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Michigan State University Cooperative Extension Service
4-H Club Bulletin
P.G. Lundin, Assistant State Club Leader
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1ST YEAR

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HANDICRAFT CLUB WORK

By
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MICHIGAN STATE COLLEGE
COOPERATIVE EXTENSION SERVICE
EAST LANSING

REQUIREMENTS FOR 4-H HANDICRAFT CLUB WORK

1. 4-H handicraft club members must be between the ages of 10 and 20 years inclusive. First-year members must be 10 years old by January 1.
2. 4-H handicraft club members enrolling for first year's work must make four articles. The squared stock is the only required article. The other three may be selected from the list of first year wood working exercises.
3. Each 4-H handicraft club member must make an exhibit of his work and his report at a club, community, district or county exhibit.

Note: 4-H Club members can make articles not listed in this bulletin with the permission of the local leader. The club member may make articles from plans obtained elsewhere, but the article selected must compare in difficulty of construction to those articles listed in first year work. Design, dimensions, the kind of lumber used can be changed to fit the conditions.

Power machinery should *not* be used in making first year exercises.

In the bill of materials, the exact measurements are given as shown in the drawings. Allow $\frac{1}{4}$ inch extra in width and length for cutting, planing and sanding before assembly.

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4-H HANDICRAFT CLUB WORK

By P. G. LUNDIN¹

The 4-H handicraft project is planned to help boys interested in wood working.

From the subject matter in this bulletin and the construction of the selected articles 4-H members should learn many things. A few are mentioned here. (1) Selection and care of tools. (2) Reading and drawing plans. (3) Selection of kind and grade of lumber and other materials. (4) Construction work. (5) Preparing and applying simple finishes. (6) Study of native trees. (7) Wood identification.

Skill and knowledge gained from completing the handicraft project should enable boys to plan and make many of their own articles. The social club meetings offer chances for association with other club members. Members should learn to conduct meetings and to follow some definite plan and program for each of the 4-H handicraft club meetings. Handicraft club work develops rural leadership, emphasizes the importance of organization and cooperation, and promotes a four-fold development of the head, heart, hands and health.

Organize the 4-H Handicraft Club during October or November. As soon as the club is organized, mail the enrollment blank to the county extension agent. Clubs should plan their work so that all project requirements will be completed by the middle of March or the first of April.

TOOLS AND EQUIPMENT

While it is good to have a complete set of tools it is not a must. These tools will be enough for a first-year club:

Back Saw	Smoothing Plane
Cross-cut Saw	Coping Saw
Chisels, 1/4", 1/2", and 1"	Tri-Square
Hammer (not too heavy)	Marking Gauge
Screw Driver	Two-foot Rule
Brace and Bits, 1/4", 1/2" 3/8" and 3/4"	Knife
	Oilstone

¹Assistant State 4-H Club Leader. The author wishes to acknowledge the assistance of John W. Creighton, Associate Professor of Forest Products, in the preparation of this bulletin.

SELECTION AND CARE OF TOOLS

Tools should be selected very carefully. It is better to buy good tools. Usually, they have better temper than cheap ones.

In order to do good work it is necessary to take good care of your tools. They should be kept in a clean, dry place. Each tool should have its proper place in a cabinet over the work bench. A picture of each tool may be placed on the rack behind it, so that at a glance one can see where it belongs. (Fig. 1.)

Oil should be used on tools to keep them from rusting. If tools become rusty, the rust should be removed with fine sandpaper, steel wool or powdered pumice stone. After all rust is removed, the tools should be wiped with an oily cloth.

All tools bearing an edge should be kept well-sharpened. Much time and energy is wasted in using dull tools.

Care should be taken so that the edges of plane bits and chisels are not dulled by contact with metal or dirty surfaces. In using old lumber, always remove all the nails, dirt and grit. Never use a plane after sandpapering, as the fine particles of sand will dull the bit.

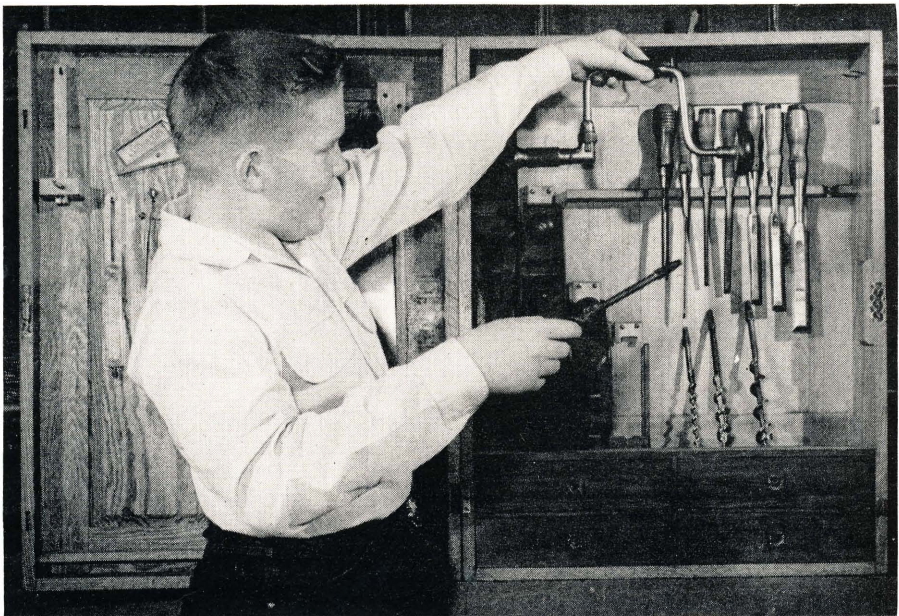


Fig. 1. A well-arranged tool chest.

TOOLS AND THEIR USES²

HAND SAWS

Hand saws are of two kinds, cross-cut and rip. The first is for sawing across the grain, the other for sawing in the direction of the grain.

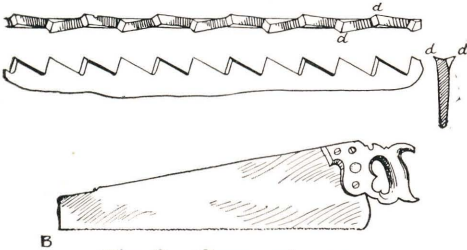


Fig. 2. Cross-cut saw.

The purpose of setting the cross-cut saw teeth or bending them out is to make a saw cut that is wider than the width of the blade, so that the saw will not stick in the cut. The teeth of the cross-cut saw are set so that the point of the first tooth is on one side of the blade and the next point is on the opposite side. These points go from one side to the other the entire length of the saw. Cross-cut saws are filed on a bevel.

Ripsaw

The ripsaw is used for ripping lumber—that is, sawing *with the grain*. It has from 3 to 7 teeth per inch. Each tooth is sharpened so that it is like a small chisel. When the teeth are sharpened the file should run straight across the blade.

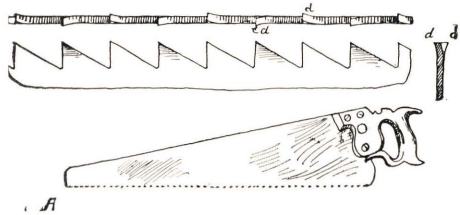


Fig. 3. A ripsaw. View and section of setting teeth.

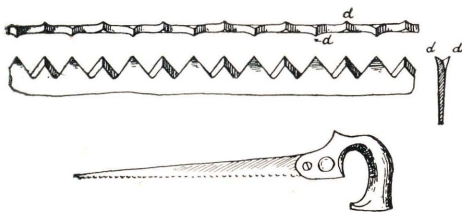


Fig. 4. Compass or keyhole saw.

The Compass Saw

The compass saw or keyhole saw is used for cutting curves or edges where a large saw won't work.

²Figures 2-12 shown in this section are from "Elements of Woodwork and Construction." Copyright, 1911, by Charles A. King. American Book Company, Publishers.

Back Saw

The back saw has a thin blade with a reinforced edge on the top. There are 12 or more teeth per inch.

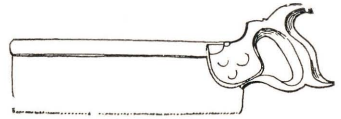


Fig. 5. Back saw.

Use of Hand Saws

In using hand saws, the most advantageous position is obtained by placing the board upon a pair of "horses." Whether ripping or cross-cutting, the manner of starting the cut and guiding the saw is the same.

The index finger of the right hand extends along the side of the handle to assist in guiding the saw. The thumb of the left hand rests upon the board beside the place where the cut is to be made. The saw blade is pressed lightly against this thumb. This assists in setting the saw at the desired place.

Begin with short, light, easy strokes, holding up on the saw so that it will take small "bites" at first. Gradually increase the length of the stroke until the full arm stroke is obtained. Avoid short, jerky strokes and undue pressure. The cutting edge of the saw should travel in a straight line. It shouldn't be rocked or forced.

The saw will cut best when held at an angle of about 45° with the board. Stand so as to permit free and easy movement of the arm. When nearing the finish of a cut, lessen the length of the stroke and hold up the saw so that little weight rests upon the wood. If cross-cutting, reach over the saw and grasp the overhanging piece to prevent splitting.

PLANES

We have two types of planes, one for cutting in the direction of the grain, and one for cutting at right angles to it. Even a hasty glance at these two planes will show that they are not the same. The cutting part of the jack plane stands more nearly perpendicular to the base of the plane than does that in a block plane.

Adjustment of the Plane

The adjustment of the modern plane can be understood by a careful study of Fig. 6 and by comparing it with the plane itself. The *cutter iron* or *bit* (1) and the *cap iron* (2) are the essentials of the tool. It is upon their condition and adjustment that the efficiency of the

plane depends. If the cap iron is set too far from the edge of the iron and if the cut is made against the grain, the shaving will not break before it leads the iron into the wood. If the cap iron is set somewhat less than $1/16''$ from the edge of the cutter according to the wood being planed, it will break the shaving nearly as soon as it is cut. This will result in a smooth, clean surface.

It will be seen that the closer the bottom of the cap iron (2) is set to the edge of the cutter (1) the shorter the shavings will be and the more smoothly the plane will cut. The *plane iron screw* (3) holds the edge of the cutter (1) and the bottom of the cap iron (2) into their desired relation. The *cap lever* (4) being pressed against the under side of the head of the *cap screw* (5) by the *cam* (4a) holds the iron in its place and presses the cap iron (2) firmly against the top of the cutter (1). Unless the cap iron fits the face of the cutter perfectly, the plane will not work satisfactorily.

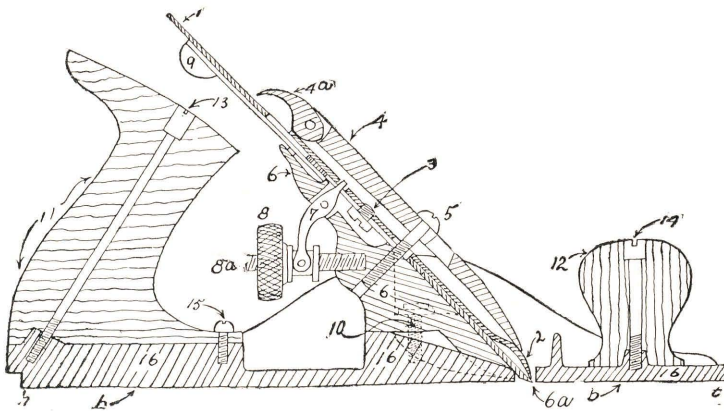


Fig. 6. Section of iron plane.

- | | |
|----------------------------|-------------------------------|
| (1) cutter iron or bit | (8a) vertical adjusting screw |
| (2) cap iron | (9) lateral adjustment |
| (3) plane iron screw | (10) frog screw |
| (4) cap level | (11) handle |
| (4a) cam | (12) knob |
| (5) cap screw | (13) handle bolt and nut |
| (6) frog | (14) bolt knob, and nut |
| (6a) mouth | (15) handle and screw |
| (7) Y lever | (16) bottom or stock |
| (8) vertical adjusting nut | |

The *frog* (6) carries all the adjusting mechanism of the plane and may be moved backward or forward to reduce or enlarge the *mouth* (6a), which should be no larger than is necessary to allow the shavings to pass freely. The frog rarely will require readjusting after it has been properly located.

The *Y lever* (7) forces the plane iron (1 and 2) in or out simultaneously. This governs the projection or set of the edge of the cutter (1), beyond the *face* or *sole* (b) of the plane stock—which in turn determines the thickness of the shavings which the plane will cut. The *adjusting nut* (8) moves freely upon the *screw* (8a) to operate the *Y lever* (7). The *side adjustment* (9) is for the purpose of forcing the iron to cut in the exact center of the width of the face (b) of the plane. The two *frog screws* (10) hold the frog rigidly in the position, which will make the throat (6a) of the desired size.

The face or sole of the plane (b) must be kept perfectly flat. If not, good work cannot be done. The ends of the plane (h) and (t) are called the *heel* and *toe*, respectively. The mouth of the plane between (6a) and (2) must be kept clear of shavings or it may become clogged. In setting a plane do not pass the fingers over the face or sole as cut fingers may result. Hold the plane face up in front of yourself with the left hand and look toward the light, when the exact projection of the cutter may be seen. This leaves the right hand free to make the adjustments. This is the workmanlike way of setting a plane.

RULER

The most common measuring tool is the two-foot folding rule. It is usually graduated, that is marked off into sixteenths, eighths, quarters, halves, and inches. Better wooden rules are bound on the edges with brass to prevent wearing. A yardstick may serve as a rule on many occasions.

THE MARKING GAUGE

The marking gauge is used in drawing a line parallel to the straight edge. The parts are called the *bar*, *head*, *thumb screw* and *spur*. The

bar has graduations in inches and fractions thereof. The head may be set to the required dimensions and the set screw is tightened against the beam.

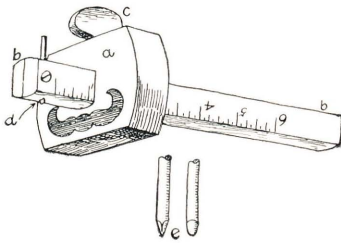


Fig. 7. Marking gauge.

(a) head, (b) stick, (c) thumb screw, (d) point.

The hand should be placed on the gauge, the thumb being placed directly back of the spur. The oval face of the beam admits turning so that the spur may be made to cut a deep or shallow line. Shallow lines are preferred as the deep lines are generally crooked. When the line is made it should be exactly parallel to the straight edge.

TRY SQUARE

The try square is used for laying out work and in testing faces, edges, and ends to make certain that they are "true." To test a block of wood to see whether a face and an edge are true, place the handle of the try square firmly against the face. Then slide it down until the blade touches an adjoining edge. If the face and edge fit the try square perfectly, they are true. That is, they form a right angle.

The parts of the try square are the *blade* and the *handle*. These parts are riveted firmly together so they form a right angle. The blade is graduated in inches, halves, quarters and eighths. Try squares graduated in the metric system can also be obtained. The blades come in lengths from 2 inches to 12 inches. A 6-inch blade is about the right size for most purposes.

CHISELS

Chisels are listed according to size and length. The size of a chisel is designated by the width of the cutting edge. Sizes range from $\frac{1}{8}$ inch to 1 inch, by eighths of an inch—as, $\frac{1}{8}$ inch, $\frac{1}{4}$ inch, $\frac{3}{8}$ inch, $\frac{1}{2}$ inch and so on—and from 1 to 2 inches by quarter-inches. Chisels are made with blades having either square edges or beveled edges. The latter cost slightly more than the square-edge chisels, but have some advantages in the ease of sharpening.

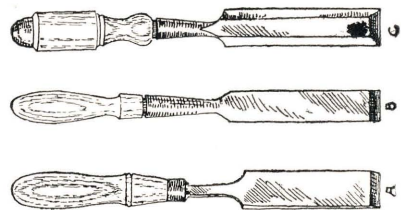


Fig. 8. Chisels.

AUGER BIT

Auger bits usually come in sets of 13, ranging in size from $\frac{1}{4}$ -inch to 1 inch. Size is given in sixteenths of an inch. The size of the bit is the size of the hole it will bore. That is marked on the shank of the bit—as 5, 6, 7, and 8 indicating, of course, the number of sixteenths. For holes larger than one inch, use the expansive bit.



Fig. 9. Auger bit.

The cutter of the expansive bit can be adjusted and held in position by a screw. Thus the size of the hole to be bored can be regulated. The expansive bit is usually made in two sizes—the smaller size boring holes from $\frac{5}{8}$ inch to $1\frac{1}{4}$ inch, and the larger size from $\frac{7}{8}$ to 3 inches. Each size is provided with two lengths of cutters.

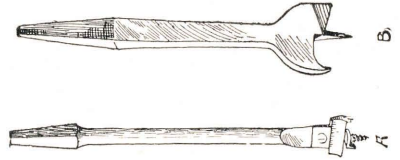


Fig. 10. Center bit and expansive bit.

THE GIMLET BIT

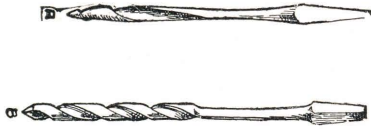


Fig. 11. German bit and twist drill.

The gimlet bit is made in sizes ranging from $\frac{2}{32}$ inch to $\frac{12}{32}$ inch, by a difference in size of $\frac{1}{32}$ inch. This type of bit is good for boring small holes. When boring too small a piece, be careful not to split the wood. A metal twist drill can be used

in place of the gimlet with less danger of splitting the wood as the drill comes through.

BIT BRACES

All the bits mentioned above are used with a brace. A ratchet brace, for the small additional expense will probably be more satisfactory for handicraft club members. The ratchet is an arrangement which enables you to drive the bit where it is not possible to make a complete revolution of the brace. This result is accomplished by means of two pawls which may be made to fit in a notched wheel. When both pawls are resting in the notches the brace works the same as the simple brace. By turn-



Fig. 12. Ratchet bit brace.

ing the collar one or the other of the pawls may be raised and held out of the notch.

If you wish to drive a bit into a corner where the brace will not make a complete turn, one pawl may be left in the notch and the other raised. The forward motion of the brace drives the bit. A backward motion leaves the bit stationary, while the pawl which is in the notch slips back and takes its place in another notch, ready to drive the bit forward on the forward stroke.

SANDPAPER

Sandpaper is one of the most important tools. Sandpaper is numbered according to the size of the grains on the surface. The numbers range from 000000—6/0 to 3. The finer grades 3/0-6/0 are used in the final smoothing and in buffing down the finishes. The grades used for rougher work usually start at 00, then range as follows—0, ½, 1, 1½, 2, 2½, and 3. Commercially, sandpaper is sold in sheets 9" x 11".

How to Sandpaper

Sandpaper may be used for the final smoothing when the woodworker is sure that it will not be necessary to do any more cutting with edged tools. The grit left in the pores of the wood by the sandpaper will take the edge off the tools almost as effectively as a grindstone.

A sanding block will help to keep the paper flat against the surface to be sanded. A convenient size for a block is 3" x 5". A large sheet of sandpaper can be folded, or cut into four equal pieces, and wrapped over the edges of the block.

The face of the block over which the paper is drawn should be perfectly straight, flat and smooth. Every part of the paper will then come in contact with the surface of the wood.

Coarse sandpaper is used for the first sanding of a piece of lumber. It is seldom necessary to use number 2½ and 3, because they leave deep scratches. The sandpaper should always be pushed straight forward and pulled straight back, parallel to the grain of the wood, except on the end grain. Careless cross grain strokes with the paper will cause scratches which show plainly when the wood is finished.

READING DRAWINGS

It will be impossible to give full details about drawings, construction and assembly for every article listed in this bulletin. A few suggestions, however, may be of benefit to the beginner.

All drawings and plans are difficult to read and understand. It should be kept in mind that a drawing shows the dimensions of each part of the article and how these parts join together. Solid lines in a drawing like this ————— always denote the edge of stock that can be seen. The dotted line like this indicates the location of edges of stock that cannot be seen in that position. Dimensions are given by prolonging the lines and showing the distance between them by two arrow points | <—————3"—————>. Most of the plans in this bulletin are drawn with the idea of showing top, front, and side views. If all the information is not obtained from

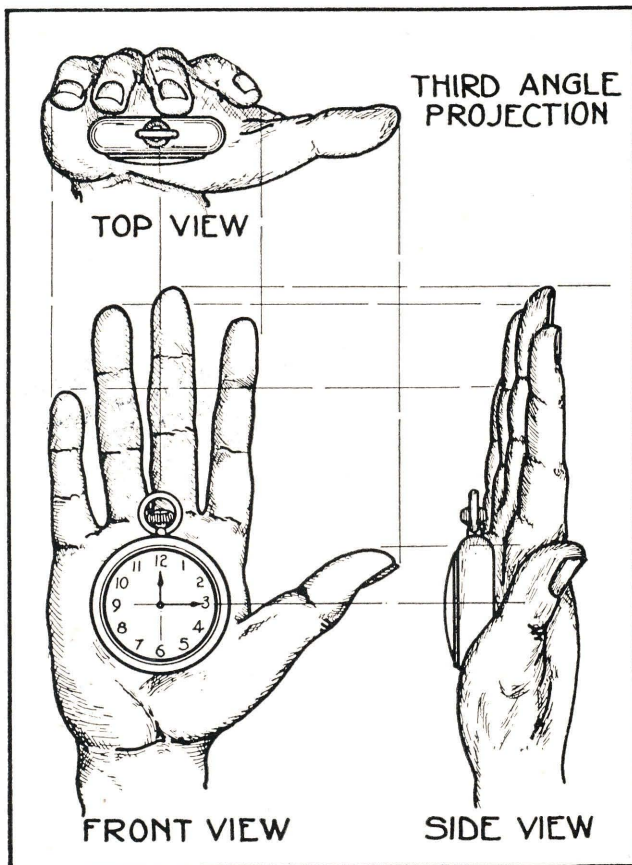


Fig. 13. Views of drawings.

the one drawing, refer to the others, showing different views of the same article. The third angle projection, shown below, reprinted from

the *Industrial Art Magazine*, illustrates clearly the three views of a drawing.

Always check the drawing with the bill of materials to make sure that enough lumber, of the right dimension, is available for the desired article.

Articles need not be made from plans mentioned in this bulletin, nor be of the same specifications. The design, size of the article, thickness and width of lumber, and even methods of construction may vary in some cases. But, generally, first-year members should follow the instructions in this bulletin.

LAYING OUT ROUGH STOCK

The tools needed for this are the rule, try square or steel square, marking gauge, and a pencil. The rule used may be the single-piece rule, or the folding 2-foot rule such as carpenters use. Measure off and mark the length and width of the piece required. Connect these points by a line drawn with a pencil, using the ruler or other straight edge as a guide. If the marking gauge is used, adjust it to the proper distance, and then mark by drawing the gauge toward you. If the pencil and rule are used the pencil is held against the end of the rule and the hand, with the thumb nail as a guide, is drawn toward the worker. Sometimes a sharp knife is used to scribe small but accurate dimension lines.

SQUARING STOCK

Squaring stock is the basis for almost all handicraft work.

A rough piece of soft wood, white pine, basswood or yellow poplar, is best for this exercise. A piece 3" x 5¼" will make a convenient sanding block. There are six steps which should be memorized, and followed in their proper order. Each step involves one of the sides of a common board.

The surfaces must be true, smooth, straight and accurate. Because of their importance, the six steps are given.

1. Plane working face (Fig. 14).

- a. Choose best face of a small board ($\frac{3}{4}$ " x 4" x 6")
- b. Determine direction of grain
- c. Take correct position at bench and plane
- d. Test to see if face is level and even
- e. Mark "number one"

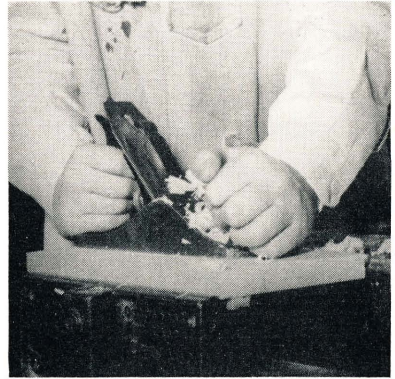


Fig. 14. Planing working face.



Fig. 15. Edge planing.

2. Square working edge (Fig. 15).

- a. Choose best edge
- b. Plane one adjoining edge at right angles to the surface No. 1
- c. Test from working face
- d. Mark the working edge "number two"

3. Square working end (Fig. 16).

- a. Square line across face "number one";
from working edge and across edge "number two";
from working face
- b. Plane to split the line
- c. Test from working face and edge
- d. Mark "number three." This is the working end



Fig. 16. Squaring the end surface.

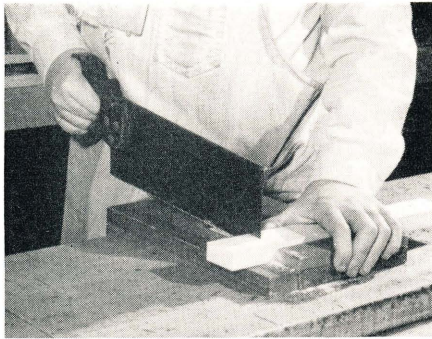


Fig. 17. Sawing cross grain. Back saw and bench hook.

4. Reduce to correct length (Fig. 17).

- a. Hold rule along arris of working edge and working face. Measure the correct length from end "number two"—mark with knife
- b. Square line across face "one" from edge "two" and across edge "two" from face "one"

- c. Use bench hook and saw about 1/16 inch over length with back saw
- d. Plane down to split the line
- e. Test from working face and edge—mark "number four"

5. Reduce to right width (Fig. 18).

- a. Set marking gauge and check with rule
- b. Gauge line on both faces holding head of gauge firmly against working edge. *Caution:* Never pull a gauge; always push it
- d. Mark this edge "numbr five"

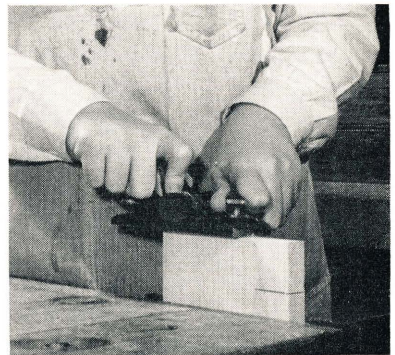


Fig. 18. End planing with block plane.

6. Reduce to right thickness (Fig. 19).

- a. Set marking gauge and check with rule
- b. Gauge lines on both edges, holding head of gauge firmly against working face "number one"
- c. Plane to split the line and test with try-square
- d. Mark this face "number six"



Fig. 19. Using the marking gauge.

In reducing a piece of wood to dimensions the try square should be used constantly to obtain right angles with adjoining surfaces. The stock should be removed to the line, but the line should never be cut away.

MATERIALS

There are many things that go into the finished article. These are all classed as "materials." One of the most important of these is lumber. No special grade, kind, or variety of wood is mentioned in this bulletin for the articles listed. The choice of lumber will be left to the individual member, depending on local conditions.

Beginners in woodwork will find that the softer woods like white pine, aspen or popple, spruce, basswood, yellow poplar, cedar and cottonwood are much easier to work with than harder woods.

Cabinet woods like cherry, walnut, oak, maple and birch may be used after the member has acquired skill and good results with a softer wood.

Plywoods may be used to good advantage in many articles. Exterior grade plywoods made with water proof glue should be used for outside articles.

COMMON KINDS OF WOOD

A few characteristics and properties of the more common lumbers³ are mentioned here so that you you may select the right kind for the article that you wish to make.

Northern white cedar

The sapwood is greyish-white; heartwood straw-brown; wood has characteristic cedar odor; straight grain; texture fine and uniform, very soft; weak; easy to work with tools, and very resistant to decay.

³From 4-H Club Bulletin 26, *Wood Identification for 4-H Clubs*, by A. J. Panshin, Professor and Head, Forest Products Dept., M.S.C.

Eastern spruce

The heartwood is not distinct; wood white to pale yellow and yellowish brown; straight grain; fine texture; moderately soft; easy to work; glues well; easy to nail, does not split readily in nailing, but is low in ability to hold nails and screws; not durable.

Northern white pine

Sapwood is white to pale yellow; the heartwood is yellowish-white to light brown. It has straight grain; slight resinous odor; soft and moderately strong; works easily with tools; glues well; takes and holds paint well; nails easily, does not split readily in nailing, average ability to hold nails and screws, low to average in ability to resist decay.

Redwood

Sapwood white, heartwood ranges from a light cherry red to dark reddish-brown, with no characteristic odor. Straight grain; even, but coarse texture; soft to moderately hard; very strong for its weight; works moderately well with tools; glues well; takes and holds paint exceptionally well; nails easily but holds nails and screws poorly; resistant to decay.

Ponderosa pine

Sapwood nearly whitish to pale yellow; heartwood ranging from yellow to orange or reddish-brown; conspicuous resinous odor; straight grained; moderately coarse texture; weak to moderately strong; easy to work; glues well; average in paint holding ability; nails easily and does not split readily; average in ability to hold nails and screws; not durable.

American elm

Sapwood greyish-white to light brown; heartwood light brown to brown; frequently with reddish tinge; straight or frequently crossed grain; moderately heavy, hard and strong with excellent bending quality; tough and difficult to split; work moderately well with tools; hard to nail, but has good nail-holding ability.

Basswood

Sapwood whitish to creamy white or pale brown; generally merging gradually into somewhat darker heartwood; wood with characteristic odor when freshly cut or when moistened; straight-grained; even texture; soft; weak; works well with hand tools; nails easily without splitting, but holds nails and screws poorly; glues well; takes and holds

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paints well; very low in durability under conditions favorable to decay.

Beech

Sapwood whitish; heartwood whitish with reddish tinge, straight or frequently cross-grained; hard; strong; bends readily after steaming; somewhat difficult to work with hand tools; excellent for turning, nails hard, has tendency to split along the broad rays, but is high in nail holding ability; average in resistance to decay.

Birch

Sapwood whitish, pale yellow to light reddish-brown; heartwood light to dark brown or reddish-brown; straight-grained, close texture, moderately heavy to very heavy; moderately hard to hard and moderately strong to very strong; works well with tools, turns well, takes smooth finish; nails hard, has a tendency to split, but holds nails and screws well; not too durable under conditions favorable to decay.

Black cherry

Sapwood whitish to light reddish brown; heartwood light to dark reddish-brown, straight-grained; texture fine and uniform, moderately hard; strong; works moderately hard with hand tools, but machines well; glues well; takes and holds finishes well.

Black walnut

Sapwood whitish to yellowish-brown; heartwood rich chocolate or purplish-brown; wood has mild but characteristic odor; stem-wood usually straight grain, but a variety of figures are obtained from walnut stumps, burls, and crotches, hard; strong; works well with tools; and finishes very smoothly; holds stain well and takes fine polish; glues readily; very durable under conditions favorable to decay.

Butternut

A close relative of walnut, but lighter in color and no characteristic odor, moderately soft, and rather weak in bending; works well with tools; takes stain well and can be finished to resemble walnut; glues readily, not resistant to decay.

Cottonwood and aspen (popple)

Sapwood whitish or greyish, usually merging gradually into creamy-white, greyish-white or greyish-brown or pinkish heartwood; has unpleasant odor when freshly cut or moistened, straight or sometimes cross-grained; light, soft to moderately soft; moderately weak;

easy to work with tools; nails easily without splitting, but holds nails and screws poorly; easy to glue; takes paint well; very low in durability, in conditions favorable to decay.

Hard and sugar maple

Sapwood white with a reddish tinge; heartwood light brown, usually straight grained, occasionally curly, wavy, and birch-eye grained, fine and close textured, hard; strong; works well with tools, turns well and finishes very smooth; hard to nail, has tendency to split, but holds nails and screws well; intermediate for gluing; takes stain very well; not durable under condition favorable to decay.

Red oak

Sapwood greyish-white to pale reddish, heartwood light reddish or pinkish-brown; usually straight-grained, open texture, hard to very hard; strong; hard under tools, but machines well and finishes smooth; difficult to nail, tends to split in nailing, but holds nails and screws well; glues well; takes paint and other finishes well; but requires a filler; not durable under conditions favorable to decay.

White oak

Sapwood greyish-white to light brown; heartwood light to dark brown, usually straight-grained, hard to very hard; strong; hard under tools, but machines well and finishes smooth; difficult to nail, tends to split in nailing, but holds nails and screws well; glues well; takes paint and other finishes well; very durable under conditions favorable to decay.

Yellow poplar

Sapwood whitish to greyish-white; heartwood variable in color ranging from light-yellow to shades of green to dark olive-brown; straight grain, uniform in texture, soft to moderately soft; moderately weak; easy to work, with tools; nails easily, but low in nail holding ability; glues satisfactorily; takes and holds stain, paint and enamel well; not durable under conditions favorable to decay.

OTHER MATERIALS

Besides the lumber, the other materials are wood fasteners including nails, brads, screws, corrugated fasteners, hardware, such as hinges, handles, and so on, glue, brushes, and finishing supplies.

Each member should figure his lumber needs and pool his order with the local leader. The leader can then purchase all the lumber

in standard sizes in the amount and kind needed for the entire club. In material measurements, $\frac{1}{4}$ " is usually allowed for cutting, planing, and sanding.

HOW TO FIGURE BOARD FEET

It may be of interest to 4-H Club members to know how to make up a lumber order and to figure the number of board feet in various size boards.

Three dimensions are given to all lumber stock. The thickness of the board is expressed by the first figure, width by the second, and length by the third. Type of material and number of pieces are also indicated in making the order; for example—

Yellow pine—2 pieces 2 x 6 x 48

Basswood—8 pieces 2 x 4—12

In the first example 2 x 6 x 48 are in inches while the second example the dash (—) before the 12 shows that the piece is 12 feet long. All measurements in the bulletin are indicated as illustrated above.

A board foot is 1 inch x 12 inches x 12 inches, or its equivalent. The rule for finding the number of board feet in a piece of lumber is as follows: Multiply the thickness in inches by the width in inches by the length in inches, and divide by 144. If the last measurement is in feet divide by 12.

$$\frac{2 \text{ pieces } 2 \times 6 \times 48}{144} = \frac{1152}{144} \text{ or } 8 \text{ board feet}$$

$$\frac{8 \text{ pieces } 2 \times 4 \text{—} 12}{12} = \frac{768}{12} \text{ or } 64 \text{ board feet}$$

WOOD FASTENERS

Assembly of the articles is an important part of the handicraft member's work. Nails, screws, glue, and dowels all have their special uses. Select the type of wood fastener most desirable for the article made.

NAILS

Nails are sold in large quantities by the keg containing 100 pounds. They are also sold by the pound. The standard wire gauge and

length in inches is taken into consideration in specifying the size and in fixing the price per pound.

Common wire nails are thick and have large, flat heads. They are used in rough work where strength is desired. Finishing nails are used for fine work such as inside woodwork and cabinet work. Casing nails are somewhat thicker and stronger than finishing nails; they have smaller heads than common nails.

Size	Length in Inches
$\frac{3}{4}$	$\frac{3}{4}$
$\frac{7}{8}$	$\frac{7}{8}$
2d	1
3d	$1\frac{1}{4}$
4d	$1\frac{1}{2}$
5d	$1\frac{3}{4}$
6d	2
7d	$2\frac{1}{4}$
8d	$2\frac{1}{2}$
9d	$2\frac{3}{4}$
10d	3
12d	$3\frac{1}{4}$
16d	$3\frac{1}{2}$
20d	4
30d	$4\frac{1}{2}$
40d	5
50d	$5\frac{1}{2}$
60d	6

Brads

Brads vary in size from $\frac{3}{8}$ " to $1\frac{1}{2}$ " and are made from wire varying in gauge from No. 20 to No. 11. For fine work brads up to 1" in size are commonly used.

Screws

Next to nails, screws are the most common fasteners used in woodwork. The setting of screws requires more time and labor but gives a much stronger joint. Flat-headed and round-headed types of wood screws are the most common in use. Use a flat-headed screw where

a flat surface is desired. On exposed surfaces a round-headed screw presents a neater appearance.

To fasten two pieces of wood together with screws, (1) drill the first hole large enough to allow the shank of the screw to slide in easily; (2) drill the second hole slightly smaller than the diameter of center portion of the screw. The second hole is sometimes omitted in very soft wood. For flathead screws use a countersink and ream out the first hole deep enough to permit the head of the screw to drop down flush with the top of the wood. Soap or oil on the threads of the screw will make the screw easier to drive, especially in hardwood.

Corrugated Fasteners

The wiggle nail or corrugated fastener is a little device that can be used for tightening up loose joints or cracks. It is commonly used in fastening window frames, screen doors and in joining boards together. It is a nail which has a good deal of strength for holding two surfaces together side by side.

The wiggle nail is made with plain edges for hardwood and saw edges for soft woods and can be obtained in different sizes.

FIRST-YEAR DRAWINGS

Required: Sanding Block

Bench Hook	Necktie Racks
Bench Vises	Nesting Boxes
Bird Feeder	Paddle Ball
Bird Shelter	Paper Knives
Book Ends	Paper Towel Rack
Book Rack	Plant Hanger
Bread Boards	Peg Puzzle
Cake Board or Crock Cover	Pen and Pad Holder
Ceramic Articles	Pyramid Puzzle
Christmas Tree Standard	Ring Toss
Clothes Line Reel	Shadow Box
Corner Shelves	Shower Clogs
Coping Saw Exercises	Sandpaper Block
Door Stop	Saw Jointer
False Bottom	Swinging Door Holder
Feed Scoop	Tooth Brush Rack
Fish Line Reel	Towel Holder
Foot Scrapers	Toy Bear
Garden Trellis	Whisk Broom Holder
Home-made Vises	Window Support

Knife Rack
 Knife Strop
 Letter and Pencil Holder
 Milk Stools

Window Ventilator
 Work Bench
 Wren Houses

SQUARED STOCK

A squared piece of stock is required for all first year members. The piece does not have to be any definite size. After it is squared it may be used as a sanding block or the part of another article. It is suggested that you select a piece of soft wood at least $\frac{3}{8}$ of an inch in thickness and of sufficient width and length for the article. A sanding block, a bench hook, bread board, door stop, are only a few suggestions for the use of this squared stock. It is not necessary to follow the detail instructions in squaring stock in order to reduce this piece to required size. However, it is quite important that all members learn something about the fundamentals and acquire skill in these steps of wood working as outlined in pages 13 to 16.

COPING SAW EXERCISES

If the beginner does not have the ability or the confidence to use the larger tools, it would be well to start with a coping saw exercise or two. These are usually made from the thin plywood and require no squaring of the stock. These exercises will create interest in the work and give the boy some experience in handling smaller tools. Results will be more encouraging to the beginner if the square stock is made later during the season.

Vegetable markers, garden and lawn ornaments, puzzles and toys are just a few suggestions in this bulletin. Other plans obtained elsewhere will be satisfactory, providing they are not too difficult for first year members.

KNIFE RACK

Back and Shelf	1 piece $\frac{1}{2}$ x $7\frac{1}{4}$ x 12
Molding	1 piece 12 (size and pattern may vary)

NESTING BOX

Fox Squirrel and Wood Duck	1 piece $\frac{1}{2}$ x 12 - 12
Raccoon	1 piece $\frac{1}{2}$ x 12 - 15

NECKTIE RACKS

1 piece $\frac{1}{2}$ x 4 x 12		1 piece $\frac{1}{2}$ x 4 x 12
2 pieces $\frac{3}{4}$ x $1\frac{1}{2}$ x $1\frac{3}{4}$	or	1 piece 1 x 2 x 1
1 dowel rod $\frac{1}{2}$ x 12		1 piece $\frac{3}{8}$ x 12

BIRD FEEDER

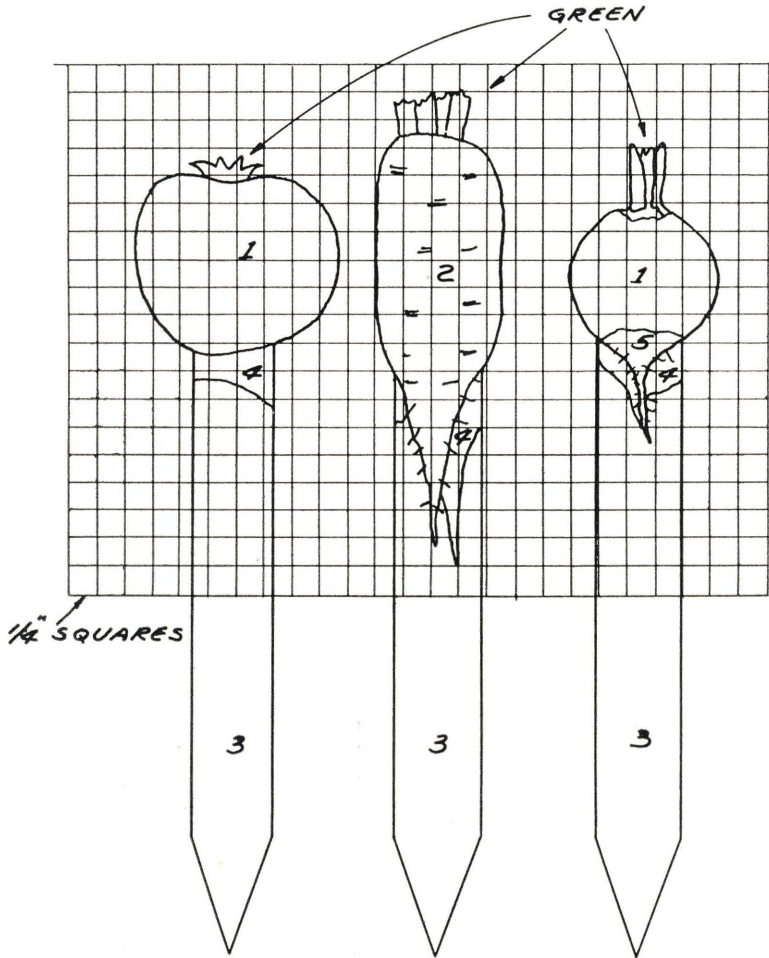
Roof	2 pieces $\frac{1}{2}$ x $4\frac{1}{2}$ x 7
Back	1 piece $\frac{1}{2}$ x 6 x 10
Bottom	1 piece $\frac{1}{2}$ x 5 x 6
Ledge	1 piece $\frac{1}{2}$ x 1 x 16
	1 piece tin $\frac{3}{4}$ x 17

ROBIN SHELTER

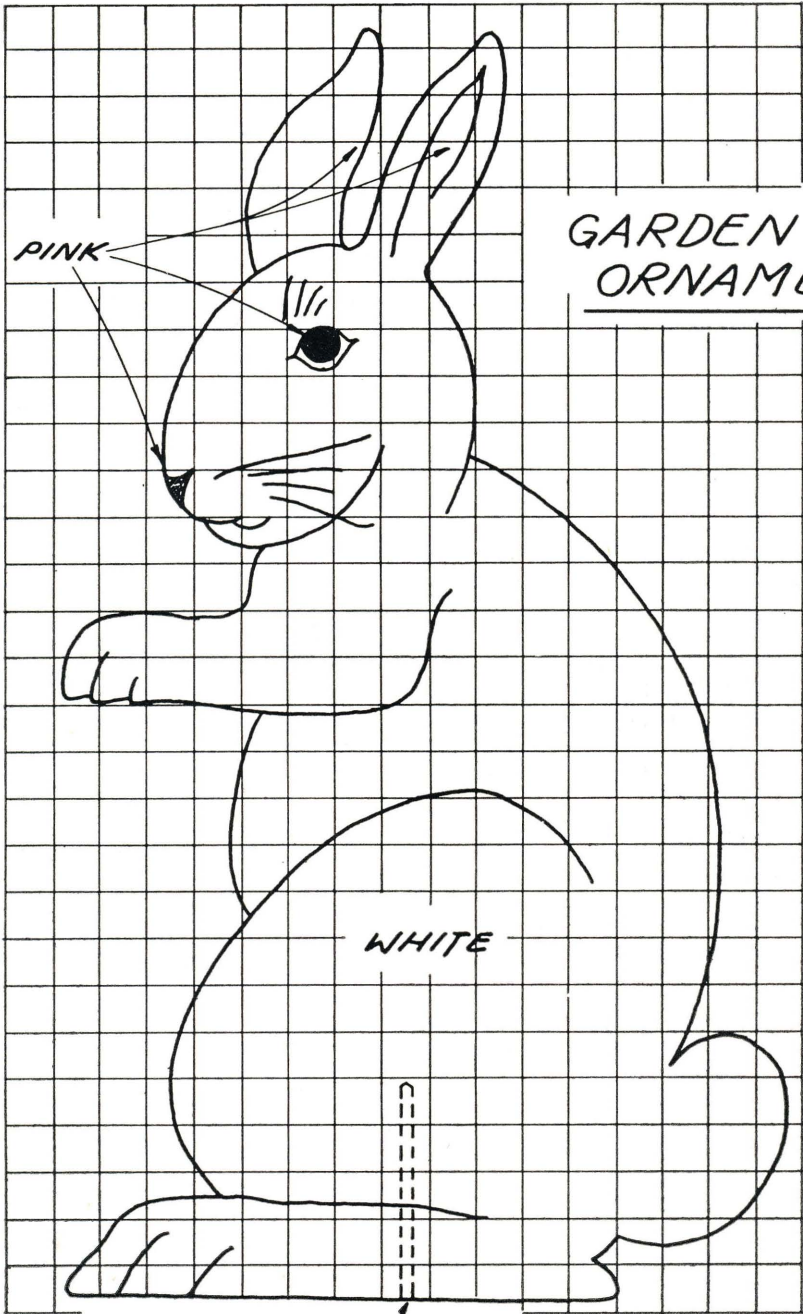
Top	1 piece $\frac{1}{2}$ x 7 x 11
Bottom	1 piece $\frac{1}{2}$ x 6 x 8
Back	1 piece $\frac{1}{2}$ x 6 x 9
Sides	1 piece $\frac{1}{2}$ x 8 x 18
Front	1 piece $\frac{1}{2}$ x $1\frac{1}{2}$ x 7

COLORS -

- 1. RED
- 2. ORANGE
- 3. PLAIN
- 4. BLACK
- 5. WHITE



VEGETABLE MARKERS

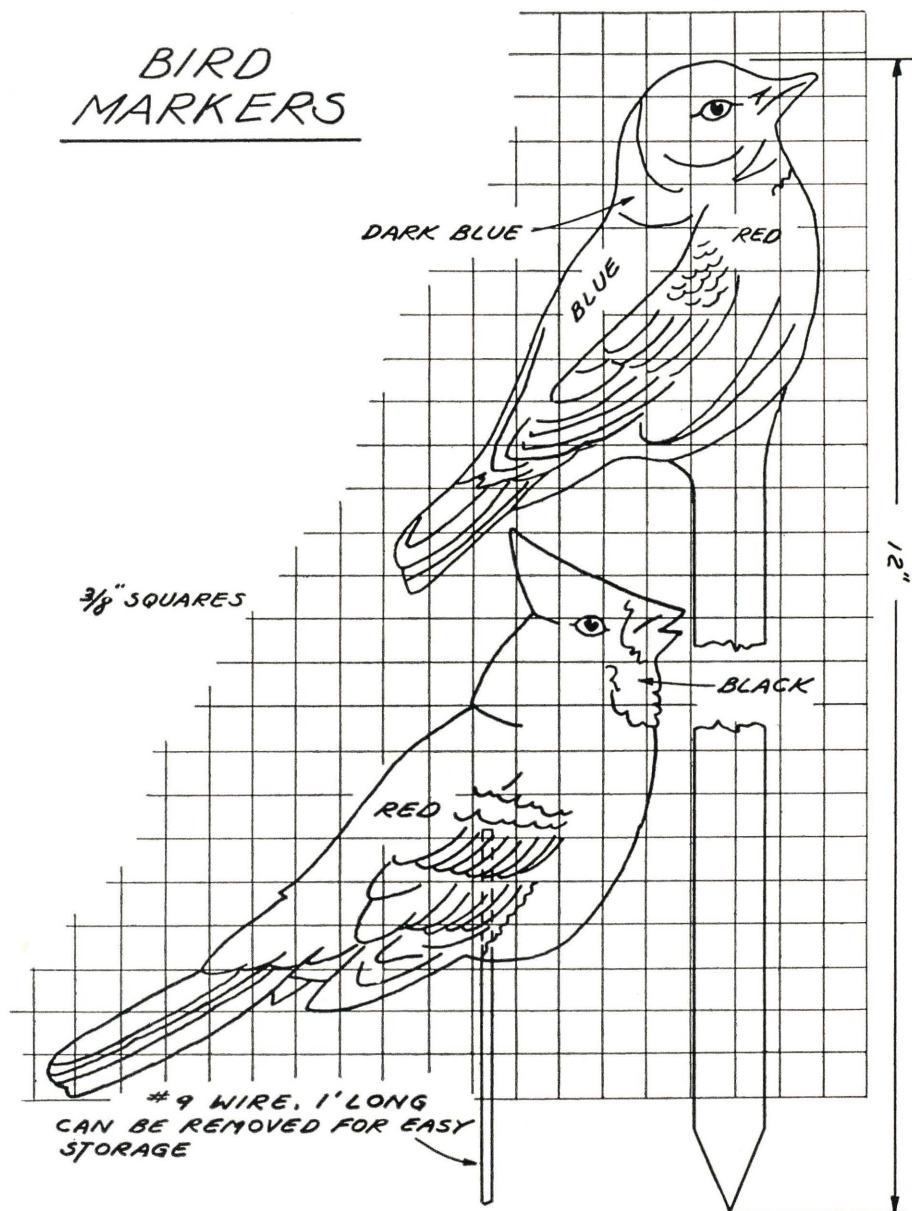


GARDEN ORNAMENT

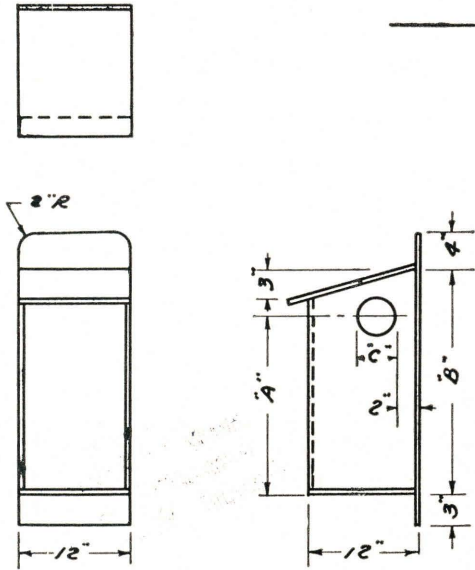
DRILL HOLE TO FIT
#9 WIRE

$\frac{3}{8}$ " SQUARES

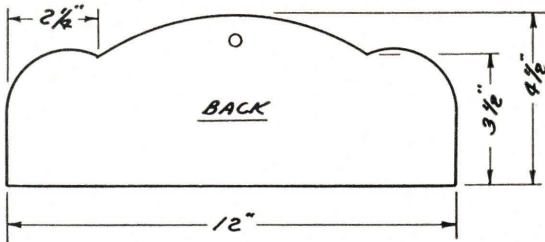
BIRD MARKERS



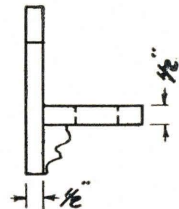
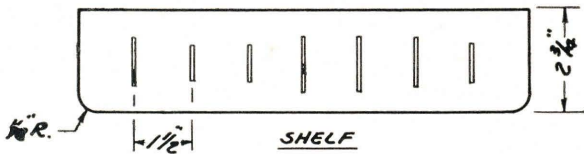
NESTING BOXES



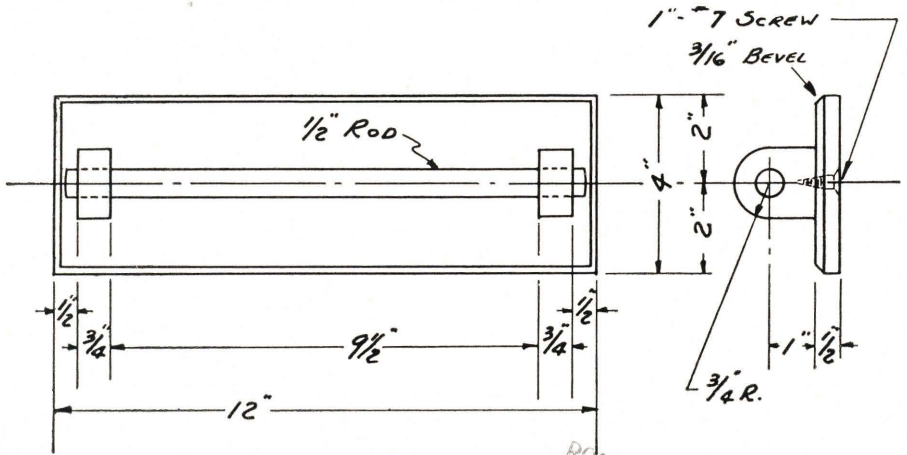
	A	B	C
FOX SQUIRREL	19"	24"	3 1/2"
WOOD DUCK	19"	24"	4 1/2"
RACCOON	19"	36"	5 1/2"



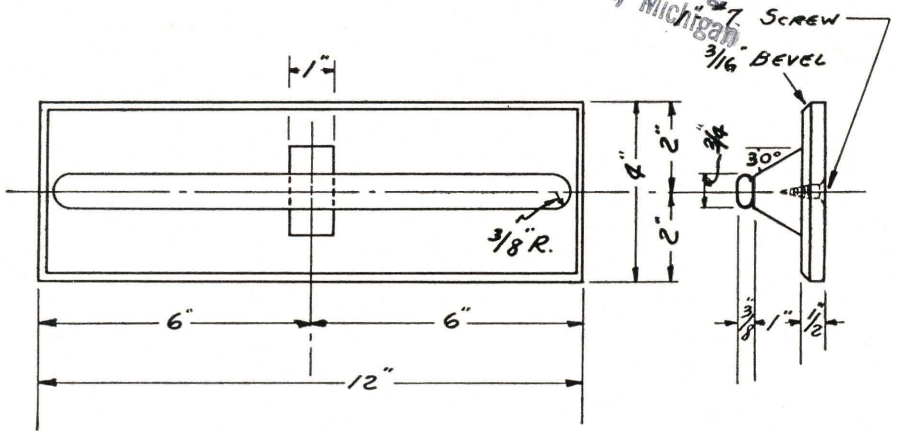
KNIFE RACK



ASSEMBLY



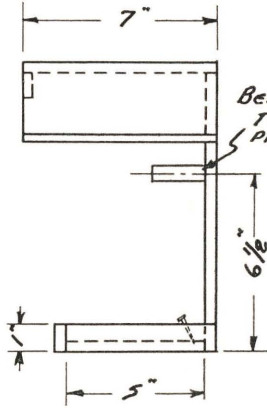
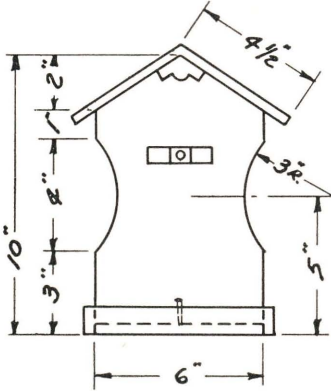
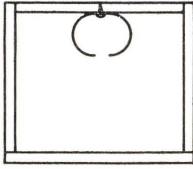
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County 4-H Agent
Community Bldg.
Fremont, Michigan



NECKTIE RACKS

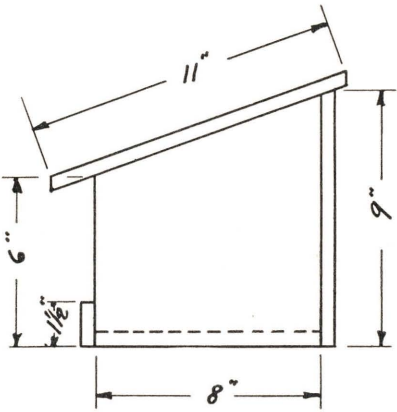
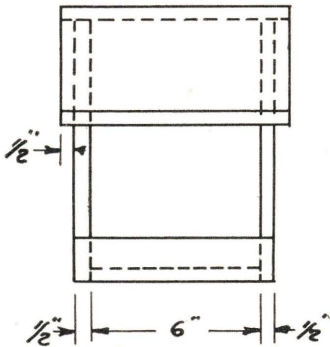
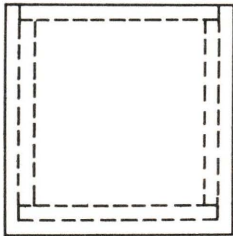
BIRD FEEDER

SECTION
BELOW
ROOF



BEND A PIECE OF
TIN TO FIT A
PINT SIZED
MILK BOTTLE.

ROBIN SHELTER



SHADOW BOX

8 pieces $\frac{1}{4}$ x $1\frac{3}{4}$ x 10

RING TOSS

1 piece plywood $\frac{1}{4}$ or $\frac{1}{2}$ x 6 x 9
1 curtain rod ring

SHOWER CLOGS

2 pieces $\frac{1}{2}$ x $3\frac{1}{2}$ x 9

CHRISTMAS TREE STAND

3 pieces $\frac{3}{4}$ x $3\frac{1}{2}$ x $20\frac{1}{2}$

PADDLE BALL

1 piece plywood $\frac{1}{4}$ or $\frac{1}{2}$ x 10 x 16

ONE O'CAT PUZZLE

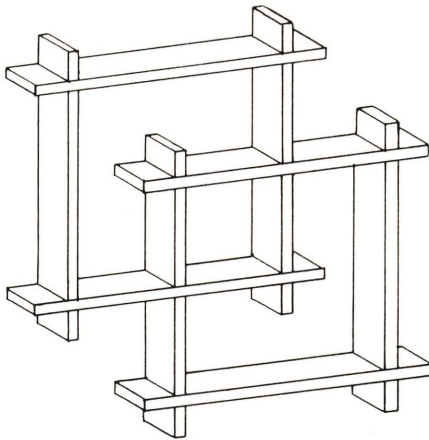
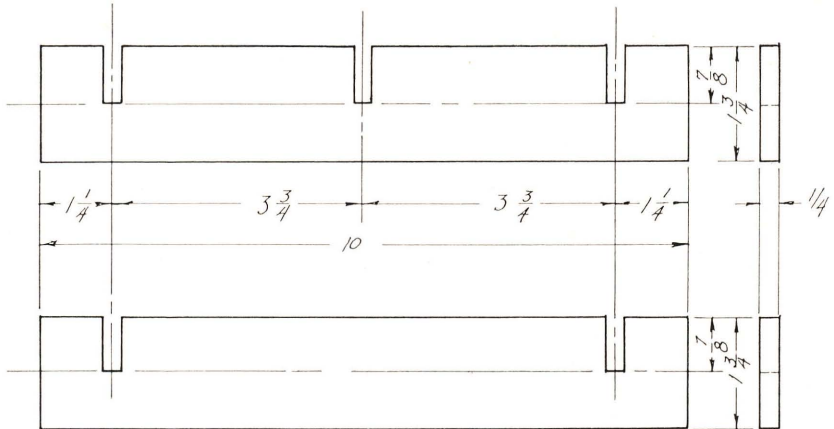
1 piece plywood $\frac{3}{4}$ x 5 x 5
9 golf tees $\frac{5}{8}$

PEG PUZZLE

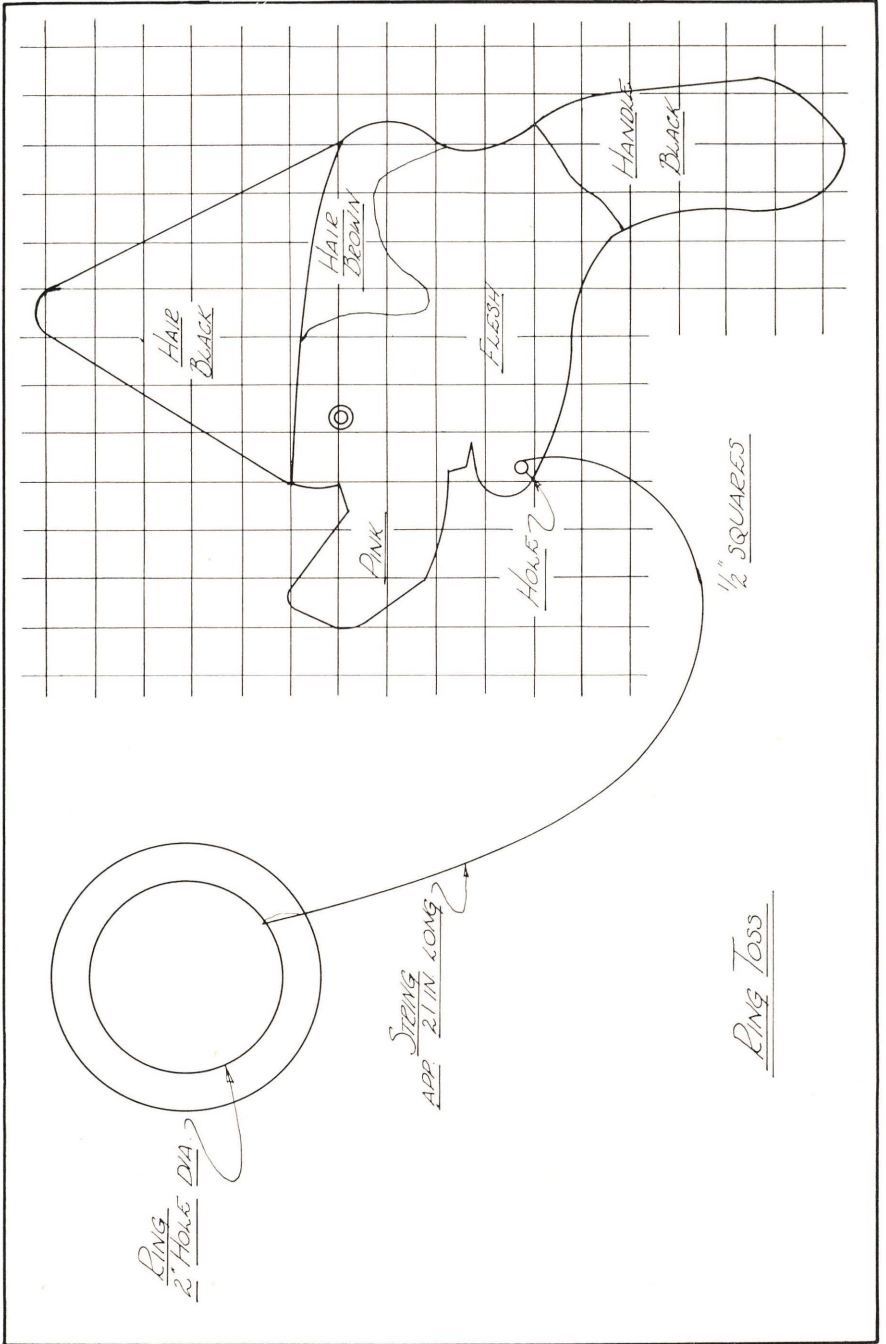
2 pieces plywood $\frac{1}{2}$ x $2\frac{1}{2}$ x 9
3 pieces dowling $\frac{1}{2}$ x $3\frac{1}{8}$

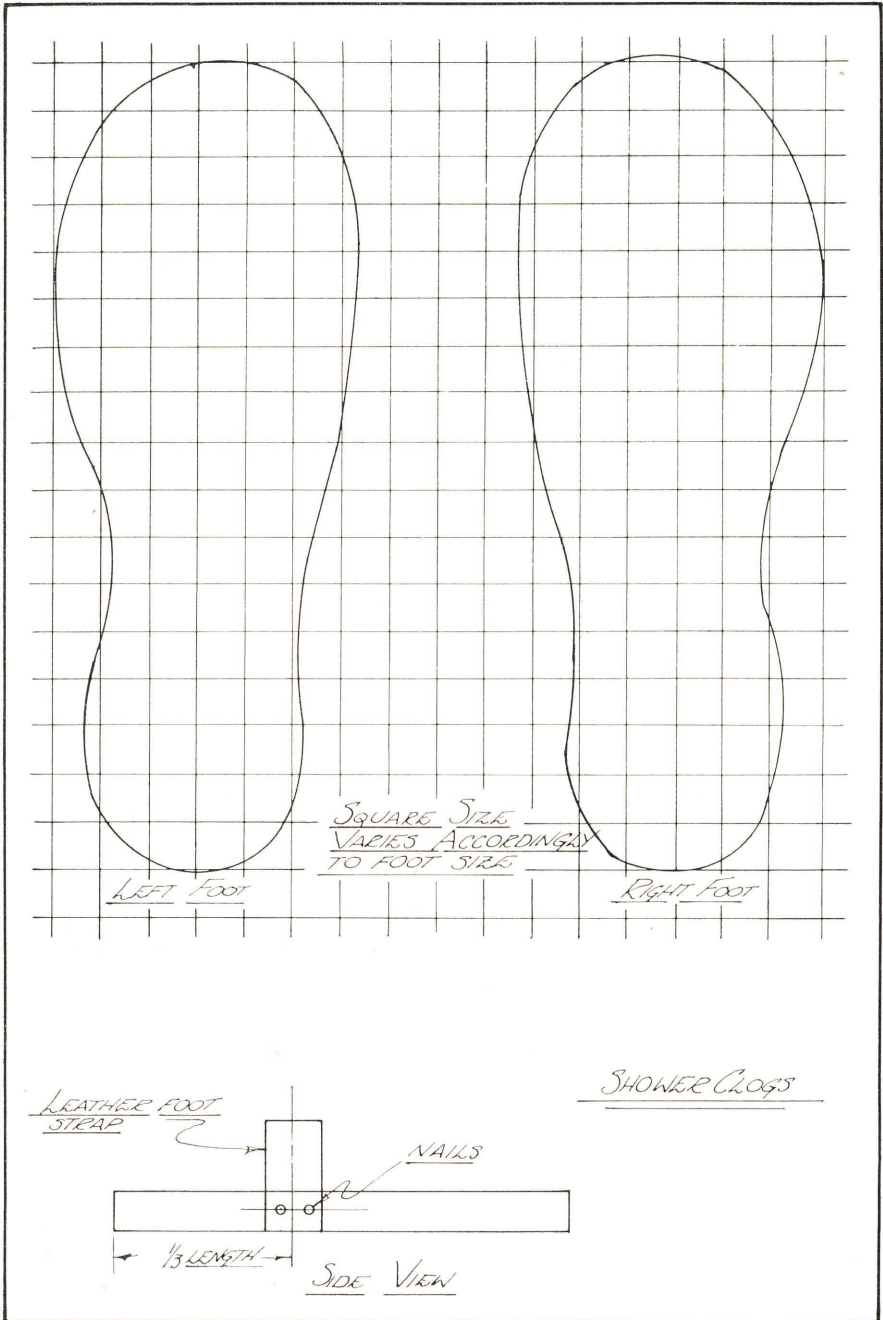
BOOK ENDS

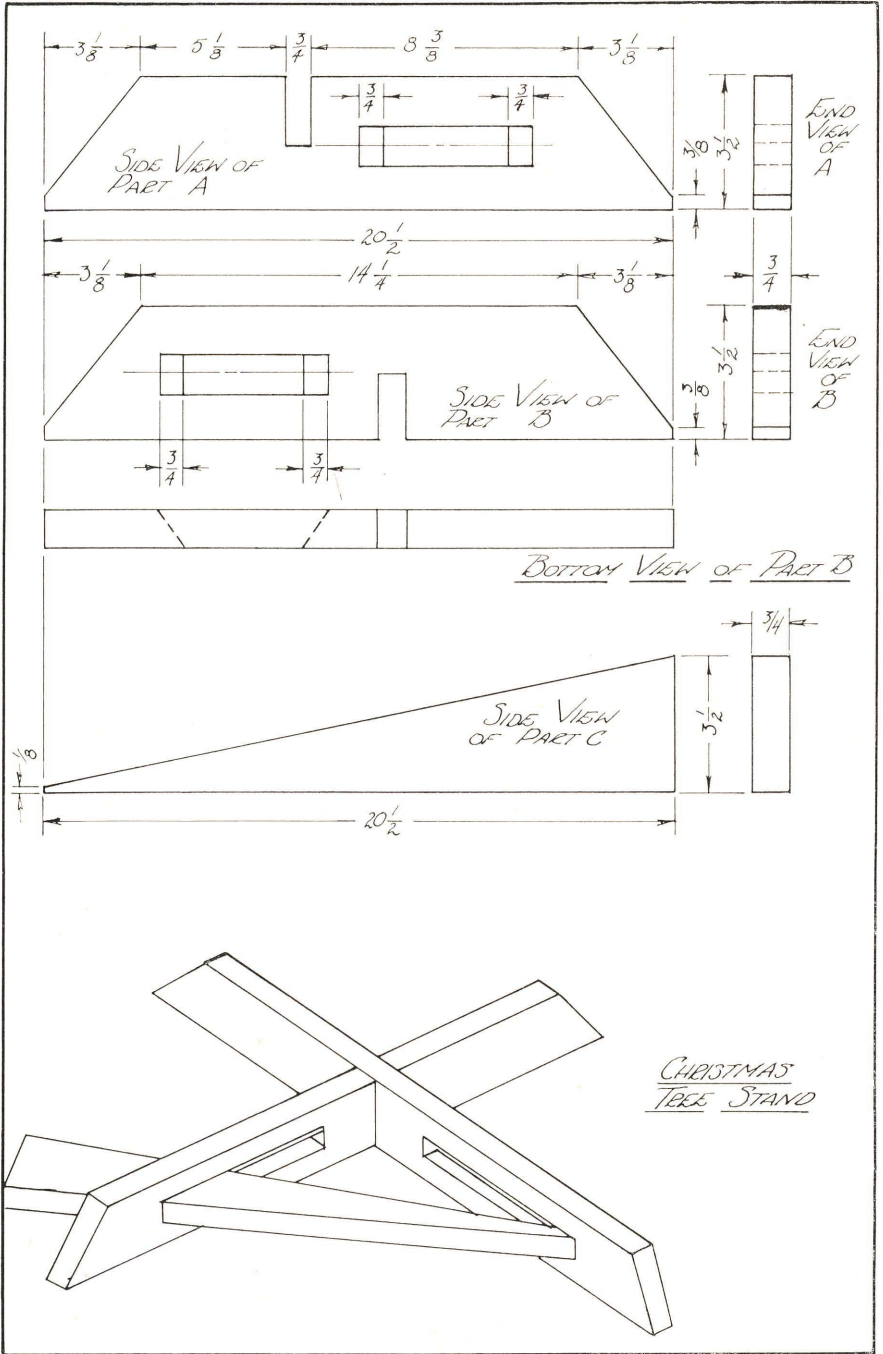
2 pieces $1\frac{1}{2}$ x 4 x $6\frac{1}{2}$
2 pieces tin $1/16$ or $\frac{1}{8}$ x 4 x $7\frac{1}{4}$
4 small screws

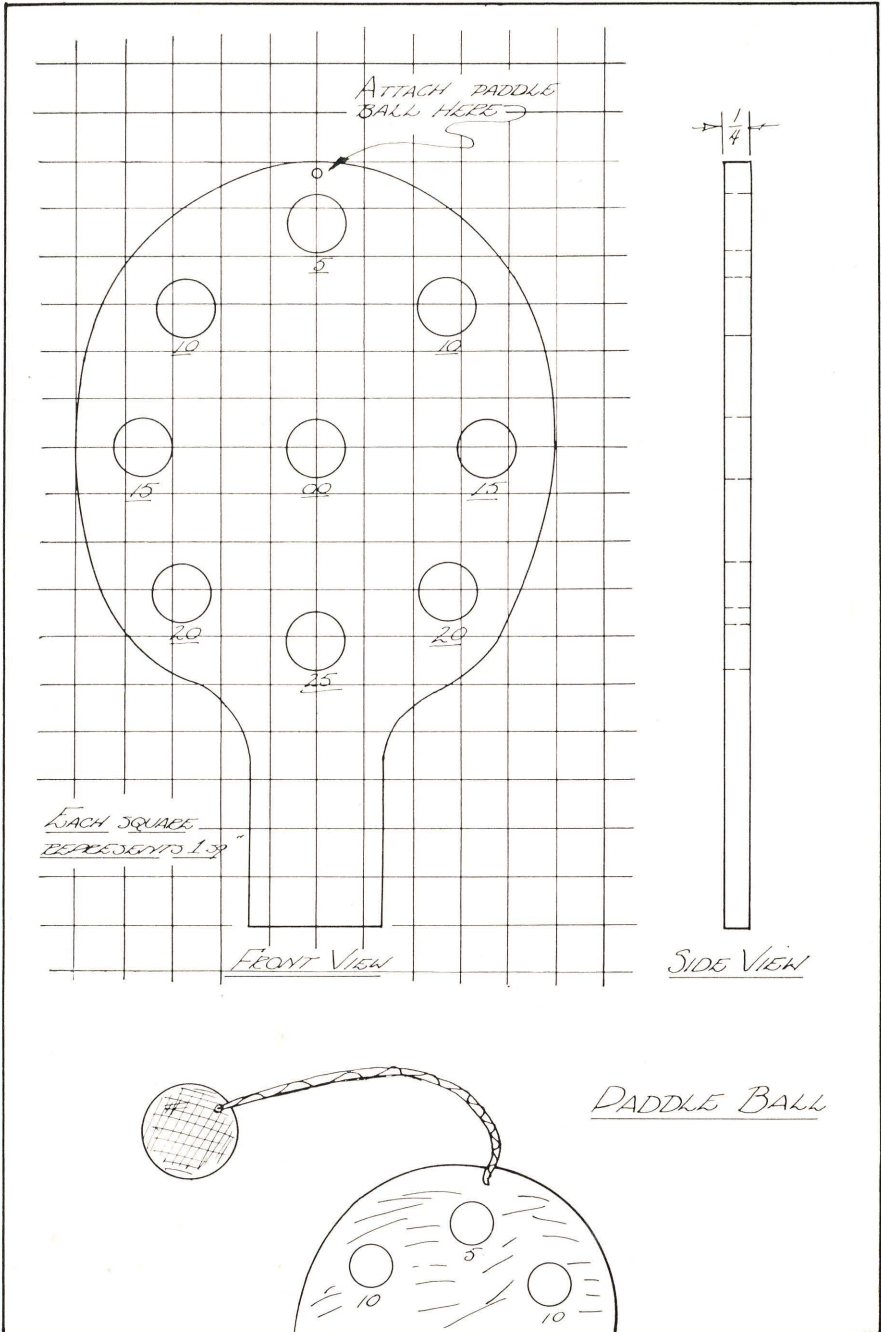


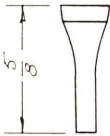
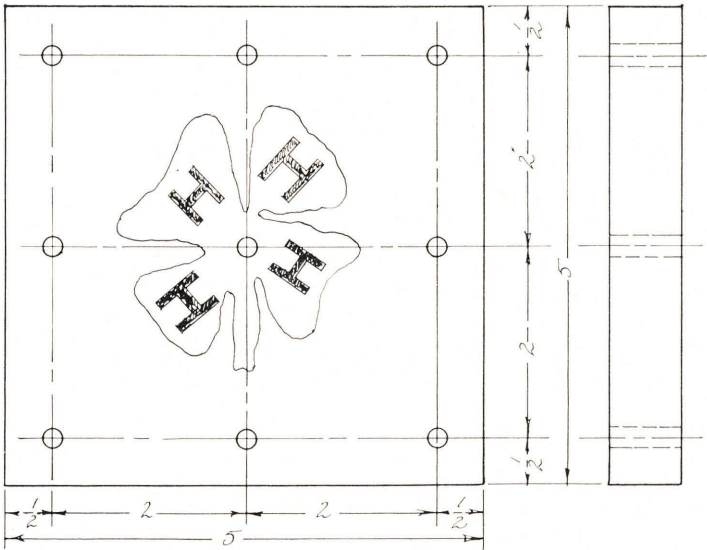
SHADOWBOX



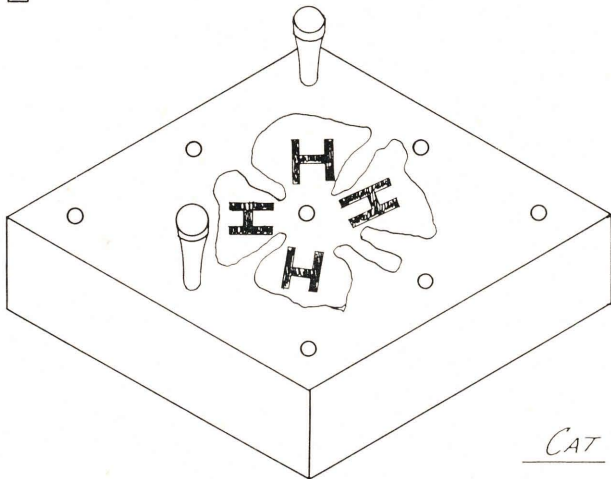




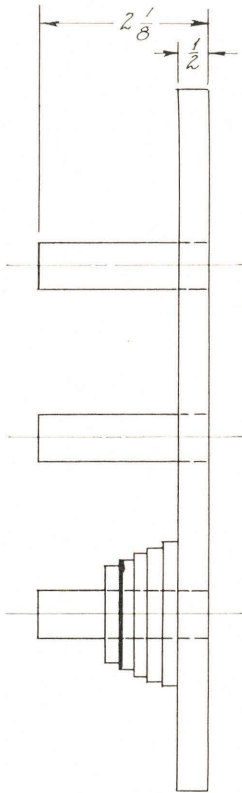




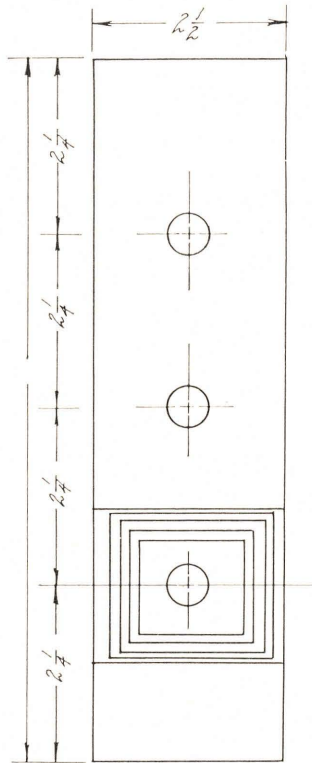
PEGS - SAWED
OFF GOLF TEES



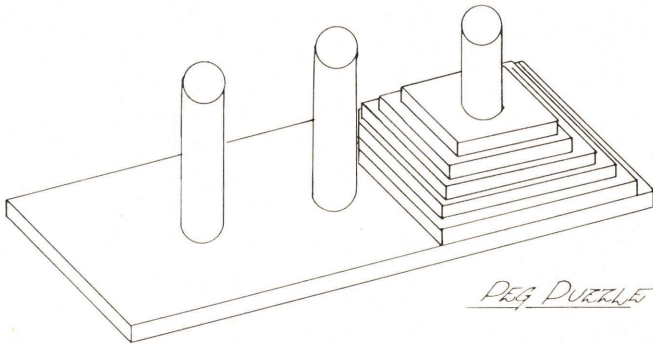
CAT



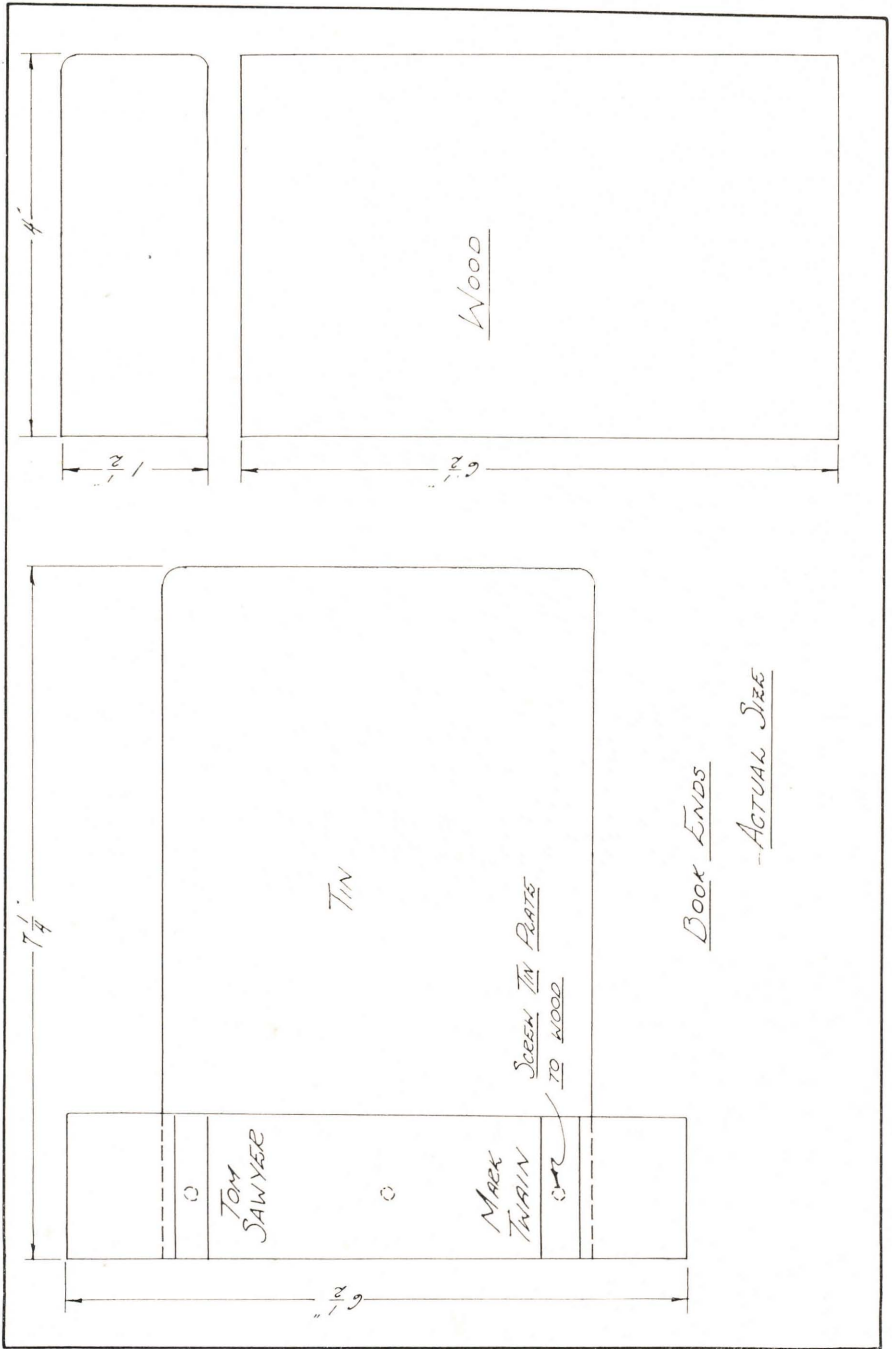
SIDE VIEW



TOP VIEW



PEG PUZZLE



WREN HOUSES**No. 1**

Bottom and Top	1 piece $\frac{3}{8}$ x 8 x 16
Front, Back and Sides	1 piece $\frac{3}{8}$ x 5 x 36

No. 2

Top and Bottom	1 piece $\frac{3}{8}$ x $6\frac{1}{2}$ x 16
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WORK BENCH

A suggestion for clubs that do not have a work bench.

Top	2 pieces—2 x 10 x length of bench
Tool trough	2 pieces—1 x 6 x length of bench
Stretchers	2 pieces—1 x 8 x length of bench
Top braces	3 pieces—2 x 6 x 30
Bottom braces	3 pieces—2 x 4 x 30
Small legs	2 pieces—2 x 4 x 30
Large legs	2 pieces—2 x 10 x 30
Vice jaw	1 piece—2 x 8 x 30 Maple
Follower	1 piece—1 x 3 x 24 Maple
1 screw vise	
18 #2 flat head screws	2 $\frac{1}{2}$ "

BENCH HOOK

A good bench hook is a very useful article when sawing, planing and chiseling small stock. It also may be used instead of a vise. This exercise will test your patience and "stick-to-it-iveness" and skill. From the experience gained you will know that the succeeding articles will be easier to make and the result will be more satisfactory.

Three pieces of $\frac{3}{4}$ " stock will be required—one $5\frac{1}{2}$ x 9, one $1\frac{1}{2}$ x $4\frac{1}{2}$ and one $1\frac{1}{2}$ x $5\frac{1}{2}$. Follow directions for reducing and squaring stock to dimensions as shown by figures 14 to 20 inclusive. After the three pieces have been squared, mark the place for the screws and bore the holes in the two $1\frac{1}{2}$ " pieces with the 6/32 drill assembled by screwing these two pieces onto the $5\frac{1}{2}$ x 9 board with $\frac{1}{4}$ " No. 7 flathead screws. Fasten all screws on the under side of the bench hook. Bore a $\frac{1}{2}$ " hole in the center of the board 1" from the top cleat. This will enable you to hang up the hook when not in use.

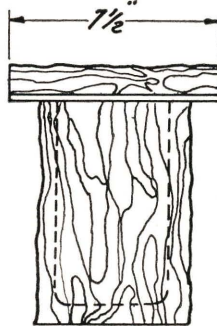
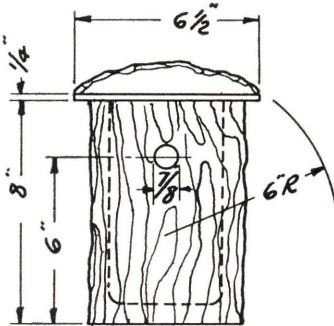
BREAD BOARD

1 piece $\frac{3}{4}$ x 10 x 16

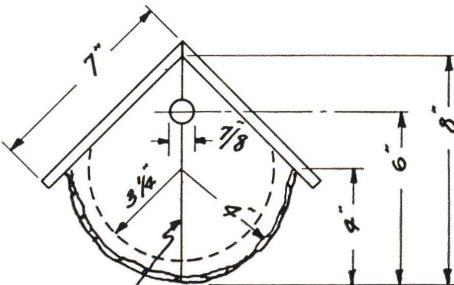
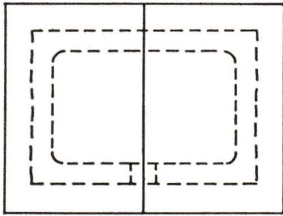
Method

Square the stock to the proper dimension. If the stock is less than $\frac{3}{4}$ " thick, it will not matter. However, the flat surface should be planed smooth. Measure $1\frac{3}{4}$ " along each edge and cut off the corners. Smooth the corners with the block plane. With a marking gauge, run a line all around $\frac{1}{4}$ " from the edge on the face and all around $\frac{1}{4}$ " from the face on the edge. Plane down to the marks. Care should be taken when planing on the end, not to splinter the wood. Completed board should be finished with paraffin wax.

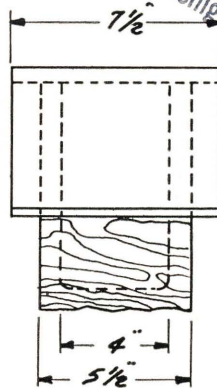
RUSTIC WREN HOUSES



ELM, BIRCH OR OTHER SUITABLE LOG MAY BE HOLLOWED OUT BY BORING SEVERAL HOLES AND USING CHISEL AND GOUGE.

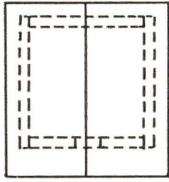


LOG MAY BE HOLLOWED BY SAWING FIRST.

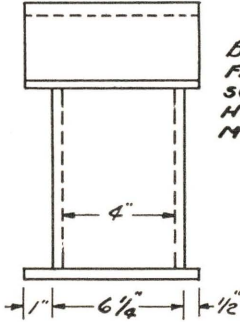
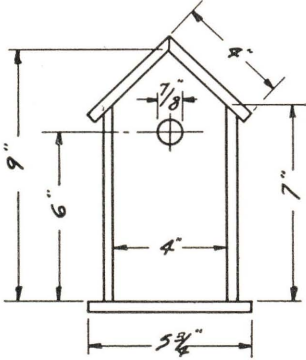


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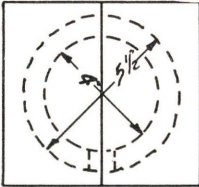
BIRD HOUSES FOR WRENS



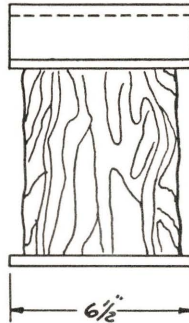
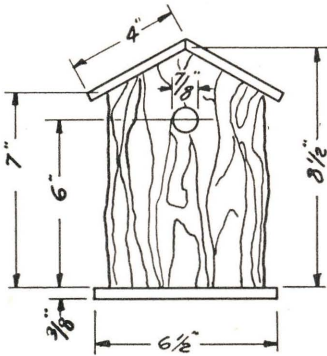
ALL STOCK - $\frac{3}{8}$ " THICK



BOTTOM MAY BE FASTENED WITH SCREWS OR HINGED TO PERMIT CLEANING

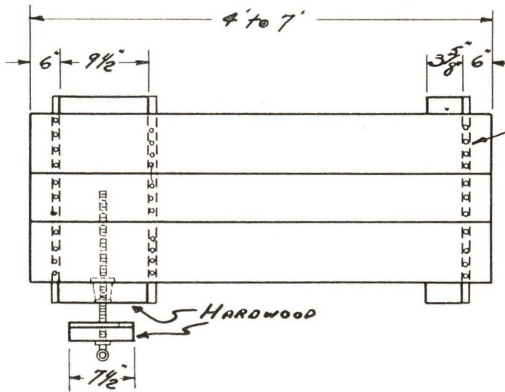


ELM, BIRCH, OR OTHER SUITABLE LOG MAY BE HOLLOWED BY BORING SEVERAL HOLES, THEN USING CHISEL AND GOUGE.

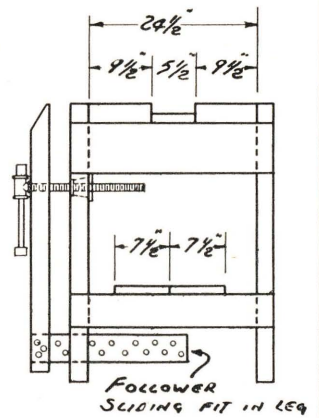
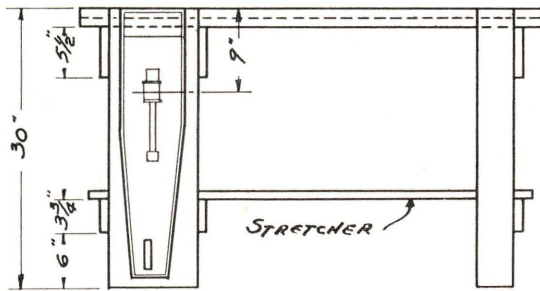


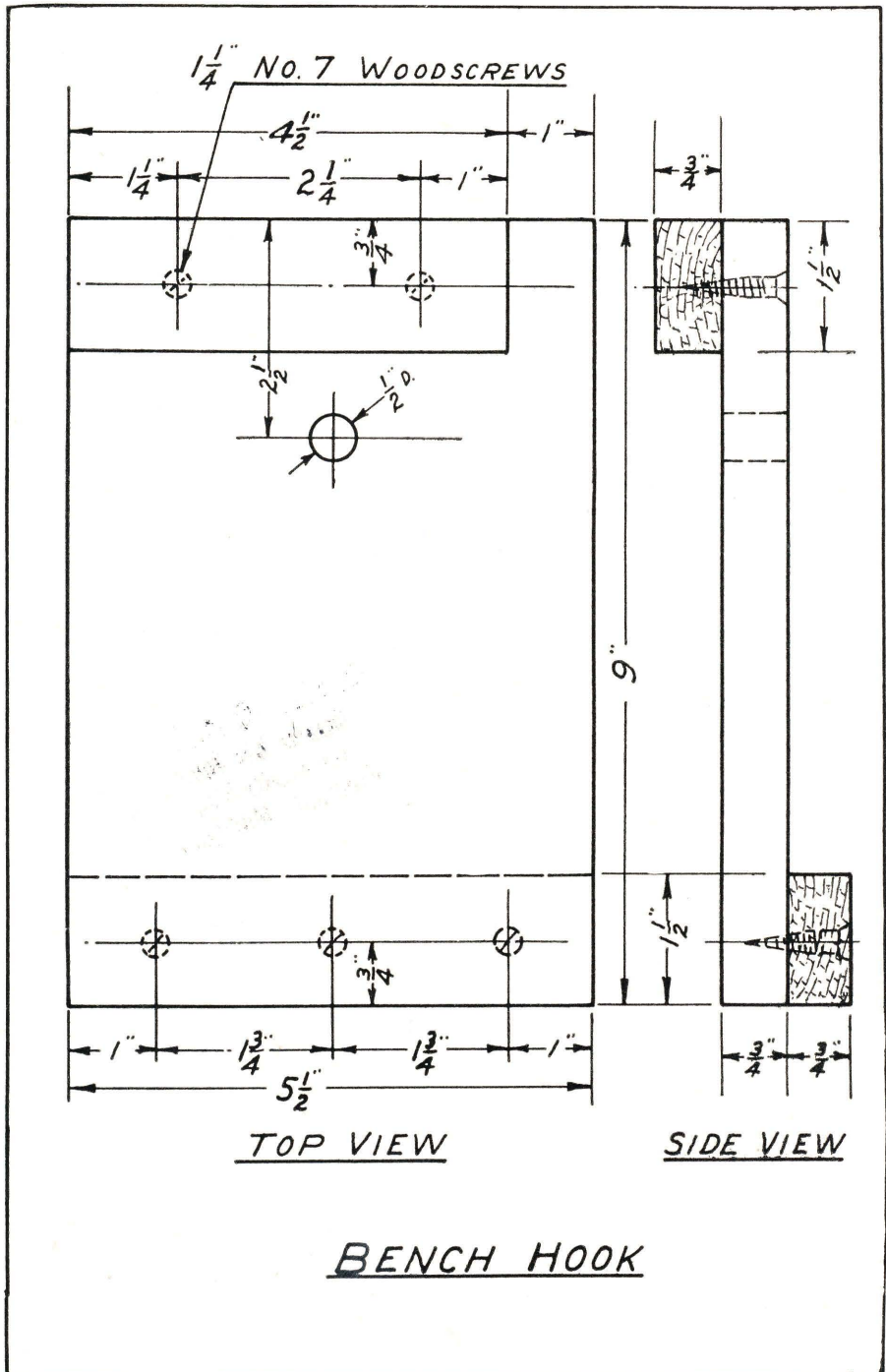
METAL STRIP MAY BE USED ON RIDGE OF ROOF TO INSURE A DRY NEST.

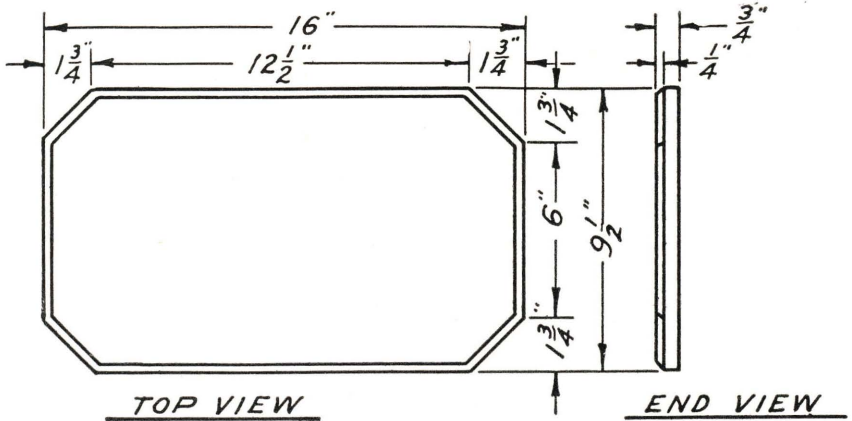
WORK BENCH



Drill 1/2" HOLE - 1 1/2" DEEP TO RECEIVE EACH 3/8" No. 12 SCREW; DRILL, IN TOP, HOLE SLIGHTLY LARGER THAN SCREW THD., AND 3/16" HOLE IN CROSS RAIL. DRIVE SCREWS, AND GLUE PLUGS INTO 1/8" HOLES.



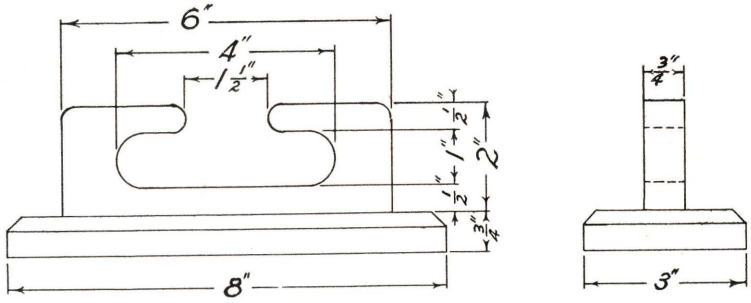




BREAD BOARD

RONILLY E. GRAHAM
County 4-H Agent
Community Bldg.
Fremont, Michigan

WHISK BROOM HOLDER



WHISK BROOM HOLDER

Back	1 piece $\frac{3}{4}$ x 3 x 8
Holder	1 piece $\frac{3}{4}$ x 2 x 6

HOME VISE

1 piece 1 x $6\frac{1}{2}$ x 8
 10 $\frac{1}{2}$ " screws, either No. 11
 or 12

or

One piece $\frac{3}{4}$ x 3 x 10
 One piece 6 x 6
 Screws $5-1\frac{1}{2}$ " No. 8
 1-2" No. 12

or

One piece 2 x 4 x 12
 Two flathead screws $3\frac{1}{2}$ "

WINDOW SUPPORT

1 piece $\frac{5}{8}$ x 3 x 14

CAKE BOARD OR CROCK COVER

1 piece $\frac{3}{4}$ x 12 x 12
 1 piece $\frac{3}{4}$ x $10\frac{1}{4}$ x $10\frac{1}{4}$
 3 spools
 3 screws

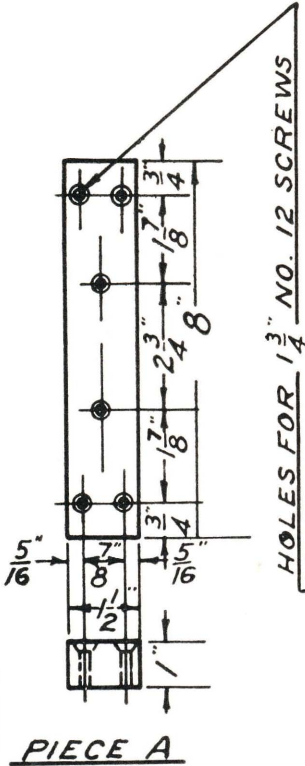
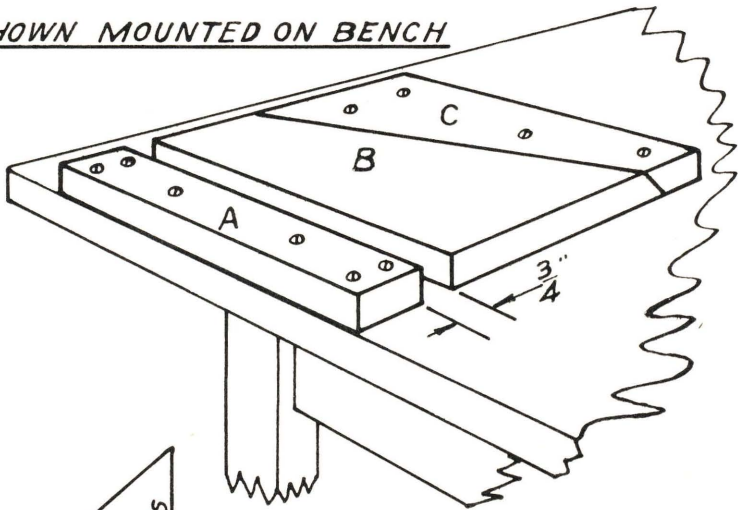
SAW JOINTER

Top	1 piece $\frac{5}{8}$ x 2 x 4
Side	2 pieces 1 x 1 x 4
	4 No. 8 flathead screws $1\frac{1}{4}$ "

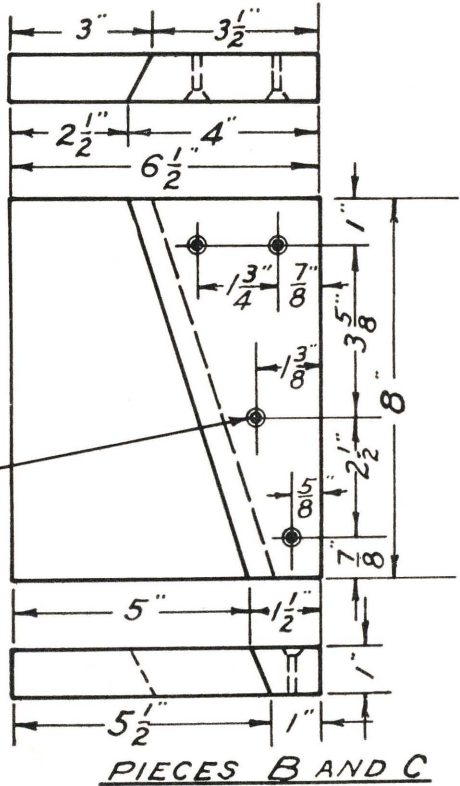
SWINGING DOOR HOLDER

2 pieces 2 x 2 x 24
 2 strap hinges $1\frac{1}{2}$ " wide
 12 No. 6 screws 1"

WISE SHOWN MOUNTED ON BENCH

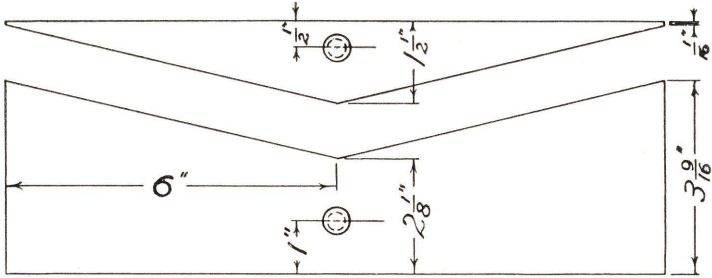


HOLES FOR $1\frac{3}{4}$ " NO. 12 SCREWS

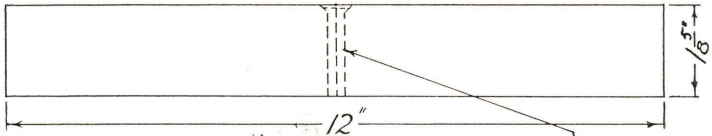


HOME VISE

BENCH VISES

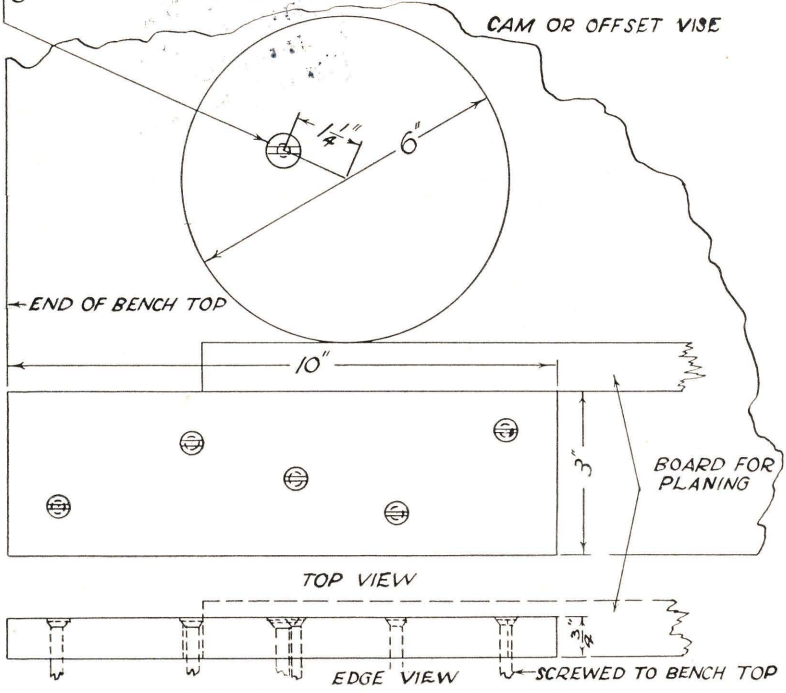


TOP VIEW



$\frac{2}{8}$ " DRILL AND COUNTERSINK FOR $3\frac{1}{2}$ " #20 F.H. SCREWS

CAM OR OFFSET VISE

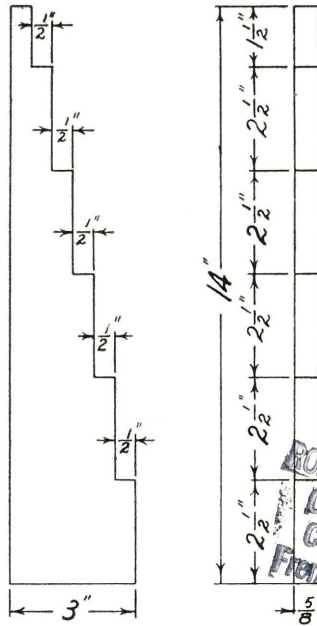


TOP VIEW

EDGE VIEW

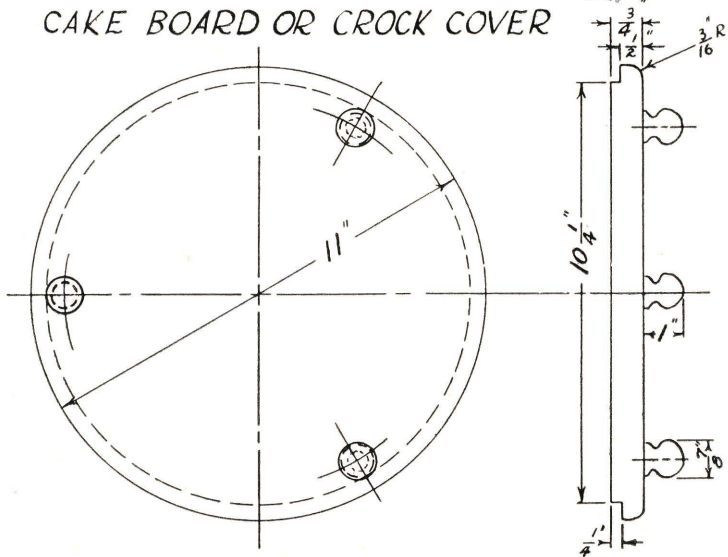
SCREWED TO BENCH TOP

WINDOW SUPPORT

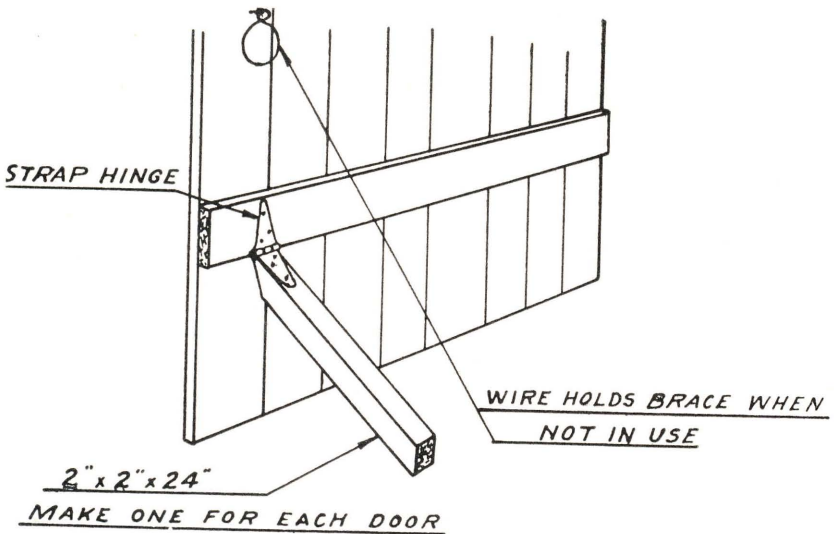
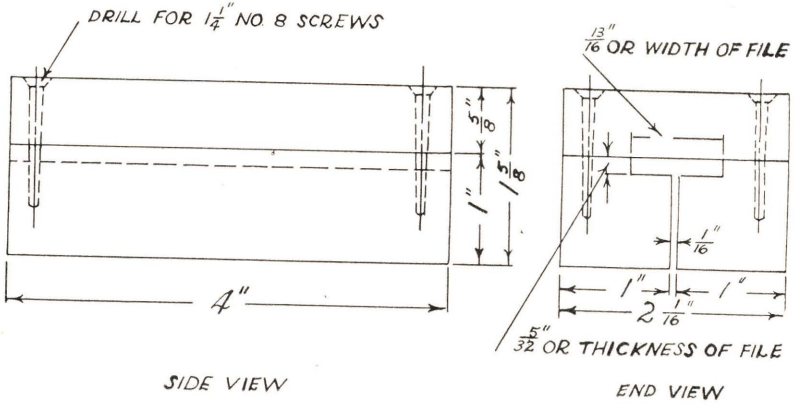


ROMILLY E. GRAHAM
 County 4-H Agent
 Community Bldg.
 Fremont, Michigan

CAKE BOARD OR CROCK COVER



SAW JOINTER



SWINGING DOOR HOLDER

TOOTH BRUSH HOLDER

Top	1 piece $\frac{3}{8}$ x $1\frac{1}{8}$ x $4\frac{1}{2}$
Rest	1 piece $\frac{5}{16}$ x $1\frac{1}{8}$ x $4\frac{1}{2}$
Back	1 piece $\frac{3}{8}$ x 5 x 8

LETTER AND PENCIL HOLDER

Bottom	1 piece $\frac{3}{8}$ x $6\frac{3}{4}$ x $6\frac{3}{4}$
	1 piece — design molding
Section	4 pieces $\frac{1}{4}$ x $5\frac{3}{4}$ x 5
	No. 16 brads $1\frac{1}{4}$

FALSE BOTTOMS

6 - 10 lath strips $\frac{1}{4}$ x $1\frac{1}{4}$

PAPER TOWEL RACK

Ends	2 pieces $\frac{3}{4}$ x 5 x 5 x width of paper (about 11)
Roller	1 piece 1" Dia. x width of paper
Brace	1 piece $\frac{3}{8}$ x 1 x width of rack
Back	1 piece $\frac{3}{4}$ x 5 x 11

WINDOW VENTILATOR

Ends	2 pieces $\frac{3}{4}$ x 8 x 8
Side braces	2 pieces $\frac{1}{4}$ x $1\frac{1}{2}$ x 12
Strips and braces	3 pieces $\frac{1}{4}$ x $1\frac{1}{2}$ x window width
	1 piece glass or thin plywood

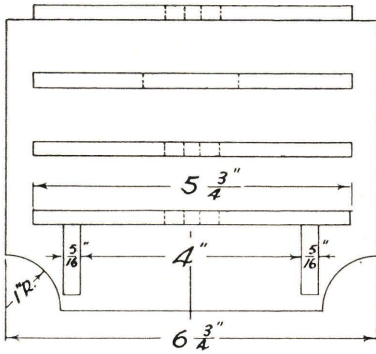
FISH LINE REEL

1 piece $\frac{5}{16}$ x $2\frac{1}{4}$ x 8

KNIFE STROP

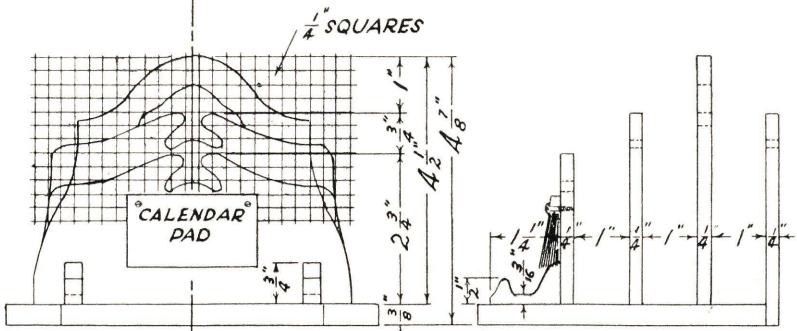
1 piece $\frac{3}{8}$ x 2 x 15

LETTER AND PENCIL HOLDER



USE $1\frac{1}{4}$ " #16 BRADS

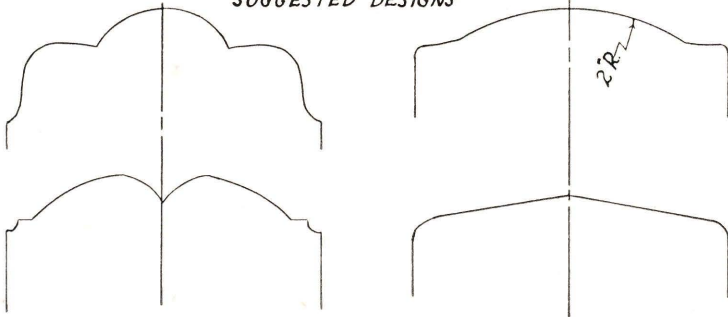
TOP VIEW



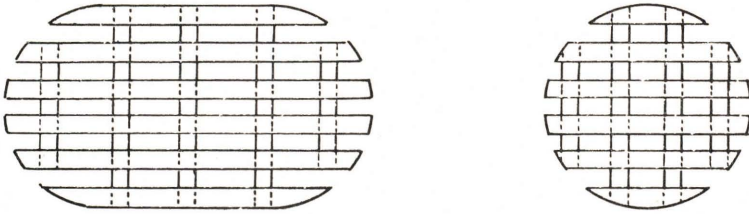
FRONT VIEW

SIDE VIEW

SUGGESTED DESIGNS

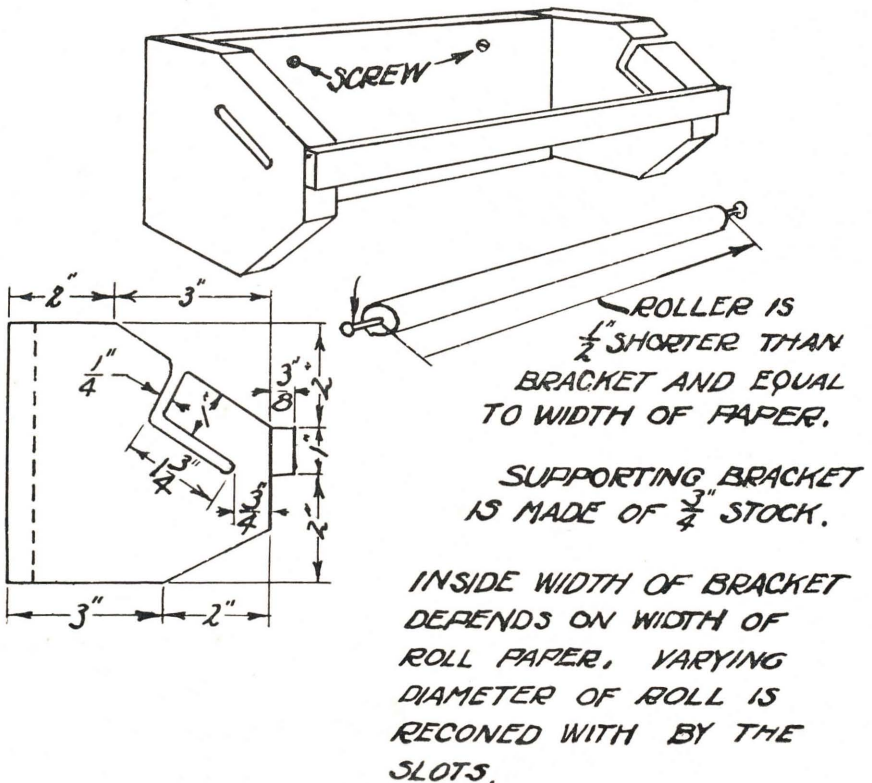


FALSE BOTTOMS

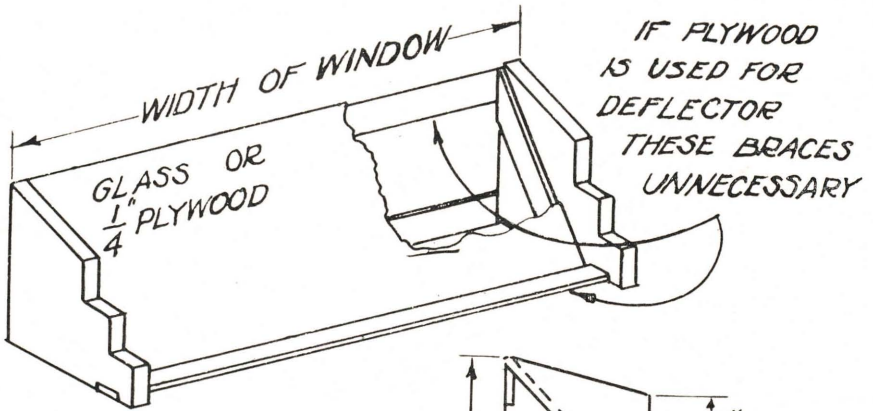


$\frac{1}{4} \times \frac{1}{4}$ STRIPS ARE EVENLY SPACED
BRACES ARE OF THE SAME MATERIAL
FORM IS $\frac{1}{2}$ " SMALLER THAN BOTTOM OF
PAN OR BOILER TO BE USED

PAPER TOWEL RACK

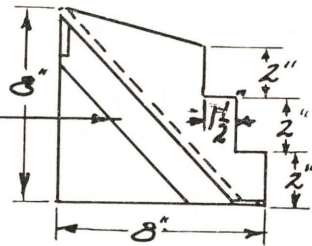


WINDOW VENTILATORS

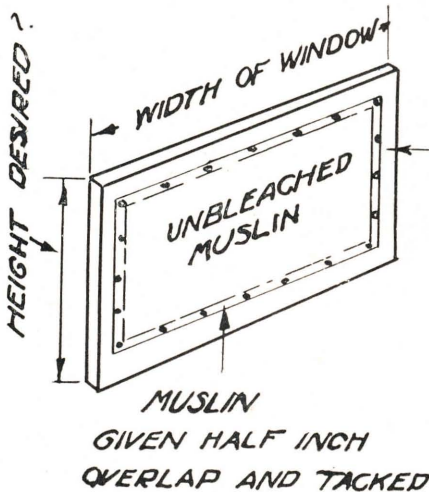


IF PLYWOOD IS USED FOR DEFLECTOR THESE BRACES UNNECESSARY

TACKING STRIPS AND BRACES ARE OF $\frac{1}{4} \times 1\frac{1}{2}$ STRIPS

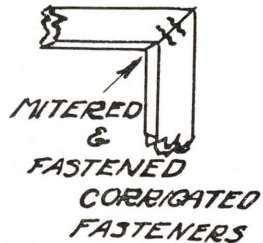


SIDE VIEW

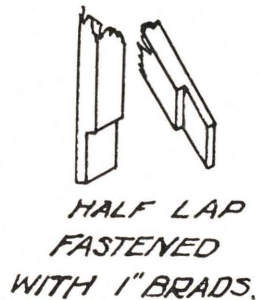


WOODEN FRAME

JOINTS

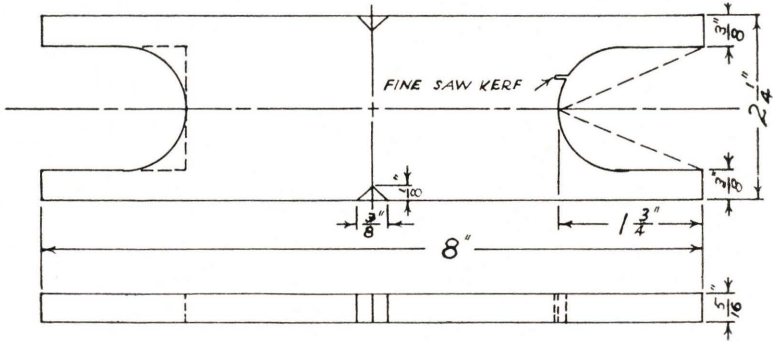


FOR A WIDE WINDOW A CENTER BRACE MIGHT BE NECESSARY OR TWO SECTIONS MAY BE HINGED TOGETHER.



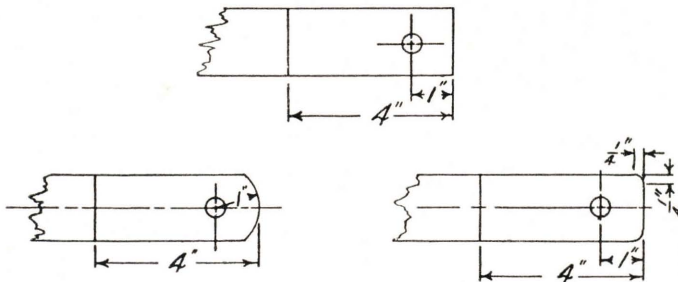
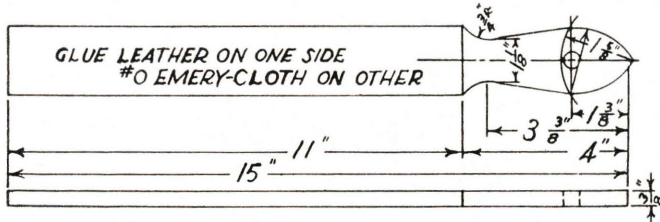
HALF LAP FASTENED WITH 1" BRADS.

FISH LINE REEL



DOTTED LINES SHOW OPTIONAL END OUTLINES

KNIFE STROP



OPTIONAL TREATMENT FOR HANDLE

FOOT SCRAPERS

See detail drawing for size and type.

CORNER SHELVES

Sizes, shapes and design will vary according to your plans. $\frac{1}{4}$ to $\frac{3}{8}$ stock recommended.

PAPER KNIVES

This is a hand carving exercise. Contrasting woods, i.e., maple, walnut may be glued together to form handle. Sizes and design will depend on the individual.

GARDEN TRELIS

Upright	1 piece 2 x 2 - 4
Braces	1 piece $\frac{3}{4}$ x $1\frac{1}{2}$ - 7
	8 flathead screws $1\frac{1}{2}$ "

TOWEL HOLDER

Back	1 piece $\frac{3}{4}$ x 3 x 5
Top	1 piece $\frac{5}{8}$ x 1 x $2\frac{1}{2}$
	2 flathead screws No. 8, $1\frac{1}{4}$ "
	1 sphere— $\frac{5}{8}$ " diameter (agate)

FEED SCOOP

	1 piece of thin sheet iron 10 x 12
	1 piece of hardwood $\frac{3}{4}$ x $4\frac{1}{2}$ x 5
	1 piece of hardwood $1\frac{1}{2}$ dia. x $4\frac{1}{2}$ long
	1 carriage bolt $\frac{5}{16}$ x 6 long and a $\frac{5}{16}$ washer

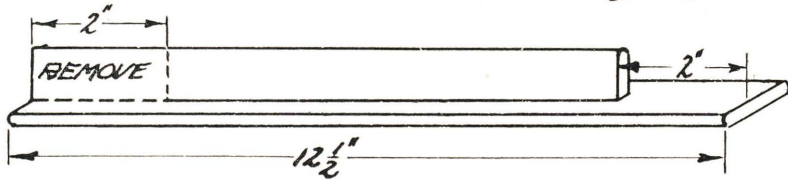
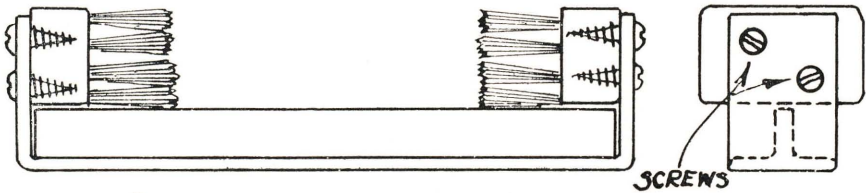
THREE-LEGGED MILK STOOL

Top	1 piece $1\frac{1}{2}$ x 9 x 12
Legs	3 pieces $1\frac{1}{2}$ dia. x $8\frac{1}{2}$

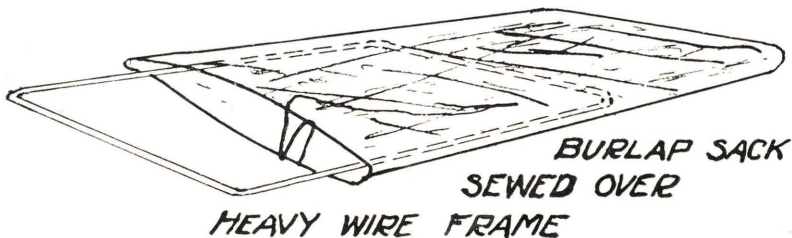
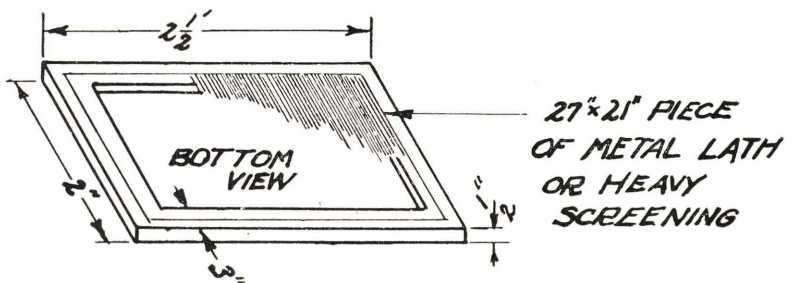
FOOT SCRAPERS

FRONT VIEW

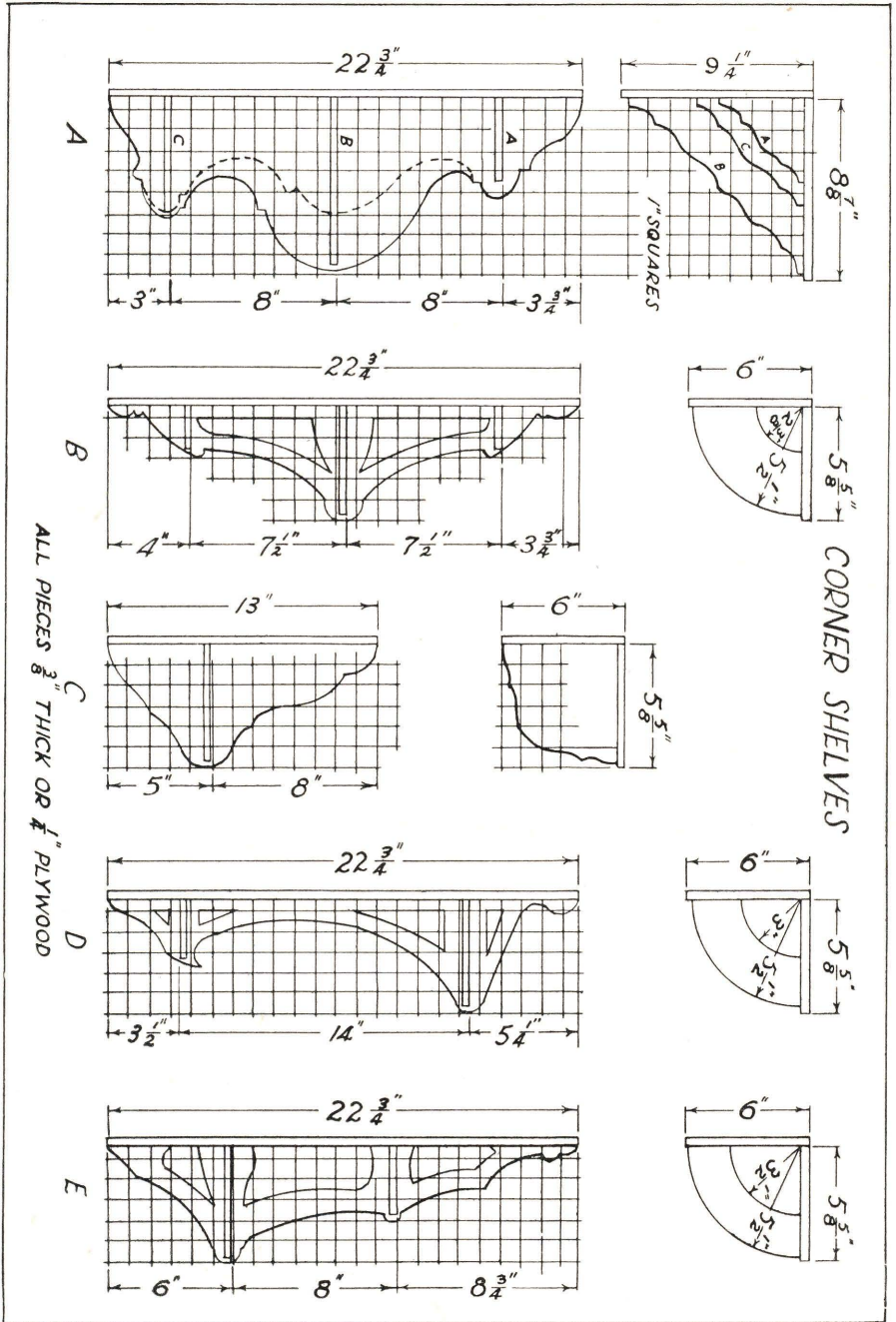
END VIEW



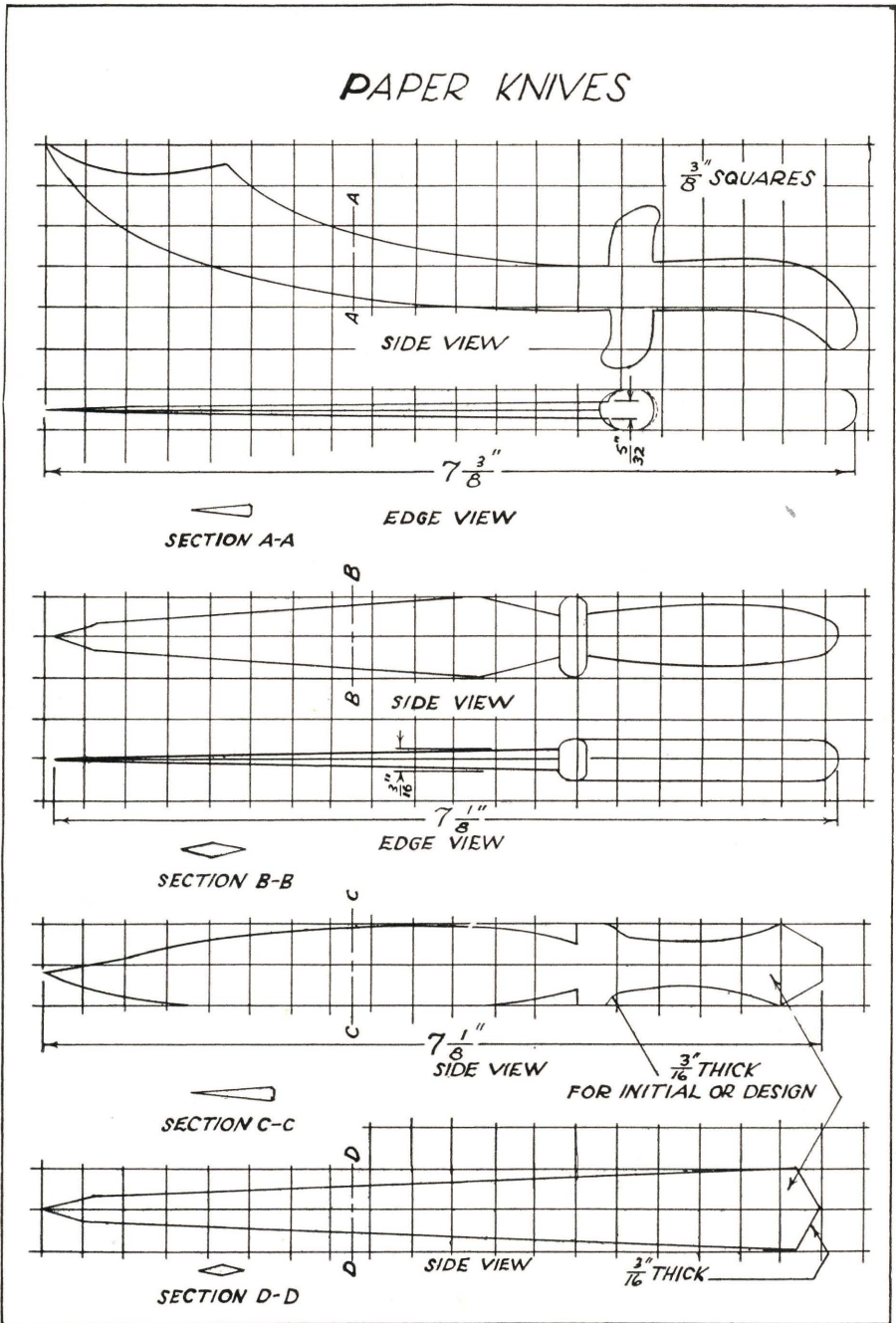
SECTION FROM "T" IRON IS REMOVED AND ENDS BENT UP FORMING BACK ON WHICH TO SCREW SCRUB BRUSH. BRUSHES CLEAN EDGES OF SHOES WHILE SOLE IS SCRAPPED.

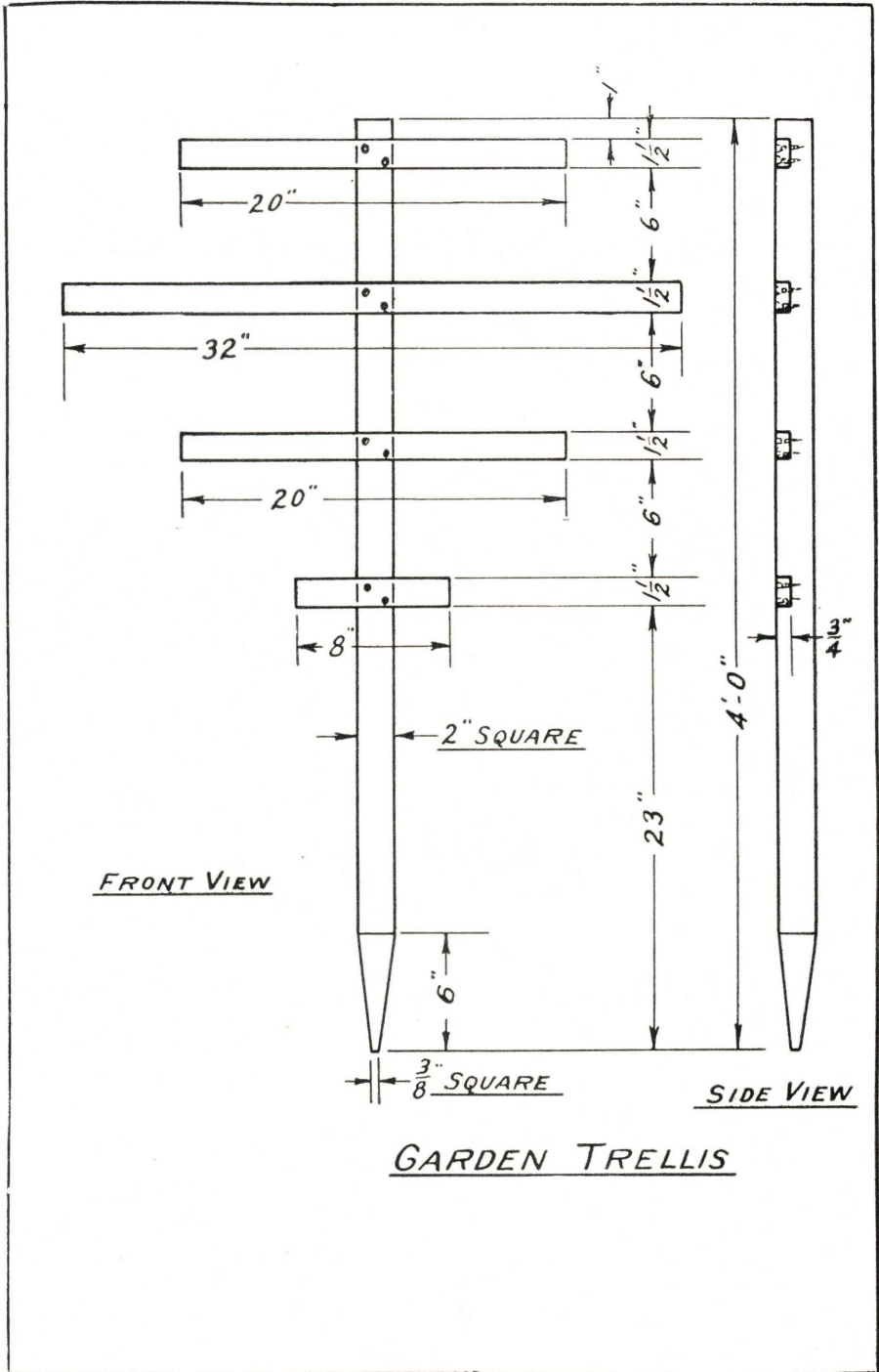


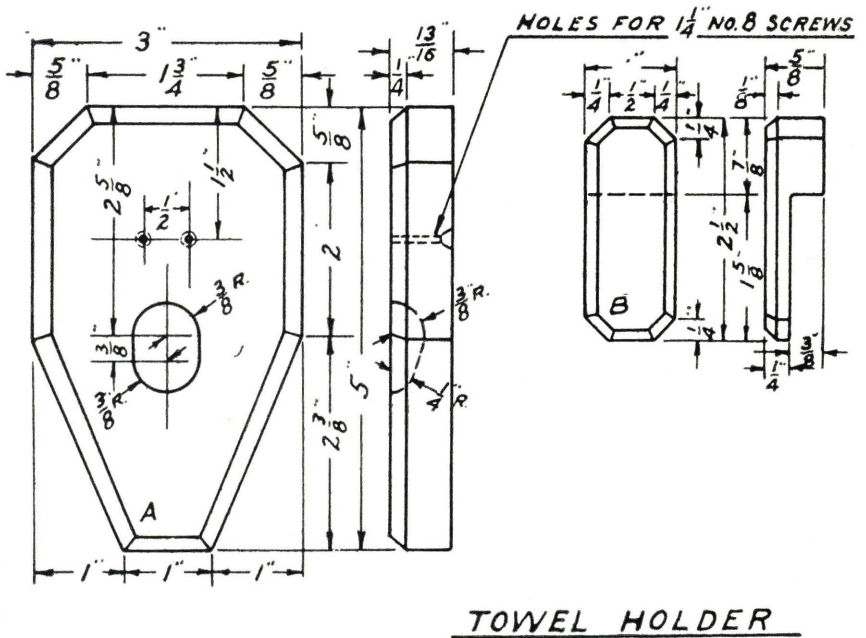
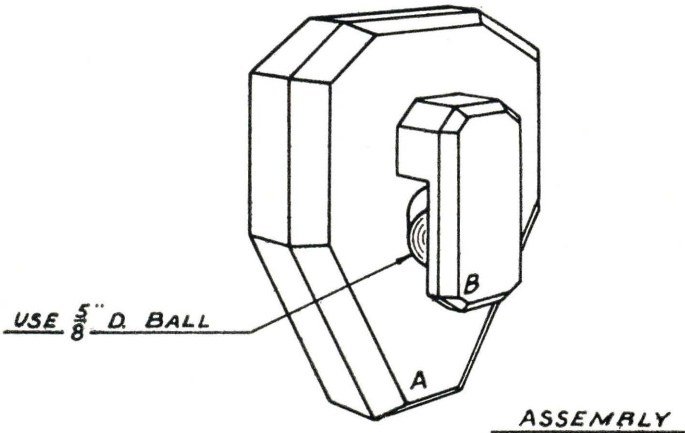
BURLAP SACK SEWED OVER HEAVY WIRE FRAME

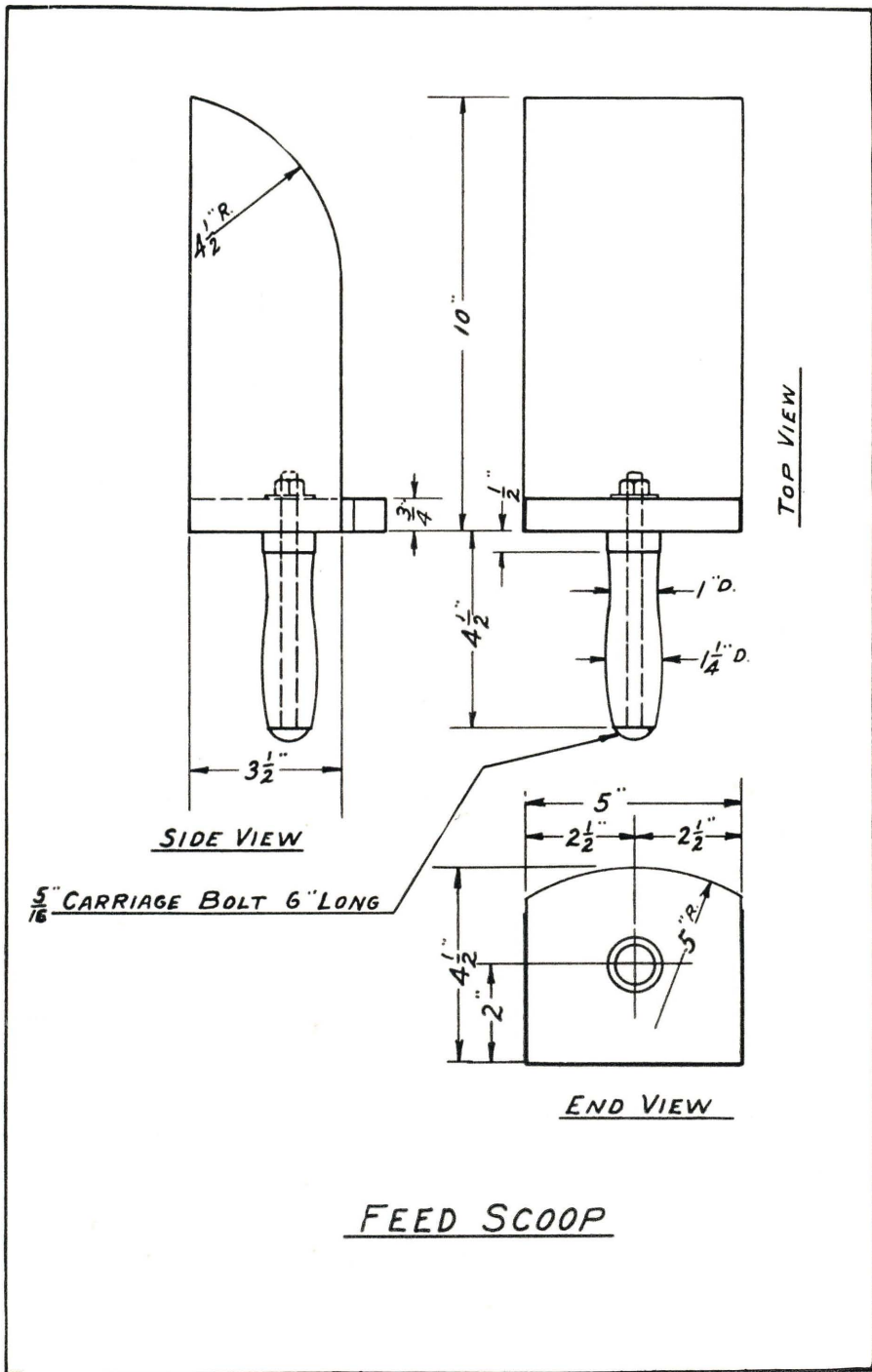


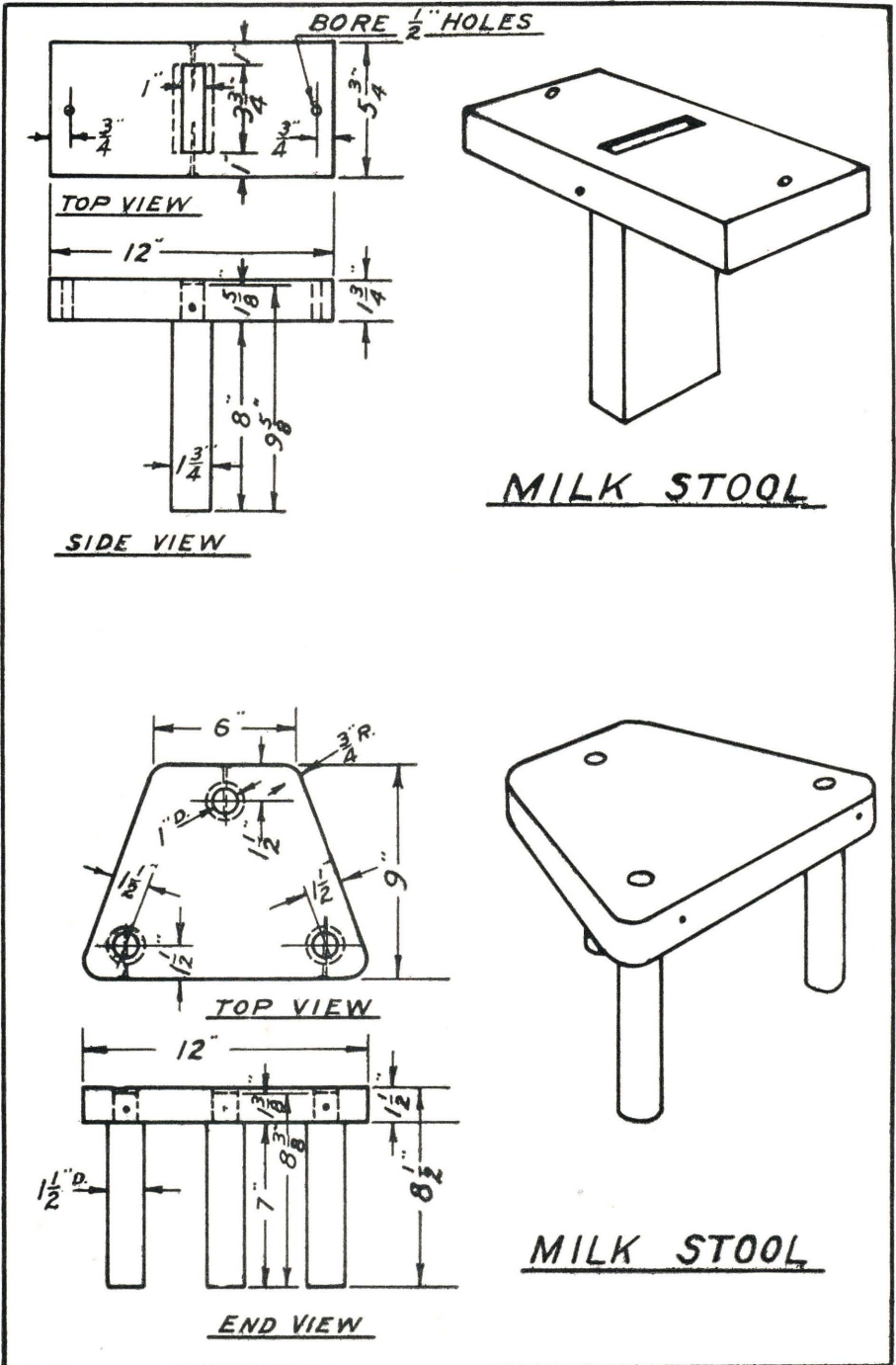
PAPER KNIVES











ONE-LEGGED MILK STOOL

Top	1 piece $1\frac{3}{4}$ x $5\frac{3}{4}$ x 12
Leg	1 piece $1\frac{3}{4}$ x $3\frac{3}{4}$ x $9\frac{5}{8}$

BREAD OR MEAT BOARDS

These may be cut into any design or size.

1 piece $\frac{1}{2}$ x 9 x 15	or	$\frac{3}{4}$ x 10 x 16
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CLOTHES LINE REEL

1 piece $\frac{1}{4}$ or $\frac{1}{2}$ x 7 x 12

PENCIL AND PAD HOLDER

Figure	1 piece $\frac{1}{4}$ x $7\frac{1}{4}$ x 8
Base	1 piece $\frac{3}{4}$ x 4 x $4\frac{1}{2}$
Pencil Holder	1 piece $\frac{3}{4}$ x $\frac{3}{4}$ x $2\frac{1}{2}$

BOOK RACK

Braces	2 pieces $\frac{1}{2}$ x 5
Base	1 piece $\frac{1}{2}$ x 5 x 12
	4 $1\frac{1}{4}$ " roundheaded screws

The two U-shaped pieces ($3\frac{1}{2}$ x 5) are cut out of main boards and used as uprights.

DOOR STOP

1 piece $\frac{3}{4}$ x $3\frac{1}{4}$ x 5
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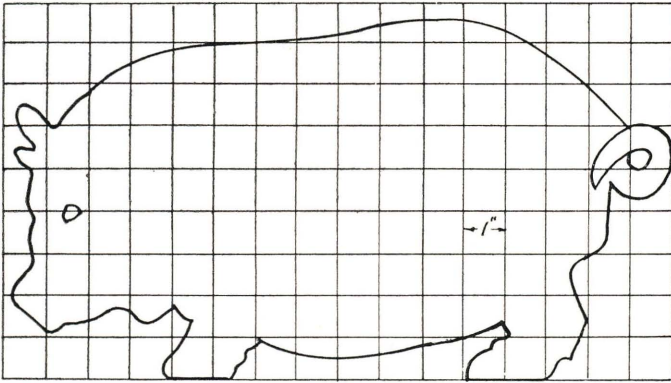
PLANT HANGER

Head	1 piece $\frac{1}{2}$ x $3\frac{1}{2}$ x 8
Leaf	1 piece $\frac{1}{2}$ x 4 x $6\frac{1}{2}$
	1 small hinge
	6 small screws

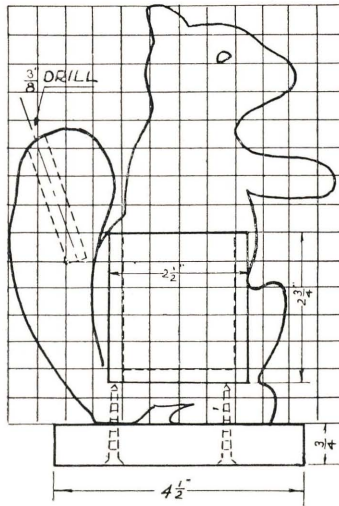
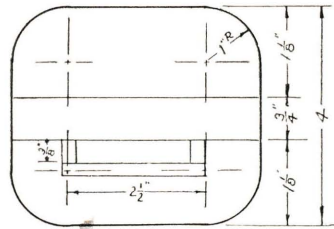
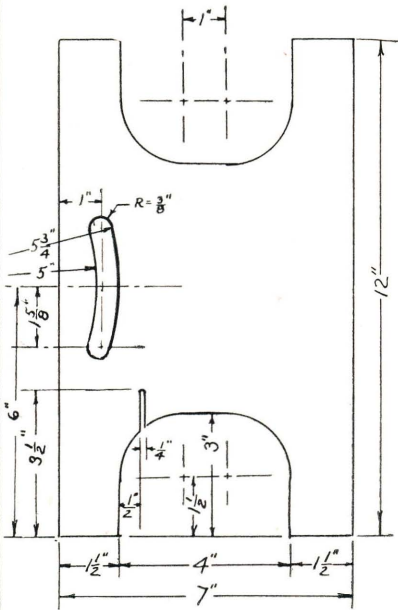
TOY BEAR

Body	1 piece $\frac{1}{4}$ x 7 x 9
Base	1 piece $\frac{1}{2}$ x 6 x 24
Rails	1 piece $\frac{1}{2}$ x 1 x 80
	1 piece $\frac{3}{8}$ dowel x 6

BREAD BOARD

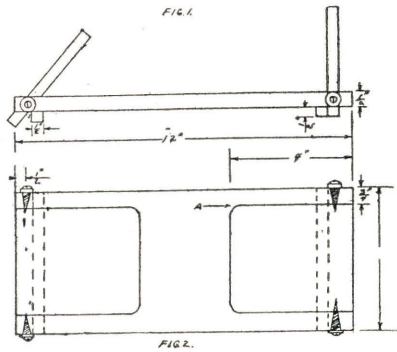


CLOTHESLINE REEL



1/2" SQUARES

PENCIL AND PAD HOLDER



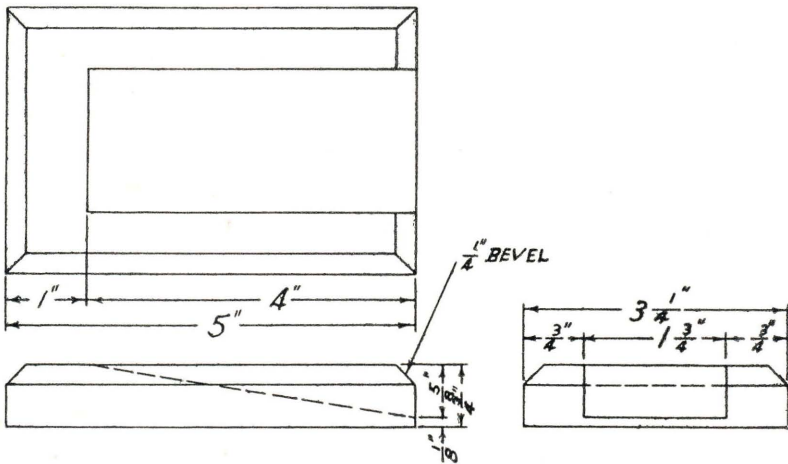
BOOK RACK

DOOR STOP

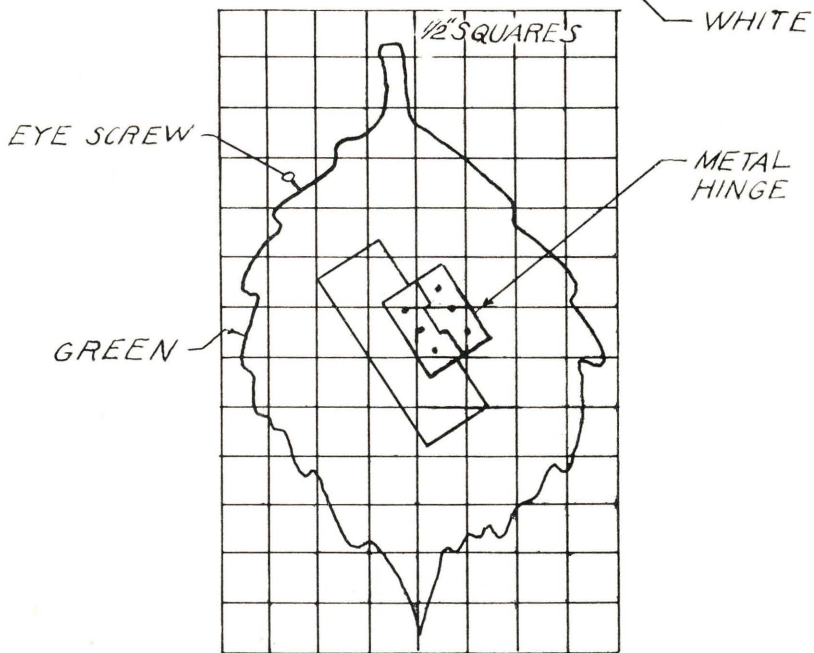
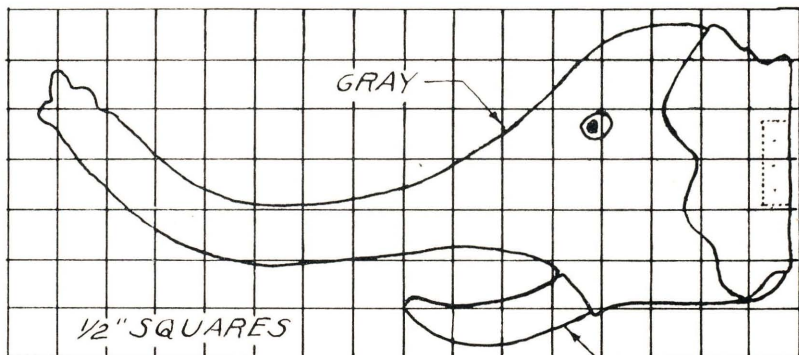
Material

Any type of wood may be used. Match stop with wood in door.
 One piece—1" x 3 1/2" x 5 1/4".

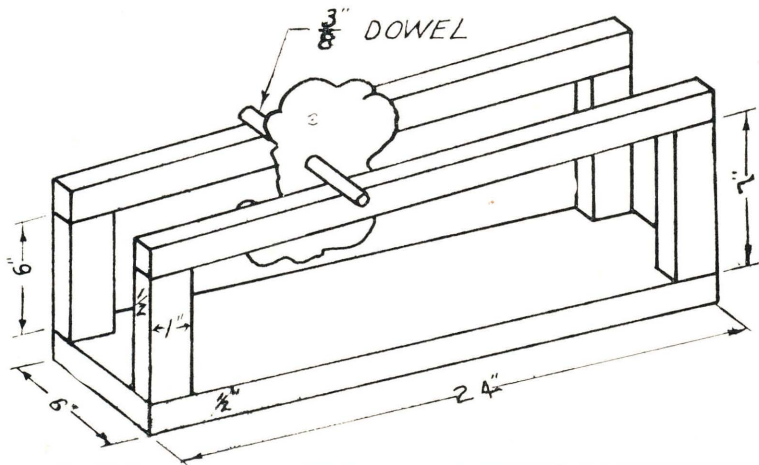
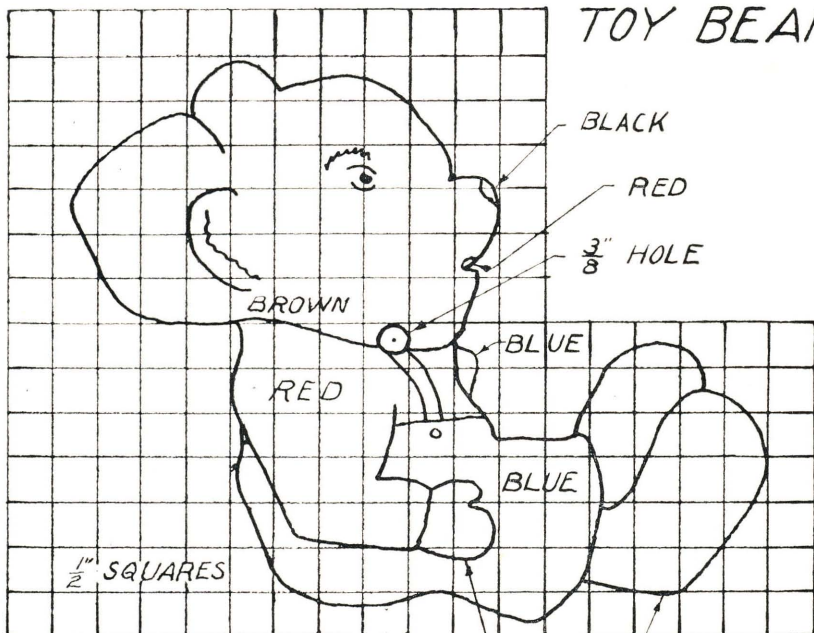
DOOR STOP



PLANT HANGER



TOY BEAR



OTHER CRAFTS

4-H Club members may do other types of craft work besides the wood work outlined in this bulletin. There is a lot of interest, especially at 4-H Camps, in leather, metal, plastic, ceramics and other types of hobby craft.

Members enrolling for the first year hobby craft must make four articles. They may be in the same or in different materials.

CERAMICS

Different forms of plaster can be used but the one that has given the best results is Hydrocal. It is an extremely hard, low-absorption, casting plaster with a very fine texture, and is less porous than some of the others. Surface hardness and strength are from two to four times greater than the standard plasters. Hardness depends on the amount of water used in the mixing process. The setting time is 15 to 30 minutes under ordinary conditions.

If Hydrocal cannot be bought, art plaster, dental plaster, molding or even gauging plaster may be substituted. Keene cement has in the past been used successfully, although it requires 24 hours for complete setting.

SUGGESTIONS FOR MAKING MOLDS, SHELLS AND PLASTER CASTINGS

Molds

1. Obtain a small plaque as a pattern or model.
2. Put one-eighth to one-fourth inch of modeling clay on back of the pattern.
3. Place the model with clay onto a clean piece of glass. Apply a thin coat of rubber to the model with a small, soft, clean brush.
4. Extend rubber coating onto the glass about one inch from the edge of the model.
5. After 10 minutes inspect the rubber coat and remove any air bubbles.
6. Apply six or seven more coats at 45- to 60-minute intervals.
7. When brush is not in use it should be placed in a soapsuds solution.

Plaster Shells

1. Build box-like form one inch higher than the rubber mold. Have space between form and the model at least one inch.
2. Form can be constructed of wood, tin or stiff cardboard.
3. Joints should be tight to prevent plaster from running out of form.
4. It is necessary to have work table level to form even shells.
5. Grease rubber mold with vegetable (not lubricating) oil.
6. Mix a thick gauging plaster and pour over greased mold.
7. Plaster may be reinforced with strands of hemp, rope or heavy twine.
8. When thoroughly dry remove the box-like form.
9. Remove the shell, rubber mold and model from the glass.
10. Separate the shell from the rubber and the model.
11. Peel off the rubber mold from the model.
12. Wash rubber mold inside and outside
13. Trim the edges of the rubber mold with small scissors.
14. Allow shell and mold to dry for several days.

Casting

1. Equipment needed: Several tin cans (No. 3, "coffee" or a No. 10), measuring cup, two water pails, several small mixing spoons, putty knife, scoop or large spoon, and wiping cloth.
2. Put clean water into a tin can. The amount will depend upon cubical contents of rubber mold.
3. Sprinkle Hydrocal into the water slowly until all the water is absorbed.
4. When material is well soaked (one or two minutes), mix with spoon to a smooth consistency.
5. Place shell open surface (up) on a level table.
6. Fit the washed rubber mold into the shell.
7. Pour plaster mixture into the rubber mold.
8. Jar or tap the shell to eliminate air bubbles or pockets.
9. Leave first cast in shell for at least an hour. Succeeding casts can be taken out as soon as they are hard.
10. A hanger may be inserted into the back of the cast in the form of a small twisted copper wire.

11. Removal of cast from the rubber mold is made when there is evidence of heat in the plaster.

Finishing Articles

1. Cast should dry thoroughly for several days.
2. Seal surfaces with either shellac, paint sealer or a flat lacquer.
3. Colors in oil with a small amount of turpentine will be very satisfactory.
4. Pop bottle caps are convenient containers for mixing colors.
5. For finer work the small art brushes may be more convenient.
6. When no details in coloring are necessary the paint may be applied with small wads of cotton.

PLASTICS

Plastic materials are now available in many forms. Attractive articles can be made out of plexiglass, lucite and other forms of plastic materials.

Saws, drills and machine tools are used in making many articles. Wooden jigs should be constructed and used to shape the heated plastics.

Suggestions for Handling Plastics

1. Plastic sheets are protected with a tough paper. This should be left on as long as possible.
2. Cut the large sheets into desirable dimensions.
3. Scribing may be done on the surface with a sharp instrument.
4. Polishing. Scrape edges with a sharp knife to remove saw marks. Use scouring powder, simonize cleaner, or rubbing compound to bring out the luster. Do this before heating.
5. Threading can be done without chipping, if care is taken not to remove too much material at once. Keep the plastic cool.
6. Forming. Thermoplastic, become soft and pliable when heated to 220 to 275 degrees Fahrenheit. At this stage, they can be bent to any shape. When the material cools, it retains the shape to which it is bent. This plastic will, however, reverse to its original flat shape when reheated to the above temperature.
7. Heating is done in ovens which may be regulated within 220 to 275 degrees Fahrenheit. Forms may be hung vertically or placed on trays with asbestos cloth bottoms. A kerosene stove oven will be

satisfactory for small work. In an emergency, an electric hot plate may be used, but the plastic should not come in contact with the heating element.

8. **Cementing.** With care and practice, it is possible to obtain a cemented joint, which will closely approximate the plastic itself. Most cementing is done by the soak method, which consists of placing one of the two pieces to be cemented into the cement for about three to five minutes or until a cushion is formed. Upon removal, the soaked surface is pressed against the opposite dry surface. The excess cement forms a smaller second cushion that makes a firm contact. A good cement is the 1A, a 50 percent mixture of Monomeric and Methyl Methacrylate. The viscous cement is better for amateurs and is made by adding a small amount of plastic to cement 1A. The viscous cement is used similarly to glue. Place a small amount on each surface—press together firmly, and let dry.

9. **Coloring.** Dyes may be used to change the colorless plastic to various shades. Plastics can, however, be bought in nearly all colors.

HANDICRAFT CLUB MEETINGS

The 4-H handicraft club should hold work meetings at least every other week. Special work periods may be held as often as the local dealer and club members desire. The club should also have at least six regular business meetings during the club season. Each one should have a definite purpose. Subjects that will be discussed, naturally, will depend upon the interest of the local club. The following is a suggested outline for the organization meeting.

A. Business Meeting (local or county extension agent in charge)

Enrollment of members in the club.

Election of officers from membership of the club.

(president, vice-president, secretary-treasurer)

Selection of a name for the club.

Selection of the time, date, and place for the next regular meeting.

Appointment of special committees

B. Instructions

Explanation of the duties of the club officers and members.

Distribution of club literature and explanation of its use.

(4-H club bulletin, report blanks and reference bulletins on the project.)

Explanation of the 4-H handicraft club requirements.
 Program for next club meeting and assignment of work.
 Discussion of the club program for the season.

C. Social

After the clubs are fully organized part of the meetings can be devoted to social activities. Games, contests, programs and parties can be arranged for the interest of the club members. Publications from the extension office will offer many suggestions for recreation.

SUGGESTED OUTLINE FOR A LATER CLUB MEETING

A. Business Meeting (Club president in charge)

Meeting called to order by president.

Roll call by secretary. Members respond by reporting on previously assigned topic.

Reading of minutes of last meeting by secretary.

Old business.

New business.

Arranging details for next meeting.

B. Instruction

How to keep a shop clean.

Discussion on care of tools.

Demonstration—"Parts of the Plane."

C. Social

Club program—games and contests.

Refreshments.

SUGGESTIONS FOR 4-H HANDICRAFT CLUB PROGRAMS

- I. The following may be used in answering roll call:
 - a. Name of kinds of soft woods that may be used in handicraft work.
 - b. Name of standard makes of the different tools, such as Stanley planes, Disston saws, etc.
 - c. Statement of handicraft articles already completed.
 - d. Statement of handicraft articles to be made this year.
 - e. States of the United States which lead in the production of lumber.
 - f. Name of kinds of trees which grow in your community.
 - g. Cost per thousand feet of different kinds of lumber.

- h. Name of tools shown by secretary.
 - i. Give number of nail or screw shown by secretary.
 - j. State amount of time spent on handicraft work since last meeting.
 - k. What our club should be doing.
 - l. Name different kinds of finishes which can be applied to articles.
 - m. Names of paint manufacturing companies.
 - n. Something useful that we could make for which we have no plans.
- II. The following may be used as topics for talks or discussions by club members or club leaders.
- a. How I am keeping my report up to date.
 - b. Best methods of keeping tools in good condition.
 - c. How I am using my handicraft articles at home or on the farm.
 - d. The use of paint, stains, wax or sealers in handicraft.
 - e. How to arrange an exhibit of the articles made by our club.
 - f. The advantages and disadvantages of doing handicraft work alone at home.
 - g. The advantages and disadvantages of doing handicraft work at the school house.
 - h. How to identify the different kinds of trees.
 - i. How to identify the different kinds of woods.
 - j. How our school board can help our club.
 - k. How father and I are planning a farm workshop.
 - l. How to secure the tools necessary for our club work.
 - m. Debate: "The value of home-made articles vs. factory-made articles."
 - n. Why write a report on handicraft work.
 - o. What handicraft clubs are doing in Michigan.
 - p. What kind of prizes should be given for handicraft work.
 - q. Talks by local men engaged in similar work.

WOOD FINISHING

Wood finishing is a trade by itself. In 4-H club work the member who does the woodwork also completes the finishing. The purpose of wood finishing is to protect the wood from moisture, dirt, weather, and to increase the beauty of the surface. All wood should be well

dried or seasoned, as the drying process is called, before it is used in any kind of construction. Wood not properly dried is likely to check, crack, or warp, and will break down the finish. Remember that the kind of finishing will depend upon the nature of the wood, personal preference, type of article chosen, and where it is going to be used.

The main points to keep in mind when finishing wood are:

1. Make a smooth surface.
2. Remove grease spots or discolorations.
3. Remove excess glue, if glue was used for jointing.
4. Remove dents in the wood.
5. Fill holes and checks.
6. Sanding.
7. Apply finishes.

The smooth surface is obtained by use of the smoothing tools. The plane, scraper, and sandpaper should be used on each piece before the article is assembled. Be sure that all saw marks are removed by these tools.

Grease spots or discoloration may be removed by rubbing with a cloth dipped in benzene, or naphtha.

If glue has been used, the excess glue should be removed. This can be done by application of a cloth wrung out with boiling water. If the glue is not removed from the grain of the wood, it acts as a filler and prevents the finish from entering the wood.

To remove dents, wring out a piece of wet muslin and lay two thicknesses of it over the dented surface. Then apply to the cloth, a hot pressing iron. By repeating this process, the dent is removed. The part that has been moistened should be sandpapered.

In filling holes and cracks several methods are used.

A. In case of large holes a piece of wood that matches the rest of the wood should be inserted into the hole.

B. Smaller holes or checks can be filled by mixing some fine sawdust of the wood used with ordinary glue. This mixture when made into a thick paste can be applied to the hole. Care should be taken not to smear the glue to other parts of the surface.

Stick shellac, plastic wood, and commercial crack fillers are also satisfactory. Putty can be used under paints.

C. For filling cracks in hardwoods, mix together one part of cornstarch and one part of wheat flour. To this mixture add one part

of linseed oil with one part of Japan drier. This mixture when placed into the cracks will take any stain.

When the surface is level and all the cracks and holes are filled, the work is ready for the final smoothing. This may be done by using a No. 1 or No. 0 sandpaper or if the surface is flat, a fine scraper.

There are many types of finishes that may be applied to the completed article. Beginners should be satisfied with simple and easy methods. It should not be necessary to use shellac, fillers, enamels or varnishes to obtain satisfactory finishes on small articles.

The first step in the process of wood finishing has been mentioned and is in reality a part of the workmanship.

The second step is the process of wood finishing, that of staining and coloring.

The purpose of the finish is, however, to bring out the natural beauty of the wood rather than to add mere color and striking effects. Paint is a very good substance to use on cheaper woods that have little or no natural beauty or graining.

LINSEED OIL

Linseed oil is one of the oldest finishing materials. Mixed with turpentine it penetrates deep into the wood and acts as a preservative, filler, and sealer.

If many coats are applied and rubbed, a natural finish will be produced. The first few coats can be applied with a mixture of 50% oil and 50% turpentine. The oil is gradually increased so that it makes up about 80% of the solution for the final coats.

STAINS

Stains are wood dyes usually dissolved in oil, naphtha, turpentine, alcohol or water. For beginners, oil stains are better than any others. These may be diluted with turpentine to obtain the desired shade. It is recommended to practice on some scrap lumber (similar to that used in your article) before the stain is applied to the constructed article.

Stain should be applied quickly covering all parts. Before the stain has time to dry the surface must be wiped with a cloth or a wad of waste. If the color is too light, apply one or two or even more coats until it is dark enough. If too dark, a damp cloth rubbed over the surface will absorb some of the stain and take up some of the color. It is easier to dilute the stain to the desired strength. End grain should be finished with stain of one-third to one-eighth strength. Stain should

be allowed to dry at least 12 hours and preferable 24. Avoid colored varnishes or varnish stain in handicraft finishing.

PAINTS

Articles to be used outside should either be oiled or painted. Use linseed oil diluted with one-half to two-thirds turpentine on articles that are not to be painted. Two or three coats will be enough. There is no harm in oiling surfaces that are later to be painted.

Paints may be purchased in many colors and shades. Best results will be obtained if the printed directions on the label, are followed.

If the surface contains knots and pitch areas, shellac should be used to touch up these places. This will prevent the pitch from bleeding through. Shellac will also act as a grab coat for the paint. The first coat of paint should be given 24 hours to dry. For some of the smaller articles it is recommended that the paint be sanded to smooth the surface for the second coat. Sometimes a third coat is applied.

SEALERS

Sealers have become very popular in finishing wood-work, floors and even handicraft articles. It is easy to apply with a cloth or a brush, and if buffed between coats will leave a nice glossy finish. Stains can be put on before or with the sealers. Sealers that penetrate deeply into the wood will be more satisfactory as a wood preservative. They can be used before and after fillers are applied to the porous wood. Two or three coats will be necessary for a high polish. A coat of wax will help to protect the finish.

WAX

Wax may be applied to all wood, or over any finish in order to:

Polish and beautify

Protect and preserve the wood

Protect and preserve the life of other finishes previously applied

Make the surface easy to keep clean.

Apply the wax with a cloth, spreading the wax out in a thin, even coat. A thin coat polishes better and is more satisfactory than a heavy coat. Allow the wax to dry until the stickiness disappears. Usually at the end of 15 minutes. Polish with a soft cloth or brush. In polishing it is speed more than weight that brings out the luster.

CARE OF BRUSHES

Good brushes are necessary in order to get a satisfactory finish. A new brush should be cleaned with warm water and soap and allowed to dry thoroughly before using. Brushes should be cleaned immediately after using them. If the finishing material dries in the brush, the bristles may be injured. The brush will also become hard and it will be very difficult to clean.

The solvent used in cleaning a brush will be the same as that used to thin out the finishing material, viz. turpentine for paint, enamel or varnish; alcohol for shellac; lacquer thinner for lacquer. Soak the brush in this solution for a minute or two. Work the brush up and down in the container to release the material from the bristles of the brush. Fill the brush with cleaning solution and quickly turn the bristles up, allowing the solvent to soak through the "crown", or the part of the brush next to the handle. Repeating this operation two or three times will help to remove finishing material from the part of the brush that is the hardest to clean.

A full brush may be worked towards the operator on several layers of newspaper to help remove sediment from the bristles.

When clean, wipe the brush dry. Allow it to dry and then it may again be washed with warm soapy water. After it is thoroughly dried, the brush can be wrapped in waxed paper. A brush cleaned this way can be kept indefinitely. If the brush is to be used repeatedly, it is not necessary to clean it each time. Suspend it in a pail or a jar by running a small wire through the handle, so the bristles are kept at least $\frac{1}{2}$ " from the bottom of the pail or jar. Put enough cleaning solution in the pail to cover all the bristles of the brush. A tightly covered pail can also be used if holes are punched in the cover to allow the handles to stick through. Put enough cleaning solution in the pail to cover all the bristles. This solution will depend on the type of brushes used, as mentioned above.

THE REPORT

The handicraft report is a definite requirement for completion. It should be turned into the Extension Office by your local leader sometime before the achievement day. No story is required but be sure to answer all the questions in the report form. Each club member should know the cost of the lumber, finishing supplies, nails, screws and other hardware used in making of each article. (See Financial Statement below.)

FINANCIAL STATEMENT

Number	Name	Cost of Material Used	Estimated Value
Required Exercise	Squared Stock	\$.25	\$.50
First Exercise	Bench Hook	.50	1.00
Second Exercise	Bread Board	.50	1.00
Third Exercise	Feed Scoop	.35	1.00
Other Exercises			
	Supplies and Finishing Materials	.40	
Totals		\$2.00	\$3.50

(Note—Use additional sheet if necessary)

Total Estimated Value of Exercises..... \$3.50
 Total Cost of Material Used on Exercises..... 2.00
 Total Profit on Exercises..... 1.50



Fig. 20. Exhibit at county achievement day.

COST OF MATERIALS

The cost of materials includes not only the amount for lumber, but also sandpaper, nails, screws, hardware and finishing supplies. If the purchase price of the new lumber is not known, the cost should be estimated at 30c per board foot. Reclaimed or used lumber should be figured at 10c per board foot.

ESTIMATED VALUES FOR HANDICRAFT ARTICLES

The following is an estimated value of completed handicraft articles. Use these values in your report. Your club leader should help you estimate the value of other articles which you have made, if they are not in the bulletin.

First-Year Exercises

Bench Hook, 75¢	Necktie Rack, \$1.00
Bench Vise, \$1.00	Necktie Rack, 75¢
Bird Feeder, \$2.00	Nesting Boxes, \$3.00
Bird Shelter, \$2.00	Paddle Ball, 75¢
Book Ends, \$1.00	Paper Knives, 35¢
Book Marker, \$1.50	Paper Towel Rack, \$1.50
Book Rack, \$1.00	Peg Puzzle, 50¢
Bread Board, \$1.00	Pen and Pad Holder, 75¢
Cake Board or Crock Cover, 75¢	Plant Hanger, \$1.50
Christmas Tree Stand, \$1.50	Pyramid Puzzle, 50¢
Clothes Line Reel, 75¢	Ring Toss, 50¢
Coping Saw Exercise, 35¢	Sanding Block, 35¢
Corner Shelves, \$1.50	Saw Jointer, 75¢
Door Stop, 35¢	Shadow Box, \$1.00
False Bottom, 75¢	Shower Clogs, \$1.00
Feed Scoop, 75¢	Swinging Door Holder, 75¢
Fish Line Reel, 35¢	Tooth Brush Holder, 75¢
Foot Scrapers, \$1.50	Towel Holder, 50¢
Garden Trellis, \$1.50	Toy Bear, \$1.50
Home-made Vise, \$1.00	Whisk Broom Holder, 75¢
Hydrocal Articles, 5¢ - 50¢	Window Support, 75¢
Knife Strop, 35¢	Window Ventilator, \$1.50
Letter and Pencil Holder, 75¢	Work Bench, \$10 - \$20
Milk Stool, \$1.50	Wren Houses, \$1.50

ACHIEVEMENT EXHIBITS

The achievement day will be a big event to all handicraft club members. Most of the achievement days are conducted as all county events. Exhibits from every member and all of the clubs in the county will be on display. The work of the members will be judged on the things listed on the following score card.

My 4-H Exhibit HANDICRAFT

	<i>Excellent</i>	<i>Satisfactory</i>	<i>Should Improve</i>
A. QUALITY AND GENERAL APPEARANCE			
B. CHOICE AND SELECTION OF MATERIALS			
Wood adapted for article			
Type of fasteners			
Hardware			
C. CONSTRUCTION			
General Workmanship			
Edges			
Square			
Bevels			
Joints			
Planing			
Sanding			
D. FINISHING			
Appropriate			
Article prepared for finish			
Application			
Sanded, buffed or rubbed			

Other factors considered are:

Interest and attitude as a club member.

Completeness, neatness and correctness of the report.

The 4-H exhibit is a public demonstration of what has been accomplished throughout the year. It will give all members and leaders a chance to make comparisons. They will also see the advanced years of work and perhaps get ideas for next year's articles.

Handicraft exhibits are set up on long tables. Paper placed on the tables will give a neater appearance and help to show up the articles to



Fig. 21. First-Year Handicraft exhibit.

better advantage. Each 4-H Club will have a definite space and will place its exhibit according to the different years of work. Each boy's articles should be grouped together, and each article labeled with the name of the club member, year of work, and name of the leader of the club.

Achievements may be held locally either before or after the county day. A short but instructive program should be given. The president of the club should preside at the meeting. A typical business meeting may be conducted. Roll call could be responded to by some statement pertaining to handicraft work, such as things that have been learned from the project; articles made and cost; properties and characteristics of Michigan's common woods. A short demonstration of some kind could be given by some members of the club, making some simple exercise, sharpening tools, or cleaning a paint brush, etc.

Talk: "What I Think of 4-H Handicraft Club Work"—Club Member.

Talk: "What I Think of 4-H Handicraft Club Work"—A Father.
Club Songs.

Instrumental Music.

Reading the best report of the Handicraft Club Members.

Talk and awarding of prizes—Judge of Exhibits.

Social Hour—Games, Lunch, etc.

DEMONSTRATIONS

A demonstration is one of the best methods of presenting various subjects to club members or other groups. What a club member learns by doing is usually more lasting than what he learns through books or lectures. All club work is demonstrational in method, and the team demonstration brings out the means and methods used by club members.

A demonstration is usually given by two club members working as a team, limiting their work to some phase of the club project. Demonstrations should frequently be a part of the club meeting. They afford the members opportunity for self-expression and gaining skill and confidence. For local club meetings the demonstrations may be by individuals. This will give each member a chance to try out for the team to represent the club.

In a successful demonstration the members of the team are busy all the time, the discussion being correlated with the work done. In order to present their topics properly the team members must study their subject, have proper equipment and illustrative matter, and divide the demonstration into logical parts.

After the topic has been selected the team should make a careful study of the different things to be discussed in the demonstration. Before demonstrating in public the team should be properly instructed and trained. Each team member should be sufficiently familiar with the subject to speak convincingly during the demonstration and to answer questions asked by the audience. This requires a good general knowledge of the subject.

To demonstrate means to *show*. Every successful demonstration requires some equipment to illustrate the different parts or phases of the work. Remember, illustrative material and equipment play a large part in helping to show or demonstrate the subject under discussion.

What one sees is remembered longer than what one hears. The materials and equipment to be used should be carefully selected before

the demonstration and checked over so that everything may be ready. The following suggestions may be of help in developing a team.

Select Topic to Demonstrate

A topic that you are interested in and familiar with should be selected—see page 87.

Select Members for Team

In doing this, the leader selects two older members whom he thinks are best suited to make the demonstration or he places the selection on the basis of an elimination contest. Members must be enrolled in project which they are demonstrating.

Preparation of Team Members and Speeches

Make a careful study of the topic selected for the demonstration. Arrange the subject matter in logical order and collect all the illustrated material possible to use with the speech. The members should train themselves to explain things as they are being done. Talk naturally so that the audience can understand. To make the best appearance it is well for the team to be dressed uniformly.

Suggested Outline for a Saw Filing Demonstration

Spaker A	Speaker B
Introduces himself and teammate in some novel way. Brief talk on club work as carried on in the nation, state and the community. Demonstration is part of club work. Nature and purpose of demonstration.	Gets material ready. Arranges tools, adjusts saw. Shows chart, etc.
Assists by showing parts of saw, pointing out differences as found and mentioned by speaker B. Show good and bad features of saws as mentioned by his partner.	Speaks on use of saw. Parts, differences between cut-off, rip, back, keyhole and coping saw. What to look for in buying saws. How to handle a saw.
Discusses the following: Jointing. Proper set for good work, and different types of lumber.	Shows how to joint. Shows hand set and anvil set. Use charts if possible.
Demonstrates how to hold file and shows chart.	Tells how to file cut-off saw.
Tells how to file rip saw.	Demonstrates how to hold file. Shows chart.
Clears bench and prepares to help his partner answer any questions that may be asked.	Summarizes points. Asks if there are any questions. Closes.

Parts of the Demonstration

1. Introduction—

The best speaker should make the first speech introducing himself and his teammate. Give a brief talk on club work, tell about the work and the purpose of the demonstration.

2. Demonstration proper—

The various phases of demonstration are presented by the club members. While one speaks to the audience, the other assists by either preparing some part of the article to be made or performing an operation or any other action directly connected with the demonstration. The members should alternate in talking and working.

3. Conclusion—

Summarize points covered and give audience an opportunity to ask questions. If you are unable to answer any question asked, refer to the handicraft bulletin or any other book on wood working. Courteously avoid answering questions that do not pertain to the work.



Fig. 22. A demonstration on wood finishing.

OTHER DEMONSTRATIONAL TOPICS

1. The construction of any article.
2. The way to use a bench hook.
3. The correct way to use the common tools.
4. Cleaning finishing brushes.
5. Preparing and mixing finishes.
6. Weaving and recaning.
7. Application of simple finishes.
8. Wood joints and their use.
9. Caning chairs.
10. Weaving.

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REFERENCE MATERIAL

This list of books is given as reference material for handicraft clubs. One or more of these texts should be found in the library of every rural school, or they may be purchased by the handicraft club.

Books:

- "Essentials of Woodworking," Griffeth, published by The Manual Arts Press, Peoria, Ill.
- "Elements of Woodwork and Construction," King, published by American Book Company, New York, N. Y.
- "Toy Patterns," Michael C. Dank, published by The Manual Arts Press, Peoria, Ill.
- "Keene's Cement Craft," Iowa State College, Ames, Iowa.
- Plastics, Quest Company, Gary, Ind.

Magazines:

- Popular Homecraft, General Publishing Company, Chicago, Ill.
- Popular Mechanics, 200 E. Ontario Street, Chicago, Ill.
- Deltagram, 600 E. Vienna Avenue, Milwaukee, Wis.

Commercial Literature:

- Southern Pine Association, New Orleans, La.—100 Handy Helps—Southern Pine and Its Uses.
- Sargent and Company, New Haven, Conn.—Literature on Saws, Squares, Planes, etc.
- Dearborn Leather Company, Detroit 6, Leather.
- American Steel and Wire Company, Chicago, Ill.—Nail Chart.
- E. C. Atkins and Company, Indianapolis, Ind.—Literature on Saws.
- Henry Disston and Sons, Inc., Philadelphia, Pa.—Literature on Saws.
- A. E. Boyle Company, Cincinnati, Ohio—200 Things to Do With Plastic Wood.
- National Lead Company, 900 West 18th Street, Chicago, Ill.—Handbook on Painting.
- Grand Rapids Fibre Cord Co., Grand Rapids—Manual and Catalog on Art Fibre Weaving.
- Brodhead Garrett Co., Cleveland, Ohio—Catalog on Manual Training Supplies.

Bulletins: (Superintendent of Documents, Washington, D. C.)

- Farmers Bulletin No. 1452—Painting on the Farm.
- Farmers Bulletin No. 1456—Homes for Birds.
- Michigan State College, Extension Bulletin 295—Refinishing Furniture.