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THE SAWYER AND FILERS FRIEND.

A TREATISE ON

HAMMERING AND STRAIGHTENING

CIRCULAR & LONG

SAWS

SCIENTIFICALLY AND THEORETICALLY EXPLAINED

SHOWING THE

LATEST IMPROVED METHODS.

ILLUSTRATED

—BY—

J. H. MINER, BATON ROUGE, LA.

BATON ROUGE:

CAPITOLIAN-ADVOCATE BOOK AND JOB PRINT,
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HAMMERING SAWS.

PREFACE.

In this advanced day of improved machinery and competition, so strong among mill men. It has become an item of the utmost importance to produce good true lumber in greater quantity and quality. This can only be done by employing the best Sawyers and Filers, men who can hammer their saws and keep them in the best of running order. These men always command from \$3.50 to \$6.00 per day and are never out of employment, because such men are cheap at a high price. The expense and delay of a mill in sending saws to the saw-maker are items of great expense and besides no saw is ever sent off to be hammered until it has spoiled its worth in making bad lumber, where if the saw was hammered in the mill this expense and delay would be avoided. This is the intention of this book, to enable Sawyers and Filers to hammer their own saws. There are but few who claim to hammer a saw, that can keep a saw in good condition and to run as well as new until worn out, because they work from no theory, not having had the proper instruction. There are many saw hammerers of 25 years experience, that cannot properly adjust a saw, following the fogy way and not taking hold of improvements. These men served a time to learn the trade and then did not learn it. While now a man can learn quickly and in the mill where he can watch the results. This book being gotten up that a man may soon learn without the loss of time and expensive tools, which puts it into the hands of all who wish to learn the art. The instructions are so simplified that it is impossible for a man of average intelligence not to learn if he will only study it well, beginning at the first and studying each part thoroughly before working on the saw. It is not expected that a man is to learn every part of a trade at once. If he does he soon learns nothing. I expect that every one that receives this book intends to try and learn it, which I guarantee he will if he tries to, and after I correspond with him and explain what part he cannot understand and then he should not learn on the receipt of this book, I will cheer-

fully refund his money. It being understood that he is to give full explanation of the work he has done on the saw, the size of it, gauge, speed, and whether mandrel heats or not. The indorsements I have from the best saw-makers and millmen are sufficient to convince the skeptic that while my ideas are new to many, a trial by my method will silence them, and while I do not claim to know it all I do claim to have set aside all the fogy ideas that a man may study his life time and not master the saw. Think of the great change that of late years has taken place in the saw. They are run at twice the speed and much thinner, cutting ten times as much lumber. Certainly this great change could not have taken place in the saw without new theory and improvements being brought about in the hammering of it. Any part of this book that may not be fully understood will be cheerfully explained by writing me in full. Read the conclusion on last page.

J. H. MINER.

PART 1.

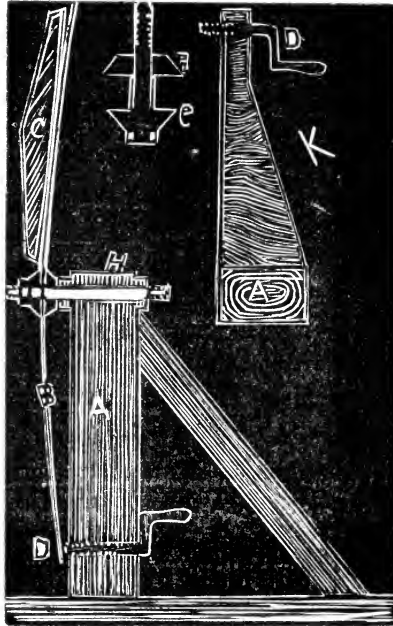


FIGURE I.

The tools necessary for a man to begin with are very few, consisting of anvil, a round and long pien hammer, two straight edges 16 and 24 inches long. If these tools cannot be had conveniently, a good smooth-faced blacksmiths anvil and hammer will do, a good steel square can also be substituted, care must be exercised to apply it straight, that is square on the saw. The rig for handling and hanging the saw on is shown in *Fig. I.* This is intended where a man is to keep up his saws in the mill, it being handy and costs not over \$2.50 and will suit a new beginner just as well as a \$40.00 outfit. To construct this

bench *A* represents a piece of timber, say 12x12 inches set on end and a little higher than half the diameter of your largest saw. This block must set in a very solid steady place and braced as shown in cut. Near the top of *A* at *H* is a collar bolt 1 inch in diameter, 19 inches long, 7 inches from one end is fastened the collar, the other goes through *A* at the top and must be screwed up very tight. The 7 inch end is for the collar. This can be made of hard dry wood, and is made as shown at *C* and *F*. It should be 4 inches in diameter, 5 inches long with an inch hole through the center, so as to revolve on the 7 inch projection of bolt. At *C* the block is shown to be reduced to two inches, this being the exact size of the eye of the saw and made to receive it. This reduced part being 2 inches long and two inches in diameter. *F* shows a round block, two inches thick, with a two inch hole in it to receive the end of *C*. These blocks should be square on the edge, not bevelled. This will make you just as good a collar if you had paid a shop \$15.00 for it. The end of the bolt to receive this collar is threaded to receive two jam nuts, so that when the saw is revolved the nuts will not unscrew. *A'* represents a top view, *A* showing end of block. Screws *D-D* are applied for springing the saw to find the defects. This being the safeguard for the new beginner as well as the experienced. This bench can be made in a frame to be moved about if desired. It should be set so as to get the best light in front of the operator, so that the defects can be seen under the straight edge. Where a man runs a small saw at moderate speed he can dispense with this bench for a while, until he can build one, by standing the saw against a post to test it. All being ready the saw is hung on the bench, as shown in *Fig. I*, with the full side out, next to you as in cut, then set up screws *D-D* against saw until it appears straight to the eye. Your saw may be dished very little, nearly all saws which

need hammering are dished more or less from the log. When you have sprung the saw straight with screws. The straight edge is applied perpendicularly, as in cut, with the left hand while saw is turned with the right watching closely and marking all the lumps or high places you find, if your saw was sprung or dished it will show a little high place outside of the collar when the straight edge is applied. This high place extends nearly always around the saw and should be marked very plainly, a piece of chalk or hard bar soap will do for marking the saw. This shows that the dished saw is sprung near the collar. Should the saw not be sprung straight and allowed to remain dished as in *Fig. I*, this high place would appear midway between center and rim, as the straight edge shows it in cut, in fact it would show the saw spring all over, where it really was sprung just outside of the collar, which was found by using screws *D-D* to spring the saw in the proper position. So it can be easily seen this great advantage of these screws. Should the saw be marked where the lumps appear, while dished, the saw would be hammered in every place, except the right place and this is why so many fail in attempting to learn the art of hammering saws they do not have the right principles to start on. In going around the saw with the straight edge you sometimes will find one or more very light lumps, sometimes there will be three as shown at *1*, *2* and *3* in *Fig. II*.

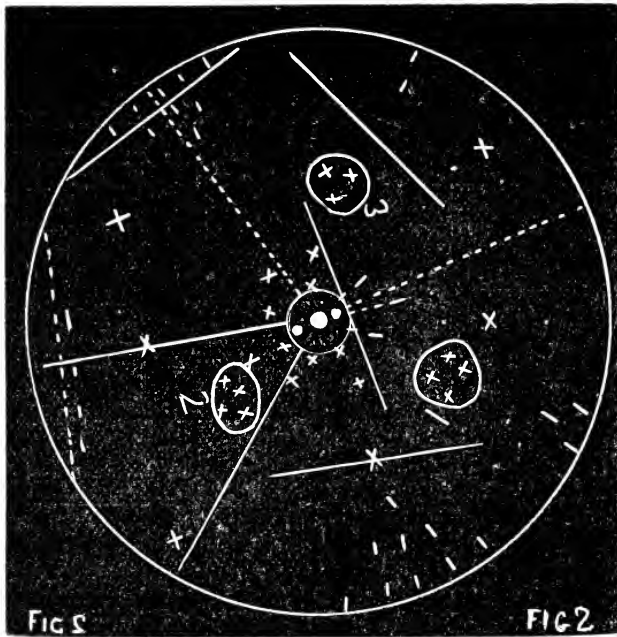


FIGURE II.

These lumps are often blue spots as is often seen on a saw, caused from getting too hot in the center and the saw to get relief from the great amount of expansion, blisters by raising in a high lump. These lumps require several marks on them as shown. After you have gone around the saw with the straight edge, as in *Fig. I*, marking a cross mark on each lump, then take the straight edge and apply it in a horizontal position on the saw, which is exactly across the former way, apply it on every lump you have marked and you will find some of them that will not show a lump this way and where you find that the lump shows one way of the straight edge and not the other, rub out the cross mark and make a straight mark in line with the line that shows the saw to be the straightest

and where the lump appears both ways mark as described, a cross mark. The blue spots always expand in a circle and shows a high lump both ways of the straight edge. After you have marked all the lumps you can find your saw will appear about as in *Fig. II*, and shows most of the long marks near the rim. These places are sprung only one way and are a twist in the saw. The straight uniform dotted lines in *Fig. II*, shows the straight way of the saw, the long marks all in a line with this straight dotted line. You now have your saw laid off and ready for hammering, that is straightening as it is to be done on a wooden block. In *Fig. I*, the upright square piece *A* will answer the purpose, it should be one-sixteenth of an inch higher in the center and the face of the block very smooth and uniform. Now lay your saw on the block and with your hammer strike a light blow with the round pisen on the cross marks and use the long pisen on the long marks and *never* across them. The high places will require heavier blows, it being safer when striking near the collar to strike lightly and two or three blows in one place. The places like *1*, *2* and *3* in *Fig. II*, will require several blows, say half dozen. Now great care and judgment must be exercised not to strike too heavily. Raise the hammer, if of 3 lbs. weight, 12 or 14 inches high and allow its weight to fall on the mark, but this is found out by practice, thin saws require much lighter blows than a six-gauge. After you have gone around the saw, on the block with the hammer, stand it on edge on the floor and notice if it yet appears full on this side, if so lay it back on the block and strike another blow on each mark, and a little heavier on the blue spots. It will probably appear straight on this side or may dish a little the other way, which is all right if it does. Turn the saw around, the other side out and hang it on the bench again, not disturbing screws *D-D* and leave the marks you have made on the

other side. Take the straight edge and go around the saw on this side, the same as the other, marking all the long marks you find, by applying the straight edge at right angles on the lumps. After you have marked all the lumps, examine and see if any of the marks on this side are opposite any of those on the other side, if so you have hit too heavy a blow and have raised a lump on the other side. This is the surest way to learn the right kind of a blow, always leaving the marks on the side operated on with the hammer, until you have the other side laid off and examined, then you can rub them out. Nine-tenths of the saw-hammerers strike too heavily and if they ever get a saw to run they have to do ten times as much work as is necessary and by this time a man is getting so sick of the job that he can't exercise much judgment and quits with a saw very little better than at first. Remember this, it takes very few blows to improve a saw, when put in the right place and not too heavy. The screws *D-D* will always show where the saw is sprung. Proceed on both sides of your saw, say three times on each side, if your saw was badly buckled and leave your saw leaning a trifle toward the log. Remember, in the last operation that the blows should be much lighter as the lumps are not so high; do not try to get it perfect at first. You probably will not have the time and should you work on a saw half a day all would expect a perfect saw, and besides a man at such work should not do too much at once, until thoroughly familiar with the business. Straighten your saw up a little, two or three different times, and you can watch the change in the saw. Before working on your saw, should it be necessary for the saw to run warm in the center to work, it will be necessary to treat the saw as described in *Fig. III*, before straightening it. The saw in this condition will sometimes appear in a kind of a twist and cannot be straightened on the block, but on the anvil, as described, which is giving the saw some tension before straightening it.

PART 3.

TENSIONING A STIFF SAW TO PROPER SPEED.

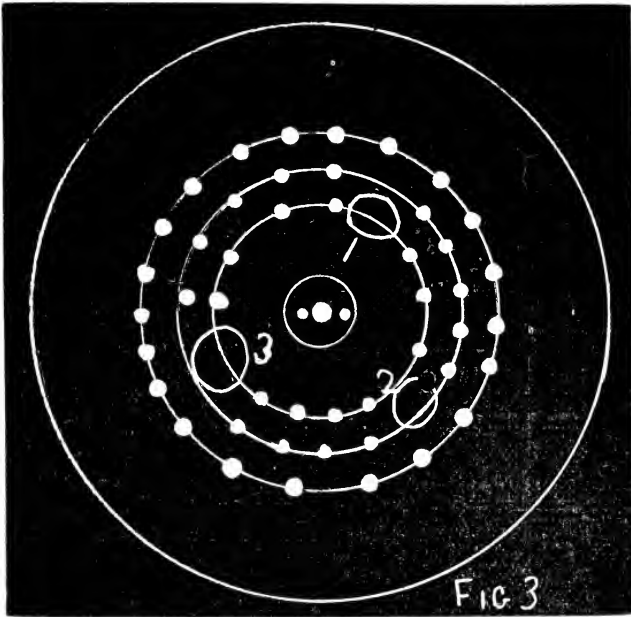


FIGURE III.

By the time you have your saw straight it may require tensioning, that is it may be too stiff in the center. This saw when running will snake and heat on the rim, the least heat on the rim causing it to form a complete twist or wind and unless the saw runs out of the timber sufficient to heat the center, there is no running it at all. This saw is too loose on the rim and too tight in the center, caused by gumming, heat and the action of centrifugal force, all these act on the rim and stretch it, and unless the center is stretched to compensate this, the saw cannot be run at all. By studying this well and watching results closely you will soon understand. *Fig. III*

shows how the saw should be laid off for hammering. First strike off three or four lines between the center and the rim, keeping nearest the center—these lines can be struck on a perfect circle, when the saw is on the bench, by holding a piece of chalk steadily against the saw and revolving it. Lay off marks, say 3 inches apart, on these circular lines 1, 2 and 3 show where the blue spots were and near these no mark for the hammer should be made, is now to be opened on the anvil and these blue spots are already an open place, caused by heat, all saws do not have these blue spots, as described in *Fig. II*; sometimes a saw will have one and not often three. The saw is now laid off, as in *Fig. III*, laid on the anvil and struck a solid blow with the round pien. These blows must be very light and the saw rest solidly on the anvil or you will get into trouble. The saw will be sprung instead of being opened or stretched at each blow. Remember you are not often straightening the saw, this is only done on the block, you want to open the saw and if all your blows are perfectly solid and of the same left, your saw will be sprung but very little. The safest way is to tap the saw lightly until you get it firm, then apply the blow. Why I caution so against heavy blows, is that this is the cause of so many men not learning anything; they actually strike a saw as if they were striking in a shop. Having gone around this side on three lines, you want to apply the same blows on the other side, exactly opposite these and if your saw is bright, not rusty by turning the saw and catching the light you can see an impression, a dull spot, and by marking these you have the blows applied exactly opposite each other. On this side it is not necessary to strike quite so heavily, but the saw must lay firmly on the anvil. Should the impressions not show, it will be necessary to measure, strike the same lines exactly opposite and apply the blows as nearly opposite as possible and you will have less straightening up to do on the block.

These 3 lines may not be sufficient to open the saw properly and you will have to be governed by your speed and size of saw and thickness. If you are running a medium size saw at a moderate speed you will require to have your saw not so open as a larger saw of higher speed, the medium speed requires that the saw be a little loose in the center, which is determined by standing the saw on edge on the floor, taking hold of the top and giving it a shake if the center shakes more than the rim the saw is open about right. Should the center appear yet stiff, not moving when shaken, it will be necessary to lay off two more lines between the three in *Fig. III*, omitting the blue spots and hammering as before on both sides, by watching you can soon get the idea of it. Sometimes in large saws the center will vibrate and the rim also, this ought not to be and the best saw in the world, in this condition will not run, new saws are sometimes in this condition and it is caused by the saw being opened too near the eye and the part on the third line, toward the rim, is too stiff and requires hammering, this is in the part of the saw that hammering will not open the saw much to speed and any saw that appears stiff, in this way, should be opened with the hammer on the anvil, and by watching the saw, as it is shaken this tight place can be located and bearing in mind that this is found when the center and rim both vibrate from the shake of the hand. The high speeded saw should dish in the center alike both ways and the rim remain steady or nearly so. This tight place is found only in high speeded saws, and not in the lower speed. In opening a saw in the center it should not be hammered nearer the center than say 6 to 10 inches, according to the size of the saw. Always straighten the saw up on the block, after opening, before putting it on the mandrel for work. Use precaution and do not do too much at once; a few blows in the right place helps a saw wonderfully and when proper work is done on a saw it requires as fine observation as the finest part of a watch.

PART 4.

A SAW TENSIONED TOO HIGH FOR SPEED TO OPEN CENTER,
BEING TOO STIFF ON RIM.

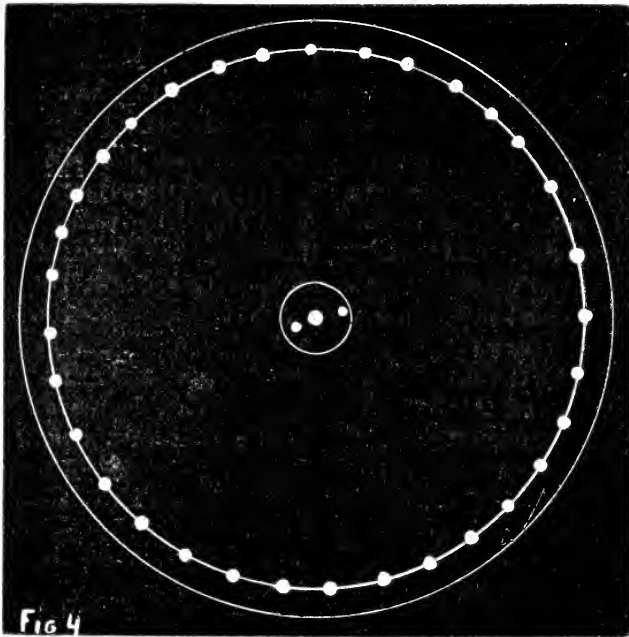


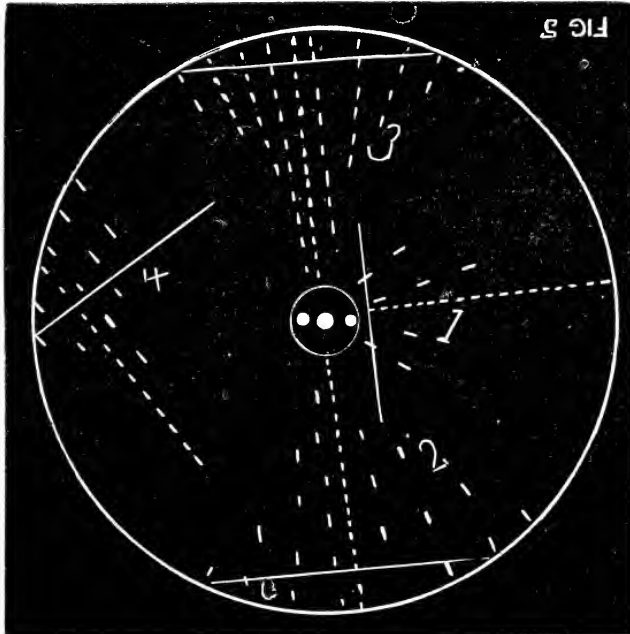
FIGURE IV.

Should you get your saw to open in the center, it will have to be hammered on the rim, as in *Fig. IV*. This saw will incline out of the log and heat in the center, it being a difficult matter to get it to run into the log and when you do, it will run in as badly as it runs out, the saw being too open in center for speed to straighten it, so it runs first one way then the other, generally out. Lay off one circular line around the saw, 4 inches from the rim, as in *Figure 4*, and opposite each tooth, make a mark, take the saw to the anvil and strike a light blow on each mark, lighter

than what you did in the center, there being a larger circle, requires very light blows, hammer the saw on both sides, laying it so as to get the blows opposite each other. One line will be sufficient, unless the saw is very open and then it may require but very few blows, using precaution, as it is much easier to do too much hammering here than in the center. Saws that accidentally becoming dished when straightened up will be too open, that is if the saw was of the proper opening before, nearly all saw hammerers hammer this kind of a dished saw on the anvil, stretching the saw more all the time, then they have five times more work to do on the rim than if they had straightened it on the block. By watching closely you will see what is needed, resting assured that if you follow these instructions closely, you will soon master the saw. In all cases, after hammering on the anvil, the saw should be straightened upon the block. Remember that hammering a saw is not straightening it. Hammering applies to uniform work on the anvil. Straightening is treating the lump on the block.

PART 5.

SHOWING A TWISTED SAW.

**FIGURE V.**

Saws become twisted through accident, by a cant or log, falling on it or jamming the saw. When the saw is turned around on the bench and watched, it will be seen that it has a wind in it and will appear full on one side, when turning it half way round it will appear full on the other side. Sometimes saws are run so long without hammering that they get so long on the rim that it is impossible for the saw to stand straight; the saw will appear very stiff in the center, and where a twisted saw is stiff in the center it is necessary to open the center, as in *Fig. III*, laying off not less than 6 lines to be operated

on. Hammer the saw on both sides, and should it appear yet stiff, operate again on 3 lines, until you get the center a little open, and when you do this you will often find your twisted saw nearly straight. Then take the straight edge and examine the saw all over and you will find places on the rim, high one way and with the straight edge applied across the high place will show a low place or light under the straight edge. The long straight dotted lines, in cut, represents the straight edge, applied the straight way, as described in *Fig. II*, and where these twisted places appear higher at the rim, when the straight edge is applied, the high way, as shown by the long white lines, the saw requires much more hammering on the rim at these places, reducing to a conical shape, as shown in cut. Twisted saws are nearly always sprung more on the rim than any where else, sometimes a little at the center. The long pien is used exclusively to remove twists and buckles, that is at all places that appear straight one way and high the other. When opening a twisted saw in the center, as described, it is done with the round pien of the hammer. The long pien is not to be used on the saw, while on the anvil, always the round pien on the anvil. Twisted saws do not have the twist all on one side, but generally about as many buckles on one side as on the other and nearly always on opposite sides of the saw, as at 2 and 3, *Fig. III*. Straightening a twisted saw is something that puzzles half of the professional saw hammers, from the fact that they do not know the principles upon which to treat a saw. Some instructors in hammering claim to remove a twist on the block is the proper way; one way this will work, but if a saw is too long on the rim, a man may hammer a life time on the block and never improve the twist. Remember this, always treat a twisted saw exactly as *Fig. III*, until you get the center a little open so that putting your fingers in the eye of the saw, while standing, you can move it a little easily, then you can go to the block and straighten your twisted saw, if you have one after doing this.

PART 6.

SHOWING UNEQUAL TENSION IN A SAW WHEN IT IS
TENSIONED TO PROPER SPEED.

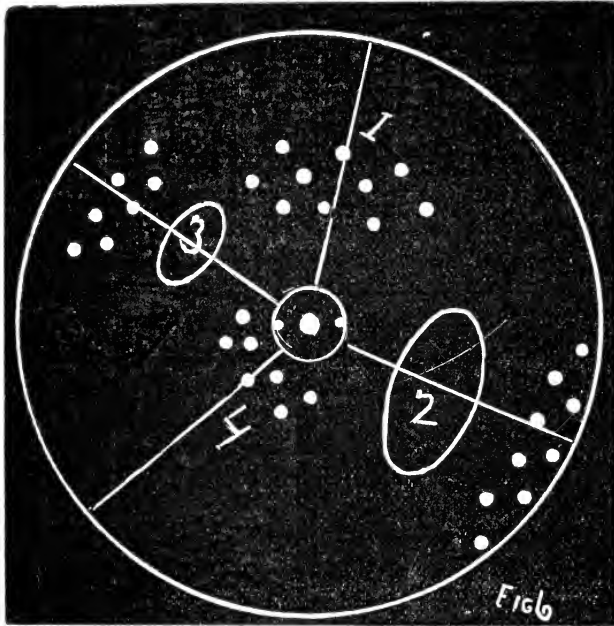


FIGURE VI.

Figure 6 shows a saw with unequal tension in it, that is one part of the saw on a line of the circumference, is more open than the other, when the saw is open properly in the center to speed. Correcting this unequal tension is termed adjusting a saw properly. This may be called the finest and most complicated work of the whole saw, and is the finishing touch. Such work as this has never entered the mind of many saw hammerers, and I have seen many experts fail to hammer a high speeded thin saw to run just from this cause. They look at it as many do, that if a saw is opened properly in the center true, and in good

cutting order, it should go all right, but not so. Now unequal tension is this, one part of the saw at the same distance from the rim or center, on a line of the circumference, is more open than another, one place being to the extreme too open, the other being to the extreme too tight. This is caused principally from the foggy way of hammering a saw on the anvil for everything, and as the lumps in a saw are about as uniform, as shown in *Fig. II*, there is reason why a saw should soon become unequally tensioned by this promiscuous hammering on the anvil. Uniform hammering does not always keep up equal tension, as in *Fig. III*, one place in a saw may be a little higher temper and another a little softer, so from the same heft of blows the soft place is all the time opening more than the hard place. Uniform hammering is always the safest, as the promiscuous hammering is sure to always keep a saw in a bad condition. To find unequal tension the saw must be gotten as true as possible on the block. Then put it on the bench and set out screws *D D* until you have the saw dished toward you perceptibly, then take the long straight edge in your left hand, turn the saw with your right. Turn the saw a few revolutions and watch very closely the openings under the straight edge and wherever the saw appears more open make a loop mark as at *2*, *Fig. VI* and where it shows less light, the straight edge fitting closer, make a long mark, watch very closely and have the very best light and mark the least perceptible difference in the light while revolving the saw, if any of the openings seem to be nearer the center mark than nearer as at *3*. Now take the saw off the bench and turn it around, the other side to you, not disturbing screws *D D*. Now apply the straight edge opposite each one of the loop marks and if the straight edge stands off and does not show a high place, this is an indication of a loose place in the saw, the saw being too open there. Turn the saw to the straight

marks and notice if the straight edge shows less light than what it did opposite the loop mark, if so it is a tight place in the saw. Loose places stand off from the straight edge on both sides of the saw, tight places do not, the saw has the appearance of being thicker there. In testing for unequal tension, great care should be used, and where the saw stands off on one side from the straight edge and shows a lump or high place on the other, this is an indication of a lump and should be straightened on the block. Unequal tension is always alike on both sides of the saw. One side may stand off a fraction more than the other, if the saw is not straightened up well before testing for unequal tension. By watching closely it will soon be learned, the screws *D D* being the best guide of all, they hold the saw firm, dished the same all the way around, where the saw is sprung or dished by the hand it is impossible to spring the saw alike all around and so unequal tension is found where there is none. None but the very best hammerers can trust to springing a saw and should they have a rig of this kind it would be better. After finding all the unequal tension in the saw, it will then be necessary to remove it by hammering on the anvil. The open places where the straight edge stands off, should be opened on the rim, as at *2* and *3*, *Fig. VI*. This expands the rim, making the center tight. Where a tight place is found the straight edge showing a high place on both sides of the saw it should be hammered, as at *1*, this stretches the saw near the center, opens it and makes the rim tight. Where the saw is tight near the center it is loose on the rim, and where it is loose in the center it is tight on the rim. Many do not believe this, but they can find it out by testing the saw. All you have to look after in testing for unequal tension, is between center and rim, with straight edge in perpendicular position. Watch the openings and tight places closely, they sometimes appear

nearer the rim, as at 2 and nearer the center, as at 4. Strike about as many blows, as in cut, very lightly on the anvil with the round pisen on both sides of the saw, and this will do for this time, as you may have the saw sprung some and so you can't test further, straighten up the saw on the block and you will have another better running saw. The next time you hammer your saw examine again for unequal tension and you will keep a perfect saw, which will stand up to nearly twice the feed and making smooth true lumber. In the low speed and thick saws, this unequal tension does not show up so much in the running of the saw. But this advanced day is laying aside the slow low speed.

PART 7.

LONG MILL AND CROSS CUT SAWS.

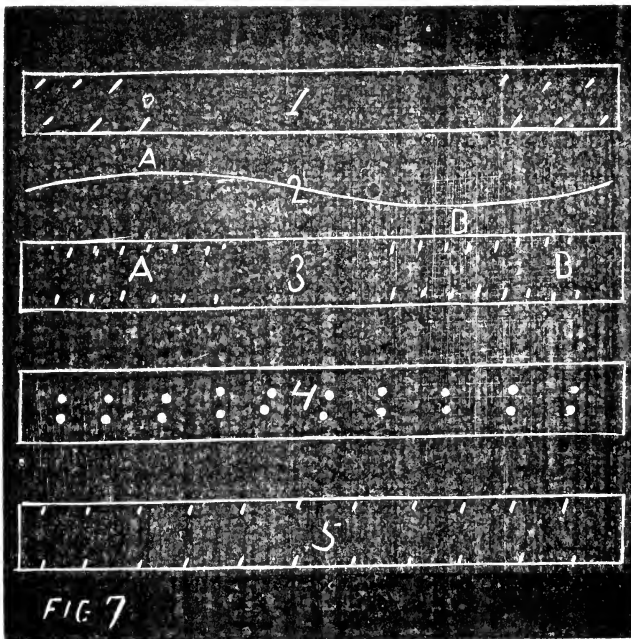


FIGURE VII.

Straight saws require hardly anything but straightening on the block the same treatment as the circular. If they are keyed up in a gate as the gang saw they require more than straightening and require tensioning not to speed but to the strain in the gate, this strain should be on both edges of the saw and the center loose. This is done by hammering the center as at $\frac{4}{4}$ on the anvil alike on both sides. To find the proper opening of the saw it should be put in a leaning position, so that the saw will sag, then apply the straight edge across the saw, if it is too tight in the center and loose or long on the edges the center will appear a little high and to turn the saw over it will appear the same on this side, and exactly the same as treating the circular for unequal tension. The straight edge should be applied all along the saw and mark all the high places, turn the saw over and test it, if any high marks appear opposite, this is a tight place, and where it is high on one side in the center and low on the other, it is a lump and should be taken to the block. If the saw appears very tight in the center, it will be best to hammer it on two lines, as at $\frac{4}{4}$ and then test for unequal tension, which is as essential to a good running gang as in the circular. When your saw shows a little opening all the way the length of it on both sides while sagging it has about the proper tension, always in testing for the tension never apply the straight edge under the saw, but always turn it over testing it, saw sagging in the center always straightening up on the block. When a long saw is only to be straightened it is laid flat on a straight board and tested with the straight edge in this way. Long saws require the use of the long pien almost entirely in straightening. \mathcal{Q} represents a bent saw; \mathcal{B} shows how it is laid off for the long pien, but saws requires the most straightening on the edge and when you straighten the two edges the center will be nearly straight. \mathcal{B} should be straightened at $A-B$ on the

edge with the long pien until nearly straight, then if the center has any high places, work on them. *I* shows a twisted saw, cross cut is straightened the same as the gang on the block, sometimes the tooth edge, from press gumming and heating with the emery wheel, will get the saw so long on that edge, that it will assume a twist on this edge, while the back remains straight, when this is the case, hammer the saw on the anvil as at *L*, but lay off another line on the back edge, having 3 lines in all, work on both sides and then you can straighten your saw. This trouble seldom happens and when it does, it is in broad drag saws. All drag saws require to be the same tension across the saw, the center and edge the same strain. Cross cut saws require only straightening. The mooley the same as the drag, the hand saw the same as the cross cut, remembering that all long saws are much thinner than circulars and require lighter blows.

PART 8.

SHINGLE AND SMALL CIRCULAR SAWS.

Shingle saws seldom require anything but to be kept straight, the collar extending so near the rim that it is not affected much by centrifugal force. Sometimes shingle saws become bent by a spalt catching under the carriage in this case, the saw can nearly always be straightened without being taken off the collar, it being best not to take it off, unless compelled to and then you must use double precaution or you will never get it any better. These saws nearly always get sprung on the rim and require the use of the long pien more than the round and only a very light tap being necessary, as shingle saws are very thin on the edge. Sometimes a saw will appear out of true, making a rough shingle. When the saw is found not to be sprung with the straight edge and runs out of true, the collar

is sprung, it being cast iron, and heat from the journal is liable to spring or warp it, so here you can't do any hammering, but must loosen the screws in collar opposite the low places in the rim, slip in one or two thicknesses of paper until you get the saw practically true, this being the only remedy, unless the collar was taken to a machine shop turned and ballanced. Shingle saws should be left a little high on the rim, the center, the lowest showing good light under the straight edge. Small circulars are always straightened on the block, unless the edge has become so long by gumming to form a twisted saw, then it will require hammering on the anvil, as in *Fig. III*. It should be opened in this way before it gets so loose as to twist, this can be seen by watching the saw at work, it appearing wavy on the rim.

PART 9.

THINGS TO KEEP ALWAYS IN VIEW IN FOLLOWING THE INSTRUCTIONS OF THIS BOOK.

1st. No saw is to be treated for lumps except on the block.

2d. In all adjustment to speed, the blows are applied uniformly on the anvil with the round pien.

3d. All straightening applies only to the block.

4th. All hammering applies to the anvil only.

5th. Correcting unequal tension applies only to the anvil.

6th. The round pien being only used on the anvil, the round and long being used on the block.

7th. Always apply the straight edge both ways at right angles on the saw. It may appear straighter one way than the other, and is the only way to find twists in a saw.

8th. All twisted places are treated on the block with the long pien in line with the straightest way of the saw. Twisted saws are sometimes so long on the rim as to form a twist, treat them as described.

9th. Do not attempt any part of this book without studying it thoroughly, as this is necessary to your success.



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