How to File a Hand Saw

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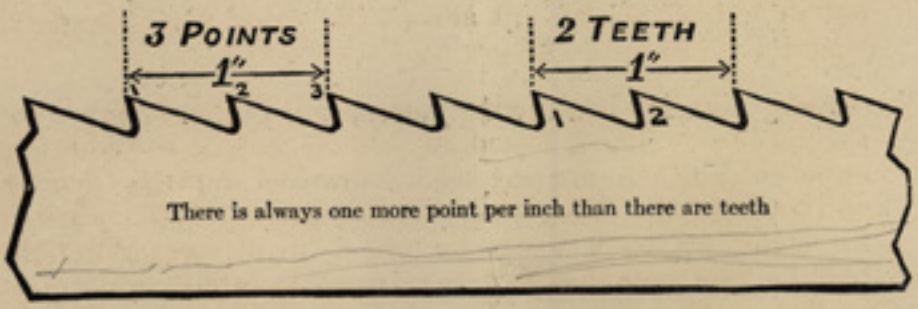
MANY who have read "The Professor and the Saw" have sent their acknowledgment of the book and testified to the benefit derived from it. Undoubtedly it has awakened a new interest in the value of manual work as a means of education. Professor Reed Wentworth learned to love tools as he had formerly loved books. He found that the brain and the hand could work together for health, happiness, and profit.

With the new interest aroused by the book has come a new demand upon the manufacturer. Teachers in manual and vocational courses are writing the Simonds Manufacturing Company and asking, How did Professor Wentworth teach his classes? What did he tell the boys about the saw? How ought a saw to be filed and kept in order?

This little book of five lessons is intended as a primer, setting forth briefly and clearly the things every user of a hand saw should know. The Simonds Mfg. Co. would be pleased to receive suggestions on anything contained in these lessons. Requests for information will be cordially welcomed. Simonds Saws have a reason which will be gladly explained. If these lessons meet a need, perhaps there are other needs that can be as readily supplied.

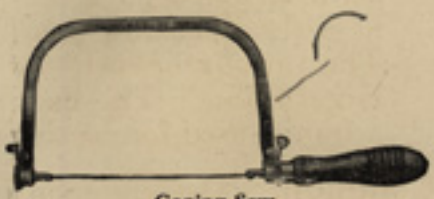
	PANEL						HAND	RIP	
SIZE, INCHES	14	16	18	20	22	24	26	28	30



There is always one more point per inch than there are teeth

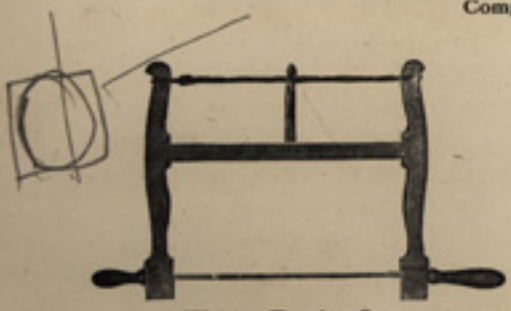
Dovetail Saw

Back Saw



Coping Saw

Compass Saw



Web or Turning Saw

Hack Saw

LESSON 1

What Is a Hand Saw?

Saw. A Hand Saw is a thin, flat blade of crucible steel, having a row of teeth along one edge.

Use. Hand Saws are used for cutting wood, metal, bone, or other material by wearing away, with the teeth, particles along a given line.

Power. Hand Saws are driven back and forth by the muscular power of the hand and arm.

Kinds. There are two kinds of Hand Saws—(1) Cross-cut or cut-off, which cut across the wood fibers, and (2) rip, which cut with the grain of the wood.

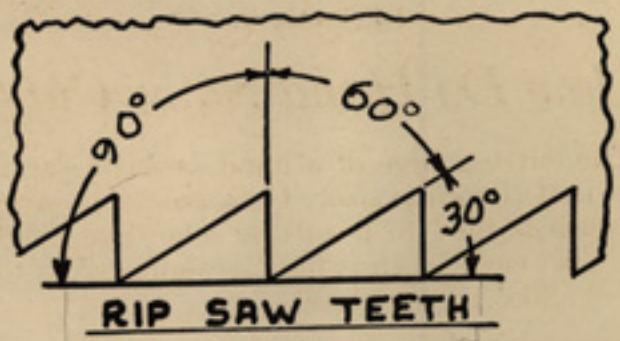
Varieties. There are many varieties of Hand Saws for special uses. Those found in schools, beside the common cross-cut and rip, are the back, compass, coping, turning, and hack saws. The back saw is a fine-toothed cross-cut for small, accurate work, having a rib of steel along the back. The compass saw is narrow, pointed, and thick, used in sawing curves. The coping saw is a narrow blade six inches in length that can be set in a frame and used as a jig or narrow band saw to cut along irregular lines. The turning or web saw is longer and heavier, used in a larger frame. The hack saw is a hard-edged blade set in a frame, used for cutting metal.

Common. The common Hand Saw is a cross-cut or rip, having a flat, slightly tapering blade of tempered steel, with a wooden handle fastened to the heavier end by screws. A smaller size is called a panel saw.

Size. The size of a saw is the length of the blade in inches. Hand Saws range from 14 to 30 inches.

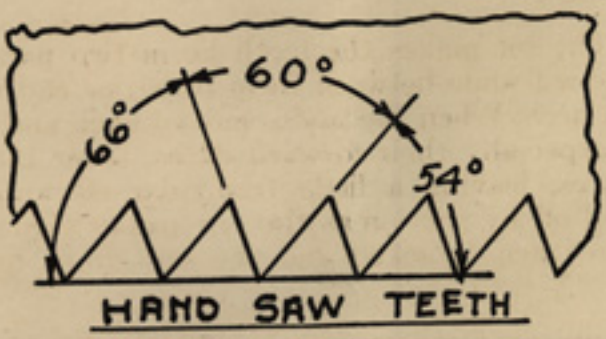
Points. The teeth are coarse or fine according to the number of points to an inch. There is one more point than teeth to an inch. Cross-cut hand saws have from 6 to 12 points to an inch; rip saws 4 to 7 points.

Cross-cut saws used in Manual Training generally have 10 points to an inch; rip saws 7 points. Back saws 10 inches long have 15 points to an inch.



RIP SAW TEETH

Properly Filed Rip Saw Teeth (*enlarged*)



HAND SAW TEETH

Properly Filed Hand Saw Teeth (*enlarged*)

LESSON 2

How Do Hand Saws Cut?

Teeth. The cutting edge of a hand saw is a series of little notches all of the same size. On a cross-cut saw each side of the tooth is filed to a cutting edge like a little knife. On a rip saw, each tooth is filed straight across to a sharp, square edge like a little chisel.

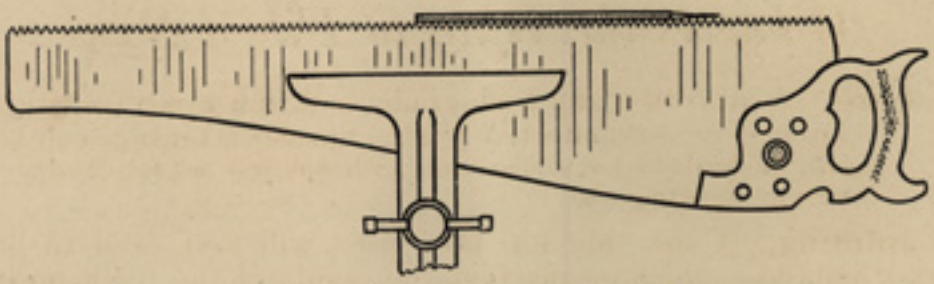
Set. To prevent the saw from binding and the teeth from choking up with sawdust, the teeth are bent alternately, one to one side and the next to the other. This is called "set." Taper grinding also gives clearance.

Cross-Cut. While each cross-cut tooth is a little two-edged knife, it cuts very differently. Centuries ago men learned that a knife blade must be free from nicks and notches to cut well. Then it could be pushed against a piece of wood and a shaving whittled off. At about the same time it was noticed that if the nicked knife were drawn back and forth across the wood, it would tear the fibers apart, making sawdust.

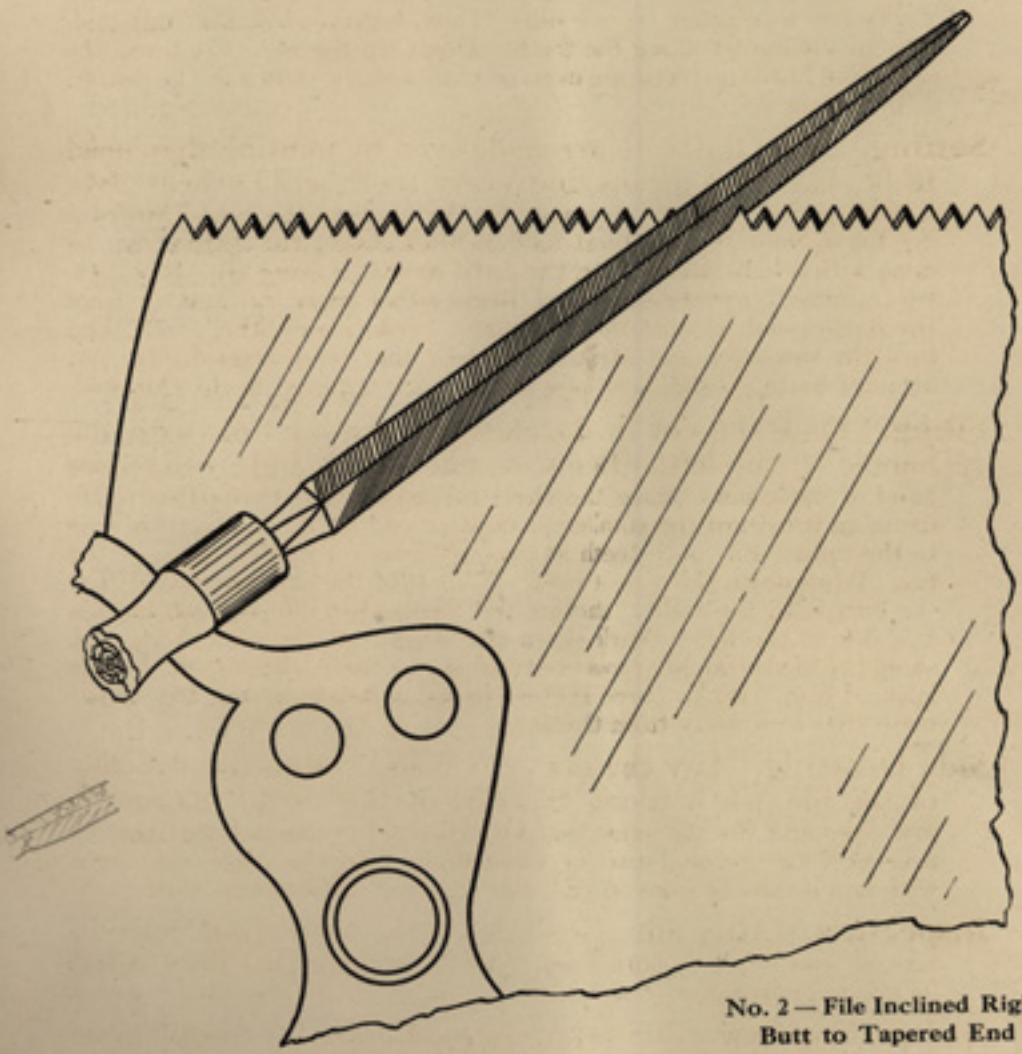
Action. The set makes the teeth lie in two parallel rows. A needle will slide between them from one end of the saw to the other. When the saw is moved back and forth, the points, especially their forward edges, sever the fibers in two places, leaving a little triangular elevation that is crumbled off by friction as the saw passes through. New fibers are then attacked and the saw drops deeper into the cut.

Rip. The rip saw teeth are a series of little chisels set in two parallel rows that overlap each other. At each stroke the sharp edge chisels off a little from the end of the wood fibers. The teeth are made strong with an acute cutting angle, but the steel is softer than that of a chisel to enable the teeth to be filed and set readily.

Angles. The "face" of each cross-cut tooth is slightly steeper than the back, making an angle with the line of the teeth of about 66°. The compass teeth lean still further with an angle of 75°. The rip saw "face" is at right angles (90°) to the line of the teeth. Its cutting edge is at right angles to the side of the blade. The angle of each tooth covers 60°.



No. 1—Teeth Made Even with Flat File



No. 2—File Inclined Right Butt to Tapered End

LESSON 3

What Is the Way to File a Saw?

Care. A saw, like any high-grade tool, must receive good care if it is to do effective work. Special attention will be given the teeth to keep them even, with sufficient set for clearance, and a good cutting edge.

Jointing. A saw that has been used will first need to be jointed—which means that the points of the teeth must be filed to a straight line. Place the saw in the clamp with the butt or handle to the right. Lay a flat file lengthwise on the teeth, using the fingers as a gauge on one side. Then, beginning at the butt end, run the file lightly along the teeth. Don't tip the file. Continue the operation until the teeth are even or with a slight crown in the center, as preferred.

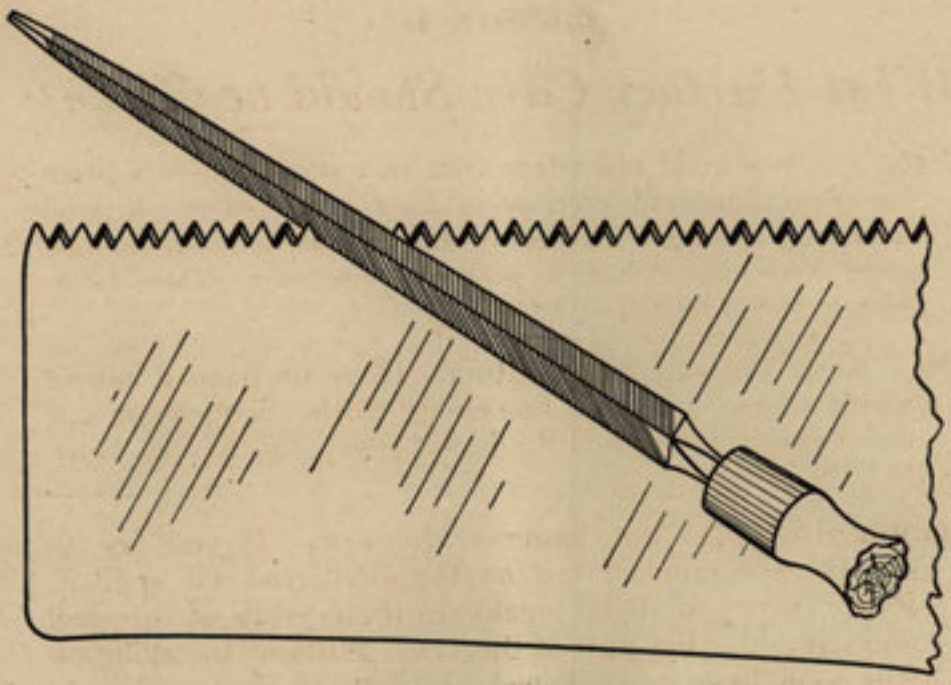
Setting. After the teeth are made even by jointing they need to be set. This means that every tooth will be bent over a little to give sufficient clearance for the blade in the cut. This leaning for a hand saw is about half its thickness. The setting can be done with a light hammer on the anvil or with a lever set. It is better training to use the hammer. Begin either from the butt or from the smaller end, as suits the workman. Strike every other tooth, then turn the saw over and strike the teeth that were missed. Do not attempt haste, as skill and long practice are required to do this well.

Filing. Place the saw in the clamp as for jointing, with the handle to the left. Begin to file at the butt end. For hand or back saws, place the three-cornered file between two teeth, inclining it toward the smaller or tapered end of the saw, in this case to the right. File both teeth at once with one or more strokes of the file. Work down the whole saw. Then turn the saw around so that the butt is to the right. Incline the file toward the tapered end, in this case to the left. Work down the length of the saw. A rip saw should be filed straight across the front of the teeth with the file handle lowered from two to three inches, giving a bevel on the top of the teeth that lean away from the filer.

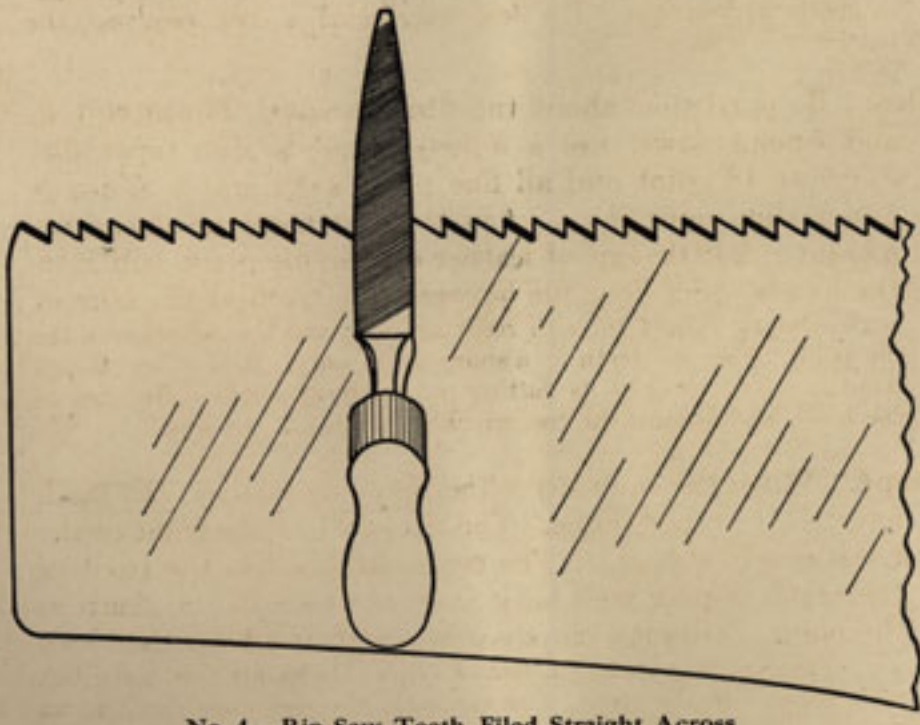
Side Dressing. Lay the saw on a board. Run the flat side of the file gently along the side of the teeth. Turn the saw over and do the same on the other side. No setting may be necessary for the next two or three filings. In that case, side dress with an oilstone to take off the wire edge and smooth the teeth.

Inspection. After filing, look down the teeth from butt to tapered end to see if both lines of teeth are up even. There should be a long groove down the center.

Order. Your saw will continue in good order for considerable cutting. If a nail is struck and teeth broken, joint down almost to the place and file.



No. 3—File Inclined Left, Tapered End to Butt



No. 4—Rip Saw Teeth, Filed Straight Across

LESSON 4

What Further Care Should be Given?

Place. It is a good old adage that one should have a place for everything and keep everything in its place. A good workman will have his bench and cabinet or his tool chest where every tool will have its hook or compartment. There will be saws, at least a rip and cut-off.

Oil. Keep the saw from rusting. Have on hand a can of sperm oil and a piece of fine emery cloth. Scour your saw clean, wipe it dry, and oil it. It will require less set, cut faster, and with less labor.

Hammering. Do not hammer the saw. If you try to straighten a crooked saw on the anvil, you will spoil it. Every blow you strike breaks up the crystals of the steel and stretches that part of the saw. Without the skill you will soon have it weakened and out of shape. Try to bend it back in your hands. If you must hammer it, take a mallet and use a smooth block of wood. Hammer out the crooks and kinks as gently as you can. The less hammering a saw receives, the better.

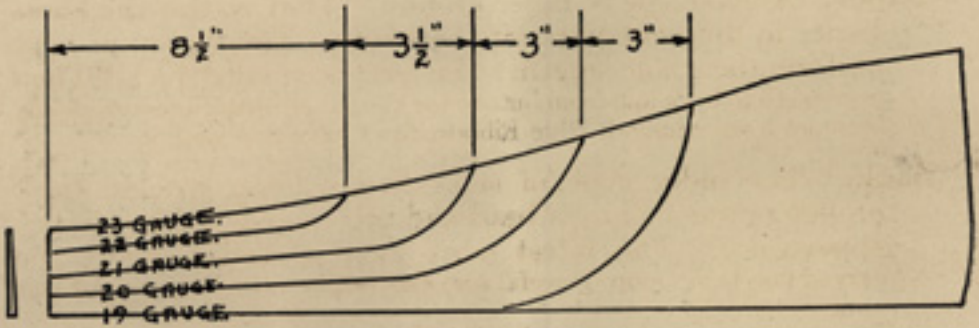
Files. Be particular about the files you use. For all 8, 7, 6, and 5 point saws, use a 6-inch Simonds slim taper file. For 9 to 12 point and all fine point saws, use a Simonds 5-inch slim taper file. Set your file straight in a good file handle. A little cap of leather on the file point will save the hands. Set your file between the teeth at the correct angle, having regard to both right and left, and the elevation of the file point. File the teeth to a sharp point only. Remember that a hand saw does most of its cutting on the down stroke. Be sure of the tooth edge toward the toe, which does most of the work.

Shape. When the saws leave the Simonds factory, the teeth have their proper shape. The rip saw has the front of the teeth nearly straight. The cross-cut saw has the front of the teeth sloping well back from the base of the teeth to the point. Observe closely a new saw and keep the teeth of your saws at that angle. Different types of saws are filed alike but with changes in the teeth. Consequently the files must be held at slightly different angles. Take pride in the appearance of your saw.

Bending Test for Spring

Whip Test for Spring

Testing the Hang



TAPER GRINDING.

Gauge	Fraction Inch	Thousandths Inch	Millimeters
23		.025	.64
22		.028	.71
21	$\frac{1}{32}$	.032	.81
20		.035	.89
19		.042	1.06

LESSON 5

What Are the Tests of a Good Hand Saw?

Steel. Quality must be in the steel. As manufactured in the Simonds Steel Mill, the iron, carbon, and other alloys are carefully selected, weighed, and fused in closed pots called crucibles. The mixture is poured into ingot moulds. The ingots are again heated and rolled to proper thickness. Tests are repeatedly applied to be certain that the steel is uniformly sound, free from pipe, sponginess, or blow-holes. If there are defects, these will be discovered in later operations. The manufacturer's guarantee can be safely accepted for the quality of the steel.

Temper. Heat treatment changes the soft steel into a blade of spring temper. Take a Simonds Saw and bend it double, watching how it regains its line with wonderful spring. Take the handle in both hands and whip the blade in the air. Feel the play of it as a fisherman tests a rod or the teamster a whip.

Hang. Test the hang of the saw by holding it down on a line with the arm from the shoulder, pointing the saw to the ground in front of the body. Feel how the weight comes where the most cutting takes place.

Taper. A good saw is taper ground. That is, the thickness varies in different parts of the blade. The teeth are kept uniform the whole length. The butt is equally thick. Then from teeth to back and from butt to toe the gauge or thickness gradually becomes less. Simonds Blue Ribbon Saws have five gauges.

Back. The older type of saws had a long, straight back broken on the end by a bead and nib to give it a less heavy appearance. The latest saws have a hollow back, the curved line being more graceful and the weight removed where it was unnecessary.

Breast. The line of the teeth is rounded out $\frac{1}{8}$ of an inch to give a little more bearing where most of the cutting takes place.

Handle. The handle should be attractive. Each one is fitted to the blade individually and fastened firmly with four or five brass screws. Most Simonds Saw handles are highly polished, thoroughly seasoned, fine-grained applewood. A few are beechwood.

Finish. The saw can be made ornamental as well as useful. The finish is an index of the quality as the labor of giving an added finish can only be expended profitably on high-grade saws.

This booklet would not be complete unless it referred to the kinds of Manual Training Saws used and gave list prices of the various sizes in which they are manufactured. The articles described on this and the following pages will all be found necessary. These goods may be purchased direct from us, the manufacturers, or through local retail dealers. On the inside back cover of this booklet you will find addresses of all our branch offices and detailed information regarding any of our products will be promptly and gladly furnished if you will write the office nearest your city.

Simonds Manufacturing Company

"The Saw Makers" Established 1832

Fitchburg, Mass.

No. 97 Back Saw

8″	10″	12″
$11.50	$12.00	$14.00 per dozen

FILES

Double Extra Blunt

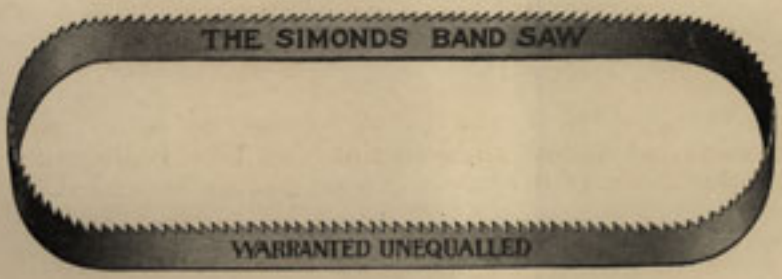
5″	5½″	6″
$3.10	$3.80	$4.50 per dozen

HACK SAW BLADES

Hard Edge — Non-breaking

8″	9″	10″
$8.00	$9.00	$10.00 per gross

We make all sizes of **Circular** and **Band Saws,** and **Planing Machine Knives.** If interested, send for special catalog.



Write for Discounts

Simonds Hand Saws

Warranted Special Crucible Steel, Simonds Patented Temper

In Nos. 10 and 10½ we offer a straight back and a skew back, manufacturer's own brand saw, at a price so low as to appeal especially to the amateur mechanic, the manual training student, or the worker on the farm or at the home shop. Selected Steel, Taper Ground Blades, Polished Beech Handles, Four Screws.

Simonds No. 10. Straight Back, Medium Width

Simonds No. 10½. Skew Back

These saws are in quality and finish of steel and handle the highest value for the moderate price, and are subject to the broadest Simonds Warranty.

LIST PRICES NOS. 10 AND 10½

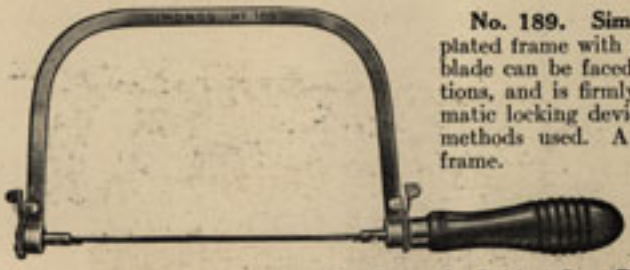
Points to the Inch	PANEL				HAND	RIP	
	8 to 12				6 to 12	4½. 5. 5½. 6	
Length, inches	18	20	22	24	26	26	28
Per dozen....	$14.00	$16.00	$18.00	$19.00	$20.00	$20.00	$23.50

Above saws packed one third dozen in a box

Write for Discounts

No. 78. Simonds Interchangeable Compass Saw. Plain handle with polished edges. Metal ferrule with screw adjustment, allowing interchange of blades. Blades held firmly in handle. Tooth edge can be faced either up or down. Packed one half dozen in a box

		List Prices					
		8	10	12	14	16	inches
No. 78.	Complete	$4.50	$4.75	$5.00	$5.25	$5.50	per dozen
No. 78 B.	Extra Blades	2.00	2.25	2.50	2.75	3.00	" "



No. 189. Simonds Coping Saw. Nickel-plated frame with polished birch handle. The blade can be faced in any one of eight directions, and is firmly held in place by an automatic locking device which is superior to other methods used. A blade furnished with each frame.

Price with blade, complete, $9.00 per dozen

Packed one half dozen in a box

No. 189 B. Simonds Coping Saw Blades
Extra 6-inch blades — List Price, 50 cents per dozen

No. 168. Dovetail Saw. Polished handle, brass plated steel back, Simonds Crucible Steel blade, 1¼ inches wide under back, 26 gauge, 17 points to the inch.

	6	8	10	12	inches
List Price	$7.25	$7.75	$8.75	$9.50	per dozen

Packed one sixth dozen in a box

No. 166. Pattern Makers' Saw. Apple Handle, blade 7½ x 1¼ inches, 21 gauge, 15 points.

List Price, $5.00 per dozen

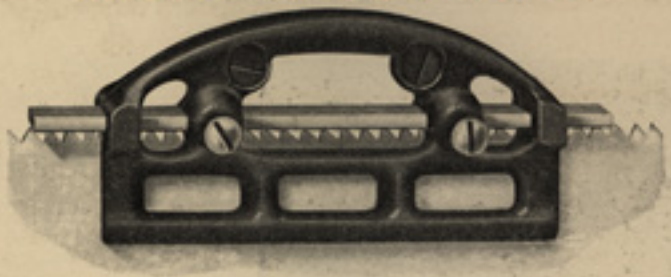
Packed one in a box

No. 170. Back Saw, Prof. Ball Pattern. Apple Handle, polished edges, brass plated steel back, Simonds Crucible Steel blade, 1¼ inches wide under back, 26 gauge, 17 points to the inch.

Packed one sixth dozen in a box

	6	8	10	12	inches
List Price	$7.50	$8.00	$9.00	$9.75	per dozen

No. 339. Hand Saw Jointer



Adjustable to any thickness of saw blade, and may be used with any common file Japanned.

List Price, per dozen $6.00

Packed one in a box

No. 198. Hand Saw Clamp

Price ..... $9.00 per dozen

No. 197. Hand Saw Set

Made of Steel Throughout. Fully Guaranteed

Will not slip, cut, or mar the teeth. Has but one gauge to set. Any setting may be reproduced. Anvil and punch easily replaced.

Price ..... $10.00 per dozen

Simonds Tool Cabinets

TOOLS FOR THE AMATEUR CARPENTER

One of the handiest, most practical, and most satisfactory collections of tools for the boy or man who likes to make things of wood.

It contains the proper tools for general carpentry work about the home, farm, or shop.

The tools are all manufacturers' own brand articles of highest grade, widely and favorably known by tool users everywhere, and are **covered by the respective manufacturers' liberal guaranties.**

Tools neatly and conveniently arranged. Cabinet made of thoroughly seasoned chestnut with oak grain finish.

With each Cabinet we send a copy of "Simonds' Guide for Carpenters," a booklet giving rules and other items of information for the woodworker.

Each Cabinet contains one each:

Firmer Chisels, ¼", ½", 1".
Firmer Gouge.
Cold Chisel.
Rose Countersink.
Ratchet Brace.
Steel Handle Wrench.
Hammer.
Auger Bits, ¼", ⅜", ½".
Oilstone in Box.
Try Square.
Marking Gauge.
Boxwood Rule.
Jack Plane.
Level.
Spoke Shave.
Mallet.
Nail Set.
"T" Bevel.
Brad Awl.
Screwdriver.
Simonds Mfg. Co.'s 22" 10-point Hand Saw.
" " " 22" 7-point Rip Saw.
" " " 10" Back Saw.
Simonds Mfg. Co.'s Coping Saw with Blade.
" " " Keyhole Saw and Pad.
" " " Cabinet Scraper Blade.
" " " Hack Saw Frame.
" " " 8" Hard Edge Blade, 14 Teeth.
Simonds Mfg. Co.'s 8" Hard Edge Blade, 18 Teeth.
Simonds Mfg. Co.'s 8" Hard Edge Blade, 24 Teeth.
Simonds Mfg. Co.'s 8" Hard Edge Blade, 32 Teeth.
Simonds Mfg. Co.'s 8" Flat Bastard File.
" " " 8" Half Round Bastard File.
Simonds Mfg. Co.'s 6" Slim Taper File.
" " " 8" Rat Tail File.
Oil Can.
Pair of Dividers.
Side Cutting Pliers.
End Cutting Carpenters' Pincers.
The size of the Cabinet is 32½" high, 16" wide, 7¾" deep.

List Price $30.00 complete

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17th Street and Western Avenue
Chicago, Ill.

Export Office
90 West Broadway
New York City

402 Occidental Avenue
Seattle, Wash.

209 Madison Avenue
Memphis, Tenn.

85 First Street
Portland, Oregon

12-14 Natoma Street
San Francisco, California

420 Canal Street
New Orleans, La.

8 White Street, Moorfields
London, E. C., England

Simonds Canada Saw Company, Ltd.

St. Remi Street and Acorn Avenue
Montreal, Quebec

55 Water Street
St. John, N. B.

54 Powell Street
Vancouver, B. C.

Simonds File Company

Fitchburg, Mass.

Simonds Steel Mill

Lockport, N. Y.