A COURSE IN SAW FILING
U.S. FOREST SERVICE
REGION I

By

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FOREWORD

Mr. Richard C. Mattson, junior foreman of construction and maintenance, stationed in CCC Camp F-102 on the Kaniksu National Forest of Region One has developed and organized this saw filing course. He has used it with marked success in training CCC enrollees to file saws. Since saw filing is a very worthwhile skill in national forest camps engaged in woods work, Mr. Mattson has kindly agreed to allow his course to be reproduced for the benefit of others engaged in similar work that requires this type of training.

In our contacts with the CCC camps of the Region, we find many very good training courses that have been developed by foremen on the job. These down-to-earth courses are the most valuable kind since they are practical and have been tested by actual use. The supervisors' offices and regional training office will heartily assist any foreman who cares to work up worthy courses for distribution so the general level of our training in all camps may be raised.

C. S. Webb

C. S. WEBB,
Assistant to Regional Forester.

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SAW FILING

By

Richard C. Mattson

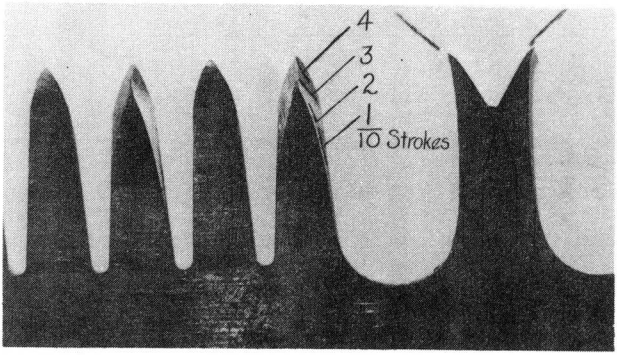
Saw filing has been quite a problem in the Civilian Conservation Corps, although every manufacturer issues free instructions on filing and fitting a saw with each set of tools sold. The writer realizes that expert filers have worked out their own methods of maintaining saws, but they will readily see the help that beginners, for whom this book has been prepared, can get from it. Many illustrations of these experts have been used, and supplemented by some of the writers to help simplify the process.

HOW TO SHARPEN A CROSS-CUT LOG SAW

The First Mistake Of A Beginner

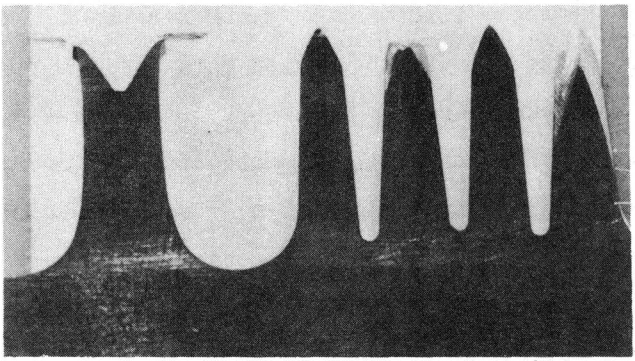
The beginner will usually bevel the teeth too much. No saw will have more than a 45 degree bevel, some without rakers will not have more than a 30 degree bevel. The reason for this is that saws without rakers must be square enough to carry their own sawdust or cuttings through the saw cut, and do cutting at the same time.

The following is an illustration of four cutting teeth and a raker of a cross-cut saw which is an example of perfect filing. Notice that the bevel, uniformity, and height of each tooth is exactly the same. The points of the cutting teeth are rounded and knife-like. They are nothing more than small knives all in perfect alignment. This manner of filing has never been pictured or explained before by books on this subject. Notice that the filing is started at the base of the tooth's cutting edge, as indicated by the numbers 1, 2, 3, and 4. When the filer reaches the top or point on one side of the tooth, care must be taken in filing the opposite side to maintain uniformity and even height. This method requires from 10 to 20 strokes on each side of a tooth. Notice the marks on the illustration where the filing started at the base of the tooth's cutting edge.



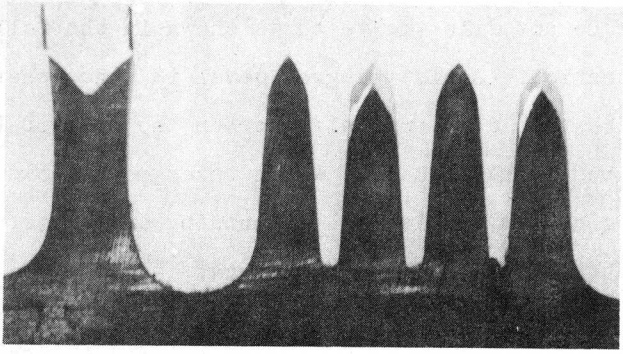
Notice the deep "V" shaped raker. Filing to form this "V" shaped raker is known as gumming. Deep gumming makes swedging easier. Notice the curve in the swedging.

Do not file the teeth as shown in the following illustration. A sixty degree bevel is unnecessary. Filing like this does not only shorten the life of the saw, but makes it hard to set, which takes more blows of the setting hammer. This excess pounding only crystallizes the teeth and causes them to break.



The raker shown in the above illustration has too much swedge. Rakers should not be swedged to more than a forty-five degree angle. They must have a lift to them which is known as "suction".

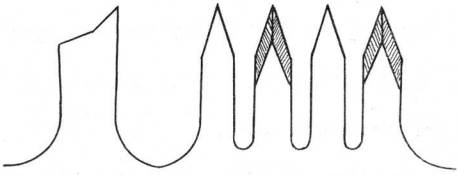
In the following illustration the points on the teeth are filed too round. This will make the saw "run" hard. You would have to "bear down" or "ride" the saw to make it cut.



In the above illustration the raker has not been swedged. It will not make "shavings" when of this shape and will also make the saw "run" hard.

The teeth in the following illustration have too long a point and nothing to support them. Teeth filed in this manner cannot cut - they are only scratchers.

Knots and cross-grained wood will break the points off. This type requires more jointing, and this means more work for the filer.



The raker in the above illustration was broken off when attempting to swedge it without first gumming the notch. Keep rakers gummed deep and swedging will be easy.

SAW FILING IN COMMON

There are a number of popular makes of saws in use. The type of saw most commonly used is crescent ground. This means it is a tapered saw or that the metal in the back of the tool is thinner than the tooth side or cutting edge.

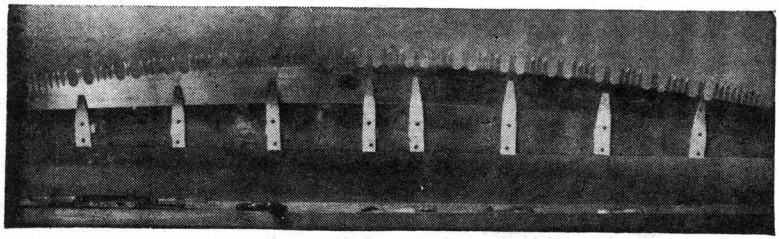
Here is the fitting or gauging given for the most commonly used log saws, step by step in order.

First Step: The Filing Rack

The rack must be solid to hold the saw rigid. The height of the rack must be gauged according to the filer's height.

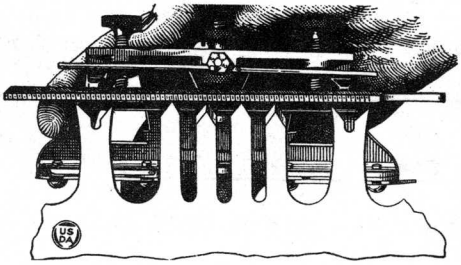
The points of the teeth should be from twelve to eighteen inches from the filer's eyes at a comfortable standing position.

The illustration shown below is commonly called a bracket saw rack. Wedges are always used between bracket and saw to hold the saw securely.



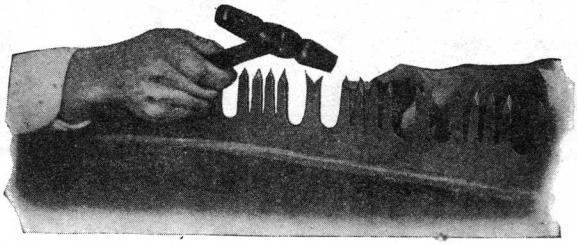
Second Step: The Raker Gauge

After the saw is placed in the rack and the teeth are found to be uneven in height, the file is placed in the raker gauge as shown in the illustration below. It is then passed over the teeth until the file touches every tooth. Now the teeth are all of an even height and ready for sharpening.



Third Step: Setting The Teeth

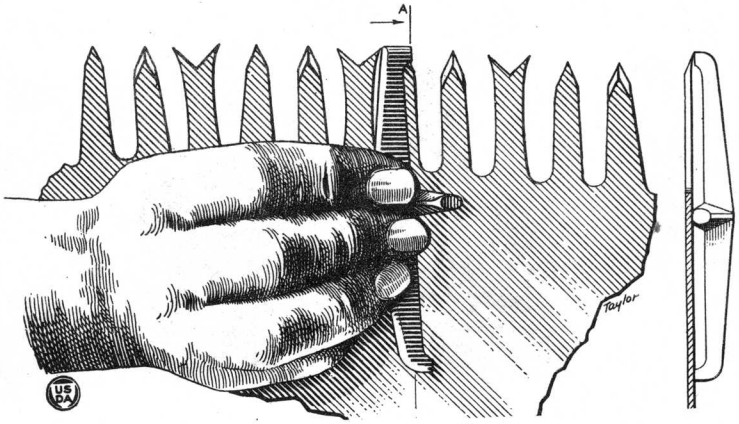
A study of the illustration below will show what setting means. Notice that the setting block is held at the back of the tooth or the smooth side. The setting block is beveled and the top of it is held about 1/64 of an inch below the top of the point. Now, the tooth is struck a light but firm blow about 3/8 of an inch down from the top of the point. The idea is to bend the point of every other tooth outward 1/64 of an inch on one side of the saw. Then the saw is turned around in the rack and the same thing is done on the other side.



Fourth Step: Use Of The Spider

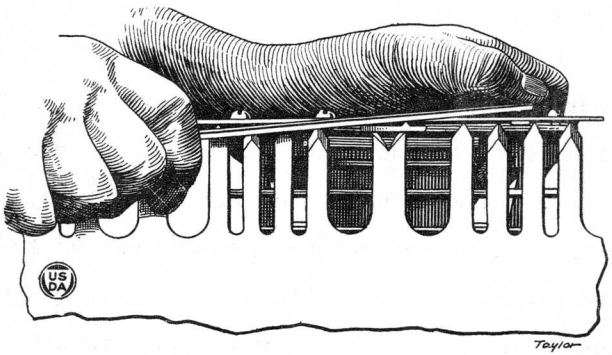
The spider is a gauge that is used along with the setting block and hammer as each tooth is being set. This illustration shows how it is used. It has four legs; two long ones and two short ones. One of the long legs is ground to be 1/64 of an inch shorter, that is when the spider is placed on a table top, three legs will rest on the table but the fourth on the long one ground off, will be 1/64 of an inch from the surface.

As each tooth is set or bent out with the hammer and setting block, the spider is placed at the back of the tooth, and will show if it is bent out too far or not far enough. If the spider rocks or tips on the two short legs, the tooth does not have enough set, and the hammer and setting block must be used again. If the spider rocks sideways on the two long legs, the tooth has too much set. To bring it back to 1/64 of an inch set, the setting block is raised to just clear the point, and the hammer is used in the same manner as when setting the tooth. This will take out the excess set.

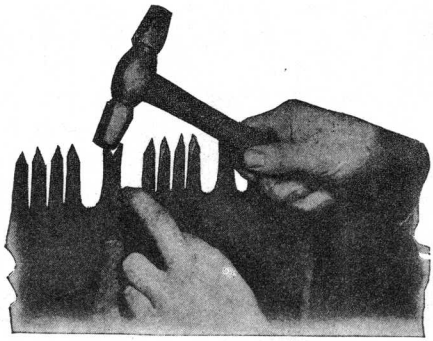


Fifth Step: Fitting The Rakers

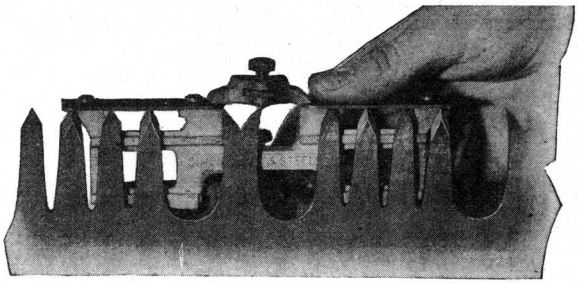
First, the slot side of the raker gauge is placed on the raker to be fitted. The file is now used to file the points of the raker off if they come up through the slot. This slot or plate is set so that when the raker points are filed off even with it, they will be about 1/100 of an inch shorter than the cutting teeth, the raker is then sharpened before swedging is started.



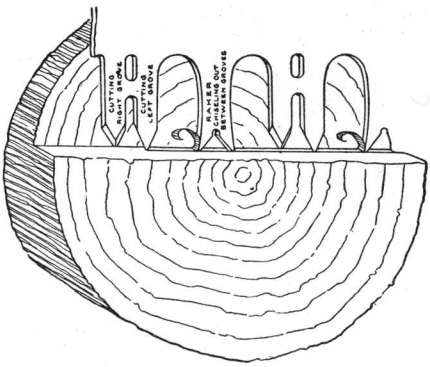
Now the raker is ready for swedging. Swedging means to curve the raker. Note the angle of the striking blow of the hammer in the illustration below.



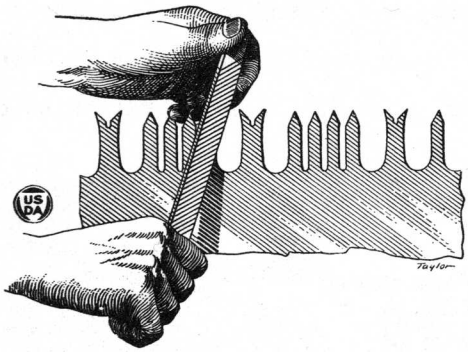
Now the raker gauge is used again. Note the set screw at the top of the gauge. In ordinary work this screw is set at 1/64 of an inch lower than the cutting teeth, and the raker points are swedged with the hammer just enough to clear this set screw as shown in the illustration below.



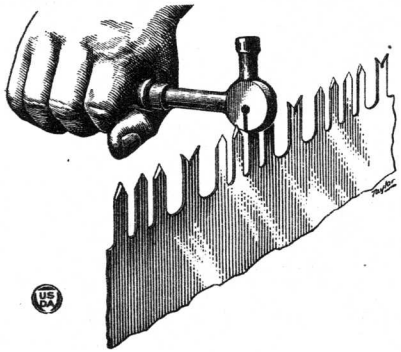
The illustration below shows how a correctly filed saw works. Notice that a swedged raker will make shavings, while one that is not swedged would make sawdust.



The illustration shown below shows how to hold a file; note the angle of the file.



The illustration shown below shows a saw set or pinch set, this tool is not used for setting, it is a special tool for straightening bent teeth or rakers which often get bent when they are pinched or mistreated while bucking or falling trees.



Although the instructions on how to file cross-cut saws, and the use of the tools have been explained and illustrated, it does not mean that a saw properly filed has to have the working over that has been illustrated.

A saw in the hands of a skilled workman does not have to be jointed and set every time it is brought in from the woods. A saw properly filed and used with care by the sawyer should not have to be jointed and set but once in every three filings.

The life of a saw depends both on the filer and the sawyer. Cooperation will do wonders in maintaining a saw and will add several seasons of service to a saw.

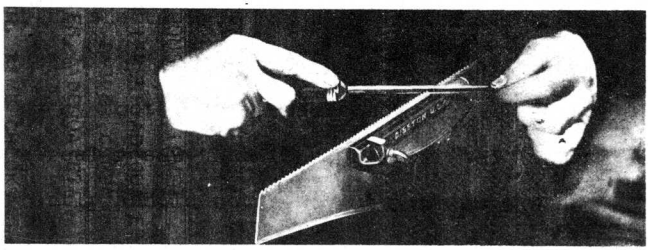
HOW TO SHARPEN THE MOST COMMONLY USED HAND SAWS

A hand saw made of good quality steel will last a life time if properly handled.

Study the saw carefully before starting to work; as every saw, when purchased from the retailer, is accurately filed and set for use. It is not necessary to reset a saw every time it needs sharpening.

A saw does not need any more set than just enough to clear or free itself in the cut.

Now study the illustration below.

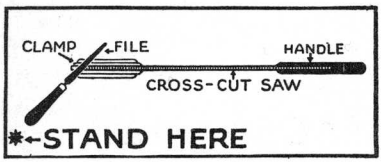


Note the saw teeth are placed about one-half inch above the clamp to avoid "chatter" or "screech". Note the

angle and the tilt of the file. Note the file fits perfectly between the teeth which are called gullets.

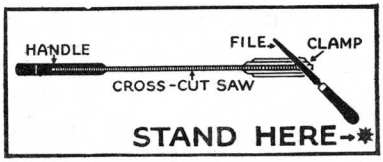
FILING A HAND CROSS-CUT SAW

Study the starting positions in the illustrations below.



First position for filing hand saws for cross-cutting

1



Second position for filing cross-cut saws

2

First the saw is placed in the clamp with the handle to the right as shown in illustration No. 1. The file is placed in the gullet left of the first tooth that is bent towards the filer. Every other gullet is filed on the push stroke of the file until the handle is reached.

Now the saw is half filed. Every tooth is half sharpened. Now the saw is ready to be turned as shown in illustration No. 2.

Then every other gullet next to the teeth that have been half filed are to be filed next.

This completes the pointing and sharpening of the teeth.

FILING HAND RIP SAWS

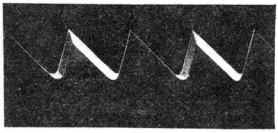
With one exception this method is the same as that given for the hand cross-cut saw. The exception is that the rip saw is filed straight across.

The cross-cut and the rip saw both cut on the push stroke only and for this reason care in filing must be taken so as not to take the load or the hook out of the saw.

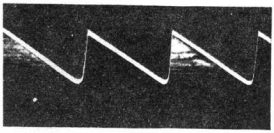
The most important factor to remember is, when sharpening the saw, the teeth are half pointed on one side, and when you turn the saw around fit the other side to the finish pointing.

Many beginners will try and file a saw from one side, and they may get a fair job to look at, but when it comes to trying the saw they find the saw will not run straight, and it is impossible to follow a line.

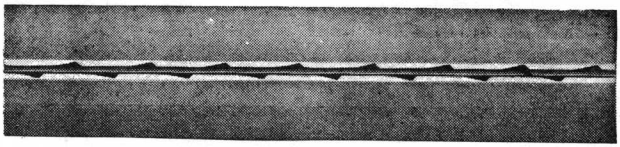
Study the illustrations of the cross-cut and rip saws shown below. Note the bevel in the teeth of the cross-cut saw and the angle of the teeth.



Note the illustration of the rip saw below. The teeth are filed straight across with a little more lead or hook to the teeth than the cross-cut saw above.



SETTING HAND SAWS



Looking from the back of the saw, this illustration shows how the teeth look when set. Note the teeth are bent out about one-half the thickness of the back of the saw.

This illustration does not mean that every saw will have this much set. They are filed and set according to the work they will be used for. A saw for cutting veneer requires very little set.

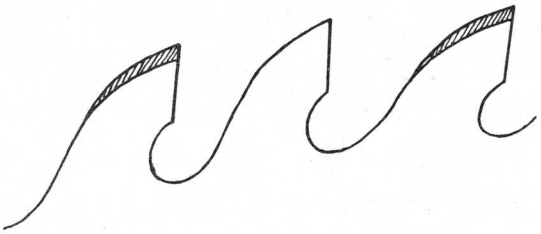
Saws are set according to the number of teeth to the inch.

Nearly all hand saw setting tools are numbered and can be adjusted to the numbers stamped on the saws which means the number of teeth to an inch of the blade.

Joint a saw only when the teeth become uneven. Jointing the saws is done in the same manner as explained in the first part of the book on log saw fitting.

HOW TO SHARPEN A CIRCULAR POWER SAW

Shown below is a diagram of a circular or cord wood saw.



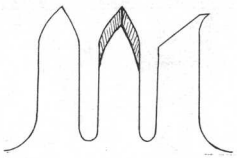
On saws of this kind the teeth should be filed straight across in front of which is the lead or cutting side of the tooth. Care must be taken to keep the lead or hook to the teeth. The bevel is at the top side of teeth only, which is not to exceed more than twenty degrees. The teeth should be set to thirty-two degrees.

Circular saws will get short teeth or broken points, and then must be jointed. The most common and safe way to joint circular saws is to leave the saw on the shaft, place an emery stone or any sharpening stone in front of the saw just touching the teeth. The stone must be fastened securely and then the saw is turned backward by hand until the point of every tooth is touched.

A circular saw that is not mistreated, and if it is filed correctly should not need jointing more than two or three times a year.

HOW TO SHARPEN A DRAG POWER SAW

A diagram of a drag saw is shown below.



When fitting a drag saw use the same method as used on cross-cut saws. The only difference is in setting. The setting should be widened to 3/64 of an inch, and the rakers 1/32 of an inch shorter than the cutting teeth.

FILES TO USE

For log saws use seven or eight inch single cut flat bastard files.

The same files may be used to sharpen drag saws, and also the circular or cord wood saws.

For filing hand saws use three corner extra slim taper files.

The following table indicates the lengths of files to use on different saws:

5 & 6	Point cross-cut saw	7 inch files
5, 5½, & 6	Point rip saws	7 " "
7	Point rip saws	6 " "
9 & 10	Point cross-cut saws	5½ " "
10, 11, & 12	Point cross-cut saws	4½ " "

NOTE BY THE AUTHOR

This book though brief requires careful study. The fundamentals of saw filing have been illustrated and explained. A student filer after a few months practice should be able to file any kind of saw, or at least be a good helper in a saw mill. If a new, unused saw is available he should observe it carefully as they are perfectly fitted when they leave the factory, especially a hand saw.

SUGGESTIONS FOR MAKING KEYHOLE SAWS

The writer's students, after one month of practice, have made keyhole saws that would cut fully as well as any factory product. The metal used was cut out of discarded log saws. After being cut out, the blades were ground and filed to an even taper. Nine teeth to the inch were cut in with a six inch double extra slim taper file, and set with the common hand saw set. The writer advises practicing on a piece of eighteen gauge or heavier tin. The important point is to be able to file in the lead or hook to the teeth properly. On this saw the teeth should all lean toward the small end of the blade.

GLOSSARY OF TERMS USED

(And Special Reference In The Text)

Terms	Meaning	Pages Used In Text
BEVEL	The angle of a saw tooth measured along its ridge crosswise from the sharp tip on one side to the shoulder point on the other side.	1-2-3-6-13
DEGREE	The amount of the angle of bevel of a saw tooth measured against the horizontal from the tip of the tooth on one side to the point of the shoulder on the other side. A perfectly flat tooth has no degree of bevel on the top from side to side. The greater the degree of bevel the longer the top ridge of the saw tooth looks from a side view. (The first picture in the text shows a 45 degree bevel while the second picture shows a 60 degree bevel.)	1-3
SET	The bend each cutting tooth has toward the outside of the saw from a perpendicular position.	6-7
JOINTING	To make the saw teeth even.	4-11-14-15
FITTING	To set the rake teeth properly.	1-5-8
SWEDGING	To curve the tips of the rake teeth properly.	2-3-4-8-9
GUMMING	Filing the notch in the rake tooth so as to form the proper shaped "V" between the points.	2-4
LIFT	"Suction" or "down draft" of the points of the rake teeth. This denotes the power of the swedged points of the rake teeth to cut and carry shavings from the bottom of the saw cut.	3
NOTE	The enrollee should be taught the nomenclature of his saws and filing tools first of all and be tested as he practices to be sure he forms the habits of proper use of them.	17

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