

1928

Carpentry



MERIT BADGE SERIES
BOY SCOUTS of AMERICA
200 FIFTH AVE.
NEW YORK CITY

REQUIREMENTS

To obtain a Merit Badge for Carpentry, a Scout must:

1. Demonstrate the use of the rule, square, level, plumb-line, mitre, chalk-line and bevel.
2. Demonstrate the proper way to drive, set, and clinch a nail, draw a spike with a claw-hammer, and to join two pieces of wood with screws.
3. Show correct use of the cross-cut saw and of the rip-saw.
4. Show how to plane the edge, end and the broad surface of a board.
5. Demonstrate how to lay shingles.
6. Make a simple article of furniture for practical use in the home or on the home grounds, finished in a workman-like manner, all work to be done without assistance.

INTRODUCTION

THIS is one of a series of pamphlets published by the Boy Scouts of America in connection with its Merit Badge scheme. This library on Scout activities and vocational guidance has been prepared by experts and is frequently revised and brought up to date.

We feel that the Merit Badge Series offers to boys a library that is unsurpassed in helpfulness, technical excellence, and wide range of interest. Much of the material that is here made available at a very moderate cost, it would be impossible to procure at any price elsewhere. Leading authorities have placed their time and knowledge at the disposal of the Boy Scouts as a contribution to the boyhood of America.

It would defeat the purpose of the Merit Badge plan if an attempt were made in the pamphlets to cover the requirements so completely as to make unnecessary the boy's using his own initiative and resourcefulness in seeking further information to enable him to meet the requirements successfully. The material in this pamphlet, however, provides a more comprehensive outline of the subject than would be practical in the Handbook for Boys. The pamphlets suggest the scope of the subject, and serve as a guide. In each case the Scout should secure further book knowledge for himself and avail himself, upon his own initiative, of such opportunities for further study as he can develop in his neighborhood or community, from men who are authorities on the subject. Experience shows that men of this type are usually very glad to cooperate with boys who show an earnest interest in the subject.

Only the duly registered Scout may qualify for Merit Badges. Second Class Scouts are eligible to take five of a selected list of thirty subjects. First Class Scouts may qualify for the entire series.

Examination for Merit Badges should be given by the Court of Honor of the Local Council and in larger communities by the district Court of Honor, organized so as to reduce to a minimum the necessity of the boy traveling long distances. In no case shall a Merit Badge be awarded unless the Scout has personally appeared before at least three members of the Court of Honor, and either by examination, conducted personally by the Court of Honor, or upon evidence furnished by a duly appointed expert counsellor, demonstrated to the satisfaction of the Court of Honor that the Handbook requirements have been complied with in a satisfactory manner. In communities where there is no Court of Honor an Examining Committee of at least three members supervises the Merit Badge Tests.

In all examinations, it should be borne in mind that the purpose of the tests and examinations is not to secure a mere technical compliance with requirements, but rather to ascertain the Scout's general knowledge of subjects studied, and practical rather than book knowledge is desired. A Scout should be prepared at any examination for a review covering previous tests given him as well as to demonstrate that he is putting the Scout Oath and Law into daily practice.

With a view of increasing the value of these pamphlets to all boys, and particularly to Boy Scouts interested in securing Merit Badges, an attempt has been made in connection with each subject, to make available facts and information bearing on the vocational value of the subject. It is believed that this practical application in each case makes available a unique contribution to the literature for boys, and will be of great value to parents and teachers as well as boys throughout the whole country.

To further this object, those interested, and having suggestions to offer as to the vocational guidance treatment of any of the eighty-eight subjects for which Merit Badge awards are provided are invited to correspond with E. S. Martin, Secretary Editorial Board, The Boy Scouts of America, Park Avenue Building, 2 Park Avenue, 32nd and 33rd Streets, New York City.

CARPENTRY

(This article is quoted or adapted by permission from *Woodworking* by Charles G. Wheeler, published by G. P. Putnam's Sons, New York and London.)

1. *Demonstrate the use of the rule, square, level, plumb-line, mitre, chalk-line and bevel.*

The *Rule*, used to measure and lay out work, is divided into inches, halves, quarters, eighths and sixteenths. To mark distances for accurate work, lay the rule on edge so that the divisions on its side touch the wood (Fig. 1). In making several small measurements do not move the rule (Fig. 1). To measure as in Fig. 2 use any division on the rule, rather than its end, for the end is likely to be inaccurate, and is harder to place in line with the edge of the wood. The thumb will help adjust the rule.

The *Try-square* is to test right-angled work, and to mark lines at right angles across surfaces. Keep the beam or head (Fig. 3) pressed against the surface to which it is applied, and the blade will then be in position for either marking or testing a right-angle (Figs. 4 & 5). A good

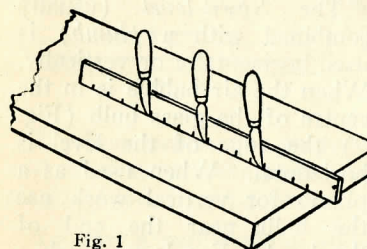


Fig. 1

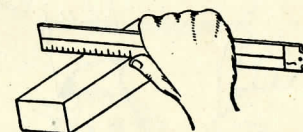


Fig. 2

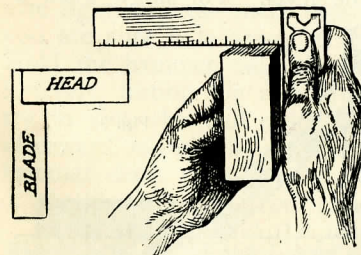


Fig. 3

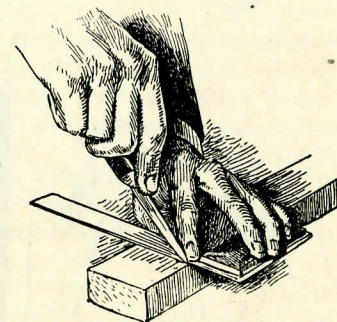


Fig. 4

Fig. 5

way to mark with the square is to place the knife on the given point and slide the square along until it hits it (Fig. 4). Then draw the line. To continue such a line upon the adjacent surface, place the knife at the end of the line as in Fig. 6, slide the square up to it, and mark the face. In testing a surface or edge with the try-square (Fig. 7) place it at several points. Face the light.

The *Framing-square*, "Steel-square," or two-foot carpenter's square, is used like the try-square and is of great value in getting out stock, in laying out work and in testing work too large for the try-square. It can also be used as a rule, as a straight-edge, and to set the bevel at different angles.

The *Bevel* is similar to the try-square, but the blade can be set at any angle. The *Mitre-square* is fixed at an angle of 45 degrees. The head of the bevel, like that of the square, must be held firmly against the wood. To get angles of 45 degrees and 135 degrees with the bevel, place it against the inside edge of the steel-square (Fig. 8) and set the blade at the same distance on each arm of the square.

The *Spirit-level* (usually combined with a *plumb*) is used horizontally or vertically. When the air bubble is in the centre of the glass bulb (Fig. 9) the edge of the level is horizontal. When used as a plumb for vertical work use the bulb near the end of the level. For large work a

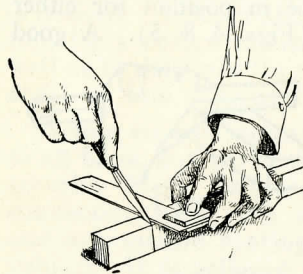


Fig. 6

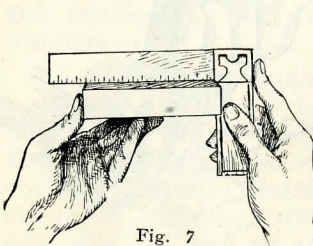


Fig. 7

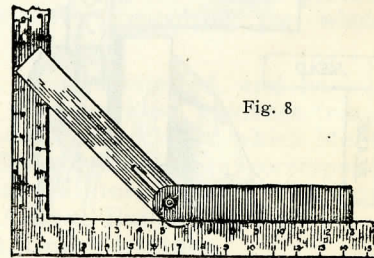


Fig. 8

long straight-edge of equal width throughout should first be placed on the surface to be tested, and the level or plumb applied to the straight-edge (Fig. 9). To get a plumb line, hang any weight at the end of a cord (Fig. 10.) The cord will be vertical as soon as it stops swinging.

The *chalk-line* is a chalked cord used to mark between two points. A small cord is better than a large one. At one end of the desired line fix the cord with a loop around an awl or nail, and chalk it from this end (as in Fig. 11).

It can be revolved in the hand as the line is chalked so that the chalk will not be cut in two. Then draw the cord taut to the other end of the desired line, hold it down with one hand, lift it squarely from as near the middle as practicable with the thumb and forefinger of the other hand, and let it snap back to the surface (Fig. 12).

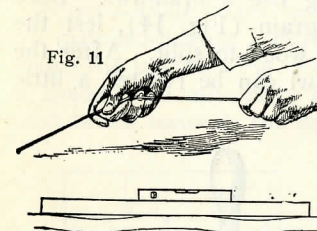


Fig. 11

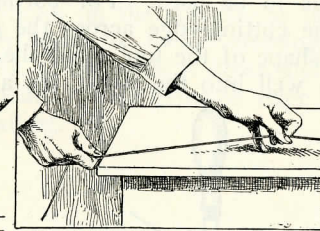


Fig. 12



Fig. 10

2. Demonstrate the proper way to drive, set and clinch a nail, to draw a spike with a claw-hammer, and to join two pieces of wood with screws.

To start a nail straight, sight it from different directions. Use light strokes—mere taps—in starting the nail. After you are sure it is going straight, you can use more force. Hold the hammer near the end of the handle, and swing it freely, hitting the nail squarely. On nice work do not try to sink the nail quite flush with the wood. Sink it afterward slightly below the surface with the nail-set lest hammer dents show on the finished work. Keep the face of the hammer free from grease or glue.

To set a nail, hold the nail-set firmly against the little finger, with the latter on the wood close to the head of the nail (Fig. 13).

When there is danger of splitting or when slender nails are driven into hard wood, bore holes not quite so large as

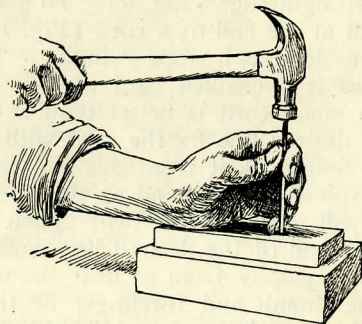


Fig. 13

the nails to be used. For boring use a brad-awl. Bore with the cutting-edge across the grain (Fig. 14), lest the wedge shape of the tool cause the wood to split. After the edge is well into the wood, the awl can be twisted a little

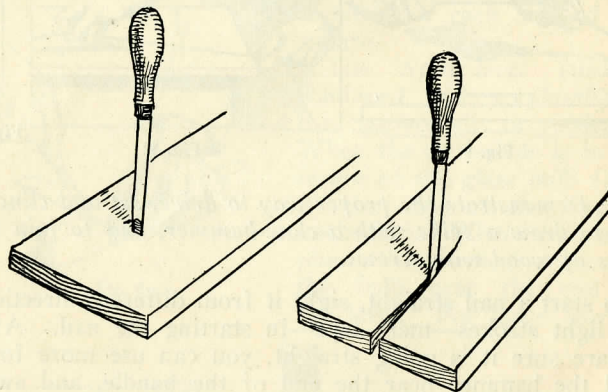


Fig. 14

back and forth as it is pushed farther. There is always risk of splitting thin wood near an edge. A drill may be used. If a nail is driving badly, pull it out and drive it in another place. If a nail becomes bent, pull it out and use a straight one. If a nail slants so that it will come out at the side, pull it, and if straight, drive it in another place. If bent, use a straight one. It is natural in such a case to tap the upper

part of the nail until it is vertical or in the line you wish it to go, but if this bends the nail, as often happens, it will be even more likely to break through the side than before, as shown in Fig. 15.

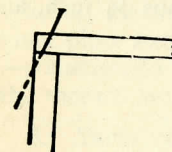


Fig. 15

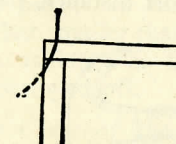


Fig. 16

Slanting the nails helps to draw one piece tightly up to another (Fig. 16).

In nailing cleats, or in similar cases, stagger the nails; that is, arrange them in a zigzag way (Fig. 17).

Blind-nailing leaves no holes on the surface, as in floors of matched-boards. Each board is nailed slantingly just above the tongue (Fig. 18). This holds it down and draws it toward the adjoining board. The grooved edge of the next board conceals the nailing.

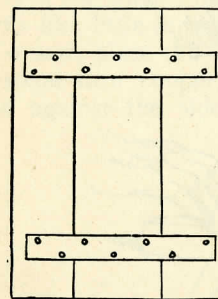


Fig. 17

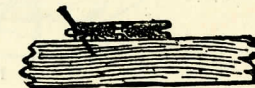


Fig. 18

To clinch, drive the nail through, hold a hammer or a piece of metal against the head and strike the projecting point with light, slanting blows so as to curl it over gradually (Fig. 19). As it bends, strike more directly downward until the hooked end is imbedded in the wood. Clinch across the grain of the wood.

To withdraw nails place a block under the hammer head (Fig. 20), using thicker blocking if necessary, as the nail is withdrawn, so that it can come out straight. To draw nails from boxes, and in similar cases, pry up a board, together with the nails, a short distance, perhaps $\frac{1}{4}$ inch, and

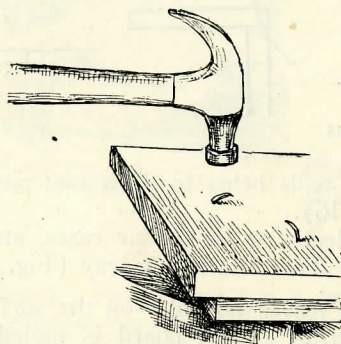


Fig. 19

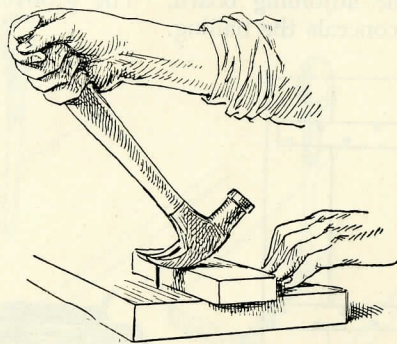


Fig. 20

then with a quick blow of the hammer pound the board back into place, striking between the nails. The nails will then project, usually, so that they can be drawn.

To join two pieces of wood with screws. Bore a hole in the outer piece—the one which the head of the screw will bear against—large enough to let the smooth part of the screw slip through easily without being loose. Then, when



Fig. 21

the screw is driven into the inner piece, the head will draw the two parts together tightly. In soft wood the hole in the outer piece is usually the only one needed, unless there be danger of splitting the inner piece. In hard wood bore a hole in the inner piece somewhat smaller than the diameter of the screw, —sometimes even as large as the core, or solid shank if the threads were stripped off.

3. Show correct use of the cross-cut saw and of the rip-saw.

Saw. Use the cross-cut saw for sawing across the grain, and the Rip-saw for sawing with the grain.

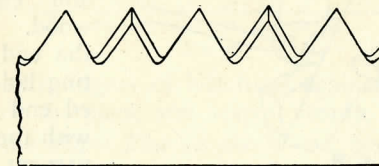


Fig. 22

Cross-cut Saw. The teeth have sharp edges and sharp points like little knives.

To saw, place the work on horses, in the bench vise, or on some firm support. Hold the forefinger of the right hand against the side of the handle, as shown below, to

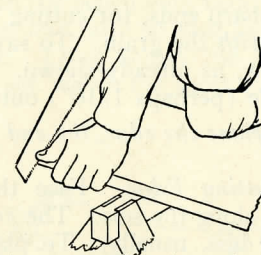


Fig. 23

steady the saw. Use the thumb of the left hand to help start the saw on the line, as shown above. Have your eyes vertically over the line, so that you can look on both sides

of the saw, to keep the blade at right angles with the surface of the wood. When the saw is in position, draw it gently

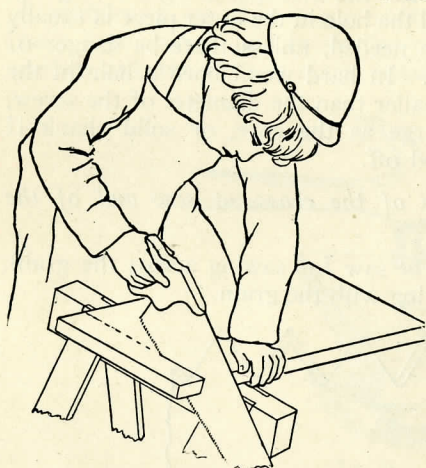


Fig. 24

Rip Saw. Use for sawing with the grain. The cross-cut saw will serve with the grain also, but the rip-saw works more quickly. Properly filed rip-saw teeth are like little

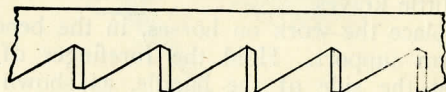


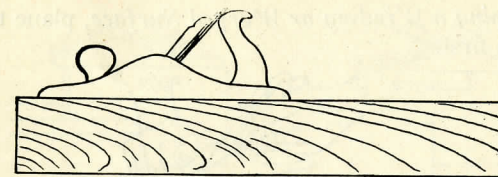
Fig. 25

chisels with square sharp ends, for cutting lengthways of the grain only; that is, *with* the grain. To saw, use the rip-saw like the cross-cut saw, as already shown. If the edge is to be planed, saw a little (perhaps $1/16''$) outside the line.

4. Show how to plane the edge, the end and broad surface of a board.

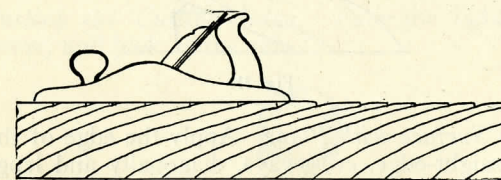
Adjusting the Cutting Edge. Face the light, turn the plane over, and look along the sole. The edge should project only about $1/32''$ or less, usually. To plane the edge of a board, fasten the wood in the vise, or otherwise, so as to plane with the grain, if possible.

Operation of Planing an Edge. The edge must be planed: (1) Straight, and (2) square with the side of the piece. Look along the edge to see where the most planing is needed.



Planing With the Grain

Fig. 26



Planing Against the Grain

Fig. 27

Hold plane with fingers of left hand against the side of the wood to guide the plane and keep it steady.

To Keep the Plane Flat on the Wood, press down on the forward part of the plane with the left hand during the first part of the stroke, and on the rear part with the right hand during the last part of the

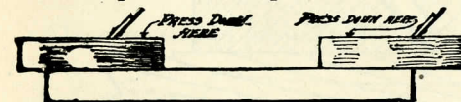


Fig. 28

Fig. 29

stroke, removing the left hand at the end.

To Plane a Broad Surface, as the side of a board, hold the wood firmly on the bench with bench-stops, or in the vise, or in some secure way, and so that you can plane with the grain, if possible. Look across the surface, or test with straight-edge, to see where the most planing is needed.

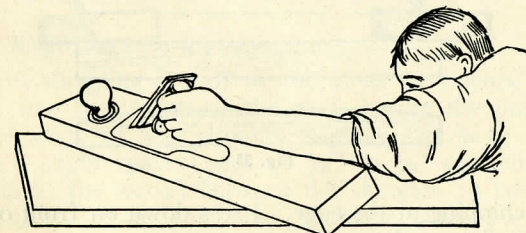


Fig. 30

In Planing a Winding or Warped Surface, plane the highest places first.

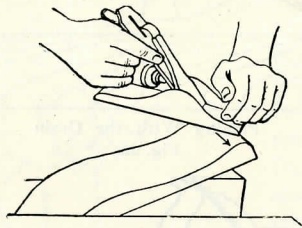


Fig. 31

Testing Surface with Plane. Apply the edge of the plane, or any straight-edge, crossways, diagonally and lengthways, and you can see whether the surface is flat; if not flat, plane the high places, test again, and so on.

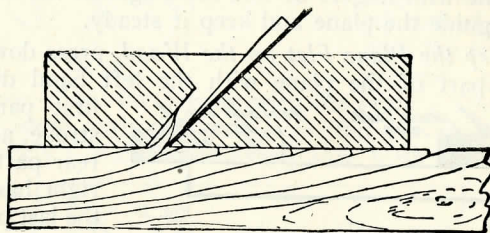


Fig. 32

Planing end-grain. Fasten the wood low in the vise. Plane partly across from one edge, then reverse the piece and plane partly across from the other edge. This is to

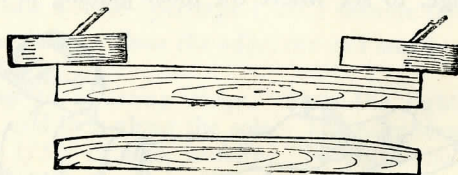


Fig. 33

prevent chipping at the edge. Press down on front of plane to keep it flat on the wood.

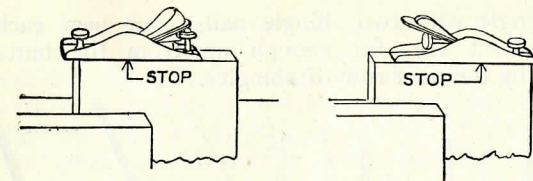


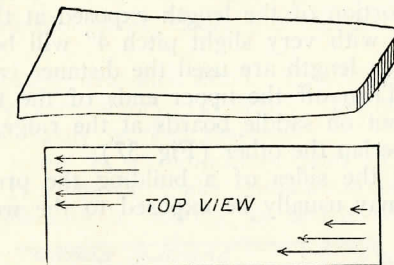
Fig. 34

Adjusting the Cutting Edge. Face the light, turn the plane over, and look at the sole.



Fig. 35

The edge should project only about $\frac{1}{32}$ " or less.



5. Know how to lay shingles.

Begin shingling a roof at the eaves and work upwards. Lay a row the length of the roof, letting the butts or the heavier ends of the shingles slightly overhang the edge. Leave a slight space (perhaps $\frac{1}{8}$ " to $\frac{3}{8}$ " according to the dryness of the wood) between the shingles, in laying them. This gives room for free drainage and for swelling and keeps the shingles from bulging and splitting. Fasten

each shingle with two shingle nails (one near each edge, within about 1"), far enough up from the butt to be covered by the next row of shingles.

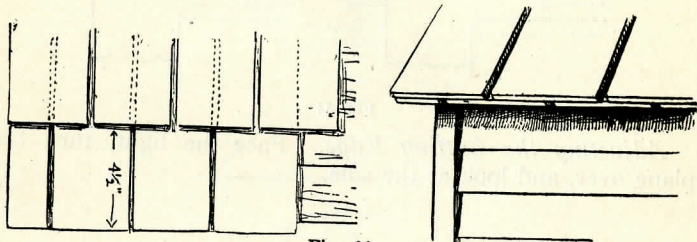


Fig. 36

On top of the first row lay another row with the butts of the second row flush with those of the first, but breaking joints with the shingles of the first row. That is, lay the first row double, but so that the spaces between the shingles of the lower layer are covered by the shingles of the upper layer (Fig. 36). Lay the butts of each row by a chalk-line or against the edge of a narrow board, which can be adjusted and temporarily held in place by two strips nailed to it and to the roof higher up. Shingles 16" long can be laid about $4\frac{1}{2}$ " to the weather (Fig. 36); that is, with that portion of the length exposed at the butt. In case of a roof with very slight pitch 4" will be safer. If shingles of extra length are used the distance can be varied accordingly. Trim off the upper ends of the top rows of shingles, and put on saddle boards at the ridge, letting the edge of one overlap the other (Fig. 37).

In shingling the sides of a building the process is the same, but 5" may usually be exposed to the weather (and

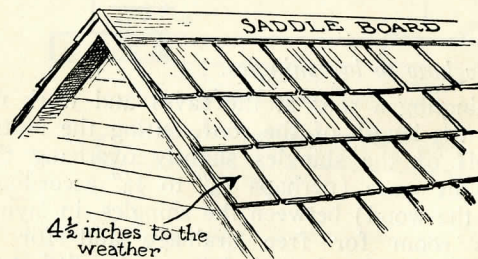


Fig. 37

sometimes even more), because the danger of leaking is less than on a roof.

Galvanized nails should be used for shingling, as the common wire ones rust away quickly. Galvanized wire nails will often outlast the shingles on a roof. Galvanized cut nails are good and should be driven on the same principle as the brad-awl (Fig. 14) lest the wedge shape split the wood. The best cedar or cypress shingles are not too good for any building where durability is of importance. Small knots or defects at the thin ends, when they will be covered by two or three layers, do no harm in ordinary work.

5. *Make a simple article of furniture for practical use in the home, finished in workmanlike manner, all work to be done without assistance.*

As the home also includes the porch and grounds of the house, bird houses, flower boxes, trellises, etc., may be considered as furniture.

Complete instructions for making furniture would necessarily include directions for the use of many woodworking tools and for many special operations which it is, of course, impossible to treat even in the briefest manner in a short article; therefore only a few general suggestions can be given.

Choose simple forms, easily put together, for your first attempts.

Use thoroughly seasoned wood. This is essential to making permanently satisfactory furniture. Begin with straight-grained and easily worked material.

Making joints is an important part of furniture construction. If a boy can make joints accurately, he will have no great difficulty in making an article of furniture. A description of some of the common joints is given below.

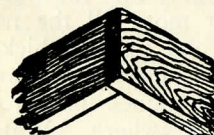


Fig. 38

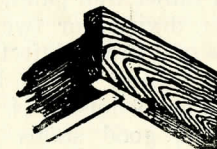


Fig. 40

The butt joint is used for a great variety of common work, as boxes, etc. It is usually nailed (Fig. 38). Screws

can be used, in such cases as boxes, but do not hold strongly in end grain. A butt joint can be straightened or stiffened

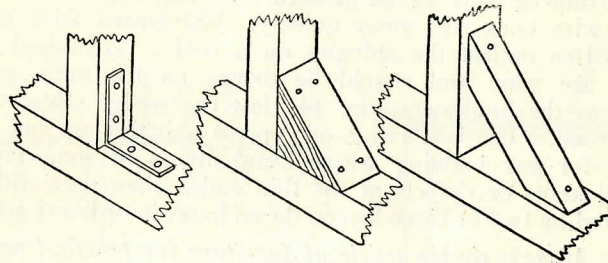


Fig. 39

by a corner-iron, by a wooden corner block, nailed or screwed or glued or by a brace (Fig. 39). A *dado joint* (Fig. 40) is where a groove is cut across the grain of one piece into which the end of another piece fits.

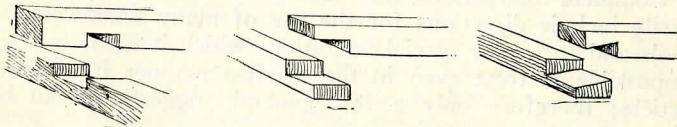


Fig. 41

(Fig. 41) shows common forms of the *halved joint*, which is a good way to join two sticks when they cross at right angles or obliquely.

Finishing

Place the work so that you face the light if possible. If the article is to be painted, first cover all knots and resinous spots with a coat of shellac. Then applying a priming coat with rather thin paint, working it thoroughly into the wood. After drying for twenty-four hours or more fill the nail holes and other defects and apply a second coat of thicker paint. After this is hard a third coat is usually required for a good finish. If the article is to be stained instead of painted, good stains can be bought everywhere. Water stains are very good as a rule. They raise the grain of the wood, which should be sanded lightly after the stain is dry. After staining, shellac or varnish may be applied—quite thin so as to flow freely from the brush. Shellac must be thinned

with alcohol, varnish with turpentine. Do the work in a dry place, free from dust. Apply shellac quickly. Varnish can be applied more slowly because it does not set so quickly. Brushing lacquer is excellent, but must be flowed on quickly and freely, according to the directions which come with it. As a rule in finishing, work lengthways of the surface rather than crossways. Begin *near* the end of the surface but not *at* the end. Start each succeeding stroke on the untouched wood and brush toward the part already covered, to avoid "laps." After each stroke brush back the other way to make the coating uniform, except with lacquer. For very nice work the surfaces may be rubbed down, for which, and for other forms of finishing, see the pamphlet "Craftsman-ship—Wood." The modern brushing lacquers are excellent, but must be applied according to the directions printed on the cans.

SOME SUGGESTED PROJECTS

Candle Light Fixture (Fig. 42)

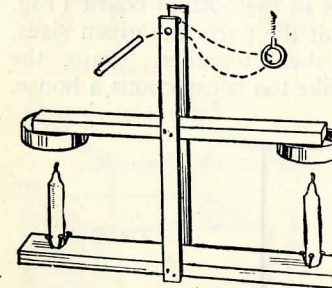


Fig. 42

This requires four wooden strips. Near each end of a strip 16 inches long (Fig. 42) drive four nails to form candle holders. For reflectors nail or screw two can covers to a strip 15 inches long, with centers the same distance apart as the candle holder centers, and connect this strip with the candle holder strip by means of a pair of narrow strips in the manner shown.

If you want to hang this fixture from the tent ridge-pole bore a hole through each of the vertical strips near the top, and cut a peg long enough to drive through the holes. Then screw a screw eye into the ridge-pole and slip the peg through the holes and screw eye.

Robin Shelter (Fig. 43)

Robins do not build their nests in enclosed houses, so their nesting places must be exposed on two or more sides.

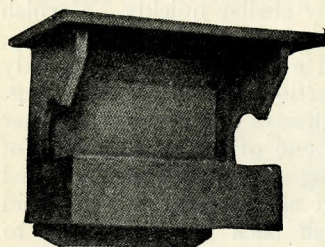


Fig. 43

They will readily build in a shelter like that in Figure 43 if it is placed about 6-15 feet high in a tree, a quiet spot in the garden, or the outside wall of a building. Fasten it high enough to be out of reach of cats.

The shelter may be made of grocery box boards. The dimensions of the parts in Figure 44 allow for wood $\frac{3}{8}$ inches thick. Fig. 44 shows how the parts fit together. Nail together temporarily the two boards out of which side pieces A are to be cut, mark the outline on as shown in Fig. 44, cut the two pieces out together and then separate them.

A hand bracket saw or coping saw is best for cutting the center circle opening. The small hole in the upper right-hand corner of the side pieces is to run a wire thorough for hanging up the house. The holes in the bottom board (Fig. 44C) are drain holes. Having cut the parts the given sizes, you will easily be able to put them together. Paint the house a dull color. Birds do not like too conspicuous a house.

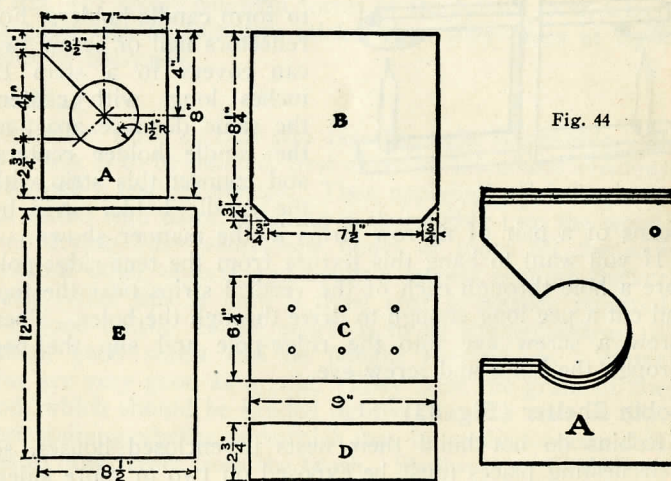


Fig. 44

Window or Porch Box

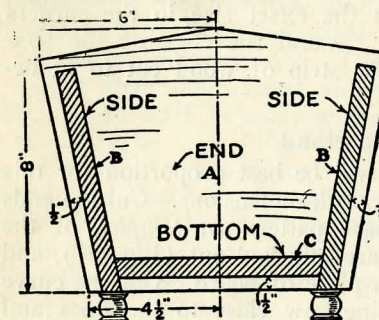


Fig. 45

The completed box is not shown, but Figure 45 gives the pattern for the end pieces (A) and the positions of the sides (B) and the bottom (C). Use one end piece for a pattern when cutting the other. Cut the sides and bottom the same length, which will be determined by the size you wish your box.

Make the sides $7\frac{3}{4}$ inches wide, and the bottom the right width to fit between them. Bevel the edges of the bottom to make them fit squarely against the side pieces. Mark the positions of the side pieces on the ends to simplify assembling. Nail the pieces together and set the nail heads below the surface. Finish either with oil paint, enamel or waterproof varnish. Cypress is the best wood because of its enduring qualities.

Plant Stand

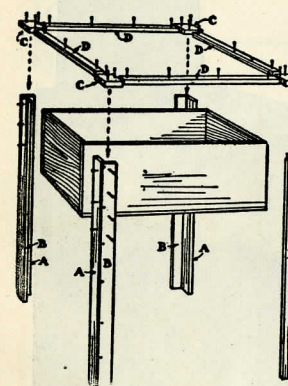


Fig. 46

Figure 46 shows the assembling of the parts of the plant stand. Make it the height of your window sill if it is to stand before a window. The one illustrated was 29 inches high. A grocery box is the foundation. For the legs use stock $\frac{1}{2}$ inch thick. Cut strips A $1\frac{1}{2}$ inches wide, and strips B 2 inches wide, and nail together for the legs. Finish the tops with blocks, C, large enough to project $\frac{1}{2}$ inch over the sides of the legs; finish the top edges of the box with strips

the corner blocks, and wide enough to project $\frac{1}{2}$ inch over the box sides.

A shelf will brace the lower ends of the legs. A single board will make it. Cut it the exact size in the corners formed by the leg strips. Conceal the edge of the box-bottom boards with a narrow strip of wood cut to fit between the corner strips.

Book Trough and Magazine Stand

Three-quarter inch stock will be best proportion for this stand. Figure 47 shows the stock dimensions. Cut the ends first. Then make a cardboard pattern, or *templet*, of the lower end, with the curve carefully laid out (Fig. 51), and mark around this upon each piece of board. Cut the curve with a bracket saw or coping saw close to the lines and smooth the edge with a file and sandpaper.

Mark and cut *mortises* to receive the ends of the trough and shelf boards. The mortises for the trough strips (B)

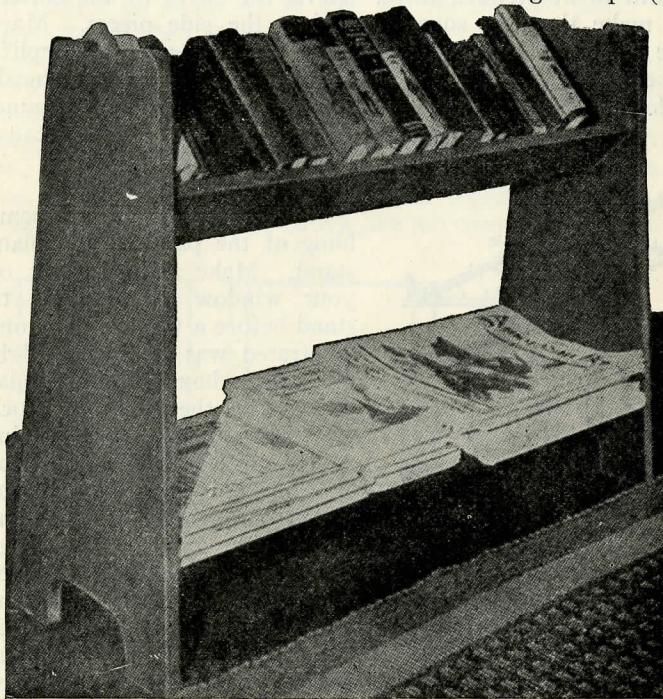


Fig. 53

must be placed at right angles to each other, and all mortises must be $\frac{1}{8}$ inch less than the board-end measurement on all sides. Cut them $\frac{1}{2}$ inch deep. Prepare *tenons* on the board end to fit the mortises. The mortises must be $\frac{1}{8}$ inch deeper than the tenons, and the tenons must fit loosely enough to drive in easily when coated with glue, yet tightly enough to be snug (Figs. 52 and 54).

Now glue the parts together. Drive four screws through each end, one into each of the book trough strips and two into the shelf board (Fig. 50). Use round-headed, blued-iron finishing screws $\frac{3}{16}$ inch in diameter and 2 inches in length. Finish in any way desired. Fig. 53 shows the completed piece of work.

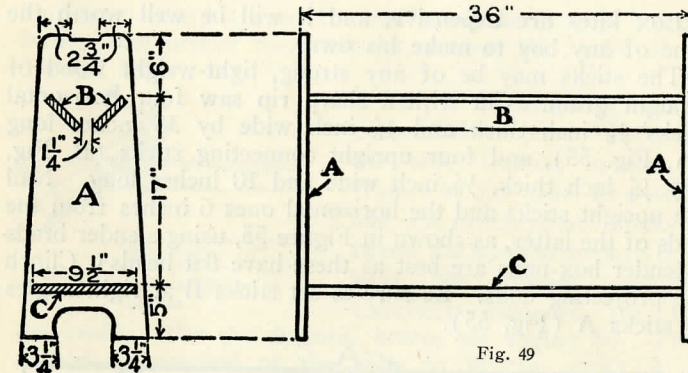


Fig. 48

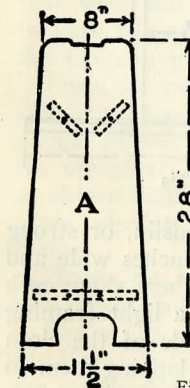


Fig. 50

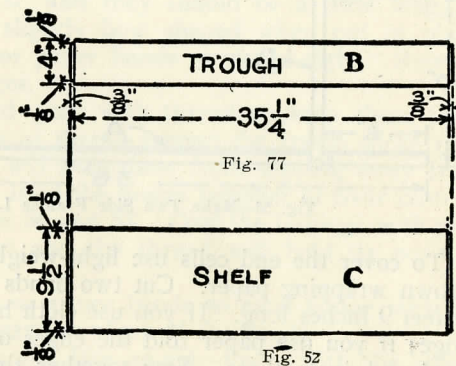


Fig. 52

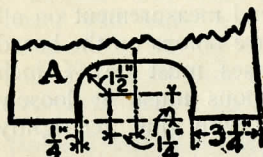


Fig. 51

MATERIAL LIST			
No. Pieces	DIMENSIONS		PARTS
2	3/4" x 12" x 28"	S-2-S	ENDS
2	" x 4" x 36"	"	TROUGH
1	" x 10" x "	"	SHELF

Fig. 47

Book-Trough and Magazine-Stand, Fig. 53

Fig. 47—Material Required for Book-Trough and Magazine-Stand (Fig. 53)

Fig. 48—Cross-Section. Fig. 49—Side View. Fig. 50—End View.

Fig. 51—Bottom of End Pieces. Fig. 52—Shelf. Fig. 54—Trough Board

The Box Kite

Box kites are expensive, and it will be well worth the time of any boy to make his own.

The sticks may be of any strong, light-weight wood of straight grain. Cut with a sharp rip saw four horizontal sticks $\frac{3}{8}$ inch thick and $\frac{3}{8}$ inch wide by 36 inches long (A, Fig. 55), and four upright connecting sticks (B, Fig. 55) $\frac{1}{4}$ inch thick, $\frac{1}{2}$ inch wide and 10 inches long. Nail the upright sticks and the horizontal ones 6 inches from the ends of the latter, as shown in Figure 55, using slender brads (slender box-nails are best as these have flat heads). Clinch the projecting ends. Be sure to set sticks B at right angles to sticks A (Fig. 55).

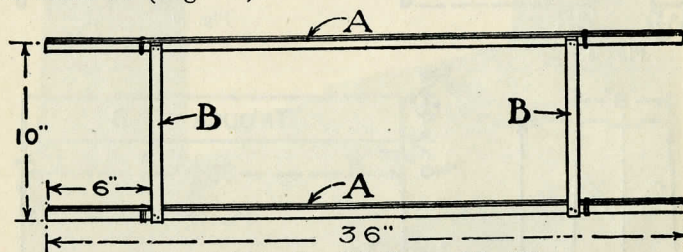


Fig. 55—Make Two Side Frames Like This

To cover the end cells use light-weight muslin, or strong brown wrapping paper. Cut two bands 10 inches wide and 5 feet 9 inches long. If you use cloth hem them along each edge; if you use paper fold the edges over a light framing cord and paste them. Sew together the ends of the cloth bands, or paste the ends of the paper bands, lapping them so

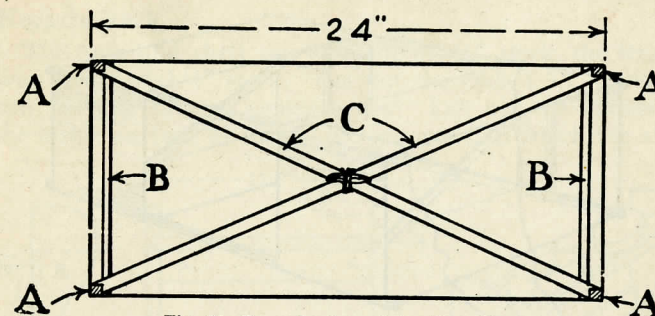


Fig. 56—Cross-Section of the Box Kite

the measurement around the inside will be exactly 5 feet 8 inches—the proper measurement around the sticks of the finished kite.

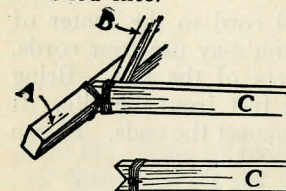


Fig. 57—Detail of Diagonal Braces

To put the kite together, slip these cloth or paper bands over the side frames, spread the frames as far apart as possible, and put in temporary sticks between the upright sticks (B) to hold the frames stretched. Carefully measure the cells diagonally. For the diagonal braces see Figure 56. These should be notched at the ends to fit the sticks A, as shown in Figure 57, and they should be a little long, so that they will be slightly bow shaped when put in place, to keep the cloth or paper bands stretched tight. Remove the temporary braces.

Lash the notched ends with thread to keep them from splitting. Lashings of thread around the frame sticks (A) (Figs. 55 and 57) will keep them from slipping away from the uprights (B). Bind the braces together at their centers, as shown in Figures 56 and 58. Coat the lashings with glue after winding them and the thread will hold its position better.

Fasten the cloth or paper bands to each frame stick by two tacks, placed near the edges of the bands.

Figure 58 shows the kite up-side-down, with the string attached. In flying the kite will be the other side up, with the string underneath. Fasten one cord at each of the two

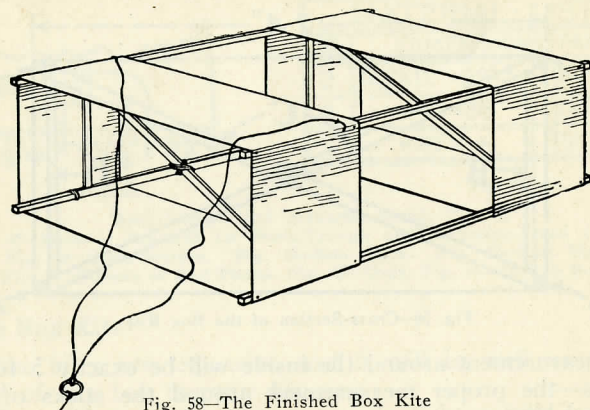


Fig. 58—The Finished Box Kite

outer corners of one cell and a third cord to the center of the outer edge of the other cell; or you may use four cords, one at each of the four outer corners of the kite. Bring the ends together and tie about three feet from the kite. It is a good plan to use a small ring to connect the ends. Fasten the long string to this.

Footstool

Use stock $\frac{7}{8}$ " or $\frac{3}{4}$ " thick. Get out ends or legs (A), using jig saw, turning saw, or compass saw. Smooth edges with spokeshave or file. Plane sides. Sandpaper, using

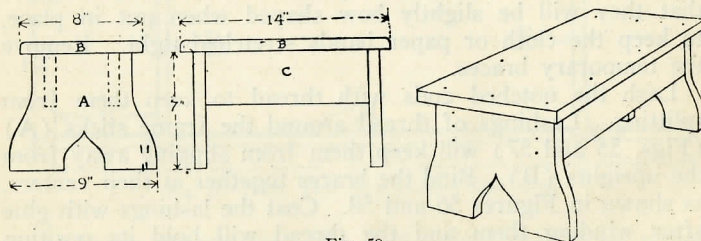


Fig. 59

block. Get out stretchers (B). Plane and sandpaper. Get out top (C). Plane and sandpaper. Nail ends and stretchers together as shown with 2" wire nails. Nail on top, seeing that it projects equally all around. Set nails. Finish as desired.

Necktie Rack

The ends and shelf can be made of $\frac{1}{2}$ " stock, the length-way strips of $\frac{1}{4}$ " stock. Get out the ends (A), using jig saw, turning saw, or compass saw. Lay out the dados on the inside surface of these (the grooves into which the shelf

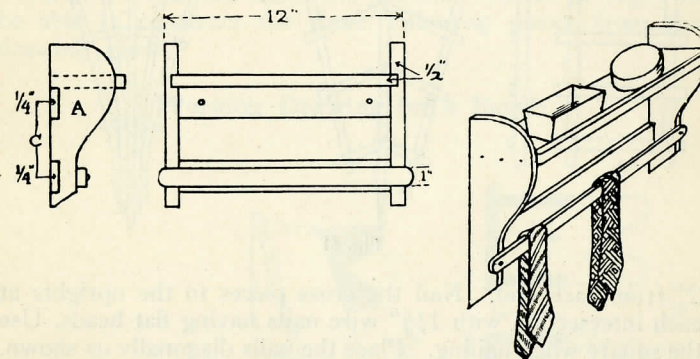


Fig. 60

is to fit) pieces by marking two parallel lines with the square $\frac{1}{2}$ " apart. Mark the depth ($\frac{3}{16}$ ") for the dados (B) on each edge with the gauge. To cut the dados saw carefully on the squared lines as far as the lines gauged on the edges and pare out the wood between with a narrow chisel. In a similar way mark and cut the recesses (C) on the back edges to hold the strips which go against the wall. Get out the shelf and fit it to the dados. Also get out the strips to fit into the back edges. Smooth these parts, apply a little glue to the joints, and fasten in place with $\frac{1}{4}$ " wire finishing nails. Set the nails slightly. Get out the necktie strip, smooth, and fasten in place with 1" round-headed blue screws. Finish as desired.

Trellises

A. Cut two strips for the uprights $\frac{7}{8}$ " thick by 2" wide and of the length desired for the trellis. Lay them side by side and square lines 6" apart across both strips. For the cross slats cut strips ($\frac{1}{2}$ " by $1\frac{1}{2}$ ") and as long as the desired width of the trellis, perhaps 18". There must be as many as the number of lines squared across the uprights. Lay these cross slats side by side and square lines across them

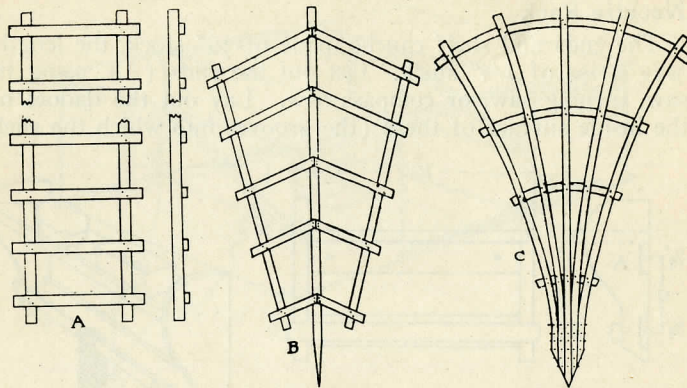


Fig. 61

2" from each end. Nail the cross pieces to the uprights at each intersection with $1\frac{1}{2}$ " wire nails having flat heads. Use the square when nailing. Place the nails diagonally as shown. Turn the trellis over and nail again, reversing the diagonal arrangement. Or use $\frac{3}{4}$ " nails and clinch them. Screws can be used. Stain or paint as desired.

B. Cut three strips ($\frac{7}{8}$ " by $1\frac{1}{2}$ "") of the desired length for the upright pieces. Also cut a sufficient number of strips ($\frac{1}{2}$ " by $1\frac{1}{2}$ "") for the slats. Mark equidistant points on the centre upright where the slats meet. Lay the uprights on the floor in the desired positions and nail the slats in place, bevelling the ends where they meet. Paint or stain as desired.

C. Cut five strips of straight-grained wood of the desired length for the trellis. They should be free from knots or flaws which would cause them to break when being bent. Place the strips side by side and fasten them together at one end with slender bolts or with screws driven from each side. Mark the places for the cross rods where desired and bore $\frac{3}{8}$ " holes at these points. Pass $\frac{3}{8}$ " dowels through the holes, spread the long strips apart until they are in the desired positions, and fasten them with slender brads. Saw off any projecting ends. Paint or stain as desired.

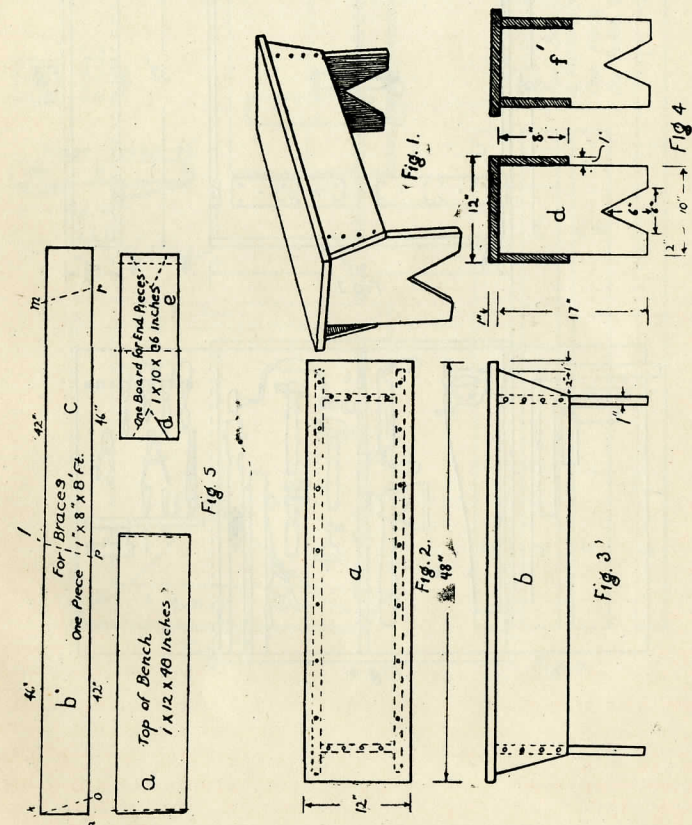
The sizes of stock given above are suitable for trellises of medium size. If very large or very small ones are to be made the sizes of the parts should be varied accordingly.

MORE SUGGESTIONS

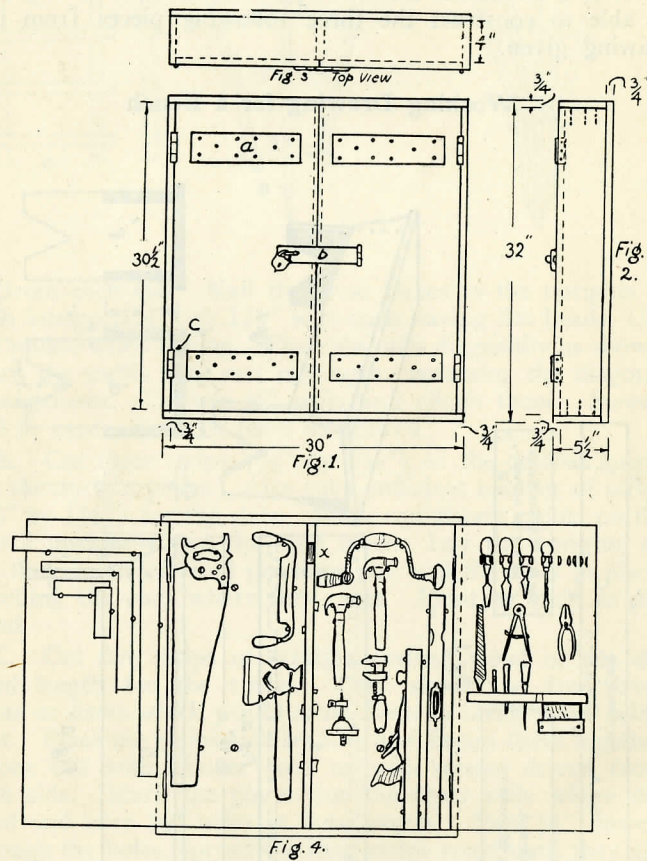
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After a Scout has made the previous articles he ought to be able to construct the three following pieces from the drawing given.

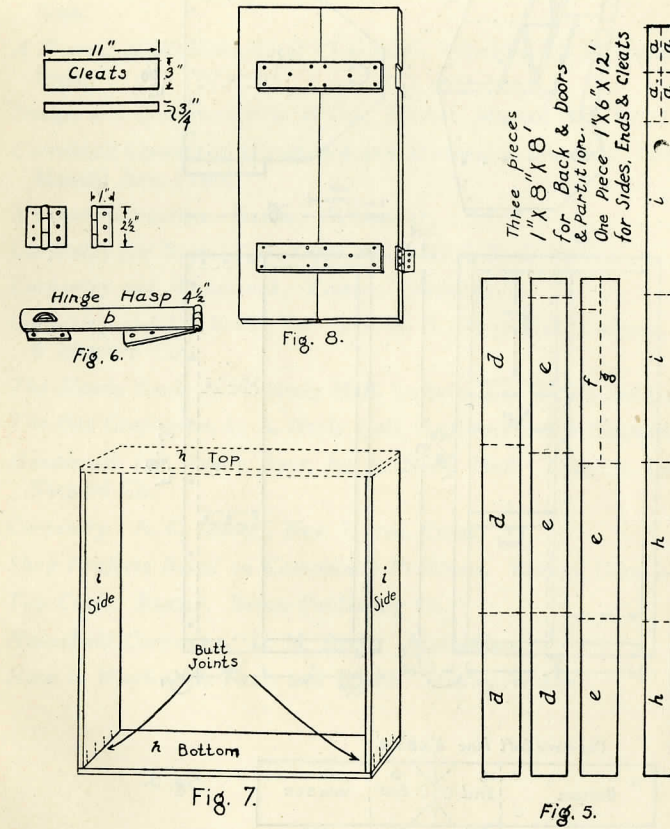
Working Drawing for a Bench



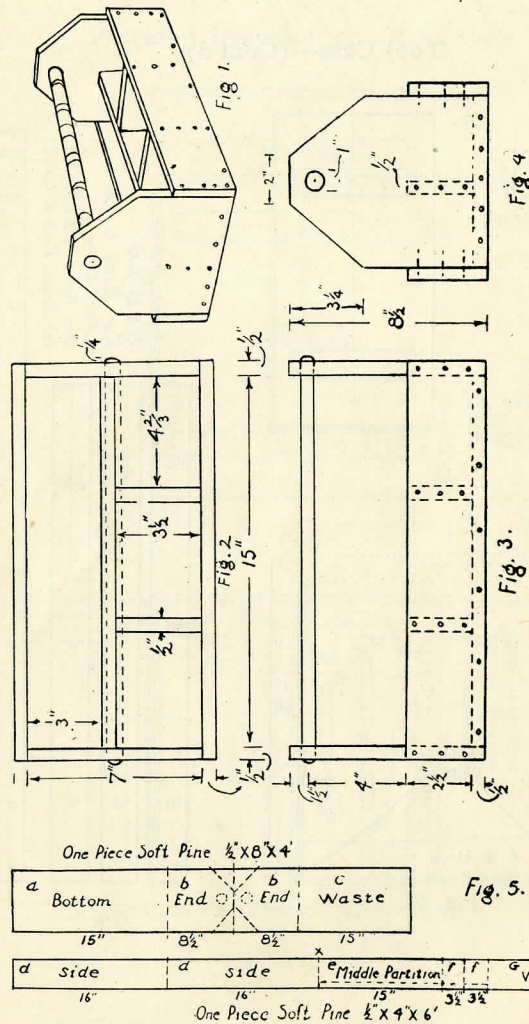
Working Drawing for a Tool Case



Tool Case—(Cont'd)



Working Drawing for a Nail Box



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