...MONDS GUIDE

for

...RPENTERS

PRINTED

...MONDS ... SAW CO.

FITCHBURG MASS. CHICAGO ILL.

U.S.A.

UNEQUALED IN QUALITY AND UNIFORMITY

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Simonds GUIDE

FOR CARPENTERS

A book of Rules and Illustrations gathered from different sources

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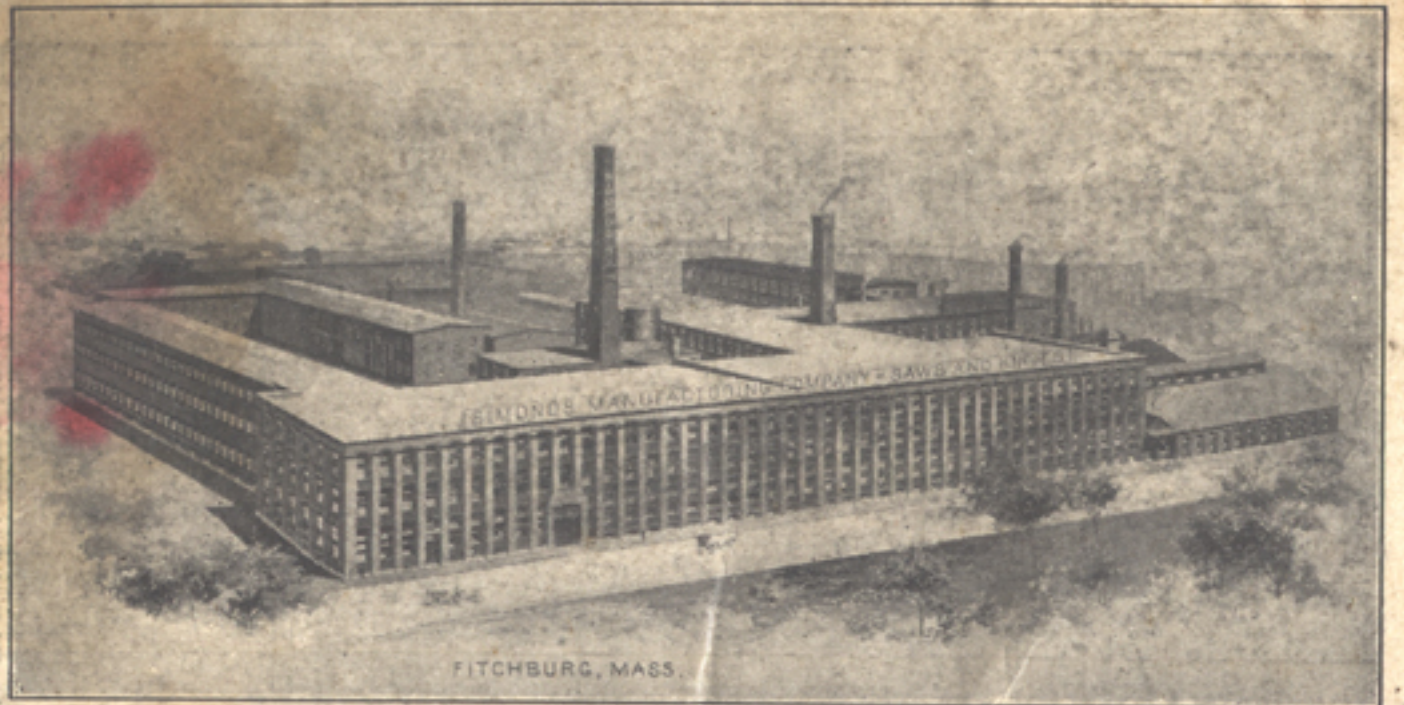
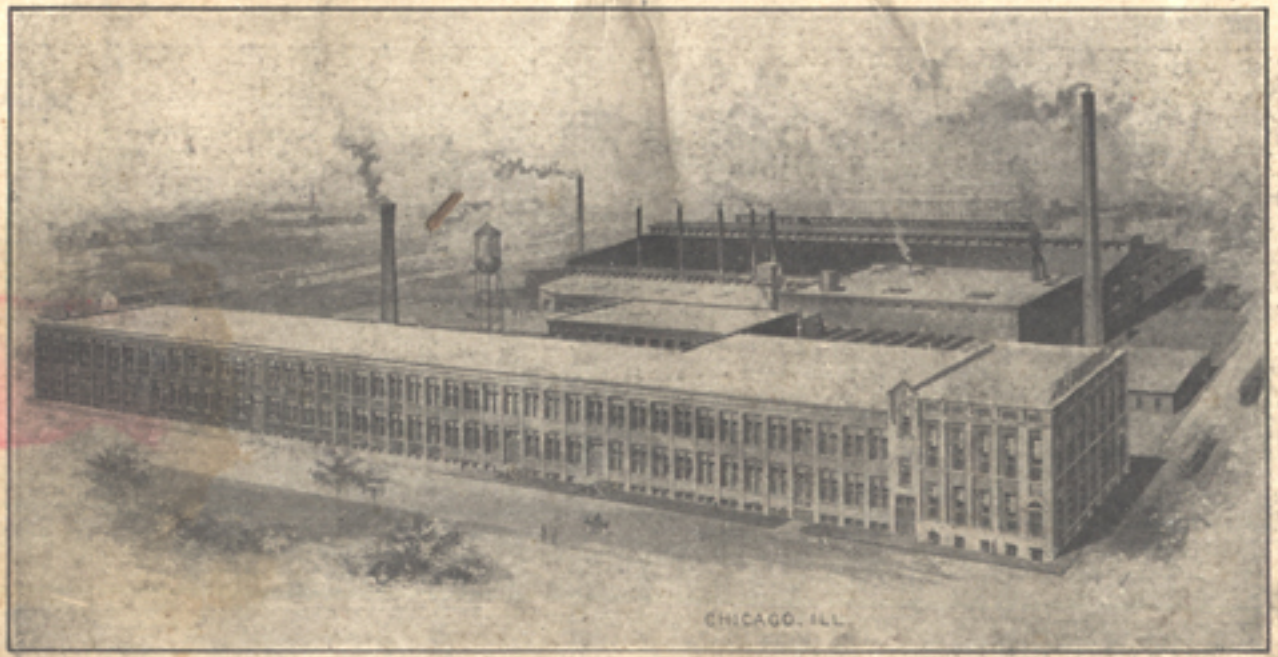


FITCHBURG PLANT.



CHICAGO PLANT.

INTRODUCTION.

IN presenting this Simonds Guide for Carpenters, we aim to introduce such rules as have been found reliable, and will facilitate the daily work of every reader.

Primarily our object is to direct your attention to the Simonds Saws, illustrated in the latter pages, and to create an interest which will result in a trial of a Simonds Hand Saw, for we are positively sure the quality will be found enough superior to win the confidence of every intelligent mechanic.

Very truly yours,

SIMONDS MFG. CO.

Carpenter Department.

RAFTER AND BRACE FRAMING.—Herewith are a few directions in framing, and for getting the lengths of rafters and braces as well as of stairs, and in dividing the space of steps, etc. These instructions are intended for beginners only, and further instructions may be found in any standard text-book on carpentry.

There are four principles or elements that apply to all trades: the point, line, superfice and cube. Appreciation of the plumb, square and level is assumed, and without knowing their application and importance one will never become a good mechanic.

A *Point* is that which has position, without length, breadth or thickness.

A *Line* is that which has length, without breadth or thickness.

Superfice is that which has length and breadth without thickness.

A *Solid* is that which has length, breadth and thickness.

It is absolutely needful to realize the importance of these mechanical elements and implements, for their proper application and use makes your work right. In making a pencil or chalk-line mark, always remember that the center of the marker is the *Line*. Keep your tools in such shape as to enable you to cut to the line (split the mark); and a saw to do this must be properly fitted, in other words, properly filed.

Illustrative Lesson.

RAFTERS.—Fig. 1 represents a frame A, B, C, D, with rafters E and F, braces G and H. The frame is 12 feet high and 12 feet wide.

The rafter E is shown as a half-pitch roof, meaning that its rise, from 1 to 2, is equal to half the width of the building 1 to 3, or 6 feet.

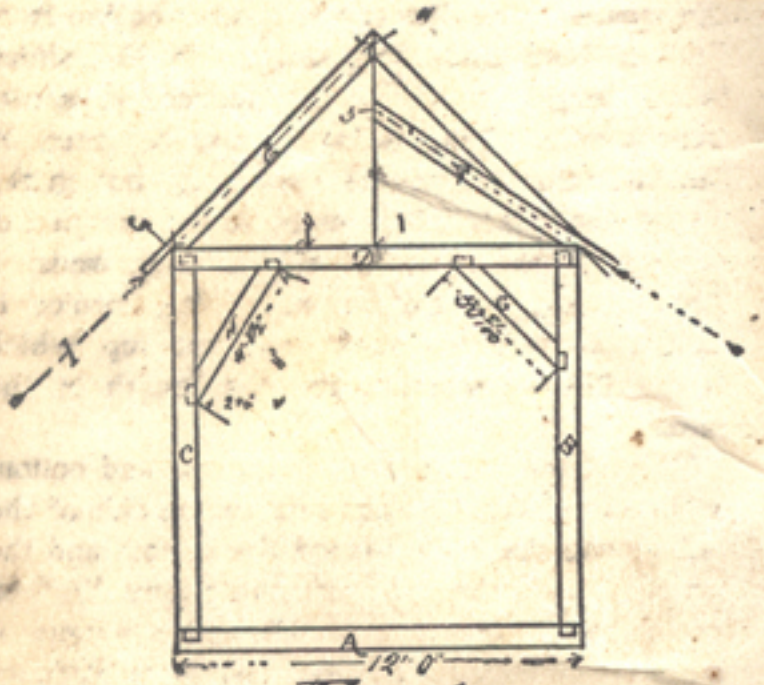


Fig. 1.

The rafter F is shown as a third-pitch roof, meaning that its rise, from 1 to 5, is equal to one-third the width of the building, 3 to 4, or four feet.

A one-quarter pitch, 3-feet rise, would be one-quarter the width of the building.

A two-thirds pitch would have 8-feet rise, two-thirds the width of the building. The 12-foot building shown is merely for convenience of illustration, but the ratio or proportion always applies.

Two terms used must be learned. They are the "Rise" and the "Run." The "Rise" means the height required for the pitch of the roof, as 1 to 5, or 1 to 2. The "Run" is from 1 to 3, or 4 to 3.

In order to find the length of rafter required for a half-pitch roof, take half the width of the building (6′), or 3 to 1, on the blade of the square, and rise (6′), or 1 to 2 on the tongue of the square. The distance in a straight line from "6" on both blade and tongue, is 8½, which is the length of the rafter needed, as shown from 2 to 2. The measure must be taken on the line indicated by the arrow "I," not on the top of the rafter. It is usual to cut the part of the rafter that projects past the side walls, 2 inches thick, the part to which the cornice is nailed, or 2 inches down from the top, which is the line to measure for the length of the rafter.

To find the cut (bevel) of the top and bottom of the rafter, lay the square flat on the side of the rafter, with the blade toward the bottom and the tongue toward the top, with the figure "6" on the blade and the figure "4" on the tongue at the edge of the rafter. Mark along the blade for the bottom cut and along the tongue for the top cut.

This gives the bevel for the top and bottom cuts for a third-pitch roof. With "6" on both blade and tongue, you get the bevel for a half-pitch roof or a mitre cut for any square purpose.

Mark the run on the blade and the rise on the tongue, and then measure across from one figure to the other, and you have the length of any rafter or brace.

Take the brace "H" for example. It has 4-feet rise and 2-feet 6-inch run. Its length is found in the same way. By measuring from "4" on the blade to "2½" on the tongue you find 4 feet 8½ inches, the length of the brace.

In measuring a brace you must mark the length on the outer edge, instead of 2 inches inside, like the rafter, for the tennon is usually made to extend to the extreme point. The bevel at each

end is obtained by the square in the same manner as with the rafter.

To find the length of the brace "G" where the rise and run are equal, 3 feet, use the side of the square that is scaled 1/12 inch. In the center of the tongue find the double number written thus: $^{36}/_{36}$ 50 ^{91}. These figures mean that the rise and run being each 36 inches, the length of the brace will be 50 $^{91}/_{100}$ inches. But make it 51 inches long and strike each end a sharp blow with a hammer, which makes it a close fit.

All lengths are shown from 24-inch rise and 24-inch run to 60-inch rise and 60-inch run. Every quarter of a foot between these lengths, and to the right of each double number, indicates the length of brace for that number. For example, $^{54}/_{54}$ requires brace 76$^{37}/_{100}$ inches long.

Stairs.

To find the rise and run for any set of stairs, see diagram No. 2.

Measure the rise and run. The rise is the height from floor to floor. In this case it is 118 inches. Divide this by eight inches. This 8-inch rise is found to be the best and most comfortable rise for stairs, and they should be made as near that as possible, preferably less rather than more. This division gives 14¾ steps, but you build 15. This number into 118 inches gives 7$^{13}/_{16}$ inches for each rise.

Now find the run, which should be 8½ inches or more, to allow for a tread of 9¾ inches, which gives a projection or overhang of 1¼ inches for nosing. It frequently happens that a narrower tread must be used, but keep as near an 8½ inch run as you can. Whatever the distance is, divide it by the number of steps you have found in the rise.

For example: You have a space of 10 feet 6 inches or 126 inches. Divide it by 15, the number of rises you found above. It gives $8\frac{13}{32}$ inches for each run. In short, you have 15 steps with $7\frac{13}{16}$ inch rise, $8\frac{13}{32}$ inch run and $9\frac{3}{4}$ inch tread.

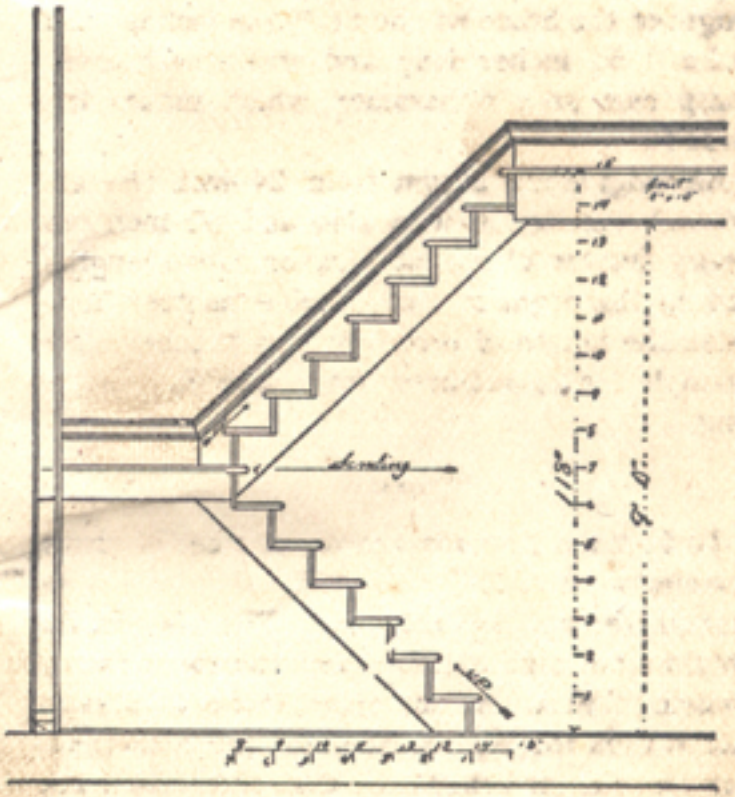


Fig. 2

In laying out the stringers be careful to cut the rise for the first tread the thickness of the tread less in height than all others, both from floor or landing, if a landing is used. If you do not, the first step will be the thickness of the tread higher than all the others.

How to File a Saw.

Joint the saw, slightly crowning in the center, with an 8-inch flat file. Then file the teeth to a uniform size, but don't file them to a point.

(Keep your saw clean. Oil it.)

Set the saw, using a hammer set, with light blows, not striking hard or smashing the teeth.

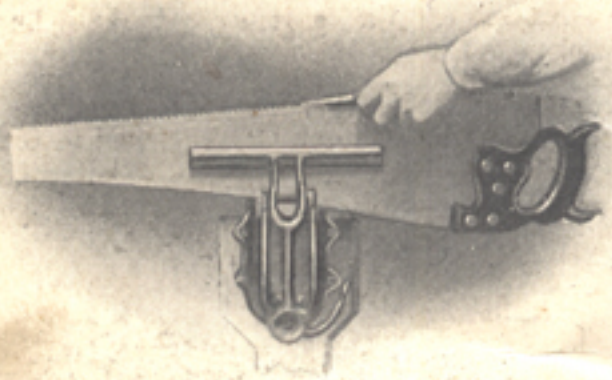


Fig. 1.

The teeth should be set a little more than you wish them when done, to allow side dressing. Run the flat file lightly over each side of the saw teeth so as to bring them into line. Now see if all the teeth are dull (blunt). If any are sharp, joint it once more, as in Fig. 1. The saw is now ready to file.

To File for All-round Work and Fast Cutting.

Fasten the saw clamp to an 8-inch x 2-inch plank, secured to a north window, for the best light is none too good. The top of the clamp should be level with the armpit, in either sitting or standing position, though the latter is preferable.

Place the saw in the clamp, with the handle to the left, and file from the heel to the toe of the saw. The pitch of the file is shown in Figs. 2 and 5. In going over the saw in this position do not file the teeth to a point, but still file deep enough to leave the points equal distances apart, after the saw is filed from the other side. If one tooth is larger than the others, don't roll the file over to file more off the large tooth, but keep the file in the same position as to pitch, and crowd against the large tooth and bear lightly on the other till the large tooth is down like the others.

Grasp the handle of your file firmly, as shown in Fig. 2, with the thumb up (not the back of the hand up), and hold it securely till you have filed across the clamp. After the saw has been

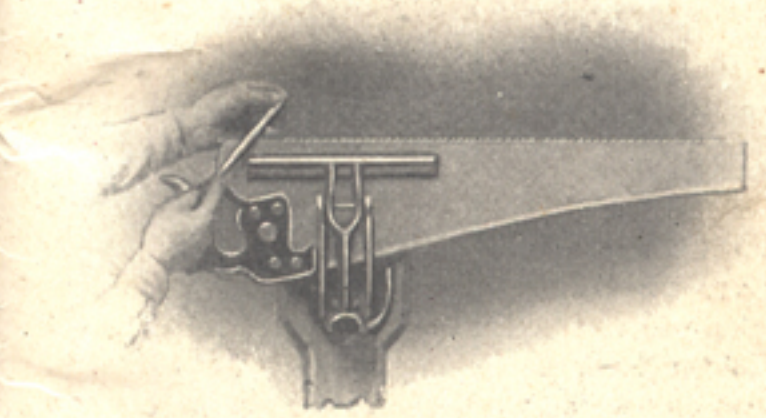


Fig. 2.

moved for another part to be filed, place the file in the last tooth filed with the thumb of the left hand on the top of the file above the saw, as shown in Fig. 2. Press on the file in different ways till it fills the space, thus getting the angle the same as you have just used it, and go on as before till you have filed across the saw.

Place the saw in the clamp, with the handle to the right. Filing this side last brings the filer directly in front of the clamp, squarely facing the saw, and gives the only position to see the

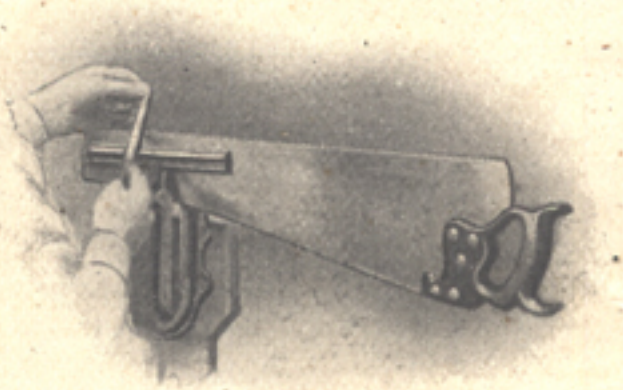


Fig. 3.

points of all the teeth and the file, at the same time. File the teeth to a sharp point only.

Fig. 4.

Begin this time filing from toe toward the heel, as shown in Fig. 3. Hold the file with the pitch and bevel the same as on the other side. To prove you have the same pitch and bevel, sight

over the teeth, as shown in Fig. 4, and see if the groove is in the center. If not in the center, change the pitch and bevel till it does show in the center, and keep the file in that position across the saw.

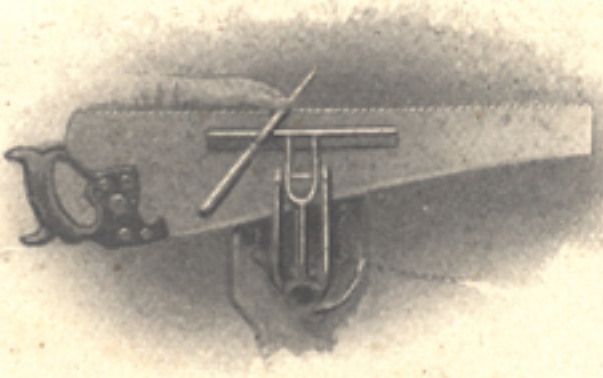


Fig. 5.

Side Dressing.

Now place the saw on a straight board and then run the flat file over the side of the part from the toe to the heel, one run of the file on each side of the saw. Try the saw and see how it cuts. If the set is too wide, another run of the file on each side, or perhaps two, may be required to reduce the set to the width required.

It will be seen that a part of the sides of the teeth are flat. For the next two or three filings, no setting of the saw will be required (unless it has been run upon a nail), but side-dress the teeth with a hard oilstone, instead of the file, to take off the wire edge and smooth them.

It will be seen that the bevel of the teeth will be on the front or cutting edge, where it should be, and the back of the teeth will be nearly

square across, and there will be a long lance point on each tooth.

NOTE.—All saws, when they leave the factory, have the proper hook. That is to say, the shape of the teeth is proper. The rip saw is nearly straight (plumb) up-and-down the front of the teeth. The cross-cut saw has the front of the teeth sloping well back from the root of the tooth to its point. Keep the teeth in that shape.

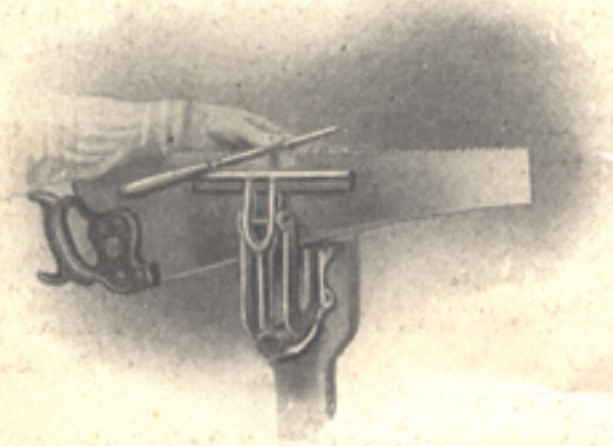


Fig. 6.

Filing for Mitre and Bevel Cutting.

To file a saw for bevel cutting and mitre-box use, all the foregoing instructions are to be carried out except one. That one is in relation to the pitch of the file. It should be held as directed, but the end of the handle should be about 2 inches lower than the point of the file, or about 2 inches fall in the foot. This pitch must be made without rolling the file. If properly carried out it will change the depth of the teeth. The bevel on the front gives a bevel to the back and reduces the lance point to a blunter and stronger point and is better for joinery work, but not so good for rough carpentry and framing.

(Wipe your saw dry and oil with sperm oil.)

To File a Rip Saw.

A rip saw should be filed square (straight) across the front of the teeth, with the handle of the file lowered from 2 inches to 3 inches, giving a bevel on the top of the teeth. A thick blade requires more bevel than a thin one.

Hints as to Care.

OIL YOUR SAW.—Always keep on hand a can of sperm oil, also a piece of fine emery cloth. Scour your saw clean, wipe it dry and oil it. It will require less set and cut fast and with less labor.

TO STRAIGHTEN A BENT SAW.—Don't try to straighten a crooked saw on an anvil with a hammer. If you do, every blow will stretch the saw and ruin it for good work. Use a mallet on the anvil, or better, use a block of timber cut off straight and planed smooth, and hammer the crooks and kinks out of the saw on the ***planed end*** of the block.

FILES TO USE.—The best files to use are:

For all 8, 7, 6, 5 and 4-point saws, a 6-inch slim taper file.

For 9, 10, 12-point and all fine-point saws, a 5-inch slim taper file.

Use a good file handle and have your file set straight in the handle.

To Forge and Temper Butcher Knives.

FORGING.—Use good quality crucible steel, about .90 carbon. Heat evenly to a good cherry-red, and forge it to the required shape. After forging, hammer the blade equally on both sides with light blows to pack the grain of the steel. After the forging is completed, heat it to a slightly lower heat than that used during forging, and allow it to cool very slowly.

TEMPERING.—After the forging is thoroughly cooled, heat it to the lowest heat at which the

steel will harden. Dip perpendicularly in salt-water hardening bath, then dip it in linseed or fish oil. Hold it over the fire to warm it a little, then polish roughly with emery cloth, and temper to a dark copper or bright blue color. Should the knife spring in hardening, take a sharp peen hammer and hammer on the hollow side while it is warm, during the drawing of the temper. The temper should be drawn very slowly.

Painters' Department.

The best way to find the tints that will blend with each other, when you paint your house, is to find a pansy with colors that suit your taste. Use the dominant color in the flower for the sidings, the next prominent color for the corner boards, cornice, etc., and the high-color tints for the panels, brackets, ornamental shingles, carvings, etc.

If you use fairly good judgment the building will look well colored from any flower you select.

When through with the paint brush, work it out on a board till it is as free from paint and as clean as you can get it, and then put it away to dry.

To soften the brush to use again, immerse in boiled oil to the top of the bristles, heat it and work the brush in the hot oil till it is soft.

To soften putty on an old window, to remove a broken light of glass, rub an iron rod, heated white, along it.

Mahogany Imitation on Beech.

Pulverized dragon's blood, 2 ounces; rectified spirits of wine, 1 quart.

Walnut Stain for Wood.

Water, 1 gallon; Vandyke Brown, 10 ounces; bichromate of potash, 1 ounce; washing soda, 6 ounces; boil 10 minutes. Immerse the article, or apply with a brush, as desired.

To Ebonize Wood.

Mix lampblack with good French polish and apply in the usual way. The lampblack may be collected on a piece of tin held over a kerosene lamp or a lighted candle.

How to Gild Small Steel Tools.

Pour some of the ethereal solution of gold into a glass dish and dip into it the blade of the tool, or a new penknife, razor, lancet, etc. Withdraw the instrument and allow the ether to evaporate.

The blade will then be found covered with a beautiful coat of gilt. The tools may be moistened with a clean rag or a small piece of very dry sponge, dipped in the ether, and the same effect will be produced.

Gold Bronze for Furniture.

Mix Copal varnish with gold-colored bronze powder. This is made from bisulphate of tin.

Hard Drying Putty.

Mix dry white lead with Japan and rubbing varnish, equal parts, to the proper consistency; beating it with a small mallet to bruise the lump. Keep it when not in use in water to prevent it drying.

Putty for Repairing Broken Wall.

The best putty for walls is composed of equal parts of whiting and plaster of paris, as it quickly hardens. The wall may be immediately colored upon it. Some painters use whiting with size; but this is not good, as it rises above the surface

of the walls, and shows the patches when the work is finished. Lime must not be used as putty to repair walls, as it will destroy almost every color it comes in contact with.

To Prevent Iron from Rusting.

To prevent iron from rusting, give it a coat of linseed oil and whiting, mixed together in the form of a paste.

It is easily removed, and will preserve iron from rusting for years.

Air and Water-tight Cement for Casks and Cisterns.

Melted glue, 8 parts; linseed oil, 4 parts; boiled into a varnish with litharge. It hardens in 48 hours.

Fire Cement.

Fire clay, 100 parts; white lead, 3 parts; powdered asbestos, ½ part. Mix all together and use as mortar.

Cement.

Sifted peroxide of manganese and zinc-white, equal parts, and sufficient soluble glass (commercial) to form a thin paste. Apply immediately.

This cement will resist red heat water and oil.

Wells.

To ascertain the quantity of water in a well, take half the circumference (in the clear) and multiply by half the diameter, multiply the result

by the depth, which gives the cubic measure, then reckon 6 gallons and 1 pint to the foot cube.

Facts about Glue.

In securing the joints of framing, as well as for other purposes, glue is indispensable to the joiner. It is obtained by boiling down the horny and sinewy parts of animals; the older they are the stronger being the glue produced. Good glue should be very hard in the cake, and when held up to the light, should be of a transparent yellowish-brown color, free from cloudy or black spots. It should be broken up in small pieces, and steeped in cold water for twelve hours, and then heated up with a little water until of a uniform consistency, and just thick enough to run freely off a brush in a continuous thin stream, without breaking into drops. In gluing up work, the surface should be made perfectly clean, smooth, and dry, and the glue should be applied as hot as possible.

According to experiments made by Tredgold, the adhesive force of fresh-made glue, cementing together two pieces of dry ash, after being left for twenty-four hours, was found to be 715 lbs. to the square inch, the pressure being applied gradually, and the surface separated being found on examination to be not entirely covered.

With glue which had been frequently melted, with occasional additions of fresh glue and water, the adhesive power was reduced to from 350 to 560 pounds to the inch. The lateral adhesion of the fibers of a piece of Scotch fir quite dry and seasoned, was found to be 562 pounds to the inch, therefore, with fresh-made glue, the wood would have parted before the glue. The tensile strength of a square inch of solid glue, was found to be 4,000 pounds (Philos. Mag. 1826). The strength of common glue for coarse work, and to stand the weather, is increased by adding a little finely powdered chalk.

A glue for outside work is often made by grinding as much white lead with linseed oil as will just make the liquid of a whitish color, and strong, but not too thick. Glue dissolved in skimmed milk, in the proportion of one pound of glue to two quarts of milk, is said to resist moisture with great effect.

Ordinary glue can be rendered insoluble in water by adding to the water with which it is mixed a small quantity of bichromate of potash; the exact proportion must be ascertained by experiment, but for most purposes one-fiftieth the amount of glue will be sufficient.

A glue, said to be proof against both fire and water, is made by mixing a handful of quicklime with four ounces of linseed oil, boiling to a good thickness, and drying on tin plates in the shade. It is rendered fit for use by boiling over the fire in the usual way.

Comparative Table.

Tp.	Sq. Mi.	Acres.	Sq. Chains.	Poles.	Sq. Links.
T	36	23,040	230,480	3,686,400	2,340,000,000
	1	640	6,400	102,400	6,400,000
		1	10	160	100,000
			1	16	10,000
				1	625

The square foot is used in estimating glazing, stone-cutting, etc; the square yard in plastering, roofing, paving, etc.; the acre in measuring lands.

Solid or Cubic Measure.

1,728 cubic inches make 1 cubic foot.
27 cubic feet make 1 cubic yard.
40 cubic feet of round timber make 1 ton.
42 cubic feet of shipping timber make 1 ton.

46,656 cubic inches make 1 cubic yard.
50 cubic feet of hewed timber make 1 ton.
128 cubic feet make 1 cord.

Liquid Measure.

The United States standard for measurement of all liquid is the "wine" or "Winchester" gallon, containing 231 cubic inches.

4 gills 1 pint.
2 pints 1 quart.
4 quarts 1 gallon.
31½ gallons 1 barrel.
2 barrels 1 hogshead.

Dry Measure.

The Government standard of dry measure of the United States is the "Winchester bushel" so-called, being a cylindrical vessel having an inside diameter of 18½ inches, and a depth of 8 inches, and containing 2,150.42 cubic inches.

4 gills 1 pint.
2 pints 1 quart.
8 quarts 1 peck,
4 pecks 1 bushel.

Measure of Weight.

The pound is the United States standard of weight as applied to general purposes, and is the weight of 27.7015 cubic inches of distilled water, as its greatest density (*i. e.*, at 39° 83' Fahrenheit, the barometer being at 30 inches), and is equivalent to 7,000 Troy grains.

$27\frac{11}{32}$ grains 1 dram.
16 drams 1 ounce.
16 ounces 1 pound.
25 pounds 1 quarter.
4 quarters 1 cwt.
20 cwt. 1 ton.

(In some cases the following table for gross weight is used: 28 pounds, 1 quarter; 4 quarters, 1 cwt.; 20 cwt., or 2,240 pounds, 1 ton.)

Weight 1,000 Feet of Lumber, Board Measure.

Yellow or Norway Pine, dry	3,000 lbs.
Yellow or Norway Pine, green	5,000 "
White Pine, dry	2,500 "
White Pine, green	4,000 "

Weight of One Cord of Seasoned Wood, 128 Cubic Feet per Cord.

Hickory or Sugar Maple	4,500 lbs.
White Oak	3,850 "
Beech, Red Oak or Black Oak	3.250 "
Poplar, Chestnut or Elm	2.350 "
Pine (White or Norway)	2.000 "
Hemlock Bark, dry	2,200 "

Capacities of Cisterns and Wells.

For a circular cistern or well take the diameter in feet, square that and multiply by 7,854; that gives the area in feet; multiply this by 1,728 and divide by 231, and you will have the number of gallons capacity of one foot in depth; from this calculate the depth. If for a square cistern, multiply length by breadth, and proceed to multiply the result by 1,728 and to divide by 231 as before. Calculated in this way, we find that each foot in depth of a circular cistern or well

5	feet	in	diameter	holds	4.66 barrels
6	"	"	"	6.61	"
7	"	"	"	9.13	"
8	"	"	"	11.93	"
9	"	"	"	15.10	"
10	"	"	"	18.65	"

SQUARE CISTERNS OR WELLS.

5	feet	by	5	holds	5.92 barrels
6	"	6	"	8.54	"
7	"	7	"	11.73	"
8	"	8	"	15.19	"
9	"	9	"	19.39	"
10	"	10	"	23.74	"

Number of Nails and Tacks per Pound.

Nails.	Size.	No. per Lb.
6 penny	fence 2 inch	80 nails
8 "	" 2½ "	50 "
10 "	" 3 "	34 "
12 "	" 3¼ "	29 "
3 "	fine 1⅓ "	760 "
3 "	1¼ "	480 "
4 "	1½ "	300 "
5 "	1¾ "	200 "
6 "	2 "	160 "
7 "	2¼ "	128 "
8 "	2½ "	92 "
9 "	2¾ "	72 "
10 "	3 "	60 "
12 "	3¼ "	44 "
16 "	3½ "	32 "
20 "	4 "	24 "
30 "	4¼ "	18 "
40 "	5 "	14 "
50 "	5½ "	12 "

Tacks.	Length.	No. per Lb.
1 ounce	⅓ inch	16,000
1¼ "	$\frac{3}{16}$ "	10,666
2 "	¼ "	8,000
2½ "	$\frac{5}{16}$ "	6,400
3 "	⅜ "	5,333
4 "	$\frac{7}{16}$ "	4,000
6 "	$\frac{9}{16}$ "	2,666
8 "	⅝ "	2,000
10 "	$\frac{11}{16}$ "	1,600
12 "	¾ "	1,333
14 "	$\frac{13}{16}$ "	1,143
16 "	⅞ "	1,000
18 "	$\frac{15}{16}$ "	888
20 "	1 "	800
22 "	$1\frac{1}{16}$ "	727
24 "	1⅛ "	666

Tables Convenient for Taking Inside Dimensions.

A box 24 x 24 x 14.7 inches will hold a barrel of 31½ gallons.

A box 15 x 14 x 11 inches will hold 10 gallons.

A box 8¼ x 7 x 4 inches will hold a gallon.

A box 4 x 4 x 3.6 inches will hold a quart.

A box 24 x 28 x 16 inches will hold five bushels.

A box 16 x 12 x 11.2 inches will hold a bushel.

A box 12 x 11.2 x 8 inches will hold a half-bushel.

A box 7 x 6.4 x 12 inches will hold a peck.

A box 8.4 x 8 x 4 inches will hold a half-peck, or four dry quarts.

A box 6 x 5⅘ x 4 inches will hold a half-gallon.

A box 4 x 4 x 2⅒ inches will hold a pint.

Estimates of Materials.

3½ barrels of lime will do 100 square yards plastering, two coats.

2 barrels of lime will do 100 square yards plastering, one coat.

1½ bushels of hair will do 100 square yards plastering.

1¼ yards of good sand will do 100 square yards plastering.

⅓ barrel of plaster (stucco) will hard-finish 100 square yards plastering.

1 barrel of lime will lay 1,000 brick. It takes good lime to do it.

2 barrels of lime will lay 1 cord rubble stone.

½ barrel of lime will lay 1 perch rubble stone (estimate ¼ cord to perch).

To every barrel of lime estimate about ⅝ yards of good sand for plastering and brick work.

Cistern Measure.

To find the capacity of a round cistern or tank, multiply the square of the average diameter by the depth, and take $\frac{3}{16}$ of the product. For great accuracy, multiply by 1865 instead of taking $\frac{3}{16}$.

For square cisterns or tanks, multiply the cubic feet by .2⅜.

Find the capacity of a round cistern 6 feet in diameter and 8 feet deep. $6 \times 6 \times 8 = 288 \times 3 = 864$, divided by 16 is 54 barrels. Ans. 54 barrels, of 31½ gallons.

How many barrels will a square tank hold 10 feet long, 7 feet wide and 6 feet deep? $6 \times 7 \times 10 = 420$ (cubic feet) $\times$ 2⅜ = 99¾ barrels. Ans.

Land Measure.

To find the number of acres in a body of land, multiply the length by the width (in rods) and divide the product by 160. When the opposite sides are unequal, add them, and take half the sum for the mean length or width.

Find how many acres in a field 96 rods long and 40 rods wide at one end, and 45 at the other? Ans. 25½ acres.

85 divided by 2 is 42½, the mean width; 96 length; 4,080 divided by 160=25½ acres.

Measures of Soils, etc.

One ton of soil, 18 feet cube.

45 cubic feet of soil, 2½ tons.

A cubic foot contains 6 gallons and 1 quart of water, weighing 62½ pounds.

15½ cubic feet of chalk weighs 1 ton.

18	"	"	clay	"	"
21	"	"	earth	"	"
19	"	"	gravel	"	"
21	"	"	sand	"	"

Carpentry.

The following materials upon an average will weigh one ton:

Ash	from 37	to 45	cubic feet
Baltic fir	" 50	" 60	"
Beech	" 42	" 50	"
Deals	" 55	" 65	"
Elm	" 53	" 60	"
Ebony	" 27	" 30	"
Lime	" 56	" 59	"
Maple	" 46	" 48	"
Mahogany	" 34	" 36	"
Oak	" 32	" 39	"
Oak, seasoned	" 32	" 48	"
Pine	" 55	" 60	"
Scotch fir	" 60	" 65	"
Walnut	" 50	" 53	"

Recipes.

One of the best varnishes for smoke-stacks or steam-pipes, is good asphaltum dissolved in oil of turpentine.

Oxalic acid dissolved in soft water, say half an ounce to a pint. is one of the best known means for cleaning and brightening brass work.

Iron or steel immersed warm in a solution of carbonate of soda (washing soda) for a few minutes will not rust.

Eighty parts of sifted cast-iron turnings, two parts of powdered sal-ammoniac, and one part sulphur made into a thick paste with water and mixed fresh for use, makes a good cement for stopping holes in castings.

Put pure olive oil into a clear glass bottle with strips of sheet lead and expose it to the sun for two or three weeks, then pour off the clear oil and the result is a lubricant which will neither gum nor corrode. It is used for watches and fine machinery of all kinds.

Kind of Wood.	Crushing Strength per square inch of Section.			Length in feet of a rod 1 inch square that would break by its weight.
Alder	6,831	to	6,960	
Ash	8,683	"	9,363	42,080
Bay	7,518	"	7,518	
Box			10,300	
Beech	7,733	"	7,363	38,940
Birch			10,300	
English Birch	3,297	"	6,402	
Cedar	5,674	"	5,863	
Deal (Christiana)				55,500
Red Deal	5,748	"	6,586	
White Deal	6,781	"	7,293	
Hornbeam			7,300	
Elder	7,451	"	9,973	
Elm	7,451	"	10,331	39,050
Fir (Mernel)				40,500
Fir (Spruce)	6,499	"	6,819	
Larch				52,160
Mahogany	8,198	"	8,198	
Lignum-vitæ			9,900	
Oak (Quebec)	4,231	"	5,982	
Oak (English)	6,484	"	10,058	32,900
Pine (Pitch)	6,790	"	6,790	
Pine (Red)	5,395	"	7,518	
Poplar	3,107	"	5,142	
Plum (Dry)	8,241	"	10,493	
Sycamore				35,800
Teak	8,241	"	12,101	36,049
Walnut	6,063	"	7,227	
Willow	2,898	"	6,128	

Transverse strength of woods, showing their breaking weight for a thickness of one inch square, and one foot in height, with weight suspended from one end.

	Breaking Weight.	Value for Use.
Locust	295	80
Hickory	250	55
Oak (Live, American)	245	55
Oak (White, American)	230	50
Oak (African)	208	50
Teak	206	60
Maple	202	
Oak (English, Best)	188	45
Ash	168	55
Pine (American)	60	50
Birch	160	40
Chestnut	160	53
Oak (Canadian)	146	36
Oak (English)	140	35
Deal (Christiana)	137	45
Pine (Pitch)	136	45
Beech	130	32
Pine (White, American)	130	45
Elm	125	30
Pine (Norway)	123	40
Oak (Dantzic)	122	30
White Wood	116	38
Riga Fir	94	30
Pine (White)	92	30

Comparative resilience of various kinds of timbers: ash being 1; fir, 4; elm, 54; pitch pine, 57; teak, 59; oak, 63; spruce, 64; yellow pine, 64; cedar, 66; chestnut, 73; larch, 84; beech, 86. (By resilience is understood the quality of springing back or toughness.)

Percentage of increase, strength of different woods by seasoning: white pine, 9%; elm, 12.3%; oak, 26.6%; ash, 44.7%; beech, 61.9%.

To measure square timbers: Multiply the length, width and thickness together, and divide the product by 12.

How many square feet in a joint 2 x 8, 18 feet long?

$2 \times 8 \times 18 = 288 \div 12 = 24$ feet. Ans.

Sill 8 x 8, 22 feet long.

$8 \times 8 \times 22 = 1{,}408 \div 12 = 117\frac{1}{3}$ feet. Ans.

Measures of Surface.

TABLE OF ORDINARY UNITS.

144 sq. in. = 1 sq. ft.
30¼ sq. yds. = 1 sq. rod.
640 acres = 1 sq. mile or section.
9 sq. ft. = 1 sq. yd.
160 sq. rods = 1 acre.
36 sections = 1 township.

COMPARATIVE TABLE.

Sq. Mile	1	.....	.....	.....	...
Acres	640	1	.....	.....	...
Sq. Rds.	102 400	160	1	.....	...
Sq. Yds.	3,097,600	4,840	30¼	1	...
Sq. Ft.	27,878,400	43,560	272¼	9	1
Sq. In.	4 014,489,600	6,272,640	39 204	1,296	144

TIMBER IN ONE LOAD—ENGLISH.

50 cubic ft. of sq. timber.
100 lin. ft. of 6 x 12 in. timber.
200 " of 6 x 6 in. timber.
150 " 4 in. planking, 12 in. wide.
200 " 3 in. " " "
300 " 2 in. " " "
400 " 1½ in. " " "
600 " 1 in. " " "

Cedar, oak, yellow pine and chestnut, are the most durable woods in dry places.

Proportions of Various Compositions in Common Use.

Babbitt Metal.—Tin, 89; Copper, 3.7; Antimony, 7.3

Fine Yellow Brass.—Copper, 66; Zinc, 34.

Gun Metal, Valves, etc.—Copper, 90; Tin, 10.

White Brass.—Copper, 10; Zinc, 80; Tin, 10.

German Silver.—Copper, 33.3; Zinc, 33.4; Nickel, 33.3.

Church Bells.—Copper, 80; Zinc, 5.6; Tin, 10.1; Lead, 4.3.

Gongs.—Copper, 81.6; Tin, 18.4.

Lathe Bushes.—Copper, 80; Tin, 20.

Machinery Bearings.—Copper, 87.5; Tin, 12.5.

Muntz Metal.—Copper, 60; Zinc, 40.

Sheathing Metal.—Copper, 56; Zinc, 44.

Landlord and Tenant.

SOME USEFUL DON'TS RESPECTING THEIR RIGHTS AND DUTIES.

Don't rent property except on written lease.

Don't depend on the verbal promises of a landlord.

Don't look to a landlord for general repairs unless specially provided for in the lease.

Don't remove a fixture (mantel, tile floor, stationary tubs, etc.), unless you expect to restore the premises as you found them.

Don't fail to record a lease when drawn for three years or more.

Don't take a married woman for a tenant unless the laws of the State permit her to make an executory contract.

Don't accept any shorter notice than thirty days when holding by the month.

Don't let premises for illegal use, or arrears of rent upon ejectment will not be collectible.

Don't leave your landlord trade fixtures erected by you on the premises.

Don't erect a building upon foundations sunken into the ground, or it will become part of the realty.

Don't turn the premises over to the landlord

until all questions of ownership of fixtures, additions, etc., have been settled in writing.

Don't try to hold back the rent for repairs made by you.

Don't move into premises until you get your written lease or agreement.

Don't allow a provision not to sublet deter you from putting in a tenant of same standing as yourself.

Number of Bricks Required to Construct any Building.

(Reckoning 7 bricks to each superficial foot.)

Superficial Feet of Wall.	Number of Bricks to thickness of					
	4 inch.	8 inch.	12 inch.	16 inch.	20 inch.	24 inch.
1.....	7	15	23	30	38	45
2.....	15	30	45	60	75	90
3.....	23	45	68	90	113	135
4.....	30	60	90	120	150	180
5.....	38	75	113	150	188	225
6.....	45	90	135	180	225	270
7.....	53	105	158	210	263	315
8.....	60	120	180	240	300	360
9.....	68	135	203	270	338	405
10.....	75	150	225	300	375	450
20.....	150	300	450	600	750	900
30.....	225	450	675	900	1,125	1,350
40.....	300	600	900	1,200	1,500	1,800
50.....	375	750	1,125	1,500	1,875	2,250
60.....	450	900	1,350	1,800	2,250	2,700
70.....	525	1,050	1,575	2,100	2,625	3,150
80.....	600	1,200	1,800	2,400	3,000	3,600
90.....	675	1,350	2,025	2,700	3,375	4,050
100.....	750	1,500	2,250	3,000	3,750	4,500
200.....	1,500	3,000	4,500	6,000	7,500	9,000
300.....	2,250	4,500	6,750	9,000	11,250	13,500
400.....	3,000	6,000	9,000	12,000	15,000	18,000
500.....	3,750	7,500	11,250	15,000	18,750	22,500
600.....	4,500	9,000	13,500	18,000	22,500	27,000
700.....	5,250	10,500	15,750	21,000	26,250	31,500
800.....	6,000	12,000	18,000	24,000	30,000	36,000
900.....	6,750	13,500	20,250	27,000	33,750	40,500
1,000.....	7,500	15,000	22,500	30,000	37,500	45,000

1,000 shingles, laid 4 inches to the weather, will cover 100 square feet of surface, and 5 lbs. of shingle nails will fasten them on. As 16-inch shingles are laid 5 inches to the weather, 1,000 shingles (4 bunches) will lay 125 sq. ft.

One fifth more siding and flooring is needed than the number of square feet of surface to be covered, because of the lap in the siding and matching.

1,000 laths will cover 70 yards of surface, and 11 lbs. of lath nails will nail them on. Eight bushels of good lime, sixteen bushels of sand, and one bushel of hair, will make enough good mortar to plaster 100 square yards.

A cord of stone, three bushels of lime, and a cubic yard of sand, will lay 100 cubic feet of wall.

Five courses of brick will lay 1 foot in height on a chimney. 16 bricks in a course will make a flue of 4 inches wide and 12 inches long, and 8 bricks in a course will make a flue 8 inches wide and 16 inches long.

Cement, one bushel, and sand, two bushels, will cover 3½ square yards one inch thick; 4½ square yards, ¾ inch thick; 6¾ square yards, ½ inch thick. One bushel cement and one of sand will cover 2¼ square yards one inch thick; 3 square yards, ¾ inch thick; and 4½ square yards, ½ inch thick.

Wood Measure.

To find the contents of cord wood: multiply the length, width and height together and divide the product by 128.

How many cords in a pile of wood 4 feet wide, 5 feet high, and 24 feet long? 4×5×24 = 480 (cubic feet) ÷ 128 = 3¾ cords.

To find the circumference of a circle: multiply the diameter by 3.1416.

To find the area of a circle: multiply the square of the diameter by .7854.

To find the surface of a globe: multiply the square of the diameter by 3.1416.

To find the solidity of a globe: multiply the cube of the diameter by .5236.

The U. S. Standard gallon measures 231 cubic inches and contains 8⅓ lbs. of distilled water.

A cubic foot of water weighs 62½ lbs. (salt water, 64.3 lbs.) and contains 1,728 cubic inches, or nearly 7½ gallons U. S. Standard.

To evaporate one cubic foot of water requires the consumption of 7½ lbs. of ordinary coal; or about 1 lb. of coal to 1 gallon of water.

The average consumption of coal for steam boilers is 12 pounds per hour for each square foot of grate.

The U. S. Standard bushel measures 2,150.42 cubic inches, or nearly 1¼ cubic feet.

Twenty-eight bushels (of 5 pecks) or 43.56 cubic feet of coal = 1 ton, 2,240 lbs.

One cubic foot of anthracite coal weighs about 53 lbs.

One cubic foot of bituminous coal weighs about 47 to 50 lbs.

One ton of coal is equivalent to two cords of wood for steam purposes.

Quantity of Seeds Required per Acre.

Wheat	1½ to 2 bu
Rye	1½ "
Oats	3 "
Barley	2 "
Peas	2 to 3 "
White Beans	1½ "
Buckwheat	½ "
Corn, broadcast	4 "
Corn, in drills	2 to 3 "
Corn, in hills	4 to 8 qts.

Broom Corn	½	bu.
Potatoes	10 to 15	"
Beets	3	lbs.
Carrots	2	"
Ruta Bagas	¾	"
Millet	½	bu.
Clover, white	4	qts.
Clover, red	8	"
Timothy	6	"
Orchard Grass	2	bu.
Red Top	1 to 2	pks.
Blue Grass	2	bu.
Mixed Lawn Grass	1 to 2	"
Tobacco	2	oz.

Hills in an Acre of Ground.

40 feet apart	27 hills.
35 "	35 "
30 "	48 "
25 "	69 "
20 "	108 "
15 "	193 "
12 "	302 "
10 "	435 "
8 "	680 "
6 "	1,210 "
5 "	1,732 "
3½ "	3,556 "
3 "	4,840 "
2½ "	6,969 "
2 "	10,890 "
1 "	43,560 "

Medical Hints.

A good liniment for old sores, sprains, bruises, etc., but not for fresh cuts or internal use, may be compounded of the following ingredients:

Tincture of opium, ½ ounce; tincture of camphor, ½ ounce; chloroform, ½ ounce; arnica, 3 ounces; glycerine, 1 ounce.

In case of a sprain, bathe the injured part in as hot water as you can till the swelling is considerably or wholly reduced; thoroughly dry the injured place and apply the liniment with the hand till it feels greasy. Repeat the treatment three times daily, if a severe injury, and your wound will speedily become healed.

DROWNING.—Send for doctor, blankets and dry clothing. Take off wet clothes from upper part of body. Lay patient on his back, with his head on a folded coat for cushion. Draw tongue out of mouth and hold it there. A second person kneels at patient's head and takes hold of both his arms just below the elbows. He then draws them upward over the patient's head, and holds them in that position until he counts two; this draws air into the lungs. He then lowers arms to side again and presses them firmly inwards, holding them there until he has again counted two; this forces air out of the lungs. Go on doing this until doctor arrives or until patient breathes naturally. As soon as he does so, rub the limbs in an upward direction with the dry hands, or, better still, with hot flannels. Put patient to bed between blankets, surrounded with hot water bottles. May give him wine or brandy when quite sensible.

RUPTURE, OR "BREAK OF THE BODY."—Try and push it back with flat hand; keep man

on his back. Cold, wet cloths laid over rupture will, perhaps, aid its return.

BROKEN RIB.—Cause intense pain when patient breathes; bind roller towel firmly around chest, fastening with pins, or sewing.

BROKEN COLLAR-BONE.—Bend arm over front of chest; place it in a sling; bind it in that position by scarf going round chest, outside sling.

DOG BITES.—Tie a handkerchief or a cord tightly around limb above wound; suck the wound.

FLESH WOUNDS.—Uncover wound; wash it with clean water; wring out a clean handkerchief, or some lint, in cold water, and lay it over the wound. Then bind in position with handkerchief.

FAINTING.—From heat, exhaustion, or loss of blood. Keep head low; undo clothing about neck; plenty of fresh air; dash cold water on face and chest; smelling salts, carefully used; a little brandy when sensibility has returned. excepting in cases of sunstroke, and where means have not been taken to prevent further bleeding.

INSENSIBILITY —From blows or wounds on the head. Send at once for doctor or take patient to hospital, keeping him on his back with head raised; undo clothing around neck; do not give brandy.

INSENSIBILITY.—From being buried in falls of earth, or breathing foul gas; proceed as in drowning.

FITS —1. If snoring and face flushed, undo clothing round neck, keep head raised, and dash cold water on top of head; hot water bottles to feet. Send for doctor; do not give brandy.

2. If foaming at mouth and convulsed, undo clothing, apply smelling salts, and prevent patient hurting himself until conscious again.

Useful Suggestions in Cases of Accident to Mechanics.

BLEEDING.—If blood spurts from wound, an artery is divided; bind limb tightly above wound with India-rubber tubing, strap, handkerchief or scarf, or bend the limb forcibly at next joint above wound, or press flat hand or stone where blood is flowing. If blood flows freely, but does not spurt, a vein is divided; then apply same measures as in case of wounded artery, but below the wound. If scalp wounded, make a pad of cloth or waste, and bandage very tightly over wound with folded pocket handkerchief.

BURNS OR SCALDS.—Apply lint, cotton, wool or waste soaked in oil and lime water, and bind the same on with handkerchief. If necessary to remove clothes, cut them off by running knife or scissors along seams.

BROKEN LEG.—Pull on leg steadily and firmly until it is of same length as sound one. Roll up a coat or empty sack into form of a cushion, carefully place leg upon it, then bind the two together with scarfs or handkerchiefs. Do not lift patient from the ground until stretcher is close at hand. Take great pains, by careful lifting, to prevent broken bone coming through skin.

BROKEN THIGH.—Take hold of ankle and, by steady traction, pull limb to same length as sound one; another person must then tie knees together, and afterward the ankles. Both limbs should then be laid over a sack of straw, or folded coat, so as to bend the knees. Patient

should on no account be removed until stretcher or cart is close at hand.

BROKEN ARM.—Pull arm to length of sound one Apply two splints, one outside and the other inside binding them firmly on with pocket handkerchiefs. The best splints are made by folding newspapers to necessary length, binding them above and below seat of fracture; anything hard and light, of suitable size, would act equally well; for instance, wood, pasteboard, twigs, leather, etc.

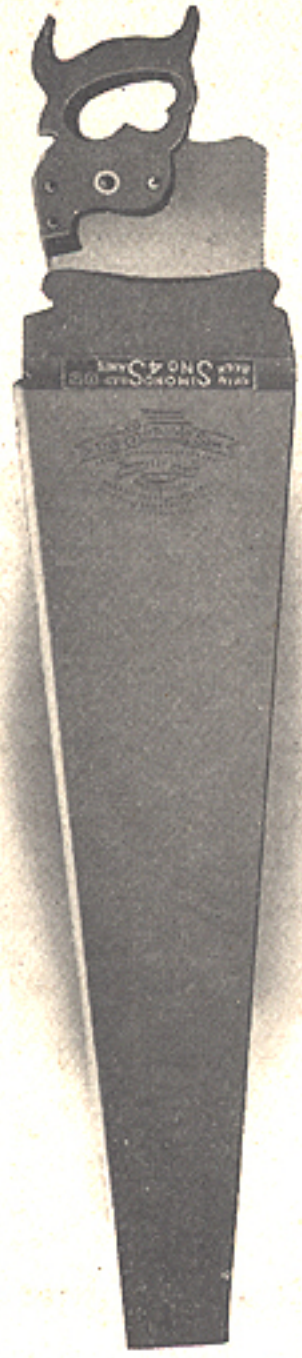
SIMONDS HAND SAWS

OUR WARRANTY.

The Simonds Hand Saws are guaranteed in temper, quality of steel and workmanship throughout, to be as perfect goods as human skill, best material, and a knowledge of manipulating steel dating back to 1832, can produce.

If a Simonds Hand Saw is found defective in any particular, it will be exchanged by the dealer from whom it was purchased.

The carpenter runs absolutely no risk when buying a Simonds Hand Saw.



SIMONDS—The Saw that comes in the separate case.

OUR METHOD OF PACKING HAND SAWS.

Each Simonds Saw is now sold in a separate case as here shown, and such a case is actually a policy of perfect order insurance.

When not in use, keep your saw in this case where it is well protected.

Hardware dealers appreciate the Simonds Saw Case because it helps them keep their shelves neat and orderly.

Ask for the saw that comes in the separate case.

No. 4.

Simonds Manufacturing Co.'s Warranted Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

Simonds No. 4.

Taking into consideration the quality of steel and finish of blade and handle, this is probably the best Hand Saw on the market today. Many carpenters insist on having a saw like this one—Skew Back—Highly polished apple handle—Five brass screws. The blade of this saw is specially selected and given an extra high polish.

All Simonds Saws are covered by an absolute guarantee.

If your Dealer does not have this saw, send us his name and the number of the saw you want.

No. 4½.

Simonds Manufacturing Co.'s Warranted Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

The one point which above all others makes Simonds Saws famous is that they are **Made of Simonds Steel;** and Simonds Steel is the highest grade of Saw Steel made, and is used only by the Simonds Manufacturing Co. and the Simonds Canada Saw Co., Lt'd.

Simonds Improved Process of Tempering guarantees a uniformity throughout the entire saw which enables it to do faster and better cutting.

Know that the saws you buy are made of Simonds Steel.

If your Dealer does not have this saw, send us his name and the number of the saw you want.

No. 5.

Simonds Manufacturing Co.'s Warranted Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

Simonds No. 5.

This saw is selected for an extra high grade Rip Saw by all who prefer the straight back saw. The superiority of the appearance of Simonds' handles is brought out most clearly in this saw. Made of highly seasoned, selected apple wood, nicely carved, and polished on sides and edges to a brilliant finish. This point is appreciated by the carpenter who takes pride in having saws that not only are the best but also look the best.

If your Dealer does not have this saw, send us his name and the number of the saw you want.

No. 7.

Simonds Manufacturing Co.'s Warranted Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

Simonds No. 7.

One of our high grade straight back saws **Made of Simonds Steel** as are all Hand Saws bearing the name of Simonds. For a medium priced straight back saw that is fully warranted in every respect, it is hard to beat Simonds No. 7. We recommend it as a saw for general use.

The improved process of grinding Simonds Saws (the forming of the blade) prevents binding in the cut.

If your Dealer does not have this saw, send us his name and the number of the saw you want.

No. 7½.

Simonds Manufacturing Co.'s Warranted Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

Simonds No. 7½.

This saw has met with flattering success. More carpenters have been genuinely pleased with it than any other special saw on the market.

A few facts about it:

Narrow Blade.

A Finishing Saw.

A Siding Saw.

A Ship Saw.

Runs with very little set.

A Mitering Saw.

A Combination Hand and Panel Saw.

Made of Simonds Steel.

If your Dealer does not have this saw, send us his name and the number of the saw you want.

No. 8.

Simonds Manufacturing Co.'s Warranted Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

Simonds No. 8.

This saw is of the general style and shape which carpenters have been accustomed to using for years past.

Made of Simonds Steel.

Good quality apple handle with polished edges. Five **brass** screws, each screw actually gripping the steel blade and holding the handle firmly in the correct position.

Ground to an even gauge all along the tooth edge and uniformly thinner on the back, thus making a light running saw that does not bind in the kerf.

If your Dealer does not have this saw, send us his name and the number of the saw you want.

No. 8½.

Simonds Manufacturing Co.'s Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

Simonds No. 8½.

The same shape as No. 8. Has a carved apple handle with highly polished sides and edges, making an extremely pretty saw. Holds its cutting edge, saws true, and has an easy, comfortable hang that pleases the carpenter who wants to do careful work.

This is one of the most popular skew back Hand Saws on the market today.

Made of Simonds Steel.

A saw that does not chew and tear the wood fibre, but makes regular, even saw dust. It cuts.

If your Dealer does not have this saw, send us his name and the number of the saw you want.

No. 10.

Simonds Manufacturing Co.'s Special Crucible Steel, Simonds Patented Temper, Hand, Panel and Rip Saws. Any Point. Standard Lengths.

Sold by leading Hardware Dealers everywhere.

Simonds No. 10.

One of the moderate priced manufacturers' own brand saws, possessing the advantages of our special crucible steel. A saw that should be in every home in the United States and Canada.

Look for this Trade Mark.

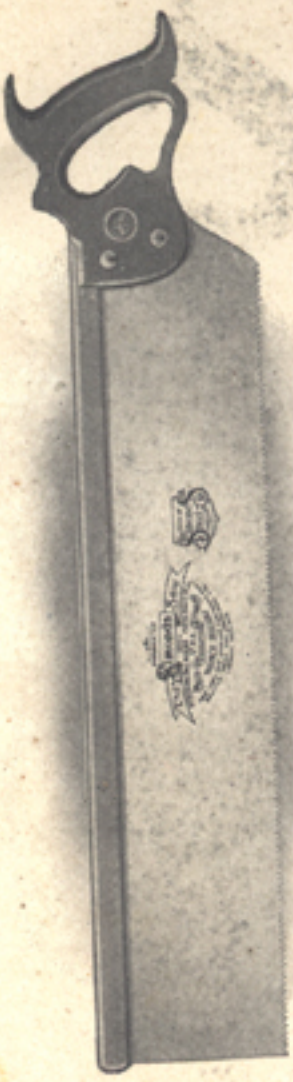
You know you are buying right when you buy saws made of good steel and saws that are absolutely guaranteed as are all Hand Saws bearing this, our trade mark.

No. 14.

Simonds Manufacturing Co.'s Warranted Special Crucible Steel, Simonds Patented Temper, Joiner or Bench Saw. Length, 17 inches.

Special Crucible Steel, Warranted. Carved and Highly Polished Apple Handle, Two Screws.

These saws are in quality and finish of steel and handle the most modern Joiner Saws on the market, and are subject to the broadest Simonds Warranty.



No. 95.

Crucible Steel Back Saws. 4 inches under back.
Length, 18, 20, 22, 24, 26, 28, 30, 32 inches.

Crucible Steel Mitre Box Saws, Apple Handle, Polished Edges, Blued Steel Back, Set and Hand Filed ready for use. Warranted. Toothed Edge, 2 inches shorter than the full length of blade.

No. 83.

Simonds No. 83 Plumbers' Nest of Saws with Metal Cutting Blade and Patented Adjustable Handle.

Complete, including Handle, 10 inch Keyhole Blade, 12 inch Compass Blade, and 18 inch Nail Cutting Blade, $18.00 per dozen.

SIMONDS SAWS

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