small cracks or chipping at the tips of the horns. For chipping at the tips of the horn I will fill in with putty and sand smooth leaving a natural smooth feel. This is especially the case with a chip under the top horn. Sometimes if the tip of the horn is really damaged or broke it is necessary to glue on a piece of replacement wood. I like using aged wood from other saw handles or old planes. I look especially for these old wood planes made of apple or beech wood by a craftsman that are often in non-usable condition. They provide a lot of horns for repairing saws.



Above is common aged check found in saw handle at the screw.



The crack is being glued and secured with a wood clamp. Glue can be seen oozing out of crack. This one held.

CAN THIS HANDLE BE RESTORED?



REFINISHED  
HANDLE TO  
COME

## REFURBISHING THE SAW PLATE





Two great saws in in the right condition to restore. After removing the handles the rust can gently be sanded off.

Below are the above saws fully restored.



I start with removing any rust on the saw plate. When there is heavy loose flaky rust this can be first removed with a razor, like used on windows in a holder. Then I sand first with 100 to 220 grit sandpaper depending on how thick the rust is. This removes most of the rust quickly. I avoid sanding around the etch as it can be damaged. Next is 400 -600 grit sand paper with water as a lubricant, taking out any scratches made with rougher paper and removing all the rust. Sand gently around the etch with the paper on a piece of flat wood so as not to erode the etch. It is up to your taste on how bright you make the metal. I like a darker color on the older saws. You can darken an etch using gun blueing or copper ageing fluid then gently sanding with 600 grit on a block and with soft backing to blend in the color. I like finishing the saw plate with hand rubbed butchers wax. On a saw that is of good quality with a mirror like finish I also use a product

called "Top Coat". It is silicon free spray that is used on machine surfaces like table saws and leaves a rust protection that is not filmy.



Above is initial sanding the rust off a saw plate with 120 grit sandpaper. Some rust is left for removal with finer grit sandpaper - especially around the etch.

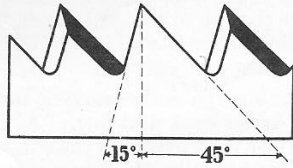
## **SAW TOOTH GEOMETRY**

Before you can consider sharpening a saw it is important to understand the differences between cutting with a rip saw and a cross cut saw. The rip saw which cuts with the grain has its teeth sharpened straight across the face and give the

appearance of a series of chisel edges. The cross-cut saw is designed for cutting across the grain and have their teeth sharpened at an angle to create a series of knife-like edges. See the drawings and descriptions below provided with the Foley instructional manual for sharpening saws using their equipment.

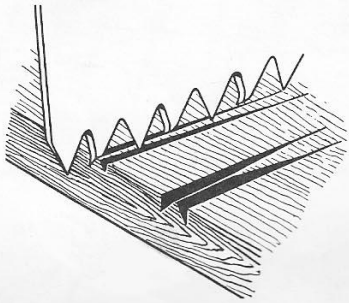


## CROSSCUT HAND SAW



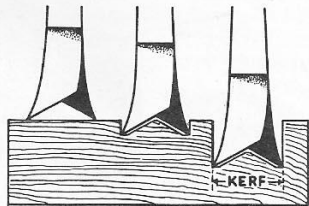
### Cross-Cut Saw Teeth

The cross-cut saw is designed for cutting *across the grain* and cuts on the *push stroke*. The front face of cross-cut teeth have an angle of 15 degrees; the back angle is 45 degrees. The beveling of the edges of the teeth of about 15 degrees gives the appearance of a series of *knife-like points* which makes for easy identification of a cross-cut saw.



### How a Cross-Cut Saw Cuts

The teeth first score the wood like points of two parallel knife blades as the saw is drawn across the grain. Then the edges of the teeth begin paring the groove which is formed and clear the sawdust from the kerf.



### Cross Section of Cross-Cut Teeth

Notice first the "set" of the teeth... the bending of the teeth to alternate sides to make the cut or "kerf" wider than the thickness of the saw blade. For even greater clearance, best quality saws are taper ground... thinner at the point and back than at butt and teeth. In the above illustrations of the saw cutting into wood, note the knife action, the paring action and the full cut.

### TOP VIEW OF CROSS-CUT TEETH

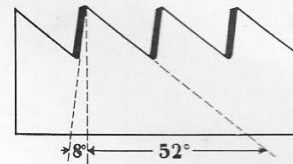


By sighting along the top of the teeth you will notice a "V" groove down which a needle will slide when the saw is properly set and filed.

Look down on the teeth and notice that the teeth are set evenly about 1/4 the thickness of the blade.

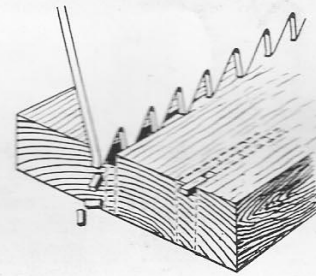


## RIP HAND SAW



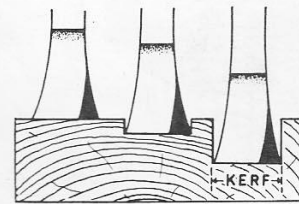
### Rip Saw Teeth

The rip saw is designed for cutting *with the grain* and cuts on the *push stroke*. The front face of rip teeth has an angle of 8 degrees; the back angle is 52 degrees. Rip teeth are filed straight across the face and give the appearance of a series of *chisel edges*.



### How a Rip Saw Cuts

Rip teeth cut like vertical chisels. First on one side of the set small pieces of wood are cut loose across the grain and pushed out. Then on the other side, the tooth following plows out a similar particle.



### Cross Section of Rip Teeth

Examination of the kerf of a rip saw in action clearly illustrates the chisel-like action with which the rip saw cuts. Observe first how the rip saw cuts into the board. Width of the kerf is determined by the set of the teeth, which are bent alternately to the right and left approximately 1/3 of their thickness.

### TOP VIEW OF RIP SAW TEETH




When viewed from above, the teeth of a rip saw appear to form rows of chisel edges set to the right and left.

Notice that they are filed straight across and are set evenly to about 1/3 the thickness of the blade.

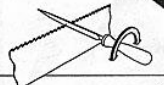







# The chart below discusses some of the different factors to consider when sharpening a hand saw.



## ELEMENTS OF SAW TOOTH DESIGN

CARPE SERRANUS!

<p><b>RAKE</b> (angle of attack)</p> 	<p><b>NEGATIVE:</b> Ideal for western crosscut to minimize snagging and promote incising across wood grain fibers. Easier to start and less prone to jamming. More forgiving. A stronger tooth. Saw has more tendency to slide over the wood without cutting.</p>	<p><b>ZERO:</b> Rake angle exactly perpendicular to the direction of cut. Commonly found on rip saws because it strikes a balance between a keen tooth and a smooth cut.</p>	<p><b>POSITIVE:</b> Aggressive angle of attack common to Japanese teeth and saws designed to cut on the pull stroke. Can be harder to start and jam in the work. Extreme cases of positive rake leave a weaker, undercut tooth which can break off.</p>
<p><b>FLEAM</b> (bevel angle)</p> 	<p><b>LESS:</b> Filing without fleam leaves the points like a row of chisels. This is the very essence of a rip pattern. Some fleam is required for cross cutting.</p>	<p><b>MORE:</b> forms two rows of alternating knife points. This is the very essence of a crosscut pattern. Too much fleam will allow teeth to dull easily.</p>	
<p><b>SLOPE</b> (file attitude)</p> 	<p><b>LESS:</b> Filing without sloping the gullets keeps the surface area of the gullet down, and easier to file.</p>	<p><b>MORE:</b> Can achieve keener tooth with a standard saw file, but can also make the saw prone to tearing. Gives more space in the gullet for sawdust.</p>	
<p><b>PITCH</b> (teeth per inch [tpi] or points per inch [ppi])</p> 	<p><b>LESS:</b> Coarser pitch means there will be deeper gullets and more pressure per tooth tip. Harder to start. Fast cutting but leaves rough cut marks.</p>	<p><b>MORE:</b> Finer pitch means less pressure per tooth tip. Yields smoother cutting, easier starts, and finer cut marks. Numerous and smaller teeth increase sharpening difficulty.</p>	
<p><b>GULLET DEPTH</b> (file corner radius)</p> 	<p><b>LESS:</b> Shallower gullets have less space for sawdust and the saw will stop cutting if the gullets fill up during a stroke.</p>	<p><b>MORE:</b> Deeper gullets give more space for sawdust to accumulate and so you can cut without clogging in thicker material.</p>	
<p><b>SET</b> (alternate tooth offset)</p> 	<p><b>LESS:</b> Makes the saw track better, once it is started correctly. A thinner cut requires less force to make.</p>	<p><b>MORE:</b> Cuts a wider kerf with more clearance for the saw plate. Prevents binding in the cut. Extra 'wobble room' allows for adjusting the direction of cut. More space for sawdust. More wood removed per cut, which takes more work.</p>	

Courtesy of the design department at Gramercy Tools™ Brooklyn, NY  
 © Copyright 2008, toolsforworkingwood.com. All rights reserved.

This is a great chart provided by Gramercy Tools when I purchased their saw vise.

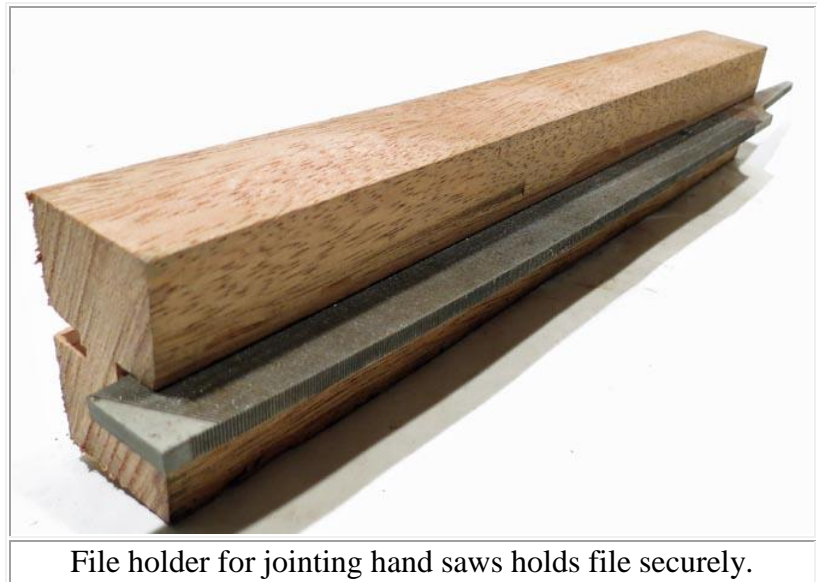
Understanding the principles of tooth geometry and their effect on cutting different woods is important. There is much discussion on many websites and among woodworkers on what is the perfect balance of angles for superior

cutting. The web site of Pete Taran - [vintagesaws.com](http://vintagesaws.com) holds a wealth of information that all woodworkers who want to learn more about saws should visit. Also the site of Daryl Weir - **OLD SAWS RESTORED** has an excellent tutorial on sharpening saws. It is only by studying all the information available and practicing on as many saws as possible will one become proficient at sharpening handsaws.

## **SHARPENING THE TEETH**

### JOINTING

First make sure the saw is straight before sharpening. The first step is to joint the tooth line. Use a flat file about 8"



File holder for jointing hand saws holds file securely.

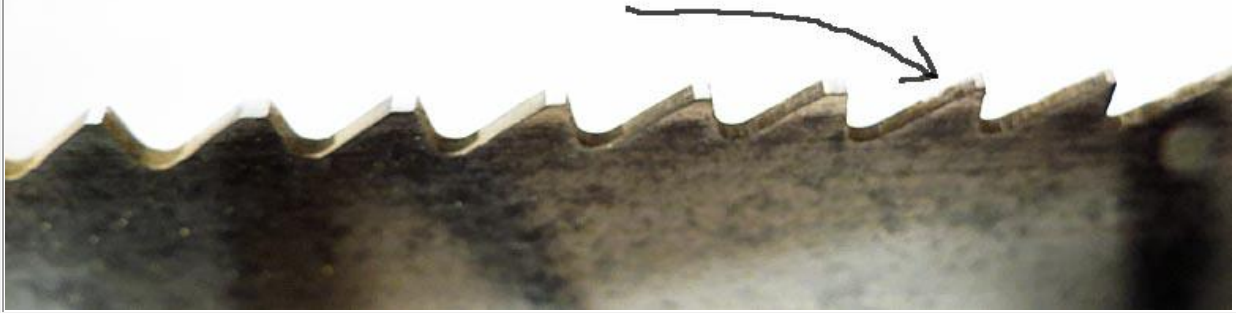
long for a hand saw to help get a even straight tooth line. File it down until all the teeth have been touched by the file. This is evident when there is a shine on each tooth left from the file. If there is a broke tooth just file the teeth down 1/2 way even if not touching the broke tooth. There are many manufactured jointers and they work good to fine tune an edge. But usually they incorporate a short file and may not get the tooth line perfectly straight. I like making my own file holder by cutting a groove in a block of wood to hold the file. This insures it files at 90 degrees and allows me to move the file to wear it evenly.



Above is initial jointing showing some teeth that were high and one tooth barely touched.



THIS TOOTH BARELY TOUCHED WITH FILE



Above you can see the flats on the teeth and one tooth on right that is lightly touched.



Above you can see that the saw has a broken tooth that will necessitate jointing and shaping a couple of times.



I have jointed the teeth edge so the teeth are half gone but still keep the gullet bottom and angle geometry to restore.

# **WORK IN PROGRESS**

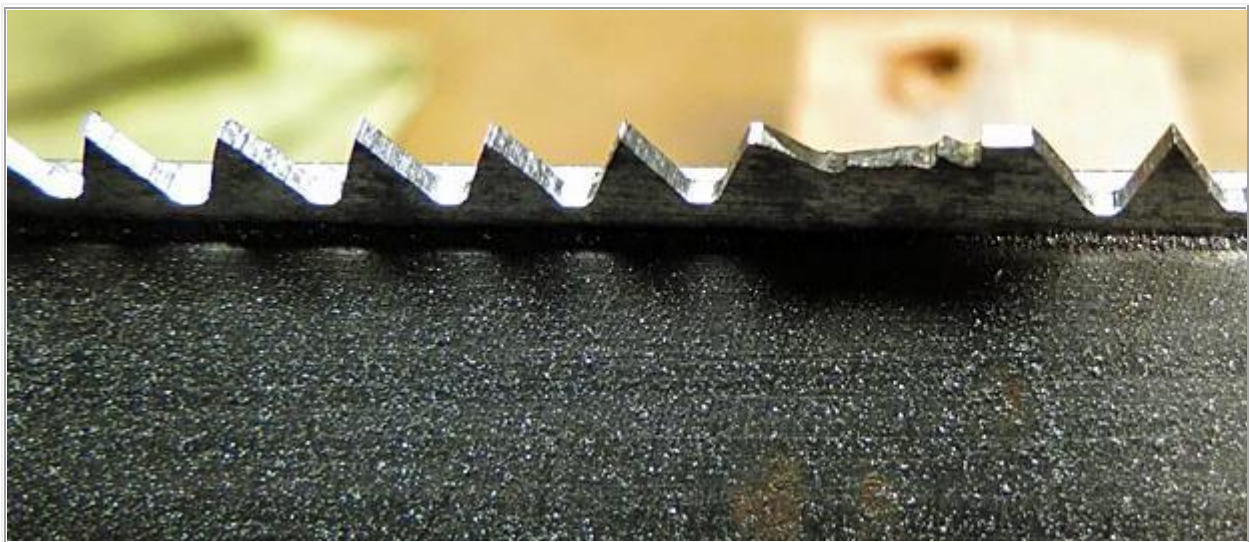
## **SHAPING THE TEETH**

As seen in the photo above there is considerable work to be done to get this saw sharpened. As I start sharpening with the handle to the right and starting with those teeth by the handle I go slowly. As I file in a gullet my file cuts two teeth at a time. It is important to keep these teeth the same size. Thus often I will have to put more pressure to one tooth or another. Looking at the flat produced while jointing will tell me which tooth needs the more pressure - always applying more pressure to the tooth with the larger flat. As I advance down this first side I leave a little of the flat on top of all teeth so I can remove the remaining steel while filing on

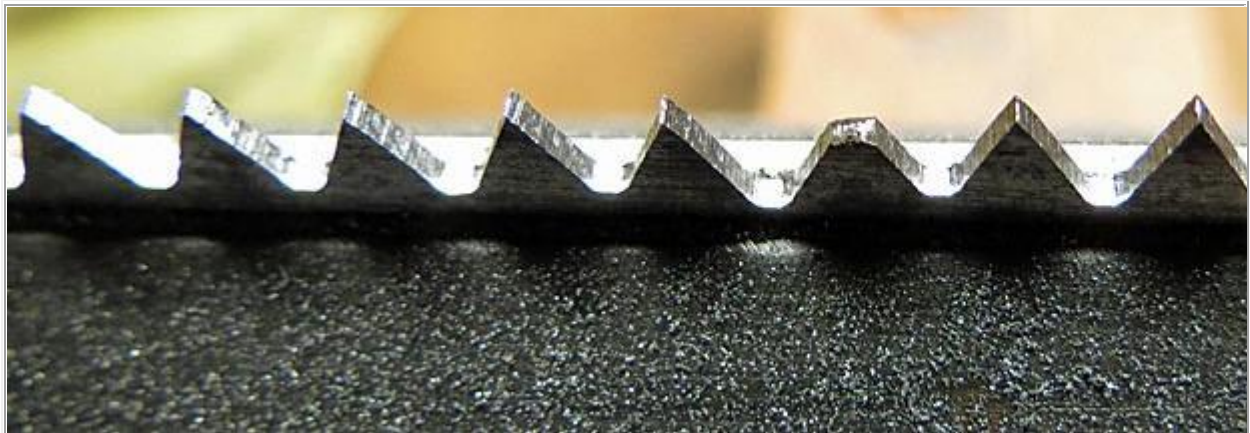
the second side of the saw, thus keeping the teeth the same size.

Of course this is a slow process and if you have a broken tooth you may have to joint the teeth a couple of times to bring it up to the height of the other teeth. Many experts say not to worry if only 1 or 2 teeth are broken as this will not majorly effect the sawing action. Well eBay buyers don't think this way and if a saw has a broken tooth it sits dead in the water! Below are some photos of shaping a saw with a broken tooth.

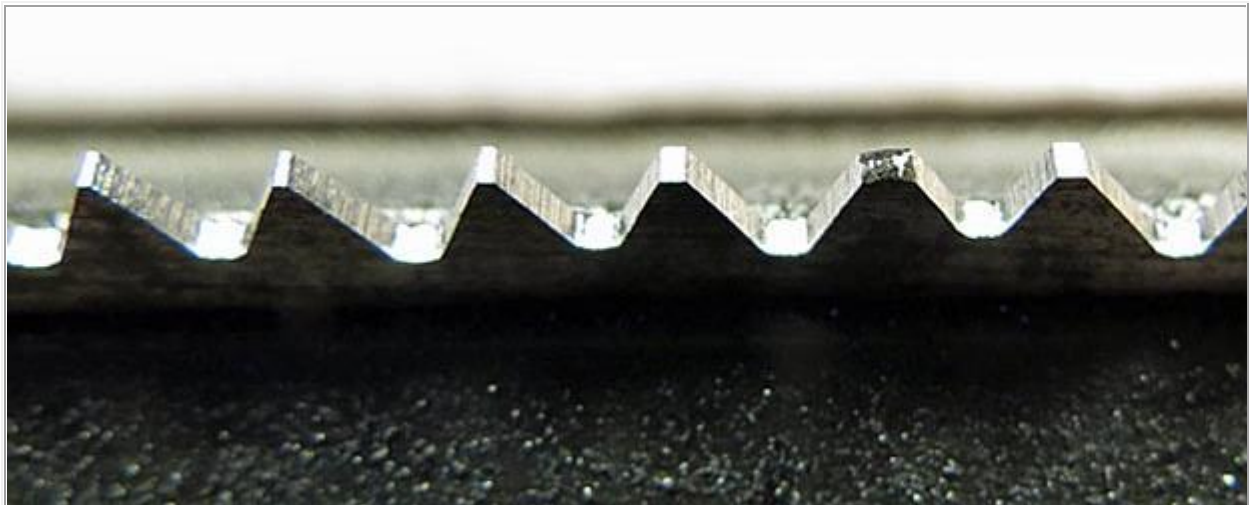
**Below are a couple of steps taken to bring up a broken tooth on a rip saw.**



Shaping on a rip saw with a broken tooth. I have already jointed the teeth and filed them for the first time getting them equally spaced. Notice the teeth are filed straight across with equal angles on both sides. I will put in the rip tooth rake angle after I have gotten a little farther getting this tooth back up to full height. Shaping the teeth this way allows you to focus on the equal spacing of teeth.



Above I have completed the initial shaping of the teeth. Now time to re-joint until I touch the broken tooth.

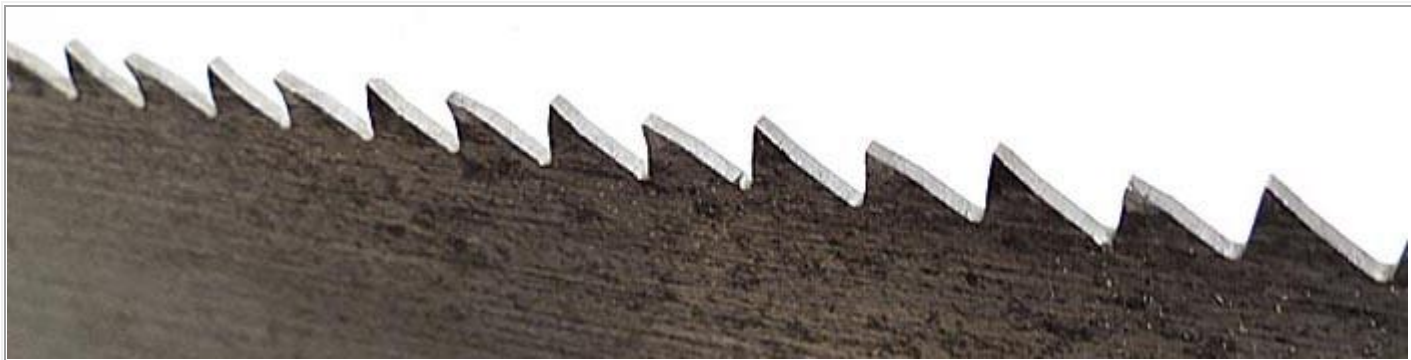


Above filing a second time to joint the edge until I touch the broken tooth. You can see a little shine on the broken tooth top.





Above final shaping has gotten all the teeth properly spaced with initial shaping. Now time to put the slight rake angle in.



Above the saw has been set and the final sharpening completed. It is ready for testing in a piece

Setting teeth - more to come-