The Circular Saw

A GUIDE BOOK
for Filers,
Sawyers and Woodworkers

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for
Filers, Sawyers and Woodworkers

Price $1.00

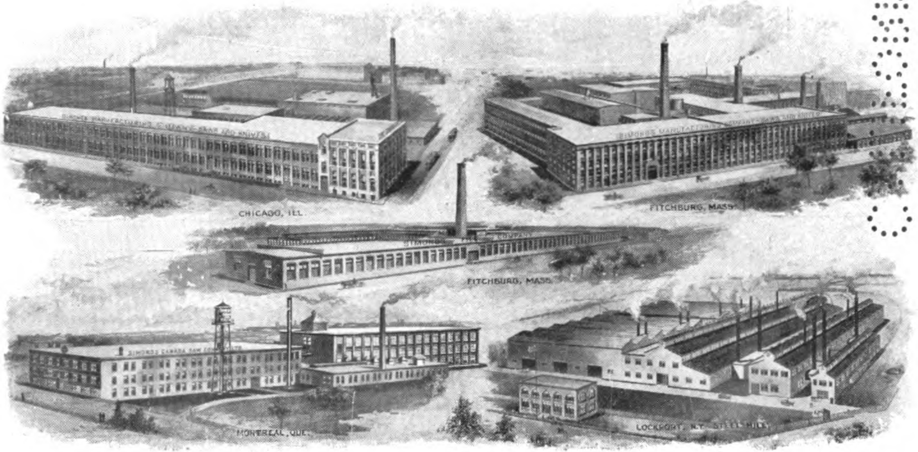
PREPARED BY

Simonds Manufacturing Co.

"The Saw Makers" **Established 1832**

Fitchburg, Mass.

Five Factories **Twelve Branches**



The four factories of the Simonds Manufacturing Company: two at Fitchburg, Mass., one at Chicago, Ill., one at Montreal, Que., and the Simonds Steel Plant at Lockport, N. Y.

INTRODUCTION

THIS little book is the natural successor to the "Simonds Guide for Filers and Sawyers" which has been in such demand that the supply is completely exhausted. In preparing a new edition it seemed wise to remodel the work and add much new material.

The Circular Saw is, therefore, taken by itself and treated in its relation both to the saw mill and woodworking shop. The convenient size and flexible cover are kept so that the book may be carried in the pocket. The headings are made prominent so that any subject may be turned to quickly for reference. At the same time the discussion proceeds in an orderly way so that a beginner may gain a clear idea of the development, manufacture, use, and care of the circular saw.

A companion work will follow immediately on "The Band Saw." A third volume will deal with "Machine Knives." Other books will appear until the line of Simonds Saw Steel Products is described in full.

Many of the illustrations in these books have been assembled on blueprint charts which can be tacked upon the wall of the filing room. Copies of these charts will be sent on request. The company has also outlined its welfare, educational, and efficiency work. Information on these subjects will be gladly furnished.

The Simonds Manufacturing Company was established in 1832; incorporated in 1868. During its long and successful history it has accumulated large resources of knowledge in the manufacture and use of saws and knives. Without presuming to be a final authority, the company is eager to aid the users of its tools to get the finest possible results in the woodworking field. Believing that Simonds Saw Steel Products are the best, the company would have all who employ them get the largest possible returns.

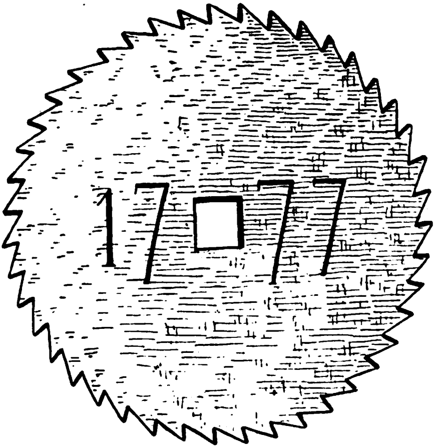
The great war is making large demands upon lumber men and woodworkers. The reconstruction period following the war will call for redoubled efforts. It is a patriotic duty to manufacture good tools and make them work to the utmost. The manufacturer, the filer, the sawyer, and the woodworker are in partnership to win the war and then to rebuild civilization.

Any corrections in the facts described in this book or suggestions as to its improvement will be welcomed. The company would appreciate a word from any who find it helpful.

CHAPTER I

History of Circular Saw

Before history was written, primitive man was acquainted with the hand saw. Perhaps his knife became nicked and he found that by working it back and forth he could make it cut a new way. Or perhaps the suggestion came from the ragged edge of a shell, or the peculiar weapon of the saw fish.



But whence came the circular saw? This was a recent invention. The Pilgrims cut their boards by digging a pit, laying logs across, then working up and down a two-handed saw. The man below was the pit sawyer, the man above, the top sawyer.

The first sawmill was built on the same principle—only that the saw worked up and down by power. Then several saws were worked together in a gang. The next step was the use of the circular saw. Just when it was invented, or where, is uncertain. The first patent in England was granted in 1777. The practical use for wood-cutting began about 1790. The general use in the United States dates from about 1820. These early saws were thick and crude, made only on special order. The mandrel hole was square. The plate was not always solid, sometimes having a toothed rim and spokes like a wheel. For power, at first water was used, then steam. In some States they were driven by horse power. In 1839 the inserted tooth was invented, which proved a distinct advance over the solid tooth for some work.

CHAPTER II

Steel

The principal changes since the early days have been in the quality of the steel and workmanship. The saw must cut continuously and at high speed. Heating and stretching must be anticipated. Allowance must be made for hard or soft wood, especially if it is frozen.

Simonds world-famous circular saws begin with the making of the steel at Lockport, N. Y. Here is a remarkable steel mill, thoroughly modern, driven by power from Niagara Falls. Only the highest quality crucible and electric steel is made. Into the crucible goes the finest grade of iron, the proper per cent of carbon and carefully chosen alloys. These elements are fused at a temperature of 3,000 degrees F. Then the pots are emptied into a large ladle to give uniformity to the mixture. A sample is taken and tested in the chemical laboratory. The ladle is emptied into ingot moulds. These ingots are then heated red hot and passed back and forth through the rolls until they are flattened into plates of the right gauge. These plates pass to the shearing department, where they are given their circular outline. They are then shipped to three of the Simonds plants—Fitchburg, Chicago, and Montreal. The soft stock is unloaded and stacked in suitable racks in the storeroom.

The Simonds Manufacturing Co. can guarantee its products because it controls every step in their manufacture, from the steel to the finished saw or knife.

Quality begins in the steel. This is not a simple substance like gold or copper, but a compound of iron plus carbon plus certain alloys or "medicines" fused together under great heat. These then form a homogeneous mass with crystals so fine that they can only be seen under a microscope after careful polishing sometimes followed by chemical treatment to differentiate between the various grains.

The properties most desired are strength and ductility. Carbon is the great strengthener, giving an increase in tensile strength until a maximum of about .9 to one per cent of carbon is reached. The proportion of carbon is expressed in "points" or hundredths of one per cent.

Mechanical work will multiply the strength of steel from two to five times. The blow holes are closed, the crystals crushed and mixed intimately together, and the cleavage planes along which the metal would yield are broken up.

Special alloy steels are of comparatively recent introduction. The presence of Tungsten, Chromium, Molybdenum, Vanadium, Titanium, Uranium, Iridium, and Cobalt alters the whole nature of steel. Carbon, once the prime factor in changing iron into steel, has lost much of its importance.

In order of expense and quality the different steels are arranged as follows: (1) crucible and electric, (2) acid open-hearth, (3) basic open-hearth, and (4) Bessemer.

Crucible steel costs at least three times as much as the next in price—acid open-hearth steel. This superiority it gains from being manufactured in a closed pot which excludes the air and furnace gases, and is, therefore, freer from oxygen, hydrogen, and nitrogen. It is manufactured in small units so that great care is exercised. The materials put into the crucible are carefully selected and weighed. Only crucible and electric steel will stand the severe service demanded of the points and edges of cutting tools.

CHAPTER III

Making a Circular Saw

Center Hole. The first operation in the making of a circular saw is the drilling of the center hole.

Toothing. Then comes the toothing, which is done with a die in a press (Fig. 2). Each fall of the die stamps out a gullet and forms a tooth. Circular saws have from

Fig. 2

4 to 400 teeth. The gullets are rounded out with an emery wheel, and the teeth shaped more evenly.

Knocking Down. Then on the anvil the teeth are "knocked down" or straightened (Fig. 3).

Hardening. The saw is now fully formed ready to be hardened and tempered. These operations are most important and mysterious. The soft steel is heated in an oven until it becomes cherry red. It is then plunged suddenly into an oily hardening fluid. A wonderful internal change has taken place in the arrangement of the molecules, especially in the disposition of the carbon. The saw that could be bent and stamped so easily has now

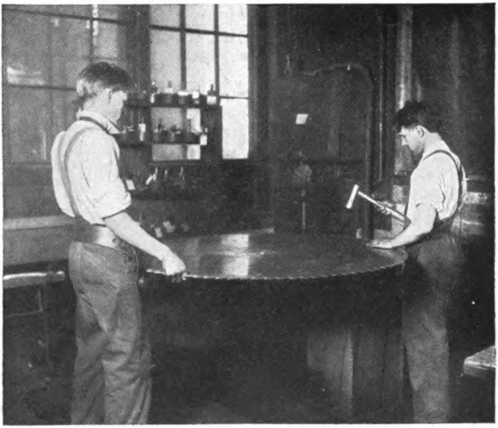


Fig. 3

become very hard and brittle. It can be easily cracked and broken.

Tempering. Before it has time to cool it is heated again to about half the former temperature, this time under pressure. By this method much of the hardness is withdrawn and the saw comes to the right toughness and spring. The pressure keeps it very flat, otherwise the heat would greatly distort the plate. The inspector now tests the teeth by bending them back and forth (Fig. 4). If they show the right temper he passes the saw to the smith.

Smithing. Smithing is the most skilled operation in saw-making (Fig. 5). The smith lays the black saw on the anvil and examines it carefully with a straight edge. Any little lumps and hollows must be hammered out. The

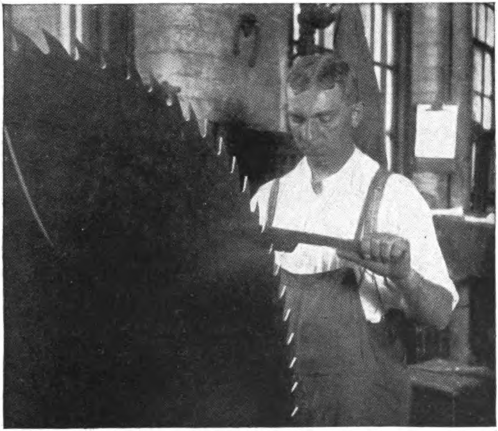


Fig. 4

first steps in tensioning are taken. By tension is meant the stretching of the steel. The saw must be looser in the center than at the rim. This anticipates the cutting, when the rim will be stretched by the speed of revolution. The saw returns to the smith after each of the following operations, to be corrected, and to have the tension further improved.

Stamping. Figure 6 shows the master smith making his close examination before stamping the saw with its final marking.

Grinding. The saw can now be ground until its beautiful steel color is brought out and the plate is reduced to the right gauge or thickness (Fig. 7). The grindstones are of Ohio sandstone, some of the largest weighing eight tons.

Polishing. In the polishing operation the saw is made to revolve rapidly in a protected case (Fig. 8). Against

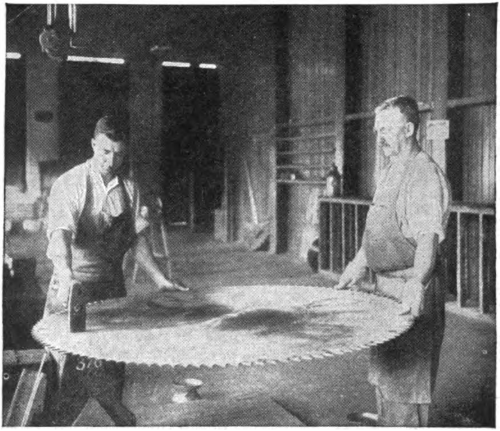


Fig. 5

the moving plate are held the polishing agents, first a block of emery, then cork with emery powder, finally cotton waste and oil. The saw now has a beautiful mirror face.

Etching. The manufacturer is proud to put his name on it. Well-inked labels bearing the name "Simonds" are rubbed on the plate. The paper is washed away and strong acid brushed on. This eats its way into the parts left uncovered by the ink. When the ink is removed, the trade mark is so clear and deep that long usage will not wear it off.

Fitting. The saws which are to be set next have their teeth bent, one to the right, the other to the left (Fig. 9).

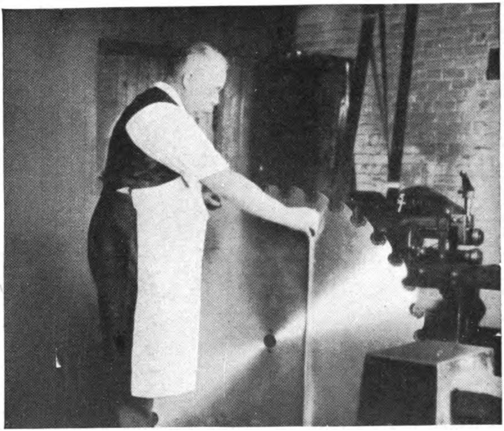


Fig. 6

Fig. 7

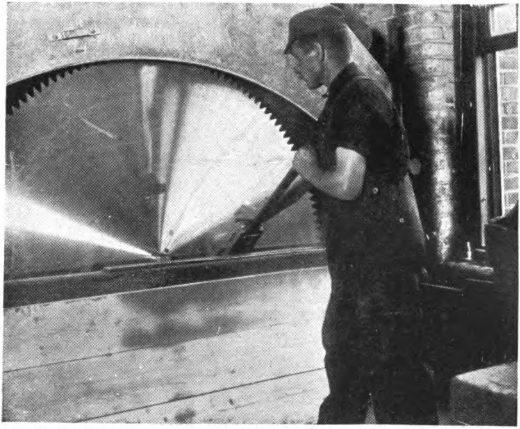


Fig. 8

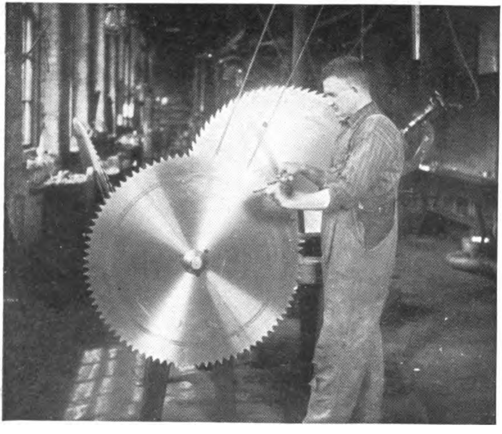


Fig. 9

This is to give clearance. Other saws are roll swaged, i.e., the teeth are flattened or spread for clearance. The filing is done largely by machine and finished by hand (Fig. 10). The tooth that leans away from the filer receives the edge. Care is taken not to file the whole tooth, but only the part where the edge meets the wood.

Fig. 10

Inspecting. The saw is finished. Before it is shipped the inspector makes a thorough examination of every part, comparing the specifications with the original order (Fig. 11). Nothing escapes his careful attention.

Shipping. When he passes the saw it goes at once to the shipping room, where it is placed in a wooden case that covers the sharp teeth. The address of the customer is printed on with a stencil. The shipping bill is made out on the typewriter. The saw speeds on its way to the mill, where it will do its work.

Circular saws have grown steadily in size until the largest practical saw is 90 inches. A show saw for the Alaska-Yukon Pacific Exposition in Seattle, 1909, was made 130 inches in diameter. Circular saws are divided

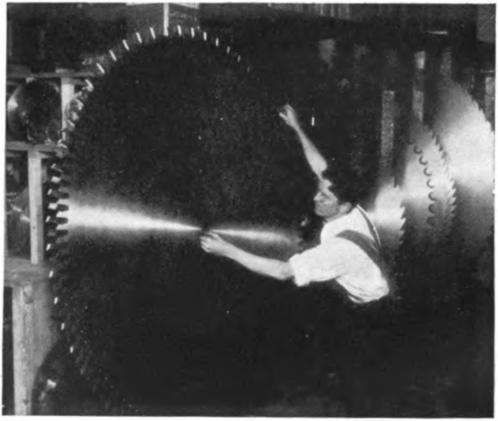


Fig. 11

into solid tooth and inserted tooth, splitting and cut-off, wood saws and metal saws, straight and concave.

While the band saw is coming more into favor the circular saw still holds its place, and will probably never be superseded for certain kinds of work.

Pre-eminent among these whirling discs of steel stand those branded "Simonds." In the quality of the steel, in the uniformity of temper, in the excellence of workmanship, they have never been surpassed.

CHAPTER IV

The Circular Saw Mill

Mill. A Circular Saw Mill is a machine in which a circular saw, driven by power, reduces logs into boards.

Power. The power used may be water, steam, gasoline or electric. While windmills or horses were occasionally tried in the early days, the first power to be generally employed was the waterfall. The types of water wheels have passed through many changes from the overshot to the turbine. Where mills are favorably located, water power is still utilized.

Steam is the power most commonly employed. The mill can be located anywhere. The fuel costs nothing as the sawdust and waste that would otherwise be thrown away are burned under forced draft.

Gasoline is the power used in small portable mills for wood cutting.

Electricity is coming into service and is perhaps destined to become the leading power. It can be generated at waterfalls and transmitted long distances.

Power Behind Saw. For a saw to operate properly there must be plenty of power behind it, more than is apparently needed.

There are various ways of calculating the quantity of power obtainable. The technical engineer uses scientific formulæ that give exact results. The practical mill man has ready rules for measuring that are near enough for his purpose.

For those interested in determining the power available at a saw mill, the following helps are given.

Water Power. Water Power is the power obtained from a weight of water moving through a certain space. The essential things to know are the flow and the head.

Flow. The flow or quantity in cubic feet per minute = the area of a cross section of the stream in square feet x the average velocity of the stream in feet per minute.

Head. The head is the height of the level of water from below the wheel (tail race) to above the wheel (mill pond) in feet.

Wheels. The application of the power depends upon the kind of wheel used. There are three general kinds.

(1) Gravity (early types)—overshot, breast, undershot.

(2) Reaction (for low heads and large volumes)—turbines, vertical and horizontal shafts.

(3) Impulse (for high heads)—turbines.

Power. The power may be developed in three different ways.

(1) WEIGHT.

1 cubic foot of water at 62° Fahrenheit = 62⅓ lbs.

1 gallon of water = 8.34 lbs.

1 horsepower = 33,000 lbs. raised 1 foot in 1 minute.

(2) PRESSURE.

The pressure of 1 foot of water at 62° F = 0.433 lb.

1 lb. of water per sq. in. = 2.3095 ft.

(3) IMPULSE.

The velocity of water issuing from an opening = the velocity of the body of water falling from the head water to the opening.

Velocity = $\sqrt{2gh}$ or the square root ($\sqrt{}$) of 2 times the head (h) times the gravity (g), the gravity being 32.2 feet per second.

Horsepower. From the above the horsepower of a mill may be calculated as follows:

Flow (cu. ft. flowing along stream per min.) x 62⅓ (number of lbs. in cu. ft. water) x head (vertical fall in feet) ÷ 33,000 (weight of one horsepower).

Losses. Allowance must be made for losses at the entrance to and exit from the wheel, the friction and slip in the wheel, and the transmission and use of power.

Steam Power. Steam power is the power obtained by heating water until it expands into an elastic gas called steam.

Heat is a form of molecular motion evolved from the chemical combustion of fuel in a boiler furnace.

The mechanical equivalent of heat = the heat required to raise 1 lb. water from 62° F to 63° F = raising 778 lb. 1 foot high, called the British Thermal Unit (B. T. U.)

The heat required to raise 1 lb. water at atmospheric pressure from freezing (32° F) to boiling (212° F) = 180.9 B. T. U.

To convert 1 lb. water at 212° F into 1 lb. steam at 212° F requires 965.7 units more.

Energy in 1 lb. steam = 180.9 + 965.7 = 1146.6 B. T. U.

Volume = 1641.5 x original pound of water B. T. U.

If steam is confined and more heat applied, the temperature will rise.

Fuel. The fuel commonly used in saw mills consists of sawdust, shavings, refuse lumber, etc., burned by being forced into the furnace by an air blast or sufficient air supplied to the surface of the mass.

Boiler. The boiler is the vessel in which the water is evaporated into steam. Boiler horsepower is the evaporation of 30 lbs. of water per hour from 100° F and at 70 lbs. Gauge pressure is the evaporation of 34.5 lbs. water per hour from and at 212° F. This is usually figured from the amount of heating surface allowing 11 or 12 square feet per horsepower.

Engine. The engine is a machine for converting heat in steam into mechanical power. This power is developed by the pressure of the expansive force of the steam upon the piston in the cylinder.

Engines are single and compound, condensing and non-condensing, etc.

Horsepower. The formula for the horsepower of an engine is $\frac{P \times L \times A \times N}{33{,}000}$

P = the average effective pressure in lbs. per square inch.

L = the length of the piston stroke in feet.

A = the area of the piston in square inches.

N = the number of strokes of the piston shaft per minute = number of revolutions $\times$ 2.

Losses. One-third of the furnace heat escapes up the chimney.

Not more than three-eighths of the heat of the steam (three-tenths of the heat of the furnace) is transformed in the engine into eight-tenths mechanical work.

Imperfections in the engine cause losses and there are losses in the transformation.

Gasoline Power. Gasoline power is the power obtained from the explosion in the cylinder of a mixture of gasoline vapor and air ignited by a hot tube or electric spark which generates great heat almost instantaneously and drives the piston.

Gasoline engines are two-cycle and four-cycle.

Four-cycle has four strokes equalling two revolutions as follows: Stroke (1) mixture of gas and air drawn in; (2) compressed on return; (3) spark, explosion and expansion, making the second outward stroke which is the power stroke; (4) second inward stroke exhausting burned gases.

The formula for the horsepower of a gasoline engine is

$$\frac{D^2 \times L \times R}{18{,}000}$$

D^2 = diameter of cylinder in inches squared.

L = stroke of piston in inches.

R = revolutions of crank shaft per minute.

Portable Mill. This is a movable mill using from 15 to 50 horsepower.

Electric Power. Electric power is the power obtained by converting mechanical into electrical energy in a dynamo by moving a conductor through a magnetic field and changing the electrical back into mechanical energy by use of a motor.

Volt = the pressure of the electric current.

Ohm = the unit of resistance.

Ampere = the flow of the current = $\frac{\text{volt}}{\text{Om}}$

Watt = volt x ampere = unit of work.

An electro-motive force of one volt with a current strength of one ampere is capable of developing an amount of work or energy called a watt.

1 Watt = 0.7373 foot per second = $\frac{1}{746}$ horsepower.

1 Kilowatt = 1000 watts = $\frac{1000}{746}$ = 1.34 horsepower.

Rules for Power in Saw Mill. The practical rules for having sufficient power to run the saw mill are

(1) See that the boiler pressure is 10% more than the horsepower of the engine.

(2) Observe the bore, stroke, and revolutions of the engine, that they are ample.

(3) See that the power is abundant and steady.

(4) Have the receiving pulley on the mandrel large enough.

(5) See that there is no lagging of the saw in the cut.

Foundation of Mill. In the manufacture of lumber a good mill is essential to good work.

The foundation of the mill must be strong to withstand the shock in turning big logs. The stringers should be of sound heart lumber, at least 8" x 10" few pieces, set perfectly level and parallel with the saw frame, gained into the girders and joists of the mill floor, secured by keys and bolts so that they will not change position when large logs are rolled against the head blocks.

Track. The track irons, particularly the "V" side, must be firmly bolted to the stringers, absolutely level and in perfect line with the saw frame. Keep gum and sawdust off the tracks. Where a guide rail is used in the center of the carriage, great care should be taken to see that this is perfectly straight and parallel with the saw frame.

Carriage. The carriage is the movable truck on which the log travels to the saw. It must be substantial, free from side play, the set works firm, running straight and smoothly.

Husk. The husk is the frame that holds the arbor and the saw. It must be of well-seasoned wood, bolted in place to overcome vibration and strain.

Arbor or Mandrel. The arbor or mandrel is the axis on which the saw is hung. It must be absolutely level, lined with the track, having $\frac{1}{64}''$ to $\frac{1}{32}''$ end play, fitting the boxes easily without heating, so that the arbor cannot lift.

The stem must be true, receiving the saw and collars freely but snugly.

Nearly all arbors run more or less warm, and it is essential that the exact warmth be given as nearly as possible, so that allowance for this can be made in adjusting the saw. This is particularly the case with regard to low speed saws—that is, saws that do not run at a rim speed of more than 50 to 60 per cent of the standard. A saw that runs 400 revolutions per minute is affected by a certain amount of heat—twice as much as it would be if the speed were 800 instead of 400 revolutions per minute. Hence the importance in low speed mills of having the arbor run cool. In case it does heat a little, exact amount of heat, as nearly as possible, should be given. No arbor should be allowed to heat to any great extent, never those in low speed mills. Remember that the manufacturer of saws should know all the conditions in order to make a saw that will run successfully.

Collars. These are the flanges that support the saw. They are 6" to 8" in diameter, the center hole 2" to 2½".

The fast collar on the mandrel is concaved, the outer edge being flat for ¾". This collar contains the pin holes.

The loose collar is flat or slightly concaved, holding the pins.

The collars by being concaved press their rims tightly against the saw, holding it flat and straight on the log side.

If the collar is worn, rings of writing paper, oiled, may be put between the collar and the saw on the dished side.

Relative to large Circular Saws cracking and breaking over the collar line, we find saws never break in this manner when running straight, but invariably when "laying over" or crowding out of the log. To have a saw run perfectly true, it is absolutely necessary that collars and stem of mandrel be true and well fitted, for any imperfections in these may lead to no end of trouble; they should fit exactly.

To guard against saws breaking over the collar line, great care should be taken to have the saw hang perfectly true on the mandrel. To ascertain whether the collars are defective, place the saw on the mandrel and tighten up the collars by hand. Test the saw with a straight edge, and, if found correct, tighten up the collar with a wrench, and test again with a straight edge to see if the position of the blade has been altered. If any change is noticed, it is safe to assume that the saw is true, and that the trouble lies in the collars, and that they require trueing up before satisfactory results can be obtained.

For large saws we prefer a collar that has a perfect bearing on the outer rim of at least three-quarters of an inch (in a six-inch collar), the other part being chambered out so that it will not come in contact with center of saw, as they hold tighter than a solid flat collar. For a collar larger than six-inch, this rim should be proportionately greater.

If the collars have become worn at the outer edge, so that when tightened with a wrench the saw will be full or convex on the log side, it will heat at the center and become more convex, causing it to lay over from the log. The arbor should be so lined that the saw will lead into the log just enough to clear the center in good shape, so that it will not rub against the log and heat at center. If it heats and becomes expanded at this point it will dish and run either in or out of the log (usually out), causing the same kind of trouble referred to above.

Another cause for saws cracking over the collar in this manner is that the saw, when adjusted for a certain (high) speed, is usually dishing when not in motion, but, when running at the speed for which it is made, is perfectly straight. If the speed be reduced while in the cut, the saw will become dished for want of the necessary speed to straighten it out. In a case where it heats at center, it will run either in or out of the log (generally out) forming a wedge between the saw and head blocks, eventually cracking or breaking the saw at or near the collar line by forcing it over this rigid point. Hence, the importance of maintaining a uniform speed, and having the tension adapted to it.

As we have stated above, large saws for a high speed mill are, when properly adjusted, dishing when not in motion, and great care should be taken to see that they are straight when running at their normal speed. In other words, they should dish or drop through a trifle more on the log side than on the board side. To see that they are right in this respect, lay the saw on an anvil or board, hold a straight edge across the saw at right angles with the part that rests on the board, and the opposite edge that is being raised to allow the saw to drop through at the center, then take the measurement of the amount it drops through at center, turn the saw over, and repeat the operation, noting if it drops or dishes alike on both sides. If it does, it is correct.

In mills where there is trouble from saws cracking over the collar, the following rule should be carefully observed. Test the saw to see that it hangs perfectly true and flat on the log side. This can be done by holding a 24″ to 30″ straight edge lightly on the face or log side of the saw when in motion. If the Saw is found to be correct in this respect, the center should be carefully examined to see that it does not heat above a normal degree.

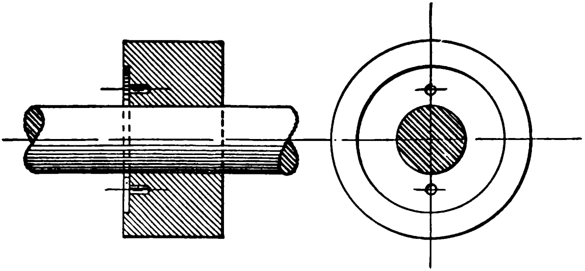
If it is found that the saw heats quite a little at the center, the cause should be located and corrected; it is usually caused by a hot arbor. Where this is the case, the arbor should be made to run cool, but where it is impossible to do so, we would recommend that the tension of the saw be readjusted so as to leave it a little stiffer toward the center. This will offset the tension produced by the heat of the arbor.

The same adjustment of the tension is advisable where there is not sufficient power to maintain a uniform speed when the saw is in a heavy cut. If a saw is left a little stiffer for a distance of about 10″ to 12″ from the center, the tendency will be to prevent it from laying over and crowding out should there be a reduction in the speed.

Lug Pins. These are flat-headed bolts to hold the saw in place. They must have good bearing with the burr filed off. Light mills will have 2 holes 5/8″ on a 3″ circle, 6″ collar. Heavy mills will have 2 holes 7/8″ on a 5″ circle, 8″ collar.

To get the size and position of the pin holes accurately place a sheet of paper on the collar, or better still, if you have a saw that you have been running, place the paper on the center of the saw so that it will cover both eye and pin holes. Hold the paper firmly in its place over the eye and with some hard smooth object rub the paper over the eye and pin holes until their outlines can be seen plainly on the paper. This will leave an impression on the paper that will guide the sawmaker accurately.

Hanging the Saw. Hang the saw on the mandrel. After placing on the loose collar, screw up the nut with the fingers just enough to steady the saw. Now try the face of the saw with a straight edge to see that it is straight. Then tighten up the collar with a wrench. Another trial of the straight edge will make sure that the position of the saw has not changed. If the rim has been thrown over either way, the collars are not right and should be corrected into the proper shape. (See sketch.)



The saw should slip freely on the mandrel and close up to the fast collar. In many cases where the stem of the arbor is a trifle large near the collar, the saw, in being forced to its place by the nut, is made full on the log side. Frequently it will be found that the metal around where the steady pins are driven, will be raised to form a bunch around the pins; if so, file it off.

A six-inch collar should have a perfectly flat bearing of at least three-fourths of an inch on the outer rim, the rest being chambered out, as this will hold tighter than a flat collar. Where collars are larger than six inches in diameter, this rim should be proportionately larger. The pin holes should be in the fast collar; the pins in the loose collar. In putting the pins into the loose collar, the holes should be drilled clear through the collar, so that in case the pins are broken off, they can be driven out with a punch, and thus avoid having to drill them out. On all saws 48″ and larger we recommend 8″ collars with ⅞″ pin holes on a 5″ circle.

Spread Wheel. Set the spread wheel flush with the saw and about ½″ behind the teeth.

Guides. These should be adjusted clear of the teeth and just touching the plate while the saw is in motion.

Lead. The amount of lead for circular saws should be the least amount that will keep the saw in the cut and prevent it from heating at the center. If the lead into the log is too much, the saw will heat on the rim. If the lead out of the log is too much the saw will heat at the center. We give, therefore, the least amount that is used which is ⅛″ in 20 feet.

Soft, tough, fibrous timber usually requires more lead than hard, close grained or frozen timber.

In sawing frozen timber, some sawyers give their saw a little more lead, thinking it will aid in slabbing a log. This is a mistake, for if a saw is lined into the log, after the first or second cut, or after the frozen sap is taken off, the saw will have a tendency to run into the log and make the lumber thin at the rear end of the cut. To prevent this, the sawyer is forced to guide the saw out a little with the guide pins. The saw will then run out in the first cut worse than before. It will be a trifle full between the rim and the center and will heat at this point, causing to tremble and flutter, and to work badly.

Our advice in lining a saw for frozen timber is to line it in such a way that it will run on the board guide instead of the log guide; that is, after the saw has attained its normal speed, set the board guide so it will touch the saw lightly. Bring the log guide close to the saw but not close enough to pinch the saw in the guides. Any play given the saw should be on the log guide. If the saw does not run so it can be guided in this manner, look to the lining and line it so that it can be run on a straight guide.

Lining the Saw. There are various methods used for lining a saw with the carriage. First, be sure that the mandrel is set perfectly level so that the saw hangs plumb and is perfectly flat on the log side. Then try one or more of the following:

(1) Move the carriage until the head block is on a line with the front edge of the saw. Fasten to the head block a pointed stick with the point lightly touching the saw. Move the carriage until the point is opposite the back edge of the saw. Then set the mandrel until the point of the stick clears the saw $\frac{1}{64}''$ to $\frac{1}{32}''$. Check by turning saw ½ revolution.

(2) Fasten a square-edged stick to the head block with the end of the stick ⅛″ from the saw at the center. Run the carriage back 15 to 18 feet. Stretch a line from the back of the saw to the stick. Give the saw the lead desired.

(3) Take a tapering board the radius of the saw with a hole at the large end. Fit the hole over the mandrel after removing the saw and screw up the collars. Pierce the stick at the small end with a nail, screw, or skewer. Measure from the head block to the nail. Turn the mandrel over by pulling the belt. Run the head block to the new position and measure again. Set the mandrel to give the required lead.

(4) Draw a line 10 feet each way from the center of the mandrel and parallel with the "V" track. Fasten a stick to the head block so that it comes up to the line at the end in front of the saw. Run the carriage forward the 20 feet. Move the rear end of the line one inch away from its former parallel position. Then set the mandrel until the saw is parallel with the new position of the line.

(5) Stretch a fine line of thread, say 20 feet long, across the face of the saw in a parallel line with the "V" or guide track. This can be done easily by running the carriage back and forth the length of the thread and placing each end of the thread an equal distance from the front head block. The thread being properly placed, with a piece of chalk mark the saw at the front at a point on a level with the carriage and measure the distance between the thread and the marked point on the saw. Then slue the arbor around either way, as the case may require, to give the saw $\frac{1}{32}''$ lead into the log in the diameter of a 60-inch saw.

We recommend marking the saw and taking both measurements from this marked point on the saw as the saw might be a trifle out of true. A measurement taken from the front and back of the saw, without turning the saw over, might not be perfectly accurate.

Feed. Feed is the moving of the wood against the saw. Where the saws are small, 46 inches in diameter or less, the feed is usually by hand or in an automatic machine.

Power feed for larger saws is—steam, rope or friction.

Feed is measured by the number of linear inches cut in one revolution of the saw. A 12″ cant is usually taken as a basis of calculation.

The feed may readily be determined by measuring the distance on the log from the mark made by a prominent tooth to the next mark of the same tooth, indicating one complete revolution of the saw. The feed of larger saws is from 4″ to 16″. The more feed desired the greater must be the number of teeth in the saw.

Be careful not to over-feed.

Speed. Speed is indicated by the number of revolutions per minute made by the saw and also by the number of feet traveled by the rim per minute. The revolutions are measured by an instrument called a speed indicator.

Revolutions. Light portable mills run 450 to 650 revolutions per minute.

High speed steam feed mills run 600 to 900 revolutions per minute.

Small circular bench saws, hand feed, may run 2000 to 2500 revolutions per minute.

Rim Speed. Rim speed is the speed of the cutting edge. For mill circular saws it increases from 8,000 to 12,000 feet per minute. Medium rim speed for the average mill is 10,000 feet per minute.

Speed must be regular and uniform as determined by the engine and the pulleys.

Test by the speed indicator.

Be careful not to over-speed.

The speed must be known before a saw can be hammered to the right tension.

Pulleys. The rules for calculating the revolution of the pulleys are:

Diameter of Driver =

$$\frac{\text{Diameter of driven x revolutions of driven}}{\text{Revolutions of driver}}$$

Diameter of Driven =

$$\frac{\text{Diameter of driver x revolutions of driver}}{\text{Revolutions of driven}}$$

Revolutions of Driver =

$$\frac{\text{Diameter of driven x revolutions of driven}}{\text{Diameter of driver}}$$

Revolutions of Driven =

$$\frac{\text{Diameter of driver x revolutions of driver}}{\text{Diameter of driven}}$$

CHAPTER V

Solid Tooth Circular Saws

Kinds. Circular Saws are divided into solid tooth and inserted tooth, splitting and cut-off, wood saws and metal cutting saws, straight and concave, etc.

Circular saws have grown steadily in size. Practical saws are now made 86 inches in diameter. The plates for some of our inserted tooth cut-off saws are over 90 inches in diameter.

At the other extreme, circular saws are made as small as one inch in diameter, Small circulars and cutters are being used for new purposes and in growing quantities.

Ordering. In ordering circular saws the following information should be given:—

Number and Style of Saws wanted.

Diameter in inches.

Right or Left Hand.

Thickness at Center, gauge.

Thickness at Rim, gauge.

Number of Teeth, (if possible, give some latitude as to number).

Size of Pin Holes.

Size of Mandrel Hole.

Distance apart of Pin Holes, center to center.

Number of Revolutions per minute.

Greatest Feed each Revolution.

Kind of timber to be sawed.

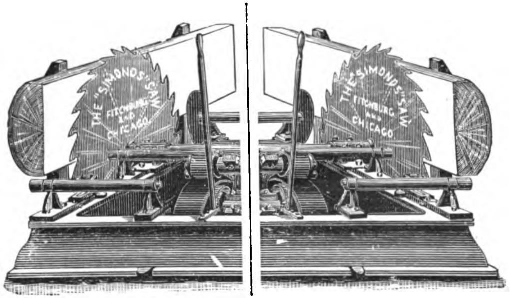
Horsepower available.

Daily capacity.

Tell also when wanted, how to be shipped, name and address.

Diameter. The diameter of the saw must measure more than twice the diameter of the largest log it will be required to cut. Otherwise one or more saws will have to be hung above it. The pulley on the mandrel may be changed to increase or reduce the speed to correspond with the size of the saw and the power available to drive it. Circular saws for cutting logs run from 42" to 78".

Hand. To determine whether a saw is right or left hand, take the sawyer's position with the saw cutting toward you. If the log or carriage travels past the saw on your right hand side, it is a "right hand saw"; if on your left, it is a "left hand saw."



Left-Hand Saw   Right-Hand Saw

Gauge. The gauge of saws for log sawing in saws 42" and over is generally 7 gauge at the center and 8 gauge at the rim. Saws should usually be one gauge thicker at the center than at the rim.

To save time—the feed and speed are increased and the saws must be heavier, 6 and 7 gauge.

To save lumber—saws are made thinner, 9 and 10 gauge. We have made saws 62" and larger, as thin as 11 and 12 gauge, both inserted and solid tooth, which are doing good work, but in such cases the conditions must be most favorable to the use of thin saws.

It is a well known fact that thin saws are far more sensitive than thick saws. In the usual gauges of large circular saws used in the ordinary way on the average feed and lumber, $\frac{3}{32}$ of an inch, equally divided, is about as little set or clearance as can be successfully run, though in hard wood or frozen timber, less should be used. A thin saw requires just as much set on either side of the plate as a thicker saw; consequently, in proportion to the thickness of the plate, the thin saw has the most strain to bear.

It is not our aim to give the impression that we do not make thin saws, but we do wish to impress upon the minds of our customers who purpose putting them in, the importance of having the conditions favorable to their use. The difference in thickness between 8 and 10 gauge is $\frac{1}{32}$ of an inch. The set for clearance of each being the same. $\frac{1}{32}$ of an inch is all that can possibly be saved, in kerf. Between 8 gauge and 11 gauge, the difference is $\frac{1}{32}$ of an inch full. Hence, the saving in the instances above is very small; so small in fact, that in nine cases out of ten it is offset by a reduction in capacity, or in the quality of lumber saved.

As to sawing in power, in many cases the difference is not in favor of the thinner saw, for, being lighter, it will deviate from a straight line much easier, unless fed very carefully.

Before deciding what gauge to order, consider well the following:

The class of logs you have to cut.

The mechanical ability of your sawyer and filer.

The condition of your mill and the power you have.

If all these are favorable you are safe in ordering a saw thinner than if they were otherwise.

In cases where boards are sawed exclusively and you wish to run as light a saw as possible in order to save lumber, we would recommend at least one gauge thicker at the eye than at the rim.

In sawing dimension or any heavy lumber, we would not recommend a taper saw as in this class of sawing it is necessary to clear the center, as the thick, heavy timber will bear heavier against the body of the saw than boards or any kind of thin lumber, causing the saw to heat at the center, thus requiring more set to keep the center from heating. Therefore, it is better under these circumstances to have a saw of equal gauge, than to be obliged to add more set to make up for the difference between the center and the rim.

Teeth. The number of teeth is determined from the feed. Find out just what feed the saw is to run. If the feed is 4 inches to the revolution, have one tooth for every inch of the diameter of the saw. Example—at 4″ feed a 60″ saw will have 60 teeth.

Then for every additional inch of feed carried, add 10 teeth. Example—at 4″ feed a 60″ saw will have 60 teeth; at 5″ feed, 70 teeth; at 6″ feed, 80 teeth. Increase the number of teeth in a slightly less proportion up to any desired amount of feed, but we would not recommend more than 100 teeth for the greatest feed.

The above rule applies particularly to pine or any kind of soft timber. For hard wood or frozen timber, where there is sufficient power to maintain a uniform speed, the same rule may be used. But in mills where the power is limited it is not good policy to have more than one tooth to every inch of the diameter of the saw, for the fewer teeth there are in the saw, the less power it takes to drive it.

Where the feed is less than 4″, the same rule can be applied by reducing the number of teeth in proportion to the reduction in feed. Inserted tooth saws would come under this classification.

When spring set is used, a larger number of teeth is required than when saws are fitted full swage.

The above rule applies only to the regular gauges used in log sawing, 6, 7, 8, and 9 gauge. Thin saws, especially small ones, require a large number of teeth to equalize the strain.

For hard wood and frozen timber, do not increase the teeth but run at a higher speed. More teeth means finer dust which packs between the saw and the log.

The Average Speed of Circular Saws

Diameter Inches	Revolutions per Minute	Diameter Inches	Revolutions per Minute
8	4,600	40	980
10	3,920	44	890
12	3,260	48	815
16	2,450	52	750
20	1,960	56	700
24	1,630	60	640
28	1,400	64	600
32	1,225	68	560
36	1,080	72	530

The above table is figured on a rim speed of 10,000 feet per minute.

The Standard Number of Teeth in Circular Saws

Diam., Ins.	Splitting	Cut-off	Diam., Ins.	Splitting	Cut-off
4	36 or 40	100	24	36	72 or 80
5	36 or 40	100	26	36	72 or 80
6	36 or 40	100	28	36	72 or 80
7	36 or 40	100	30	36	72 or 80
8	36 or 40	100	32	36	72 or 80
10	36 or 40	90, 100 or 120	34	36	72 or 80
12	30, 36 or 40	90, 100 or 120	36	36	72 or 80
14	30, 36 or 40	90, 100 or 120	38	36	72 or 80
16	30, 36 or 40	80, 90, 100 or 120	40	36 or 40	72, 80 or 90
18	36	80, 90, 100 or 120	42	36 or 40	72, 80 or 90
20	36	72, 80 or 90	44	36 or 40	80 or 90
22	36	72 or 80	46	36 or 40	80 or 90

It is impossible to cover in table form all the varying conditions under which the larger sizes of Circular Saws are operated, but the following will give a good general idea of the number of teeth suited to different conditions of speed and feed. Material variations in either speed or feed will possibly require changes from the number of teeth here shown. We shall be glad at any time to give our customers the benefit of our experience in determining the number and style of teeth best adapted to their conditions.

	SPLITTING SAWS						CUT-OFF SAWS
Rim Speed per Minute	8,000 Ft.		10,000 Ft.		12,000 Ft.		
Feed p. Rev.	4 In. and Less		Over 4 In. to 6 In.		Over 6 In.		
Diam., Ins.	Rev. per Minute	Number of Teeth	Rev. per Minute	Number of Teeth	Rev. per Minute	Number of Teeth	
48	640	30 or 36	795	36, 44 or 48	..	...	80, 90 or 100
50	610	30 or 36	765	40, 44 or 50	..	...	80, 90 or 100
52	585	30 or 36	735	44, 48 or 52	..	...	80, 90 or 100
54	565	30, 36 or 40	705	44, 50 or 54	..	...	90 or 100
56	545	30, 36 or 40	680	50, 56 or 60	820	80 or 90	90 or 100
58	525	36, 40 or 44	660	50, 56 or 60	790	80 or 90	90, 100 or 120
60	510	36, 40 or 44	635	50, 56 or 60	765	80 or 90	100, 120 or 150
62	490	40, 44 or 48	615	62	740	80 or 90	100, 120 or 150
64	475	40, 44 or 48	595	64	715	80 or 90	100, 120 or 150
66	..	...	580	66	695	90 or 100	100, 120 or 150
68	..	...	560	68	675	90 or 100	120, 144 or 150
70	..	...	545	70	655	90 or 100	120, 144 or 150
72	..	...	530	72	635	90 or 100	120, 130 or 140

Diam., Ins.	Resaws	Edgers	Diam., Ins.	Shingles
16		18, 20, 24, 30	36	60, 72, 80
18	36, 40, 44, 48	18, 20, 24, 30	38	60, 72, 80, 90, 100
20	36, 40, 44, 48	20, 24, 30	40	60, 72, 80, 90, 100
22	36, 40, 44, 48	20, 24, 30	42	60, 72, 80, 90, 100
24	36, 40, 44, 48	24, 30, 36	44	60, 72, 80, 90, 100
26	40, 50, 60	24, 30, 36	..	......
28	40, 50, 60	...	..	......
30	40, 50, 60	...	..	......
32	40, 50, 60	...	..	......
34	50, 60, 72	...	..	......
36	50, 60, 72	...	..	......
38	50, 60, 72	...	..	......

Hook or Pitch. The hook, or pitch of the teeth, and the depth, size and shape of the gullets, all play an important part in the success or failure of the saw.

Too little hook will cause the teeth to tear and scrape instead of cutting. It will take much more power to force the saw through the log; the teeth get dull quickly; and the severe strain in the gullets stretches the rim so that the saw appears to lack tension.

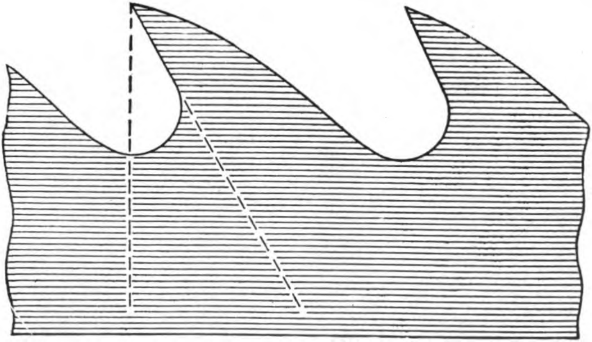
Too much hook weakens the tooth and makes it liable to break out or dodge. The correct hook cuts the kerf out in shavings, but is never so extreme as to rob the tooth of its body, particularly at the base.

A good deal of hook may be carried, if the base of the tooth is rounded off into a good round gullet, giving plenty of space to carry off sawdust and at the same time leaving a strong base for the tooth.

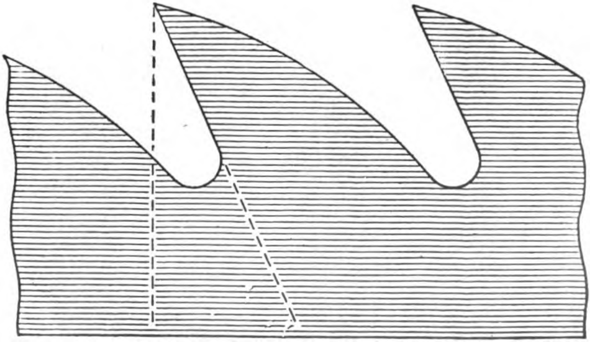
If the tooth has not the required strength at the base in proportion to its length, it will chatter or vibrate in the cut, crystalizing the steel, and will eventually cause the tooth to break out. Cracks from vibration can be recognized by a smooth glassy appearance of the fracture near its starting point, which is generally at the back of the tooth, curving forward. The remedy is to shorten or make stout the tooth, or correct the hook.

Sketch A shows a good tooth. The base is wide and strong, but well rounded off so as to leave a spacious gullet. The back is high enough to give body to the tooth, still leaving plenty of gullet room. The shape of the gullet is such as to chamber a good deal of sawdust and to discharge it freely; and being well rounded has no corners for sawdust to pack or tensile strains to localize.

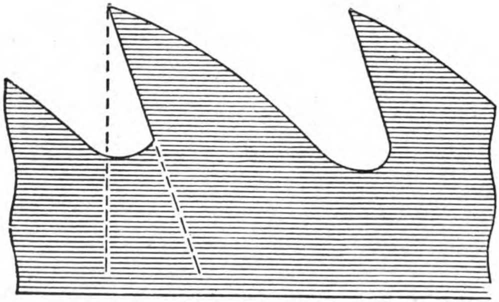
Sketches B, C, D, E, F, and G, show some improper forms of teeth. Straight teeth cut hard and dull quickly. Sharp angles in the throat invite gullet cracks. Deep, narrow gullets cause sawdust to wedge and choke, putting a severe strain on the rim of the saw; this condition may break out the teeth, and will pull out the tension and



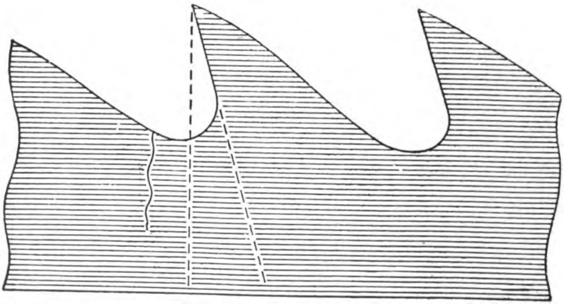
Sketch A.



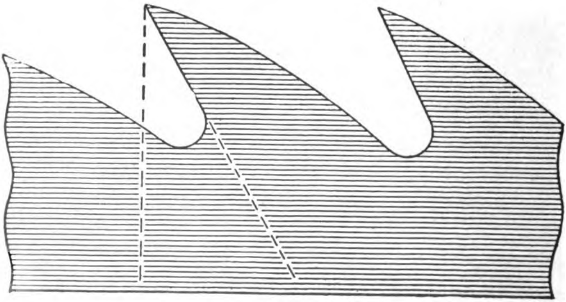
Sketch B.



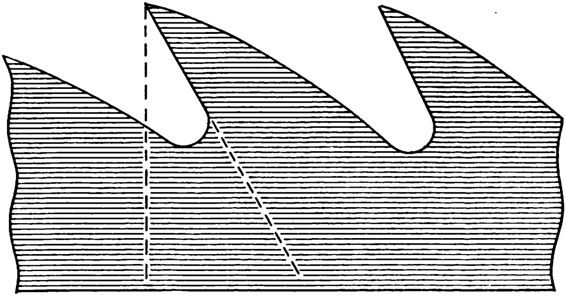
Sketch C



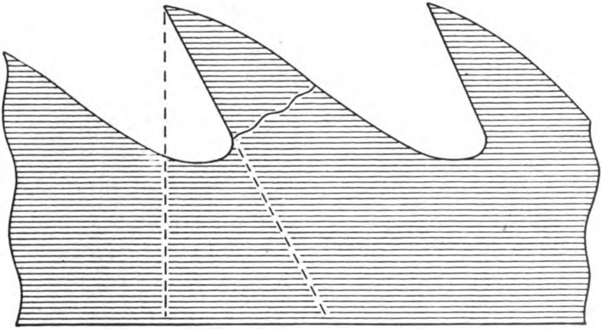
Sketch D.



Sketch E.



Sketch F

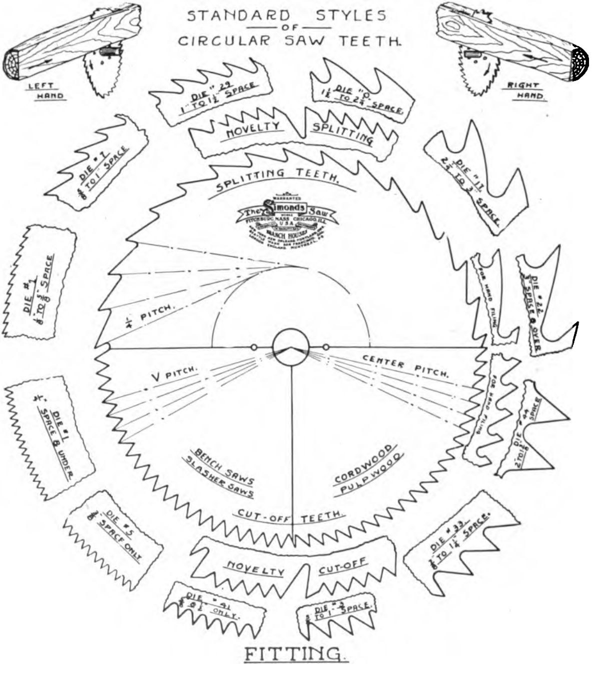


Sketch G

cause the saw to snake, even though the saw may be properly tensioned to begin with. More tension would only add to the tensile strain on the rim; the remedy is to correct the shape of the teeth and gullets.

The importance of correctly shaped teeth and gullets cannot be too much emphasized.

The following sketch shows how teeth are laid out in the factory.



Rules for Splitting Teeth. The least hook that the teeth of a splitting saw should carry is tangent to a circle half the diameter of the saw: that is, the line of the face of the tooth should not pass inside a point one half the distance from the center to the rim. In most cases a little more hook than this is better; but it should never be less.

In fact, our saws are sent out from the factory with quite a little more than this amount of hook and we have yet to learn of any trouble on this account.

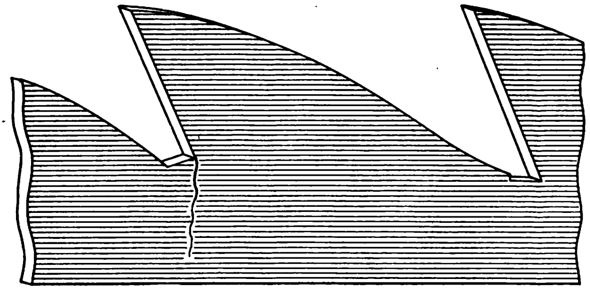
Soft woods require more hook than hard woods.

Since we have adopted our present tooth for large circular saws, as shown in sketch A, we have never had a saw returned to us cracked, except where there had been a radical departure from this standard, either in hook of tooth, shape cf gullet, or both.

This standard tooth is the result of long experience. Cuts B, C, D, E, F, and G, above referred to, show sections of sixty-inch saws with ninety teeth which were returned to us at different times to be re-toothed, having been cracked in the work. The direct cause of the cracking was the shape of the teeth which, after being re-tcothed on the lines of the sketch A, gave no further trouble.

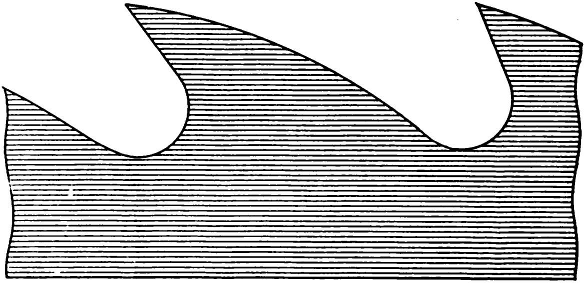
Rules for Cut-Off Teeth. Cut-off teeth may have "center pitch" or "V pitch." "Center pitch" means that the line is drawn from the face of the tooth to the center of the circle. This causes the saw to take the feed more easily and consequently is largely used for saws fed above the center or by hand, such as cordwood and pulpwood saws. It should be used with caution on saws fed below the center on account of a tendency to snatch the work ahead. "V pitch" means that the line is drawn from the point of the tooth to the center of the circle. This is used for bench and slasher saws and cut-off saws generally.

Winter Sawing. Sketch "I" on next page represents the style of tooth we send out for winter sawing. We guarantee that if saws of our make are kept in this condition, there will be no trouble from cracking or breaking.



Sketch H

Sketch "H" represents the condition in which saws are sometimes returned to us with the complaint that the saw is defective, whereas the direct cause is the shape of the tooth.



Sketch I

Sketch "I" represents a section of a 52-inch saw with 52 teeth. We use this diameter and number of teeth, being the average size and number of teeth generally used in this class of work. It can be seen that this is a good stout tooth, with ample chamber or gullet to carry out the sawdust, and has a depth of $1\frac{1}{4}$ inches from point of tooth to extreme bottom of gullet. This tooth is sufficiently deep for winter, and is better than if it were deeper, for after gumming the tooth to sufficient depth for the work required of the saw, any additional depth only serves to cause the tooth to chatter and vibrate in the cut. And further, in going deeper into the plate, the gullet becomes more wedge-shaped, which causes the dust to choke and wedge in the gullets, creating a severe strain at this point, which eventually results in cracks or broken teeth.

Fitting. Saws may have their teeth swage set or spring set. Full swage does more cutting but requires more power. One swaged tooth is equal in capacity to two spring-set teeth. The swage set is used in mills of large feed and high power. Spring set is used in mills with light power.

Swage Set. To swage a saw—(1) Make it round by holding a piece of grindstone or soft emery against the rim as the saw revolves. (2) File all the teeth to a keen point. (3) Swage from under or top side according to the swage used, $\frac{1}{16}''$ on each side of the tooth. (4) Joint again and file square across or grind to a keen edge without changing the hook. (5) Side file to bring all teeth to a uniform width.

Sharpen saws from two to four times in a full day's sawing.

Spring Set. For spring set—follow the same steps as above but instead of swaging, bend teeth alternately, first one to the right, then one to the left. File front of teeth square to the side of the saw, beveling each tooth slightly on the back. Cut-off teeth are given more bevel at the points where the cutting takes place.

All saws are left stiffer for spring set than for swaging. In ordering, always be careful to mention whether they are to be run with full swage, or entirely spring set.

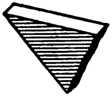
Swaging. In the use of all swages employed in spreading the points of saw teeth, great care should be taken to see that the swaging dies are in the best condition possible, for, if they are not, they will not do the work required of them in anything like a satisfactory manner.

The teeth should also be kept in proper shape for swaging. In many instances not enough care is given to the shape of the teeth. It is a matter of great importance that the teeth be kept in proper shape to swage, as the swaging, fitting, and shaping of teeth have much to do with the successful use of a saw. If a saw has a large round gullet, with plenty of hook in the teeth, nicely swaged and fitted, it will take far less power to drive it, make better and more lumber, and requires a great deal less work to keep the plate in shape than when these conditions are not properly met.

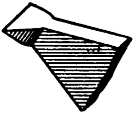
The teeth should be slim enough to swage out easily, giving a good swage at front of tooth, but not slim enough to turn over or bend back in the cut.

If the tooth is too slim, as shown in cut "E," the swage will spread too much at the extreme points, and not extend far enough into the body of the tooth to give it the required strength. In this case the corners would be needle pointed, as in cut "F," and would be likely to break off or bend back in the cut. The saw would not run half the usual time before it would need refitting.

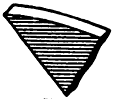
On the other hand, if the teeth are too stout, as in cut "C," the swage will spread too far into the body of the tooth, and not enough at the points. It will be seen that if a tooth is too stout and round on the back near the point, as in cut "C," the top die, instead of bearing a little heavier on the point, as it should, bears too heavily on the high or round part back from the point, and bears scarcely any at the extreme point. Thus, instead of the point being spread as it should, it is pulled apart and consequently checks and splits at the point. See cut "D."



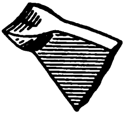
Sketch A.



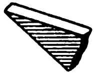
Sketch B.



Sketch C.



Sketch D.



Sketch E.

Sketch F.

Where there is such a large amount of material in the tooth, it requires double the amount of pressure to spread it. In fact, it does not spread clear through the tooth, but simply rolls the metal over at each side of the tooth, extending quite a distance down the back of the tooth, with scarcely any in front.

When it takes such a heavy pressure to spread the tooth, the dies acting on hardened steel have a tendency to crystallize and case harden the steel. This will eventually cause checking and dropping of corners.

Swages are now made that can be conveniently adjusted to the shape and point of the tooth. After the first swaging, if care is used not to alter materially the shape of the tooth, there will be no further trouble, as the swage will then fit the tooth, bearing equally on the part of the tooth being swaged. After swaging, the tooth should be faced off on the front.

Above are a number of cuts of different forms of teeth for convenience in illustrating our ideas on this subject.

Cut "A" represents a section of a tooth in proper shape to swage.

Cut "B" is the same tooth after being swaged and before being fitted. It will be seen that the tooth has been altered but very little in the process of swaging, requiring very little dressing to bring it to its original shape.

Cut "C" also shows a tooth before being swaged.

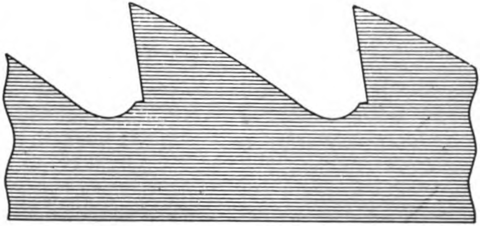
Cut "D" is the same tooth after the operation. It can readily be seen the great amount of force it must have taken to spread this amount of hardened steel, and also the work required to bring the tooth to a good working shape. A tooth in this shape makes trouble in swaging and is detrimental to the general working of the saw for the reason that the teeth will cut much harder and hence the plate is more apt to crack at the gullets from the severe strain on the edge.

Cut "E" represents a tooth before being swaged.

Cut "F" is the same tooth after swaging. In this case, as in the others, the shape of the swage is governed by the shape of the tooth before the operation. The tooth being too slim, the spreading was done at the extreme point and the corners are, therefore, needle pointed so that it will not stand in fast feed, or in fact in any kind of sawing.

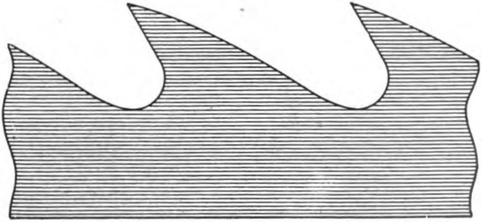
Fitting Small Circular Rip Saws. These saws should be kept perfectly round and true on the edge and the gullets round at the bottom, of equal depth and width. They should never be filed to sharp corners at the bottom of the teeth for this will cause them to crack at this point. The best results can only be obtained by keeping the points of the teeth sharp and in proper shape to cut. They should be either set or swaged for clearance and this work should be carefully done. If swaged, the corners should be of uniform width and depth, and sufficiently stout so they will not crumble off in the cut.

Saws are frequently complained of as being either too hard or too soft, when in reality the trouble is entirely due to the manner in which they are filed. For instance, if the teeth are lacking in hook and are extremely stout at the points, as shown in cut "A," below they will cut hard even when sharp.



Cut A

When they become slightly dull, which they will in a very short time, on account of the blunt shape of the points, they will not cut at all and are very liable to crack when in this condition.

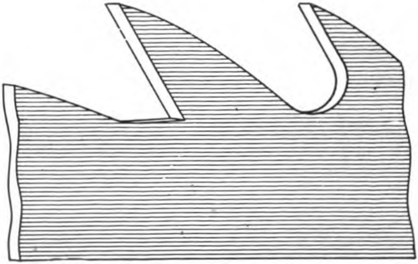


Cut B

We recommend, therefore, that the teeth be kept in proper shape, as shown in cut "B," and the results obtained, both in quality and quantity of work done will pay well for the time and labor expended in keeping them in proper condition.

An emery wheel or round file is indispensable to the proper care of these saws, for it is impossible to maintain the desired shape with the use of a common flat file only. Machines are now made to keep these teeth in perfect shape.

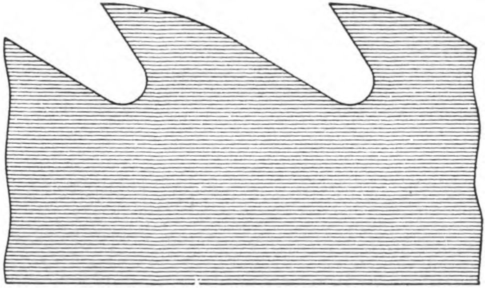
In order to maintain the original pitch and back line of the tooth, it is necessary that about the same amount of filing be done on the back as on the front of the tooth. For if there is more filing done on the face of the tooth than on the back, the original shape is soon destroyed and it is almost impossible to restore it to the proper shape without re-toothing the saw.



Cut C

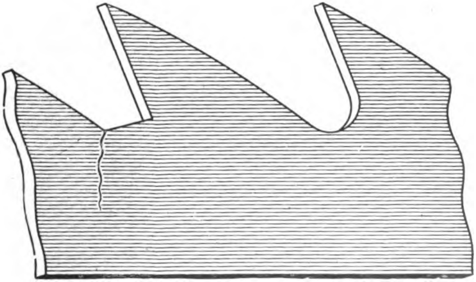
Cut "C" will perhaps illustrate the idea better than anything that might be said on the subject. Cut "C" represents a tooth of a saw where all the filing is done on the face. The bad results from this method of filing can readily be seen. The body of the tooth is now so slim that it will not support the point in doing its work, but will chatter and vibrate in the cut and be liable eventually to break at this weak point.

Cut "B," previously referred to, represents a tooth very well adapted to miscellaneous work, but if very hard or kiln dried hardwood is to be sawed, we should recommend a narrower gullet and stouter tooth, as shown in cut "D." For this class of work the set or swage for



Cut D

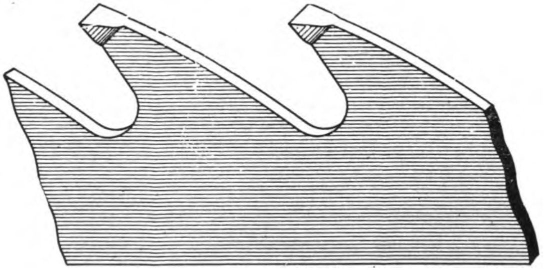
clearance should be the least amount that will clear the plate and prevent friction and heating. The smoothness of the work done and the light and easy running of the saw depend largely on the teeth being properly set for the special work required of the saw.



Cut E

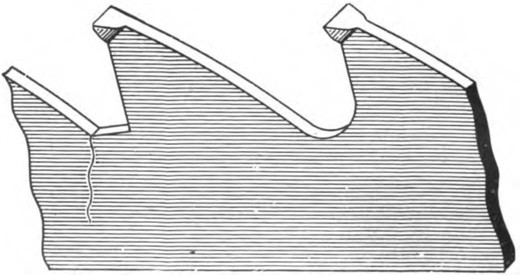
Cracking at Rim. Among the various causes of cracking at the rim is filing sharp corners at the bottom of the teeth. Cut "E" represents a section of a 14″ saw filed in this manner which cracked and was sent to us for repairs.

In can be seen that the fracture started at the sharp notch for the reason that the entire strain is centered at this point instead of being distributed throughout a larger circle. The sharp notch, also, prevents the free circulation of the sawdust.



Cut F

Of these cuts, Cut "F" represents the proper, and Cut "G" the improper, manner of fitting saws full swage.

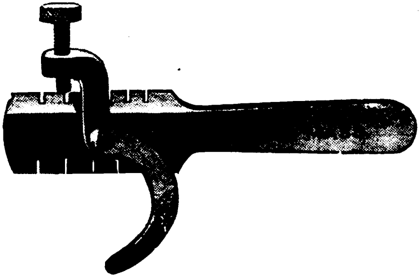


Cut G

The teeth of saws are frequently split at the points by attempting to swage them when in the condition shown in cut "G." The teeth should always be kept in about the shape shown in cut "F" and much trouble will be avoided in swaging and fewer split teeth or cracked saws.

No matter whether rip saws be fitted with swage or spring set, they should be filed straight across in front and back of the teeth.

It is a mistake to think that rip saws will do better work if beveled than if dressed square across. A beveled tooth has a tendency to split the fiber instead of cutting it off squarely across. The bevel also produces a lateral motion which causes the teeth to chatter and vibrate in the cut. Many saws are cracked from this cause.

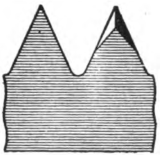


Cut H

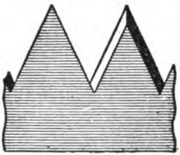
Set. Cut "H" represents a finely constructed tool for setting the points of teeth in small rip and cut-off saws. We consider it the best thing of its kind on the market. This is a combination tool having a gauge attachment for the purpose of regulating the set. It can be seen that this set is provided with setting slots which are so graduated as to give the desired depth to the set in each gauge of teeth they are intended to set.

When placing the set on the tooth, permit it to drop until the point of the tooth touches the bottom of the slot and bend the tooth over until the gauge touches the side of the plate. The set will then be perfectly accurate.

Fitting Small Circular Cut-Off Saws. In fitting small circular cut-off saws, as in the fitting of small rip saws, it is essential in all cases that they be kept perfectly round and true on the edge. The teeth should be of uniform width and shape and the gullets of equal depth and width. Every tooth should have the proper amount of bevel and this bevel should be alike on both sides of the tooth when a "V" tooth is used.



Cut No. 11



Cut No. 12

It can be seen that in cut No. 11 the point of the tooth *only* is beveled. The point of the tooth being the only portion of the tooth that cuts, the remainder is left square across to carry out the sawdust.

Cut No. 12 is a representation of cut No. 11 improperly filed to a sharp corner at the bottom of the tooth.

If the same amount of time and labor were used in dressing out the gullets with an emery wheel or filing them down with a round file that is used in filing the long bevel and sharp notch at the bottom of the tooth, as shown in cut No. 12, much trouble would be avoided from the cracking and breaking of saws.

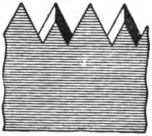
In all saws where the teeth are sufficiently far apart to admit it the gullets should be kept round.

Set. The amount of set in these saws should be the least that will clear the plate sufficiently to prevent friction. The setting of the teeth is an important matter, and this work should be carefully done. The set should never extend too far into the body of the tooth, neither should the tooth be set too close to the point. Where an attempt is made to set the teeth too far into the body, the plate is often cramped, and saws are often cracked in this way.

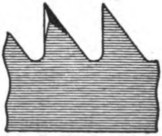
On the other hand, they should never be set too near the points, for if the teeth are bent over too near the points they will be "needle-pointed" when beveled. They will cut rough when in this condition and the points will be liable to bend back or crumble off in the cut.

Fine Tooth Cut-Off Saws. These saws, if used where smooth work is desired, require no pitch or hook to the teeth. See cut No. 11.

But where more rapid work is desired, a pitch to the center tooth, as shown in cut No. 14, will cut more rapidly but the work will not be quite so smoothly done.



Cut No. 13



Cut No. 14

Cut No. 13 shows the proper shape of the teeth, and the manner of filing Cut-off and Mitre saws. This filing is done with a taper file, and the teeth are beveled alike on both sides.

Fitting Large Circular Saws. The points of teeth in large circular rip saws, as well as in small saws; are the only portion of the saw which should come in contact with the timber. They must be kept sharp by the use of a file or emery wheel, and set by springing or spread by swaging. They should be swaged and side-dressed so the extreme point of the tooth should be widest, and diminish back from the point. A saw fitted full swage will stand up better in fast feed than if fitted spring set, but as there is more friction on the edge on account of the points of the teeth being wider, it takes more power to drive the saw. However, for log sawing this style is most reliable.

As the swage wears faster on the log side, and thus makes an unequal strain on the saw, it is a mistake to try to run a saw without swaging nearly every time it is filed. Where the timber is clean and free from grit, a saw may sometimes be run two or three times after being swaged before needing to be swaged again, and if carefully filed, will do very good work.

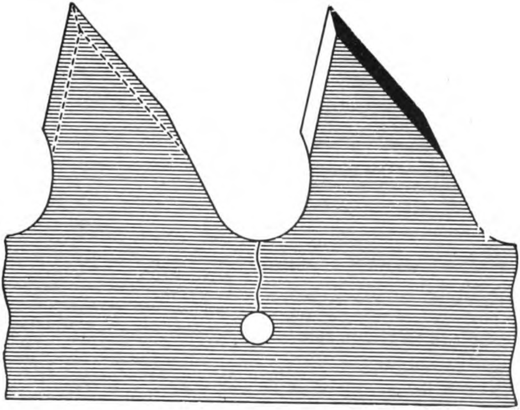
Out of Round. When saws get out of round, hold a piece of emery wheel squarely across the points of the teeth while the saw is in motion, thus reducing the most prominent teeth. When a saw has long and short teeth, it follows that the long teeth will have the most work to do, thus producing an unequal strain on the saw, which will have a tendency to cause the saw to deviate from its line, heat, and give bad results generally.

The cutting of a saw should be continuous, and to be so it should be perfectly round; otherwise, the best results cannot be obtained. On the same principle, the tooth edge of a gang, band, mill or muley saw should be perfectly straight.

Cut-off Saws. The fitting of cut-off saws differs from the fitting of rip saws only in the shape of the teeth and the manner of filing them.

Large cut-off saws for cutting off large logs where power feed is used and rapid work is required, should have the pitch line from 4 to 8 inches in front of the center of the saw for soft wood. For hard wood a trifle more hook is preferable.

In heavy sawing where a very smooth cut is required, as in cutting off logs for pulp, there is more bevel required than for ordinary work, and the bevel should be about equally divided between the back and front of the tooth. It is a mistake to try to run a large cut-off saw for heavy work, where a large amount of bevel is required, with all the bevel on the front of the teeth. A very great bevel on the face of the tooth creates a severe lateral strain. The teeth are thus spread apart, as it were, and forced out of line into the sides of the cut.

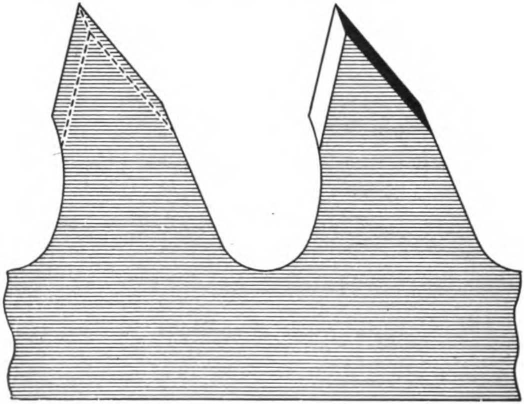


Cut No. 1

Where the teeth are extremely stout and short, as shown in cut No. 1, the strain is transmitted to the bottom of the gullets, and in many cases cracks at the rim are the result.

In a case of this kind, the teeth should be gummed out deeper, as in cut No. 2, and the trouble will disappear. Where cracks appear in the plate, as above referred to, not only should the teeth be gummed out in good shape, but there should be a hole drilled at the bottom of the crack to prevent it from extending farther into the plate. See cut No. 1.

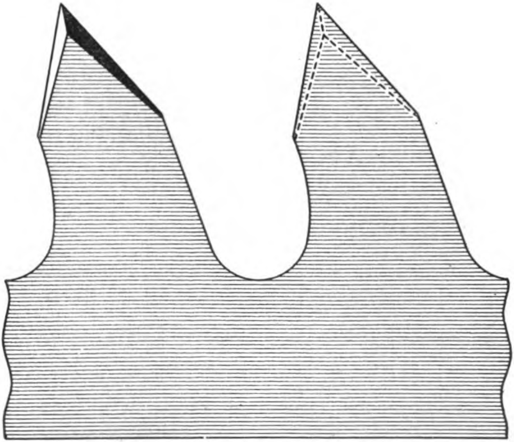
For ordinary work the bevel should never extend to the bottom of the tooth. In fact, the point of the tooth *only* needs beveling, the remainder of the tooth and throat should be dressed straight across, as shown in cut No. 2.



Cut No. 2

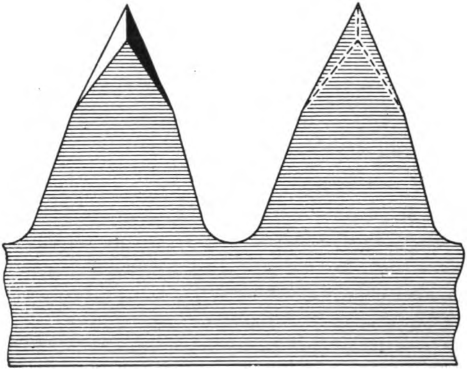
But there are cases, it is claimed, where a longer and wider bevel is required, for example, where saws are used for cutting up cedar logs into shingle bolts. Cedar bark is tough and easily separated into strings instead of sawdust. These strings, it is said, often get pulled in between the teeth, and are carried around on the front of the tooth, often collecting in such large quantities in the gullets as to cause much trouble with the working of the saw; whereas, if the face of the tooth had a longer bevel, the sharp edge of the beveled face would, it is claimed by those who advocate this style of filing in such cases, cut the stringy fiber into small particles, and permit it to be properly discharged.

For heavy work, where a smooth cut is not necessary, a cut-off saw should be filed with the front of the tooth slightly beveled.

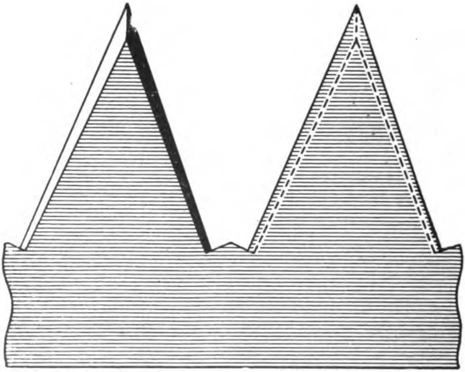


Cut No. 3

In the case of a tooth built on a line to about center—if the back of the point be nicely beveled, as shown in cut No. 3, it will be sufficiently sharp to cut off the fiber, and the square front will carry out the sawdust. This style of filing is preferable, for the reason that it prevents much of the lateral strain previously referred to, and the saw will run lighter, cut faster, and is less liable to crack than if run on fast feed with an extreme amount of bevel on the face of the tooth.



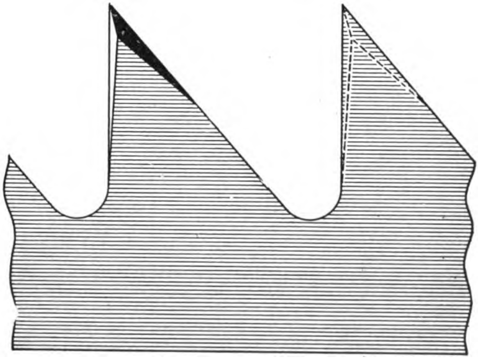
Cut No. 4



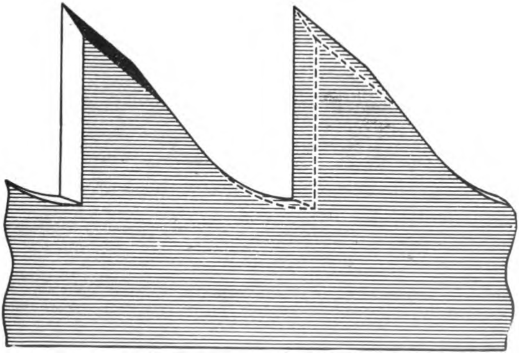
Cut No. 5

This is particularly the case where hard wood is sawed. Hard wood requires less bevel than soft wood.

Cut No. 4 represents the proper, and cut No. 5 the im proper, manner of filing a "V" tooth cut-off saw.



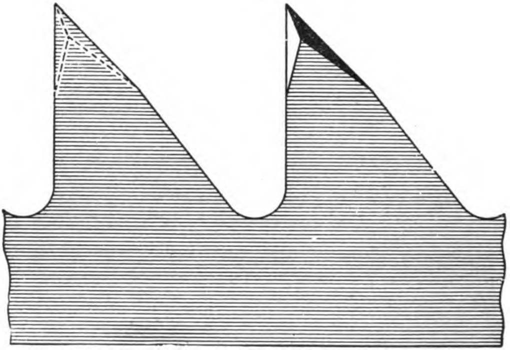
Cut No. 6



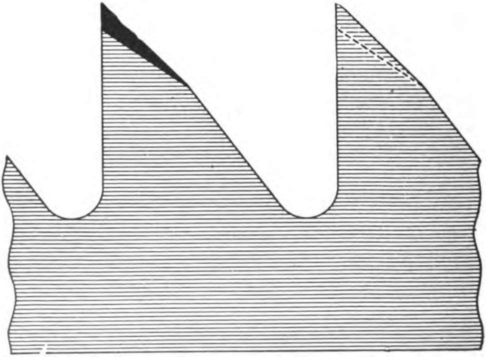
Cut No. 7

Cut No. 6 and cut No. 7 represent a pitch to the center tooth, the first properly and the other improperly filed.

The style of tooth and the manner of filing, as shown in cut No. 6, is used in comparatively light but rapid work in soft fibrous timber where fairly smooth work is desired.



Cut No. 8

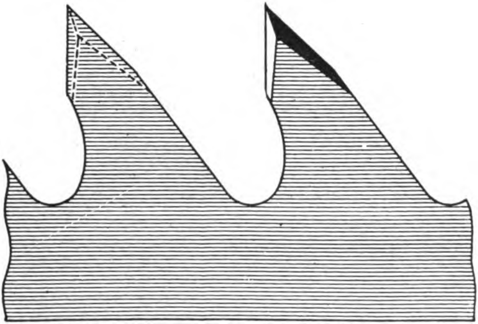


Cut No. 9

Where a smooth cut is desired, we would recommend the style of filing as shown in cut No. 8.

Cut No. 9 represents the same style (pitch to the center) fitted for hard wood.

Cut-off saws with the front of the tooth undercut, as shown in cuts No. 1 and No. 2 and cut No. 10 below, are the best for general use.

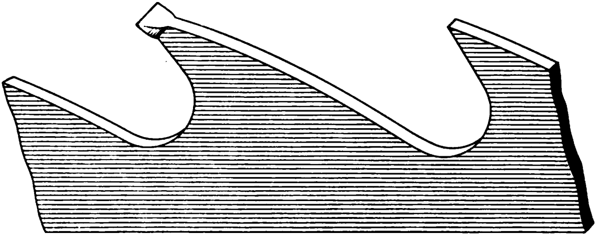


Cut No. 10

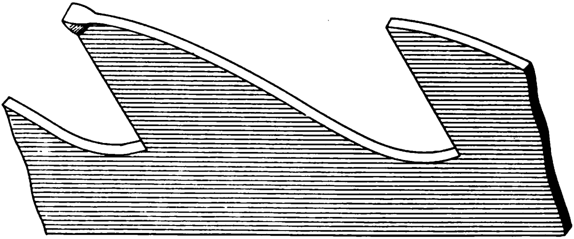
Cuts No. 1 and No. 2 are for heavy cutting with fast power feed, and the style shown in cut No. 10 for cord-wood saws, or any kind of work where hand feed is used. If the teeth are kept in this shape, the saws will give better satisfaction and be far less liable to crack at the rim.

Sawing Frozen Timber. Frost affects steel and a saw should never be used until the frost has been taken out of the plate. This can be done by prying over the end of the carriage with a piece of board, holding the end firmly against the saw and moving it along the saw. The friction will, in a few minutes, warm the saw and take out the frost. This will guard against the saw's cracking or breaking from the frost being in the plate.

In frozen timber, run the saw as close as possible; that is, run as narrow a set or swage as will clear the plate and prevent heating. As frozen timber cuts much cleaner, less set is required. Do not have the set or swage extend as far into the body of the tooth as in summer sawing; the



Sketch C



Sketch D

point being narrower requires less depth to support the corner. Keep good sharp corners; file the teeth perfectly square across, and line the saw straight with the carriage, and frozen timber can be sawed as easily as any kind.

We recommend for frozen timber the style of fitting as shown in sketch C instead of sketch D, as a saw with sharp corners is less liable to dodge or run out in taking off a light slab.

Saws fitted as shown in sketch D often give a great deal of trouble. The corners, being dull and rounding, do not take hold and enter the log as they should, but dodge out and lay over from the log, causing the saw to heat between the rim and the center. The result is that it is liable to run into the log as much in the second cut as it ran out in the first, making wedge-shaped lumber.

Gumming Saws. When gumming with an emery wheel, the operation should be performed by going around the saw several times. Doing too much work at one time will heat the saw at the gullet and stretch the rim so that after a few operations the saw will need hammering to restore it to the original tension. There is no excuse for crowding the emery wheel so as to heat the saw to a blue, as this is sure to injure the saw where the emery wheel comes in contact with it, often glazing it so hard that a file will make no impression whatever upon it. From these hard spots on the outer surface, small cracks begin, invisible at first to the eye, but gradually enlarging until they become dangerous fractures.

Care should be taken to choose the type of emery wheel adapted to the work.

Hacking the wheel with a file or cold chisel will make it cut faster and prevent it from glazing, so that it is not so liable to heat the saw.

A good emery wheel dresser can be made from an iron bolt and some ½-inch or ⅝-inch washers. This is far better than the hacking plan, as it not only serves to rough up the wheel and remove the gum from it, but can also be used for the purpose of rounding off the sharp edge of the wheel, which is made so by grinding more on the backs of the teeth than at the bottom of the gullets. The edge of the emery wheel should always be round when used in gumming out the throats of the teeth and should always be of sufficient thickness to give a good, large, round gullet.

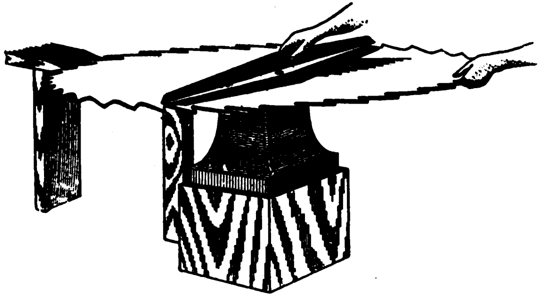
Hammering Circular Saws. All saws, if properly made, are what we call open toward the center, this amount being more or less in proportion to the number of revolutions the saw is to run.

The object is to keep the edge strained on a straight line, to prevent it from rattling in the guides, and cutting a zig-zag kerf through the timber. What applies to one saw in hammering, applies to all. The Circular saw, however, is the most difficult to treat, and even after the most careful instructions are given, it requires practical experience and the most careful observation on the part of those having them in charge to hammer them successfully.

The strain on the rim, caused by the choking and wedging of sawdust, particularly where the teeth are close together, with narrow gullets, such as are used in large mills with fast speed, and the process of gumming, will in time stretch the rim, and it will begin to run snaky and make bad lumber.

However, before concluding that the saw needs hammering to adjust the tension, see if there is not some other cause for the trouble, such as the saw being lined into the log too much, which would cause it to draw into the log and heat on the rim, the guides not being properly adjusted, the gullets being too narrow for the feed, or the teeth not being properly swaged and dressed. These matters, however, are all referred to in our instructions on fitting and running saws, and are only mentioned here in connection with the instructions on straightening, our object here being to treat only on the hammering necessary to keep the saw true, and the tension properly adjusted to speed, feed, and class of work required of the saw.

What is required in the way of tools is an anvil, one straight-edge 18 to 20 inches long, one about 36 inches, and one 48 inches long, and a set of hammers, one doghead and one cross peen, weighing from 4 to 6 pounds each. We find that these tools are being put in for adjusting large saws in many of the large mills. The men who handle the saws are becoming thoroughly acquainted with the art of saw straightening, and this knowledge they have acquired by perseverance and a careful application to the rules governing this class of work, and by practical experience.

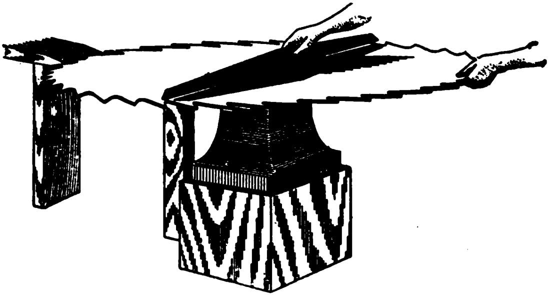


Cut No. 1

In studying the art of hammering Circular Saws, it would be well for those having charge of the saws to examine them carefully when new, closely noting the amount the saw drops away from the straight edge, as shown in Fig. 5; also test in the same manner at the center as shown in Fig. 6. It is a matter of much importance that these tests be made carefully, and we recommend that measurements be taken therefrom.

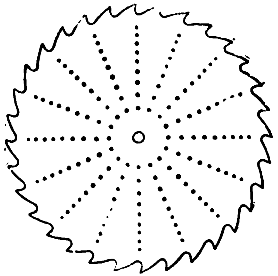
There are tension gauges in use which can be adjusted to any amount the saw may drop, but where nothing of this kind is available, a gauge may be made from a thin piece of steel. It should be of sufficient length to reach from center to rim of saw, and made convex to fit the dish in saw, when held as in cut No. 5. It is necessary to have one for the center, as well as from center to rim. It should be the same length as the one used from center to rim, and made to conform to the amount the saw drops at center, when held as in Fig. 6.

We do not recommend these gauges to be used as a straight edge; that is, for the purpose of finding lumps and leveling up the saw, but simply to be used for the purpose of taking the measurements above mentioned.



Cut No. 2

A saw that has lost its tension will appear as shown in Fig. 2, and needs hammering, as shown in Fig. 3, but, before beginning to hammer it, examine the saw carefully all around, holding the saw and straight edge as shown in Fig. 5. If any part is found to drop away more than the rest of the saw, mark this part as shown in Fig. 4, and do not hammer as much, if any, at that place, until you have gone over the rest of the saw with the round-face hammer, as shown in Fig. 4. Examine the saw again carefully as before, and, if any place is found that does not drop the required amount, mark around it, or any other place that might be found lacking in the proper amount of tension. When all such places are located and marked, go over the saw, hammering lightly on each place. Then turn the saw over and do likewise on the opposite side of each place. In every case hammer each side of the plate the same amount, to avoid dishing the saw.

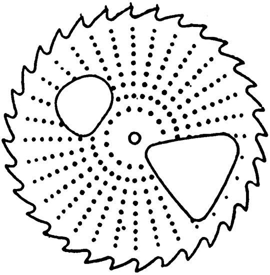


Cut 3

If, however, in the process of regulating the tension, you find the saw to be a trifle dishing, lay it on the anvil with the full side up, and hammer lightly over body of saw, as in Fig. 3 until you have made it perfectly flat on the log side.

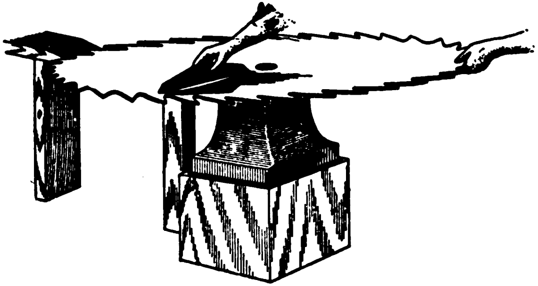
In testing for the tension, be sure to have the straight edge at right angles with the part of the saw that rests on the board, and the opposite edge which is being raised by the left hand, while the straight edge is held and gently pressed down with the right hand. The straight edge should not be allowed to lean to one side or the other, but held in an upright position, or it will fail to show what is desired.

A straight edge reaching from the center to rim of saw is the best to use when hammering to regulate the tension. When this straight edge is applied as below, the saw should fall away from the straight edge, as shown in Fig. 5.



Cut No. 4

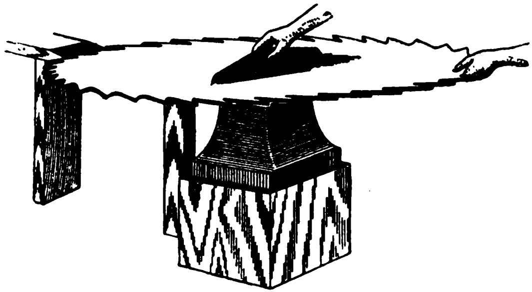
This will show the center of saw to be stiff, as it should be to run properly and do good work. If a short straight-edge of 6 inches long is held over the center, and pressed



Cut No. 5

down while the edge of the saw is being raised, it should show the saw to be nearly flat, or of equal tension at that part. We would state here that it is very seldom necessary to hammer inside the outer collar line.

When beginning to hammer, as in Fig. 3, see that the face of the hammer is round so that the blow will be round, and do not strike too heavy, for it is better to go over the saw several times, than to hammer too much at one time, and put the saw in worse shape than it was before you began.

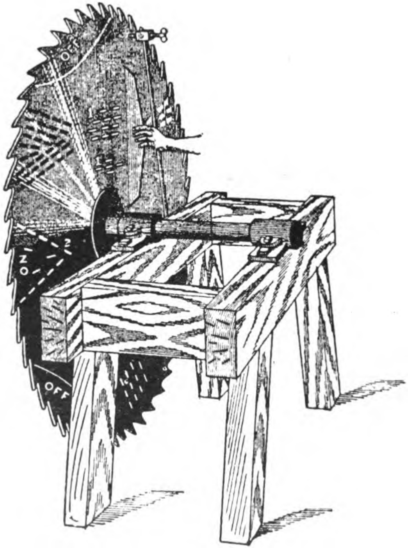


Cut No. 6

After going over one side, mark off the other side, and repeat the operation with as near as possible the same number and weight of blows as struck on the first side, and as nearly directly over them as possible. Now stand the saw on the floor, hold it up straight, and test it with the long straight edge, as shown by Fig. 12, and if the hammering has been equally done on both sides, the saw should be very nearly true. If, however, it shows full on one side, and dishing on the other, mark these places that are full.

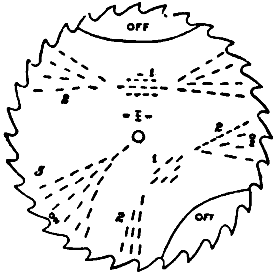
Place the saw on the anvil with the round or full side up, hammer lightly on the full places, test again with the long straight edge, and, if it appears true, put it on the anvil and test it for tension, as before explained, to see if it has the proper tension. If not, repeat the operation with the round-face hammer, and when you have regulated it to a proper tension, you will have accomplished the most difficult part of saw hammering.

After again testing with the long straight edge, put the saw on the try mandrel, if you have one (and we think every millman should have one) and test with short straight edge for running true. Mark the places as they run off or on, as shown in Fig. 7, while turning the saw slowly around, and, where the saw runs off, lumps



Cut No. 7

will be found most likely, as at 1, 1, 1, or what is termed "twist lumps," as at 2, 2, 2 of Fig. 8, or both may occur. These lumps must be taken out with a cross-face hammer, the blows being struck so that they will be in line with the lump; that is, the mark or impression the hammer leaves, should run in the same direction that the lump runs as shown by the straight edge. A twist cannot be taken out with a round-face hammer, neither is a round-face hammer liable to twist a saw. On the other hand, by using a cross-face hammer, twist lumps can be

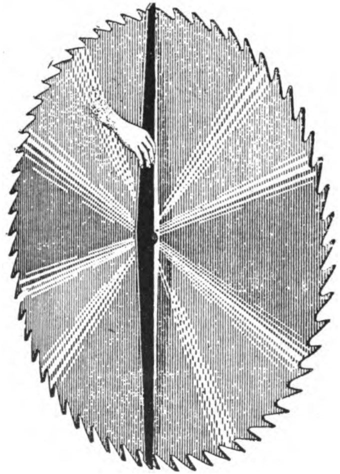


Cut No. 8

very easily removed, if the blows are struck in line with the lump, as above stated. The saw may also be thrown out of true by lumps running toward the center, as No. 3, Fig. 8. In this case the saw will be on or off at points about opposite each other. This class of twists or lumps is usually located and removed in the process of flattening the saw, and it is seldom necessary to run the saw on the try mandrel to find them. It is the small twists, as at 1, 1, 1 that are hard to locate, and sometimes cannot be located without running the saw on the try mandrel. Where you have nothing of the kind, a saw can be tested on the mandrel of the mill.

In removing these twist lumps, the hammering must be done carefully. If the hammer is of the proper weight, and the face properly ground, the saw can be made to run true without altering the tension to any great extent.

The testing on the mandrel should be done with the full side of the saw toward the pointer, and knocking down the lumps from that side will make the saw flat.

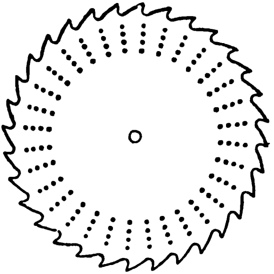


Cut No. 9

Now, put saw on the arbor, and, if for a high speed, it should sway gently from side to side in getting up to full speed, and will then run steadily and do its work properly. But if it acts as heretofore stated (that is, snaky and rattles in the guides) it needs to be more open towards the center.

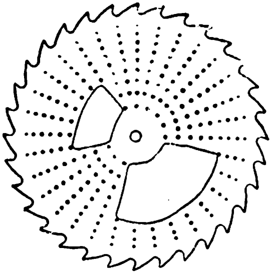
An experienced man, however, will stand the saw on the floor, taking hold at the top edge, giving it a sudden shake, and if the center vibrates and the rim stands stiff, he knows it to be open towards the center. He will also test it by leaning the saw over, to see if it falls away from the straight edge sufficiently, as shown by Fig. 9.

If the saw is too open at center, it will run from side to side, and will generally run out in taking off a light slab. After the first cut in a log, it will almost always run in.



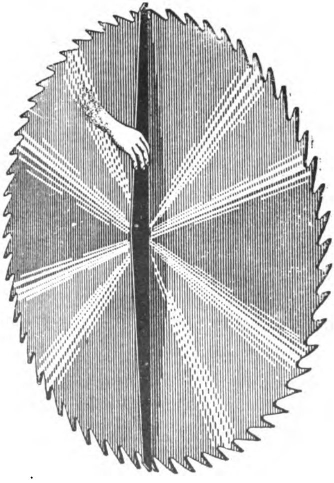
Cut No. 10

Great care should be taken not to run a saw when too open at center, for if it should run out to any great extent, it is liable to become sprung at the collar line. In case the feed is fast, with good power the saw is liable to crack around the edge of the collar. Where a saw is too open at the center, as above stated, it should be hammered in from the edge, as shown by Fig. 10, and the distance to hammer in from the edge depends on where the loose parts are on the saw. If the center is loose to the first line, or the one nearest the center, hammer from rim to that line; but, if the looseness runs out to the next line, hammer only to that line, and so on. Or, the looseness may be irregular, as shown by Fig. 11, and needs to be hammered as shown in the cut to regulate the tension. Then proceed with cross-face hammer as before explained by 6, 7, and 8, before regulating the tension and final trueing. Do the same in case of buckling by burned spots or sharp lumps over the collar line. These may be knocked down by placing two thicknesses of strong, heavy paper on the



Cut No. 11

anvil, and then by a few, well directed, light, solid blows you can knock down the lumps without expanding the metal, to the same extent as if straightened on the bare face of the anvil.



Cut No. 12

In hammering with the round-face hammer, it is very important to have the blows distributed evenly over the part to be hammered. It is better to begin at or near the collar line, and hammer on a straight line out to within 3½ or 4 inches of the rim; then move over as shown by lines on cut No. 11, and hammer back to the center again. By hammering on uniform lines back and forth over the saw, you avoid putting in lumps that would require much work with the cross-face hammer to true up the saw again. This matter of doing the hammering uniformly over the plate is one of the most important features in connection with the adjustment of saws, for hammering too much in one place would cause a lump or loose spot that would be hard to take out, which, if left there, would likely cause a blue spot to appear at this place, caused by the friction while in the cut.

If it is necessary to go over the saw more than once for tension, hammer between the lines already operated upon.

The dressing of the faces of the hammers is an important matter. The round-face should be dressed so that if a blow is struck on the oiled surface of the saw, it should show about ½ inch in diameter, and the cross-face so that it should show about ¾ x ⅜ inch, for a sharp cutting blow is not effective in either knocking down a lump or stretching the metal.

In conclusion we make the following suggestions to beginners: Do not be discouraged by the failure of first attempts. Try to make yourself perfectly familiar with instructions, and persevere in properly applying them.

Carefully study the amount of opening the saw requires at the center for tension to suit the speed and feed, and to regulate this always use the round-face hammer.

Beginners in the art of saw hammering should begin with a small Circular Cut-off Saw—for this class of saws are, as a rule, given very little attention in the mills,—one that can be very easily handled. Go through with the operation as instructed, and, after succeeding in putting this in good shape by hammering so that it will run true and steady without chattering in the cut, you will have advanced well in the art of hammering, and will be able to operate on larger saws without the same risk of failure.

CHAPTER VI

Special Types of Circular Saws

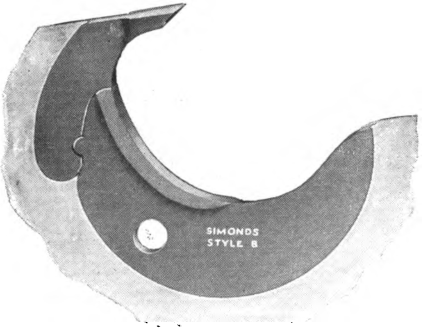
Inserted Tooth Saws. The inserted tooth saw it most economical for either winter or summer sawing. Is always remains the same diameter. It saws well for years. It will stand heavy feed.

The plate must be of good saw steel, capable of holding the tension.

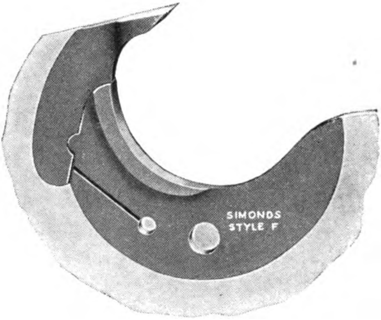
The "V"s into which the points and shanks are inserted are accurately machine milled. They must have good wearing quality for if they become worn or distorted the saw is ruined.

Styles of Teeth. The particular size or style of tooth that will operate to best advantage in a mill is determined by the work to be done. We can assist in selecting the proper tooth if we know the kind of a mill, the wood to be cut, the power available, the speed and the size of the saw desired.

Simonds offers a choice of nine different styles or sizes of teeth for inserted point rip saws—B, F, K, D, 2, 2½, 3, 4, and 5. Teeth illustrations are ⅔ full size.



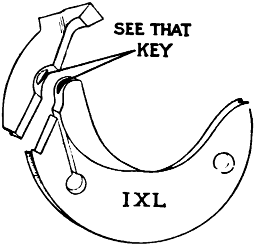
The standard number of teeth for 50-inch B saws is 34.



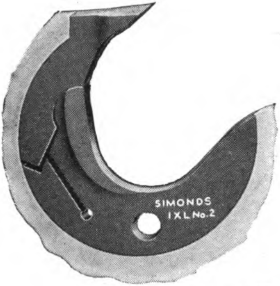
This tooth is for fine tooth saws. As many teeth can be inserted as the diameter of the saw less two; for example in a 50-inch saw 48 teeth, in a 66-inch saw 64 teeth.

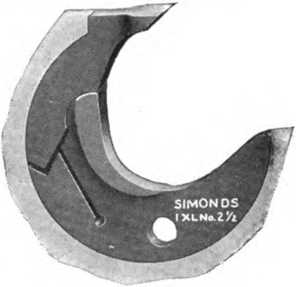
The special feature of this tooth is that a greater numbe of teeth may be carried, yet each tooth has a large open gullet. An examination of the construction of the tooth will show this large gullet room and also a swaged shank t aid in carrying off the sawdust and keeping the plate cleared. Points, shanks, and plate have a close fitting machine milled "V" and groove.

Style D is for coarse tooth saws. It is especially adapted to the requirements of the Pacific Coast mills. Forty-two teeth is the maximum number that can be put in a 60-inch saw.



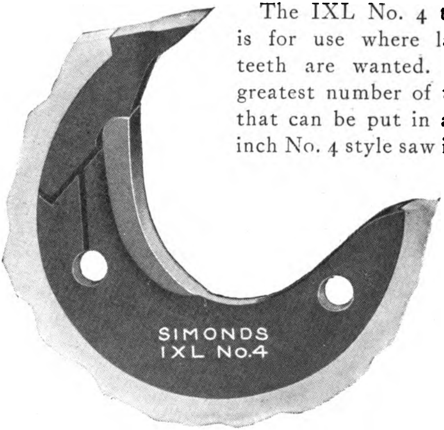
The IXL tooth, which is sold exclusively by the Simonds Company, is equipped with a key on the inner side of the point, as shown in the above diagram. This key prevents the point being forced sidewise in the shank. The three following styles may be obtained either as plain chisel teeth or as IXL teeth.


SIMONDS
IXL No. 2

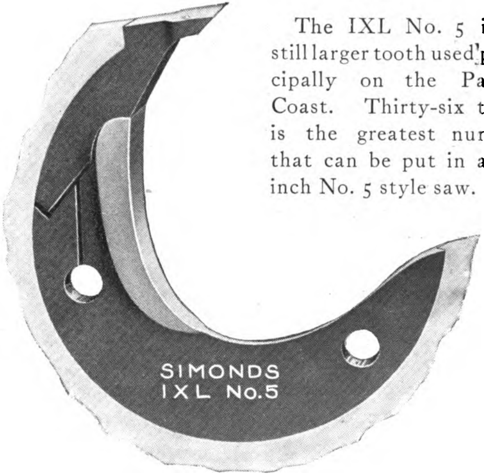

SIMONDS
IXL No. 2½


SIMONDS
IXL No. 3

The IXL No. 4 tooth is for use where larger teeth are wanted. The greatest number of teeth that can be put in a 60-inch No. 4 style saw is 46.



The IXL No. 5 is a still larger tooth used principally on the Pacific Coast. Thirty-six teeth is the greatest number that can be put in a 60-inch No. 5 style saw.



Inserting New Points. Before inserting new points, the grooves in the plate and shanks should be wiped perfectly clean and well oiled, so that the points will draw easily into the plate. When inserting a point, pick it up with the left hand. After dipping the grooved part in oil, place it in position, holding it even with the sides of the shank. Great care must be taken to have the point seat clean and free from particles of fine dust or gum which may have collected there in the use of the saw, as this is often the cause of saws being out of round.

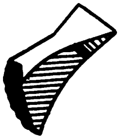
Fitting Inserted Points. After inserting a set of points, the shanks should be carefully examined to see that none project on either side of the plate. They should be exactly on the center. This is of special importance when a narrow kerf is desired, for if the shank is allowed to project a little on one side when the kerf is narrow it would be likely to rub against the side of the cut and cause trouble.

Side-dressing Inserted Points. It is almost impossible to make points that are adapted to all kinds of work, but with a little side-dressing, our points can be adapted to any kind of work required of an inserted tooth saw.

Hard Wood. In sawing hard wood the points of the teeth should be a trifle narrower than for soft or fibrous timber, yet the extreme point should be quite a little wider than the body of the tooth.

Frozen Timber. In sawing frozen timber great care must be taken to have the extreme point the widest and the corners should be sharp so that the saw will not dodge out in the first cut.

Sapling Pine. Special attention is called to fitting inserted points for sapling pine. It is well known that there is a great deal of trouble in sawing this kind of timber. The inner bark sometimes comes off in long strings instead of sawdust and is drawn in between the saw and the log, causing the saw to run hard and make bad lumber. This can be avoided by side-dressing the points, as shown in cut "C" instead of the filing as in cut "B."



Cut C

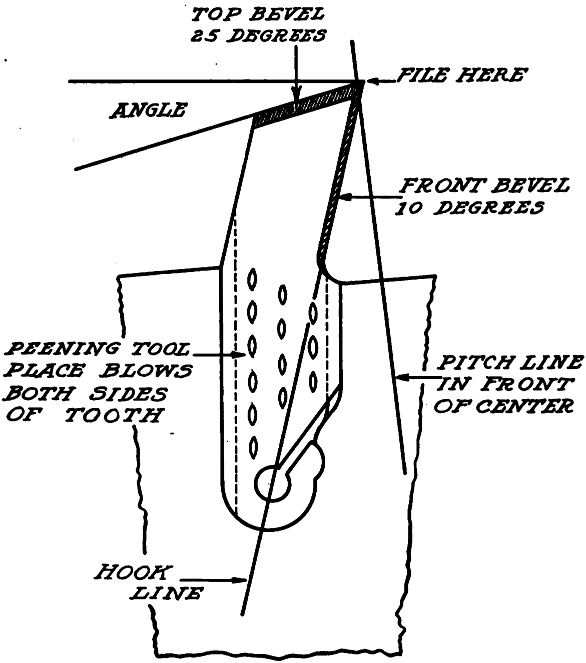
Cut B

The advantage in this style of side-dressing is that the corners, being sharp where they come in contact with the side of the cut, the stringy or fibrous bark is cut into small pieces instead of being pulled out in long strings as referred to above.

Inserted Tooth Cut-off Saws. The Simonds Inserted Tooth Cut-off Saw has wide possibilities. Some of its good features are—it does not crack, it will stay sharp longer, hold its tension better, cut smoother, and with less power than a solid tooth saw.

Sharpening. The angle of the top of the tooth should be kept the same as when new. The bevel on top of the tooth should not be less than 25 degrees. The bevel on the front of the tooth must not be more than 10 degrees, a trifle less will work to advantage when cutting hard wood.

Hook. The hook, or the angle which teeth are pitched back of a straight line to the center, will work well in most kinds of timber and should not be changed except when the material to be cut is fed through under the saw, as is the



case with some slasher, trimmer, and circular gang saw rigs. The hook can be taken out and any degree of pitch in front of the center given by simply filing the point of the tooth to the desired angle. It is not necessary to file a long pitch line—$\frac{1}{16}$ to $\frac{1}{8}$ inch is enough. This does not reduce the cutting wear of the tooth.

Tool for Inserting and Removing Teeth. One patented tool is furnished free with each saw order. The tool is slotted right and left to a hole in such a manner as to protect the cutting edge of the tooth when inserting the tooth. It is also provided with a pin to be inserted in the hole at the bottom of the tooth when driving it out of the plate.

Hammering rivets into saws of this kind has a strong tendency to distort the plate or alter the tension. Simonds saws do not have rivets. The spring at the bottom of the tooth serves the same purpose as the rivet between the plate and the tooth, and neither spring nor rivet can prevent or care for a tooth becoming slightly loosened in the grooves, which may be due to natural wear in operation or to other causes. The proper way to remedy this wear in an inserted tooth cut-off saw is to peen the teeth.

Peening Tool. One peening tool is furnished free with each saw order. This tool is for the purpose of peening or stretching the teeth should they for any reason become loose in the plate. Distribute the blows as indicated in the sketch, peening from both sides of the tooth and being careful not to peen any one tooth too much. Go around the saw several times until you know the number and force of blows necessary to tighten the teeth. Never peen or stretch the plate between the teeth. It destroys the accuracy of the milling. All peening should be done with the teeth in the plate.

Putting in New Teeth. Be sure the V'ing in the teeth and the gullets in the saw are thoroughly oiled. Don't drive the first tooth you put in until it fits solidly down into the bottom of the gullet, but start the full set of teeth about half way down into the gullets, then go around the saw and drive the teeth down to fit solidly into the gullets. This care in putting in a new set of teeth eliminates the liability of disturbing the tension of the saw on the rim.

Shingle and Heading Saws. When ordering shingle saws, give the following dimensions plainly:—

Diameter in inches.

Thickness of gauge at center.

Thickness of gauge at rim.

Full sketch or pattern of holes and sample of screw by which to drill and countersink.

If you have a flange, send it to have the holes in the saw made to fit it.

If you wish us to furnish the flange, send full and correct sketch of the diameter, thickness of holes, etc.

Give the name of the maker of the machine on which the saw is to go.

Be sure to give the flat or countersunk side and the direction in which the teeth are to run.

Left-Hand Saw Right-Hand Saw

Particular attention is called to the importance of using screws that are suitable for the thickness of the saw. We frequently receive screws as samples by which to drill and countersink, that have heads entirely too large and which require the flange to be countersunk (Fig. 1) thereby reducing the length of the thread and making it impossible to bind the saw firmly.

Figure 2 shows the correct size screw heads should be, thus getting a good bearing for the screw heads of the countersink in the saw and leaving the full thickness of the flange for the thread. In no case should the screw heads be deeper than the thickness of the saw.

Fig. 1

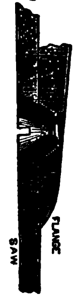


Fig. 2.

Keeping Shingle Saws in Shape. A great deal of experience is necessary to keep shingle saws in shape—to have them do good work all the time. A filer must know how to fit up, hammer, and keep his saws in perfect shape. He must also thoroughly understand the shingle machines on which the saws are used.

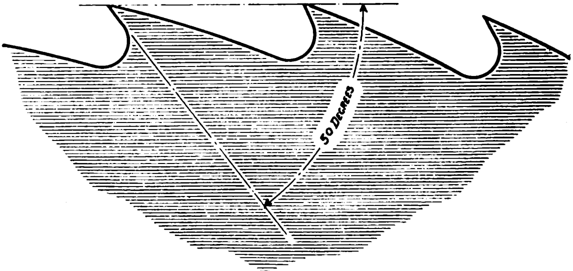
The saw collars should be examined frequently by the filer to see that they are in perfect condition. The saw arbor should also be looked after often and carefully, for if the arbor is out of line or out of true, even a very little, it affects both the collar and saw, causing them to be out of true, and making it impossible to cut smooth shingles.

When the shingles are not coming as they should, the filer nearly always looks to the saws for the trouble Without first examining the collar or arbor he may start in to hammer the saws. Then if the saws do not make better shingles he takes them off the collars and hammers them again. After another trial, if the shingles are no better, but still coming rough, wavy or uneven, the saws are hammered some more. Another trial without improvement and the filer thinks the saws are no good and makes this report to the proprietor of the mill. They talk the matter over and finally decide to examine the collars, where in a great majority of cases they find the cause of the trouble.

All the trouble in mills where they make rough shingles is not due to the saw collars or saw arbors being out of true. In many instances the teeth in the saws have been allowed to get in such condition that they will make poor shingles. It is necessary to keep the teeth of uniform shape and equal distance apart.

Then again, the hook in the teeth must not be changed from the angle of the hook in the saws as they come from the makers. Too much hook does not improve the running qualities of the saws and too little hook will cause trouble on account of the saws not cutting the wood as they should.

Filers should watch the shape of the teeth more carefully and watch the collars more closely to see that they are always in perfect condition. If these two points are carefully watched and the saws are properly ground, made of good steel, tempered with the right degree of hardness, then tensioned in perfect shape, there should be no trouble about the saws making first-class shingles.

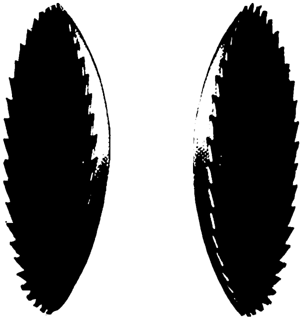


This sketch opposite is a good one to use as a guide for the proper shape of shingle saw teeth. Notice that one line is drawn straight across two teeth and one drawn following the hook of the tooth. The angle formed is 50 degrees.

Saws sharpened on automatic machines usually make better shingles than saws sharpened on hand gummers. The automatic machines keep the hook in the teeth at the right angle, the teeth uniform in shape and space, as well as keep the saws perfectly round. These are the essential points in the sharpening process of shingle saws.

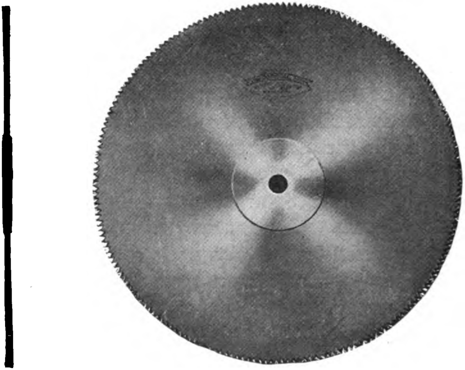
Concave Saws. Our concave saws are dished, tempered, and ground by our new and patented process and are of superior quality in every respect.

To keep concave saws in order, set the teeth alike on both sides of the plate.

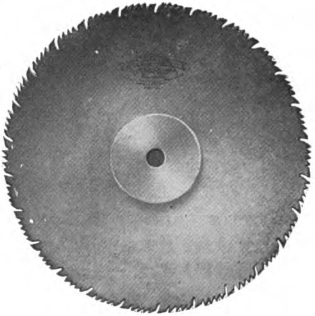


Left-Hand Saw Right-Hand Saw

As they cut with the grain as well as across the grain, they require less bevel on the teeth than a regular cut-off saw. They should be filled about straight across in front and beveled on the backs of the teeth. Keep the same amount of hook on the front of all the teeth. Keep the gullets round by the use of a round edge emery wheel or round file. Do not run the saw when extremely dull.



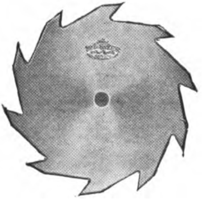
Mitre Saw. The above cut represents a circular mitre cut-off saw. These saws are ground to run without set. They are especially adapted for smooth cutting but will not cut as fast as an ordinary saw fitted with either set or swage. They should be kept perfectly round and true on the edge and filed flemming back and front of teeth.



Novelty Saw. The novelty saw can be made for either rip or cut-off work. When used for ripping the teeth should be so that when a straight edge is laid across the center of the saw it will also be in line with the front of the teeth. For cross-cutting exclusively a "V" tooth is better.

These saws should have a certain number of cleaner teeth which should always be a trifle lower than the cutting teeth.

A novelty saw, when fitted with "pitch to center" or regular "V" tooth, can be used for either splitting or cross-cut work, but for doing either kind exclusively, it is better to have the tooth that is adapted to the work.



Grooving Saws. These saws are ground thinner at the center than at the rim, so that little or no set is required or just enough to keep the extreme points of the teeth perceptibly wider than the body of the teeth. We make them any gauge at edge or center, as ordered.

In ordering groover saws, state whether wanted straight or hollow ground. If the latter, give size of collar.

CHAPTER VII

Safety First

Safeguarding Circular Saws. The most usual accidents are caused by pieces being thrown back by the saw while ripping stock; strains in the lumber, resulting in the stock warping itself against the saw; knots or loose slivers being jarred against the saw by the vibration of the saw table or otherwise, and thrown against the operator; by the operator reaching over the revolving saw for stock and dropping or dragging the stock on the saw; sawing small pieces without a guide and getting the fingers in contact with the saw; by slipping and falling on to the saw; by defective balancing arrangements on circular swing saws; lack of a device to prevent saw swinging beyond front edge of the table; by an occasional saw breaking while in use, due to same being defective; by the saw striking metal; using cracked saws, etc.

For certain kinds of special work there are no satisfactory, practical saw guards, but there are numerous guards suitable for the common operations of ripping, splitting, cutting off, matching, and other similar operations, provided due care has been made in selecting the guard. Some points necessary to consider are:—In construction, the guard should be light, so that it may be easily handled; should be substantial, and with rigid support, to avoid vibration and consequent danger of contact with saw. The softer metals are usually considered better material for the hood as contact of the saw with the hood is not so likely to result in a broken saw. The guard should be so constructed that it will automatically adjust itself to the varying thicknesses of the stock; it should be sufficiently open to give the operator a reasonably clear vision of the saw blade while in operation. The supports should be so set that they will not interfere with the work. The guard should be permanently attached to the machine so that it cannot be readily removed. The hood, however, should be so constructed that it may be swung out of the way for special work to which the guard cannot be adapted. The guard should be so arranged that it can be adjusted to the tilting of the saw table without interfering with the free working of the saw.

All rip saws should have a spreader either attached to the guard or fastened securely to the table, to prevent pinching or binding, and it is desirable on cross-cut saws as well to prevent loose ends from being caught up and thrown back by the saw. The spreader should be slightly beveled on the inner edge, and slightly thinner than the saw kerf, but thicker than the saw disk. It should always be securely fastened in careful alignment with the saw, and about ⅓" behind it.

Where the work is too small to permit holding with the hand, a push stick should be used.

SIMONDS

Saw Steel Products

In addition to the Circular Saws listed on the following pages we manufacture a complete line of—

Band Saws

Cross-cut Saws

Gang Saws

Drag Saws

Ice Saws

Hand Saws

Hack Saws

Metal Saws

Files

Planer Knives

Flat Steel Plates

Copy of our general catalog sent free on request to any user of this class of goods.

Simonds Inserted Point Saws

Styles 3, 4, and 5

Diam.	Thickness	Standard Number of Teeth			Greatest Number of Teeth that can be put in Saw			Price	Extra for each Gauge Heavier	Price for Beveling New Saws per Gauge
		3	4	5	3	4	5			
12 inch	11 gauge	10	—	—	10	—	—	$19.50	$0.20	$0.35
14 "	11 "	10	—	—	12	—	—	23.00	.25	.40
16 "	11 "	12	—	—	12	—	—	27.00	30	.50
18 "	11 "	14	—	—	14	—	—	30.00	.40	.60
20 "	11 "	14	—	—	16	—	—	34.00	.50	.70
22 "	11 "	16	12	10	18	14	12	38.50	.60	.80
24 "	11 "	18	14	12	18	16	14	42.00	.70	.90
26 "	10 "	18	14	12	20	16	14	46.00	.85	1.05
28 "	10 "	18	16	14	22	18	14	50.00	1.00	1.20
30 "	10 "	20	16	14	24	20	18	54.00	1.15	1.30
32 "	9 "	22	18	16	26	22	20	61.00	1.30	1.40
34 "	9 "	22	20	18	28	24	20	66.00	1.50	1.55
36 "	8 "	24	20	18	30	26	22	72.00	1.80	1.70
38 "	8 "	24	22	20	32	28	22	78.00	2.00	1.85
40 "	8 "	26	24	20	34	30	24	84.00	2.30	2.00
42 "	8 "	28	26	22	36	32	26	94.00	2.60	2.20
44 "	7 "	30	26	24	38	34	26	102.00	3.00	2.40
46 "	7 "	32	28	24	40	36	28	110.00	3.50	2.60
48 "	7 "	34	30	26	42	36	28	120.00	4.00	2.80
50 "	7 "	36	32	28	44	38	30	134.00	4.50	3.00
52 "	6 "	38	34	30	44	40	32	156.00	5.00	3.25
54 "	6 "	40	36	30	46	42	32	174.00	6.00	3.50
56 "	6 "	42	36	32	48	42	34	194.00	7.00	3.75
58 "	6 "	44	38	34	50	44	36	212.00	8.00	4.05
60 "	5 "	46	40	34	52	46	36	230.00	9.00	4.35
62 "	5 "	48	40	36	54	48	38	260.00	10.00	4.65
64 "	5 "	48	42	36	56	50	38	290.00	12.00	5,00
66 "	5 "	50	44	38	58	52	40	320.00	15.00	5.35
68 "	5 "	52	44	38	60	54	40	350.00	18.00	5.75
70 "	4 "	54	46	42	62	54	44	380.00	21.00	6.15
72 "	4 "	56	48	42	64	56	44	420.00	24.00	6.55

List Prices of Bits or Points.

No. 3 .... 6 cts. each
No. 4 .... 6 cts. each
No. 5 .... 7 cts. each

List Prices of Shanks.

No. 3............ 54 cts. each
No. 4............ 60 cts. each
No. 5............ 85 cts. each

When ordering Bits or Points, give number, gauge, and kerf.

The following furnished free with each Saw: — one wrench, one extra set of points, two extra shanks with Saws 40 inches and under, three extra shanks with Saws 42 inches and over.

No extra charge for Saws one gauge thicker than list. No extra charge for Saws one, two, or three gauges thinner than list; when more than three gauges thinner, add 5 per cent to list for each gauge. Circular Saws 48 inches and larger, thinner than 10 gauge, are not warranted. Circular Saws 42 inches or less in diameter, beveled one gauge without extra charge; 44 inches or larger, beveled two gauges without extra charge.

Simonds Inserted Point Saws

Styles B, F, and D

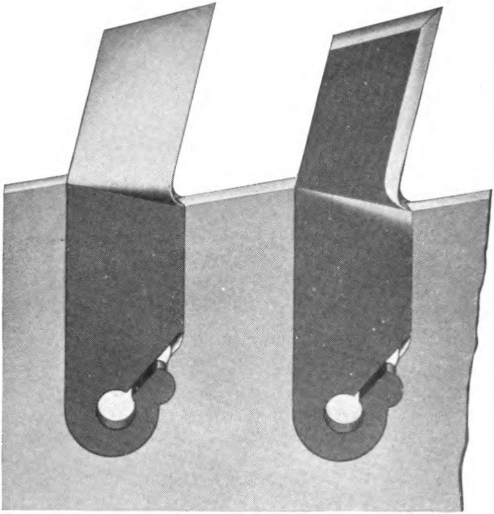
Diameter	Thickness	Standard Number of Teeth		Greatest Number of Teeth that can be put in Saw			Price	Extra for each Gauge Heavier	Price for Beveling New Saws per Gauge
		B & D	F	B	F	D			
12 inch	11 gauge	8	10	8	10	—	$19.50	$0.20	$0.35
14 "	11 "	10	12	10	12	—	23.00	.25	.40
16 "	11 "	12	12	12	14	—	27.00	.30	.50
18 "	11 "	14	14	14	16	—	30.00	.40	.60
20 "	11 "	14	16	16	18	—	34.00	.50	.70
22 "	11 "	16	18	18	20	—	38.50	.60	.80
24 "	11 "	18	18	20	22	—	42.00	.70	.90
26 "	10 "	18	20	22	24	—	46.00	.85	1.05
28 "	10 "	20	22	24	26	—	50.00	1.00	1.20
30 "	10 "	20	24	26	28	22	54.00	1.15	1.30
32 "	9 "	22	26	28	30	24	61.00	1.30	1.40
34 "	9 "	22	28	30	32	24	66.00	1.50	1.55
36 "	8 "	24	30	30	34	26	72.00	1.80	1.70
38 "	8 "	24	32	32	36	28	78.00	2.00	1.85
40 "	8 "	26	34	34	38	30	84.00	2.30	2.00
42 "	8 "	28	36	36	40	32	94.00	2.60	2.20
44 "	7 "	30	38	38	42	32	102.00	3.00	2.40
46 "	7 "	30	40	40	44	34	110.00	3.50	2.60
48 "	7 "	32	42	42	46	36	120.00	4.00	2.80
50 "	7 "	34	44	44	48	38	134.00	4.50	3.00
52 "	6 "	36	44	46	50	38	156.00	5.00	3.25
54 "	6 "	38	46	48	52	40	174.00	6.00	3.50
56 "	6 "	40	48	50	54	42	194.00	7.00	3.75
58 "	6 "	42	50	50	56	44	212.00	8.00	4.05
60 "	5 "	42	52	52	58	46	230.00	9.00	4.35
62 "	5 "	44	54	54	60	46	260.00	10.00	4.65
64 "	5 "	44	56	56	62	48	290.00	12.00	5.00
66 "	5 "	48	58	58	64	50	320.00	15.00	5.35
68 "	5 "	48	60	60	66	52	350.00	18.00	5.75
70 "	4 "	52	62	62	68	54	380.00	21.00	6.15
72 "	4 "	52	64	64	70	54	420.00	24.00	6.55

Points, 6c. each. Shanks, 60c. each. Extra wrenches, $1.00 net each. The following furnished free with each Saw:—one wrench, one extra set points, two extra shanks with Saws up to 40 inches, three extra shanks with Saws 42 inches and over.

No extra charge for Saws one gauge thicker than list. No extra charge for Saws one, two, or three gauges thinner than list; when more than three gauges thinner, add 5 per cent to list for each gauge. Circular Saws 48 inches and larger, thinner than 10 gauge, are not warranted. Circular Saws 42 inches or less in diameter beveled one gauge without extra charge; 44 inches or larger, beveled two gauges without extra charge.

Write
Simonds
about any
kind or
style of
Inserted Tooth
Rip
Cut-off
or Groover
Saw

Simonds Inserted Tooth Cut-Off Saws



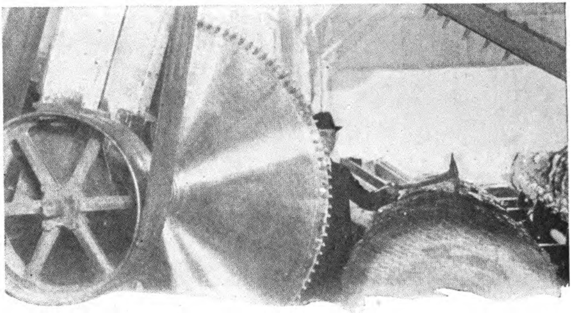
In making this saw we have not only drawn upon our experience as Saw Makers since 1832 but have done experimental work, and as a result we are convinced that this is the most successful type of Inserted Tooth Cut-Off Saw on the market.

It is the only saw of the kind the teeth of which do not require some form of rivets, consequently the tension of the Simonds plate is not disturbed by the hammering of rivets, as often happens with other makes Without rivets, teeth are more easily inserted or removed When sprung into position they are firmly locked in the plate.

Because of the manner in which they are offset, the teeth may be worn out without resetting. They are provided with ample clearance from the point both downward and backward, the cutting point only coming in contact with the wood. Unnecessary friction is avoided in the Simonds Saw

The forward hook angle of the teeth can be changed by filing a very slight amount from the point of the tooth at the desired angle. The "V" in the Simonds plate and the grooves in the teeth are machine milled, making mechanically perfect, close fitting joints. Full instructions for inserting and removing teeth are sent with each saw or box of points.

Simonds Inserted Tooth Cut-Off Saws are used chiefly by Pulp Mills and by Shingle and Stave Mills for cutting logs into short lengths or bolts. They may, however, be used for many other cutting-off purposes



Simonds Inserted Tooth Cut-Off Saws

Price-List

Diameter Inches	Thickness Gauge	Standard No. Teeth	Price Each	Diameter Inches	Thickness Gauge	Standard No. Teeth	Price Each
36	9	60	$82.00	66	6	114	$355.00
38	9	62	88.00	68	5	116	387.00
40	9	66	95.00	70	5	120	420.00
42	8	70	105.00	72	5	124	458.00
44	8	74	115.00	74	5	128	507.00
46	8	78	125.00	76	5	132	573.00
48	8	80	136.00	78	5	134	665.00
50	7	84	153.00	80	5	138	770.00
52	7	88	175.00	82	5	142	873.00
54	7	92	196.00	84	5	146	982.00
56	7	96	218.00	86	4	150	1 102.00
58	7	98	240.00	88	4	154	1 320.00
60	6	102	262.00	90	4	156	1,450.00
62	6	106	290.00	92	4	158	1 620.00
64	6	110	322.00				

No extra teeth included in above prices.

All saws of odd diameters, not listed, take prices of next larger size listed.

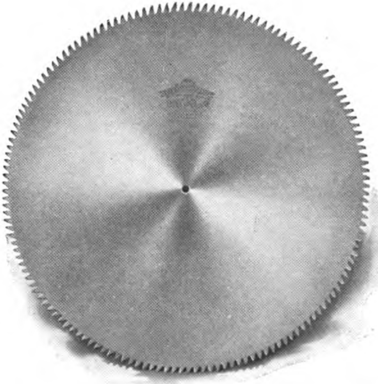
No extra charge for saws one gauge thicker than list; if more than one gauge thicker an extra charge for each additional gauge heavier will be made, the same as on Solid Circular Saws.

EXTRA TEETH for Simonds Inserted Tooth Cut-Off Saws 40 cents each.

For each tooth inserted in excess of standard, add to the list $1.25.

Solid Tooth Circular Saws

Diameter Inches	Thickness Gauge	Size Hole Inches	Price Each	Extra for Each Gauge Heavier	Beveling New Saws Per Gauge	Net Prices Extra for Setting and Sharpening if	
						Rip	Cross-cut
4	19	¾	1.20	.03	.14	.06	.07
6	18	¾	1.80	.05	.18	.07	.10
8	18	⅞	2.40	.08	.22	.10	.13
10	16	1	3.30	.12	.28	.12	.16
12	15	1	4.40	.20	.35	.15	.20
14	14	1⅛	5.30	.25	.40	.18	.23
16	14	1⅛	6.50	.30	.50	.20	.25
18	13	1¼	8.00	.40	.60	.23	.28
20	13	1 5/16	9.50	.50	.70	.25	.32
22	12	1 5/16	11.50	.60	.80	.28	.35
24	11	1⅜	13.50	.70	.90	.31	.40
26	11	1⅜	16.00	.85	1.05	.35	.45
28	10	1½	18.50	1.00	1.20	.38	.50
30	10	1½	21.00	1.15	1.30	.42	.55
32	10	1⅝	24.00	1.30	1.40	.45	.60
34	9	1⅝	27.00	1.50	1.55	.50	.65
36	9	1⅝	31.00	1.80	1.70	.55	.70
38	9	1¾	35.00	2.00	1.85	.60	.75
40	9	2	41.00	2.30	2.00	.65	.80
42	8	2	47.00	2.60	2.20	. .	.85



Solid Tooth Circular Saws

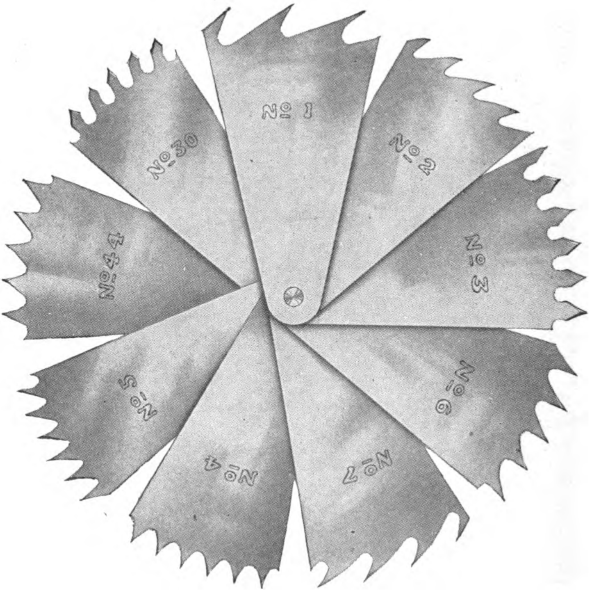
Continued

Complete Instructions for ordering on page 32

Diameter Inches	Thickness Gauge	Size Hole Inches	Price Each	Extra for Each Gauge Heavier	Beveling New Saws Per Gauge	NET PRICES Extra for Setting and Sharpening if Rip	Cross-cut
44	8	2	$55.00	$3.00	$2.40	. .	$0.90
46	8	2	65.00	3.50	2.60	. .	1.00
48	8	2	75.00	4.00	2.80	. .	1.10
50	7	2	85.00	4.50	3.00	. .	1.20
52	7	2	95.00	5.00	3.25	. .	1.30
54	7	2	105.00	6.00	3.50	. .	1.40
56	7	2	120.00	7.00	3.75	. .	1.50
58	7	2	135.00	8.00	4.05	. .	1.60
60	6	2	150.00	9.00	4.35	. .	1.70
62	6	2	170.00	10.00	4.65	. .	1.80
64	6	2	190.00	12.00	5.00	. .	1.90
66	6	2	210.00	15.00	5.35	. .	2.00
68	5	2	235.00	18.00	5.75	. .	2.10
70	5	2	265.00	21.00	6.15	. .	2.20
72	5	2	300.00	24.00	6.55	. .	2.30
74	5	2	340.00	27.00	7.00	. .	2.40
76	5	2	390.00	30.00	7.50	. .	2.50
78	5	2	465.00	34.00	8.10	. .	2.60
80	5	2	550.00	38.00	8.80	. .	2.70
82	5	2	640.00	43.00	9.60	. .	2.80
84	5	2	730.00	48.00	10.50	. .	3.00

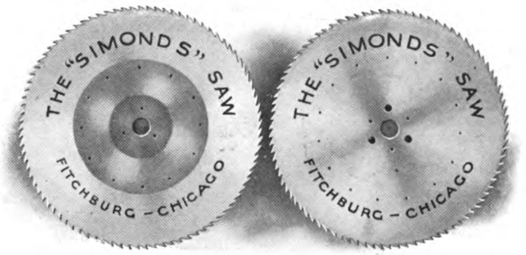
All saws of odd diameters, not listed, take price of next larger size listed.
Circular Saws for Bone, Horn, and Ivory, add 50 per cent to above list.
No extra charge for saws one gauge thicker than list.
No extra charge for saws one, two or three gauges thinner than list; when more than three gauges thinner, add 5 per cent to list for each gauge. Circular Saws 48 inches and larger, thinner than 10 gauge, are not warranted.
Circular Saws 42 inches or less in diameter beveled one gauge without extra charge; 44 inches or larger, beveled two gauges without extra charge.
Circular Saws hollow ground or concaved, add for each gauge, hollow ground or concaved, double the list for beveling.

Styles of Circular Saw Teeth



If you are having difficulty in properly describing the shape of a tooth in a solid tooth Circular Saw, when writing to any of our offices, just refer to the tooth number in the above illustration which shows a sample of most of the styles that are anywhere near standard at the present time.

Shingle and Heading Saws



LEFT HAND SAW		RIGHT HAND SAW	
Diameter	Price Each	Diameter	Price Each
30 inch	$32.00	46 inch	$85.00
32 "	35.00	48 "	100.00
34 "	38.00	50 "	115.00
36 "	42.00	52 "	135.00
38 "	47.00	54 "	155.00
40 "	53.00	56 "	175.00
42 "	65.00	58 "	195.00
44 "	72.00	60 "	215.00

Above list is for saws beveled not more than 8 gauges, and with thickness at center of same gauge as shown in Solid Tooth Circular Saw list for saws of same diameter, but one gauge thicker is allowed without extra charge.

For any additional thickness or beveling, add for each gauge thicker or gauge beveling as per Solid Tooth Circular Saw list.

When ordering Shingle or Heading Saws give the following specifications: diameter of saw in inches; thickness or gauge at center and at rim; number of teeth; right or left hand; speed of saw; name of maker of machine and size of flange.

If new flange is required, send full size template of old flange, showing size and location of all holes.

If saw only is required, send the old flange to us to be fitted to the saw, or if this cannot be done, send template of holes and a sample screw by which to drill and countersink saw.

Collars for Shingle and Heading Saws or Resaws

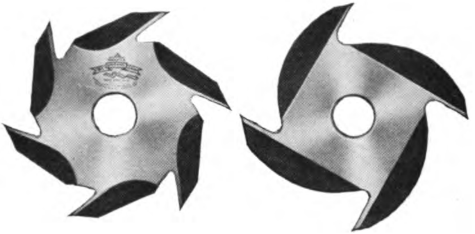
New Cast Iron Flanges for standard makes of shingle machines fitted to new saws, per inch in diameter.

New Steel Flanges 8 inches to 26 inches in diameter, [illegible] inch thick or less, fitted to new saws, either with screws or rivets, per inch.

Flanges other than above, special price.

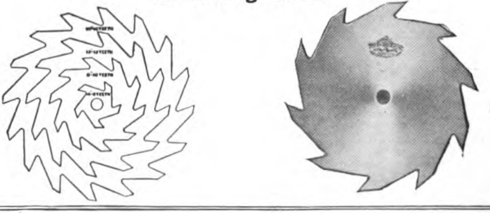
Fitting old flanges to new saws, $2.00 each, net.

Lock Corner Cutters



Price on Lock Corner Cutters in lots of less than twelve, Groover Saw list, plus 25 cents per tooth when scarfed.
In lots of twelve or more, Groover Saw list, plus 12½ cents per tooth when scarfed.
The above addition subject to the same discount as saws.

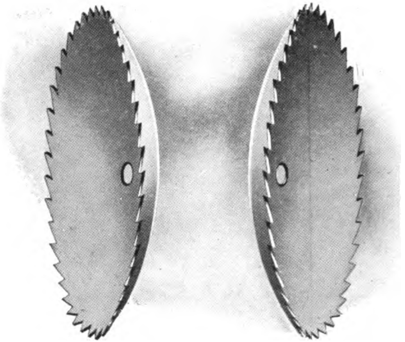
Grooving Saws



Diam Inch	No. of Teeth	THICKNESS ⅛ inch	$\frac{3}{16}$ inch	¼ inch	$\frac{5}{16}$ inch	⅜ inch	$\frac{7}{16}$ inch	½ inch	⅝ inch	¾ inch
3	5	$1.60	$2.20	$4.00	$4.60	$5.20	$5 80	$6.40	$7.50	$8.50
4	5	1.80	2.50	4.80	5.50	6.20	6.80	7.60	8.80	10.00
5	6	2.00	2.80	5.60	6.40	7.20	8.00	8.80	10.20	12.00
6	8	2.30	3.20	6.40	7.30	8.20	9.10	10.00	11.60	14.00
7	8	2.70	3.70	7.20	8.20	9.20	10.20	11.20	13.20	16.00
8	10	3.20	4.30	8.00	9.20	10.40	11.60	12.70	15.00	18.00
9	10	3.80	5.00	9.00	10.30	11.60	12.90	14.30	16.80	20.00
10	10	4.40	5.80	10.00	11.40	12.90	14.40	15.90	18.80	22.00
11	11	5.00	6.70	11.00	12.60	14.20	15.90	17.60	20.80	24.00
12	12	5.70	7.70	12.00	13.80	15.60	17.40	19.20	23.00	26.00
14	14	7.00	9.80	14.00	16.00	18.00	20.00	22.00	26.00	30.00
16	16	8.40	12.00	16.00	18.30	20.60	22.90	25.20	30.00	35.00

Bevel Grooving Saws, add 10 per cent to above prices.
Grooving Saws with teeth shaped and backed off, add 50 per cent to above prices.
Special Grooving Saws made to order, special prices.

Concave Saws



LEFT HAND SAW　　　　RIGHT HAND SAW

When ordering Concave Saws give circle to be dished to, or give the diameter of the old saw and the amount of drop in the old saw, accurately measured; also give the greatest diameter of the heading to be cut. State which side is to be dished or concaved, right or left hand, as the saw runs towards you

4	inch.	16	gauge,	$2.30;	for	each	additional	gauge	5	cents	extra
5	"	16	"	2.40	"	"	"	"	5	"	"
6	"	16	"	2.50	"	"	"	"	5	"	"
7	"	15	"	2.90	"	"	"	"	6	"	"
8	"	15	"	3.30	"	"	"	"	8	"	"
9	"	15	"	3.80	"	"	"	"	10	"	"
10	"	14	"	4.60	"	"	"	"	12	"	"
11	"	14	"	5.40	"	"	"	"	16	"	"
12	"	14	"	6.20	"	"	"	"	20	"	"
14	"	13	"	7.60	"	"	"	"	25	"	"
16	"	13	"	9.50	"	"	"	"	30	"	"
18	"	12	"	11.30	"	"	"	"	40	"	"
20	"	12	"	14 20	"	"	"	"	50	"	"

Saws concaved to a smaller circle than 16 inches, extra price

INDEX

Simonds Manufacturing Co.

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