

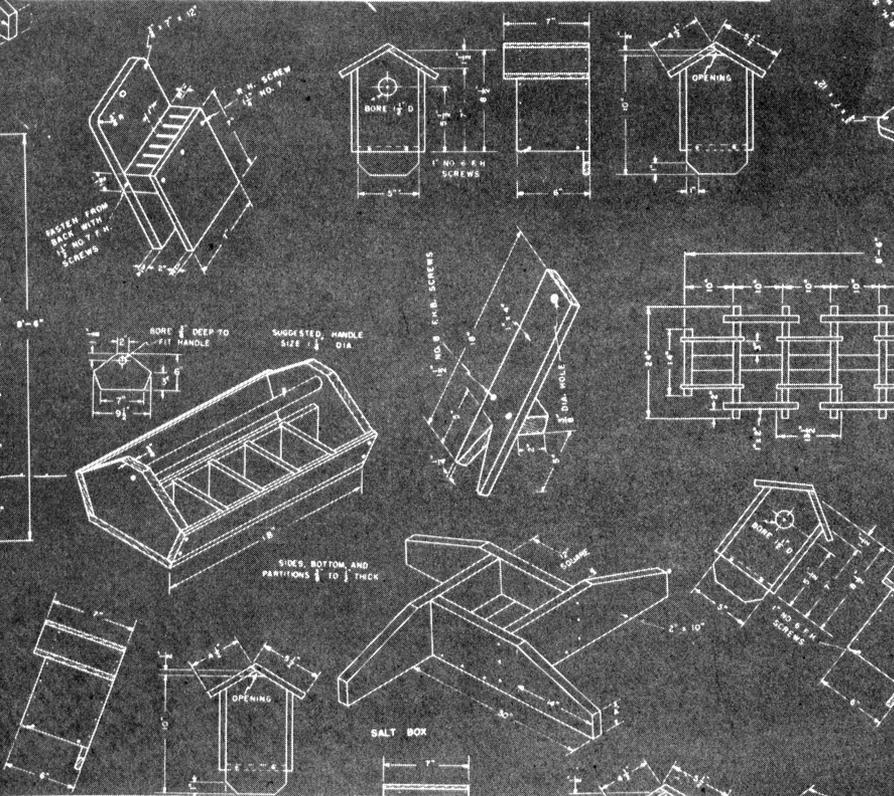
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4-H

WOODWORK

H. J. Hall and C. E. Stevens



UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXTENSION SERVICE
Columbia, Missouri
4-H CIRCULAR 118 JUNE 1954

PROJECT REQUIREMENTS

Woodwork I

1. Develop abilities in handling and caring for simple hand tools.
2. Make four or more of the following articles:
 - a. Bushel crate
 - b. Flower box
 - c. Bird house
 - d. Nail and tool box
 - e. Sawhorse
 - f. Bird feeding station
 - g. Bootjack
 - h. Exhibit tray
 - i. Wood float
 - j. Salt box
 - k. Knife rack
 - l. Bench vise

Woodwork II

1. Develop abilities in handling the plane, drawknife, chisel, rasp, and drill.
2. Make three or more of the following:
 - a. Miter box
 - b. Hog trough
 - c. Baby chick feeder
 - d. Footstool
 - e. Book and magazine rack
 - f. Book ends
 - g. Sleeve board
 - h. Roadside sign
 - i. Garden trellis
 - j. Medicine cabinet for the barn
 - k. Bench seat

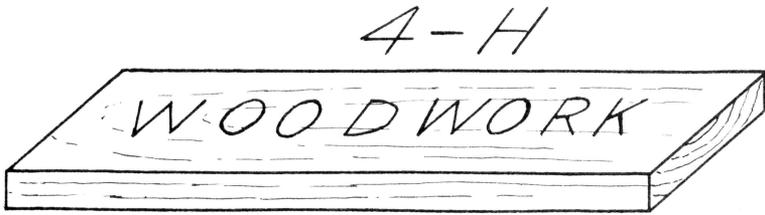
Woodwork III

1. Develop abilities with power tools.
2. Make two or more of the following:
 - a. Workbench
 - b. Self feeder
 - c. Individual hog houses
 - d. Farm gate
 - e. Dog house
 - f. Picnic table
 - g. Two lawn chairs
 - h. Medicine cabinet
 - i. Chest of drawers
 - j. Kitchen worktable
 - k. Checkerboard

Woodwork IV*

1. Read a blue print.
2. Construct one of the following:
 - a. Brooder house
 - b. Garage
 - c. Milk house
 - d. Complete set of kitchen cabinets
 - e. Truck bed or wagon bed
 - f. Pump house
 - g. Hay frame
 - h. Range shelter
 - i. Crib
 - j. Poultry house
 - k. 40 rods of fence with braced end or corner posts.

*Designs available from Agricultural Engineering Department, University of Missouri College of Agriculture, Columbia, and commercial sources.



WOODWORK I, II, III, and IV

H. J. HALL AND C. E. STEVENS*

This handicraft woodwork project has two major objectives. One is that members will make articles of value for the home and farm. The other objective is that members in making these articles will acquire knowledge, skill and habits in the proper and efficient use of woodworking tools. Acquiring knowledge and skill in the use of tools tends to give one an interest in making repairs, which results in increased efficiency from properly kept farm equipment.

This circular gives plans for Woodwork I, II, and III. Plans for the individual items in Woodwork IV can be obtained by your county agent from bulletins or the University of Missouri Plan Service.

THE FARM SHOP

1. **Location:**—Most farm shops will be located in one end of the garage or machine shed or in a shop building. It will usually be a general repair shop including metal work, welding and woodwork. Occasionally a separate woodworking shop on a farm is practical. If a bench or other woodworking facilities are not available look around the farmstead for possible space. In addition to good lighting it is desirable to have a stove in good repair to provide heat in cold weather.

2. **Care of Tools:**—Tools should be kept clean and dry, and where they may be readily found when needed. Tools can be arranged in a cabinet or box, or hung on a board over the bench or at some other convenient place in the shop. It's a good plan to paint black outlines behind the tools so they can be easily returned to their proper places after use.

Keep a light coat of oil on all tools not used often enough to prevent rusting. Rust may be removed from tools by rubbing with oil, automobile paint rubbing compound, fine emery cloth or other abrasive material.

All cutting tools should be kept sharp. Sharp tools increase the speed and improve the quality of work done. Wood working tools are difficult to keep sharp if used on gritty surfaces. That's why such surfaces should be

*In collaboration with Lester O. Akers, State 4-H Club Agent.

brushed or cleaned well before working. A plane should not be used on sand-papered surfaces without first thoroughly cleaning the surface of grit. Planes should be placed on their sides when not in use, or the cutting edge otherwise protected. Take care to keep sharp cutting edges from coming in contact with metal objects.

Tools should be used for the purpose intended. For example, a wrench should not be used for a hammer, nor a wood chisel as a "crow" or pinch-bar for prying.

3.. **Tools:**— While it is desirable to have a complete set of tools, certain tools used infrequently may be too expensive to be practical for a small shop. Often workers are handicapped by too few and poorly kept tools. Here are the more common and useful woodworking tools: hammer, rip saw, crosscut saw, coping saw, screwdriver, wood chisel, jack plane, brace and bits, hand drill with drill bits and square.

Important points to be observed and definite directions for the proper use of each of these tools are given in the "Handbook—4-H Woodwork Project Leaders."

With electricity generally available a variety of power tools are being used in farm shops. This project stresses the use of hand tools because they are more generally available and are basic in teaching principles of woodworking. A few of the projects require the use of a bench saw; but otherwise hand tools will be sufficient.

Buy good tools. This does not necessarily mean that the highest priced tools need to be bought.

WORKING DRAWING

A working drawing is one which shows dimensions and gives all information necessary to guide you in the correct construction of an article. Working drawings are drawn by a draftsman using such tools as a drawing board, T-square, 30° and 45° triangles, dividers, compasses, ruling pens, scale, lettering guides, etc. The process is mechanical but considerable experience is required to become proficient.

A working drawing may take one of several forms.

The Projection Drawing is universally used to show construction details. It is called a projection drawing because after the plan view is made other views such as side and top views, can be projected from the plan view. Examples of this type drawing are the bluebird house and barn medicine cabinet.

An Isometric Drawing is used to show three sides of an object in one view. It may be used alone or in conjunction with other drawings to present an idea or give detail dimensions of an article. This drawing is based on the following rules:

1. All vertical lines are drawn vertical.
2. Horizontal lines extending to the right and left are drawn 30° from the horizontal.

The salt box is an example of this type drawing.

Oblique Drawings are similar to isometric drawings except that one face is drawn with vertical and horizontal lines as in projection drawing. The bushel crate is an example of this type drawing.

Perspective Drawings show objects as they appear to the eye from a particular point of view. Perspective drawings are more complicated to draw than the isometric or oblique but are more pleasing to the eye and give a more exact idea of how the object or building will actually appear. The hog house is an example of a perspective drawing. Note that all horizontal lines, if extended, converge to common points called vanishing points.

LUMBER

1. **Board Measure:**—The size of a board is designated by its thickness, width and length, for example a 1x4x10. Such a board is 1 inch thick, 4 inches wide and 10 feet long. If you ask for this board at a lumberyard you will usually get a mill-finished board somewhat thinner and narrower than the nominal dimensions. The board would be about 13/16 inch thick, about 3 13/16 inches wide, and would likely be slightly over 10 feet long.

Lumber is sold by the board foot, which is the amount of lumber in a piece of lumber 1 inch thick, 1 foot wide and 1 foot long. The board feet in a piece of lumber may be found by multiplying the thickness in inches (for all lumber 1 inch or more) by width in feet, and by length in feet. A 1x4 ten feet long would be equal to a 1x 1/2 x10, or 3 1/2 board feet (4 inches equals 1/2 foot). At 15¢ per board foot it will cost 50¢. Lumber under 1 inch thick is commonly sold by the square foot. (Lumber prices are often stated in terms of 1000 board or square feet, such as \$150 per M.)

2. **Grading:**—Lumber is graded and sold as “common” or “select.” The coarser and more defective part of the lumber is called common lumber and is classed as No. 1, 2, 3, and 4. The better pieces of lumber are from the best trees and the better part of the tree. This lumber is graded as A, B, C and D. Thus, you may buy a select B piece of yellow pine, or if not such good lumber is needed, a piece of common No. 2. Learn to work with soft wood before attempting any of the more complicated or expensive articles of hardwood. Common hardwoods are black walnut, oak and hard maple.

Materials for some projects can be obtained from wooden packing boxes.

PLYWOOD

Plywood is a building material that is coming into more general use. It is available in many different woods, of various thicknesses and finishes and for different service such as interior for inside work, exterior for outside exposure to the weather, and marine which is used for boat building. It is available in panel sizes 4 feet wide and 6 to 8 feet long and in thicknesses of 1/4 to 13/16 inch.

Facewood veneer is cut in three different ways. The cheaper veneers are usually rotary cut, which gives a wild zigzag grain. More expensive veneers

are quarter-sliced or flat-sliced. Each method produces a different grain. Quarter- or flat-sliced veneer can be joined for matched grain effects.

Several grades are available, depending on quality of the two surfaces. You will save money by picking the cheapest grade that will satisfy your need. Many times only one side of a finished product will show, in which case obtain panels with only one good side. If it is to be painted, the quality can be lower than if the grain will show after finishing. Plywood is sold by the square foot.

BILL OF MATERIAL

A bill of material should be complete enough to guide the buyer in purchasing all materials. It should show the number of pieces of lumber required, kind of lumber and dimensions. It should list all needed hardware, paint, etc. An example of a complete bill of material is given with the modified "A" hog house. A complete bill of material is not given with each plan, but each member should make a complete bill of material before starting an article.

GLUE

Glue is a fastener like nails or screws. It holds over the entire surface of the joint and if properly applied may be stronger than the wood itself.

There are several glues on the market which are satisfactory for gluing wood. Urea resin or plastic resin glue comes in powdered form and can be purchased under a number of trade names. It is mixed with cold water and is highly water resistant. It is stain free and should be used at temperatures of 70°F or higher. Joints must be well fitted and high clamping pressure is essential.

Casein glue also is powdered and available under a number of trade names. It is mixed with cold water and is moderately water resistant. It stains wood rather badly so excess should be removed before setting. It can be applied at any temperature above freezing and does not require high clamping pressures or closely fitted joints.

SANDPAPER

Use sandpaper only after all work with cutting tools such as planes and scrapers is finished. The most used grades of sandpaper range from No. OO (fine) to No. 2 (coarse). Sandpapering with No. 1 sandpaper and followed by No. 0 gives a surface smooth enough for most finishes. Tear the 9"x10" sheets of sandpaper into 4 equal sized pieces by using a straightedge. The small sheets should then be placed around a $\frac{3}{4}$ "x3"x5" block. When using sandpaper always sand with the grain except when sanding end grain.

FINISHES

The use of an article will determine its required degree of finish. For example the bird houses will attract more birds if made from unplanned lumber with no finish. The book rack is an article that should be planed and sanded smooth with a pleasing finish applied.

FURNITURE FINISHING

There are many different kinds and degrees of furniture finishing which range from simple painting, or oiling and waxing, to very delicate varnish finishes.

It is important that paints and varnishes be applied in a place free from dirt and dust. This is particularly true of varnishes. Since most farm workshops are not free of dust it is suggested that simple finishes other than varnish be used. The simple finishes given here are economical, easy to apply and attractive. A dull soft finish is more attractive than a glossy one.

Other finishes you like which are approved by the leader may be used. Local paint dealers can give good advise on finishing problems. Circular 564 "Refinishing Furniture" gives other information on finishes and can be obtained from your county extension office.

Linseed Oil Finish:—This is a lasting finish which is resistant to moisture and scratches. The oil finish is most suitable for walnut, cherry, and mahogany, and while it darkens the wood it gives the surface a beautiful, soft finish.

The beauty of this finish depends on the number of coats applied and the time and energy spent in polishing. Use as many coats as necessary to obtain a beautiful lasting sheen. Dry thoroughly between coats. Later coats may be spaced at intervals of several weeks or months.

A mixture of one-fourth turpentine and three-fourths boiled linseed oil is used for the first two or three coats or until the wood has the desired finish. Then the last coat is made with the reverse proportions, three-fourths turpentine and one-fourth linseed oil. This brings out the beauty of the wood and gives a beautiful, soft sheen.

Apply the oil to the wood with a brush or cloth and let stand a few hours, then rub vigorously with a clean, soft cloth. Rub all the oil in or off the wood before the next application. Wax may be used over the oil finish.

Penetrating Seal Finish:—This finish is easy to apply and looks much like the linseed oil finish. It is durable and resistant to scratches.

Penetrating seals are of two types—those with a varnish base and those without. The type without the varnish base has a dull finish which is usually preferred for furniture. Clear or wood-tone colors are available.

Penetrating seal cannot be applied over any other finish. Before using penetrating seal, all old finish must be thoroughly removed and the surface left clean, smooth, and dry.

To apply, follow the directions on the container, which vary somewhat for different brands. In general, it is applied with a cloth or brush and allowed to stand for about 15 to 20 minutes. The excess is then wiped off and the surface left to dry. When dry, buff with very fine steel wool. A second coat may be needed. On open grain wood, paste filler may be used over the seal. Wax may be applied as a final finish.

Wax Finish:—This is the easiest finish to apply. Paste wax may be applied directly to the wood without further treatment. It may be desirable

to stain the wood before applying the wax. With open grained wood a filler is desirable.

Stain:—The color of some wood is improved by the application of stain. Oil stain is the easiest to use and is obtainable in several degrees of color. Stain can be used to darken the color of the wood before applying the linseed oil or penetrating seal finishes. It is a good idea to try several colors and amounts of stain on scrap pieces of the same type wood used in article to be finished. By this method the most pleasing color combinations can be obtained. Follow directions given on container.

Filler:—Paste fillers are usually recommended on open grained woods, such as oak, mahogany and wanut. It fills the pores of the wood and gives a smooth surface for the finish. Follow directions given on the container.

CARE OF BRUSHES

A brush should never be allowed to rest upright on its bristles. If work is stopped for a few minutes, the surplus paint may be removed from the brush by wiping it on the edge of the pail. The brush should be laid flat across the top of the paint pail or on a smooth clean surface. If the work is stopped overnight, suspend the brush in a can of raw linseed oil. To do this, make a small hole through the brush handle, insert a wire which when laid across the can will suspend the brush in the oil. The bristles should be covered by the liquid, but should not touch the bottom of the can. If you have used varnish, clean the brush immediately.

After the paint job is done, clean the brush thoroughly with turpentine, benzine, kerosene or gasoline, then wash it with warm soap suds. Give the brush a brisk shake to straighten out the bristles, wrap in heavy paper while still damp and lay it away or hang it in a dry, cool place.

SOURCE MATERIAL

Plans for the following items were taken or adapted from 4-H publications printed by other states and are used through the courtesy of the institutions named.

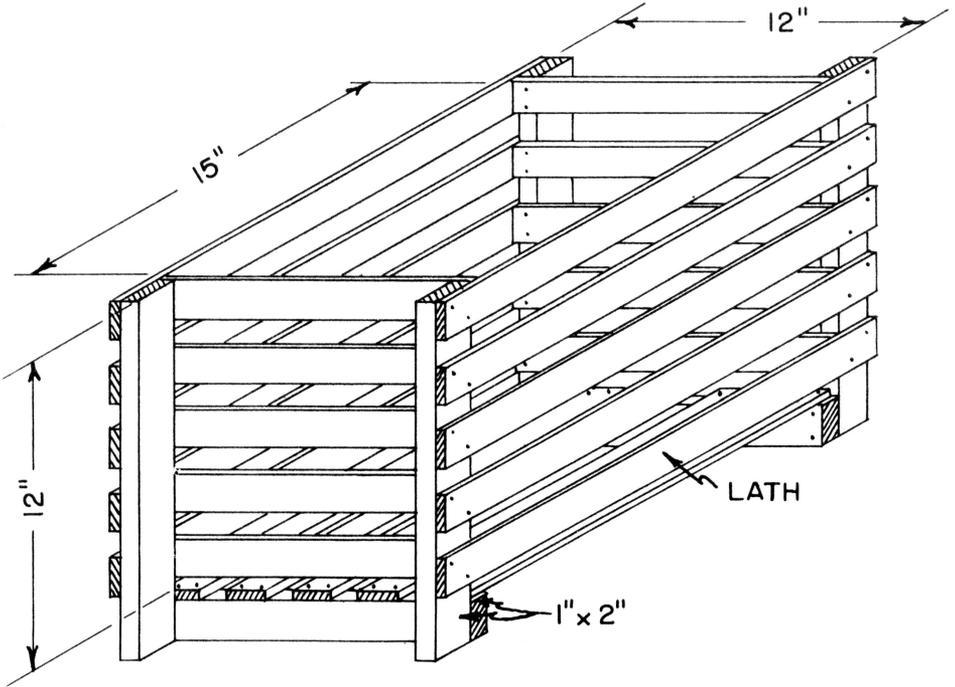
Knife Racks and Medicine Cabinet—Ohio State University

Lawn Chair and Bench—Oklahoma Agricultural and Mechanical College

Checker Board, Barn Medicine Cabinet and Book Ends—Michigan State College

Work Bench—University of Wisconsin

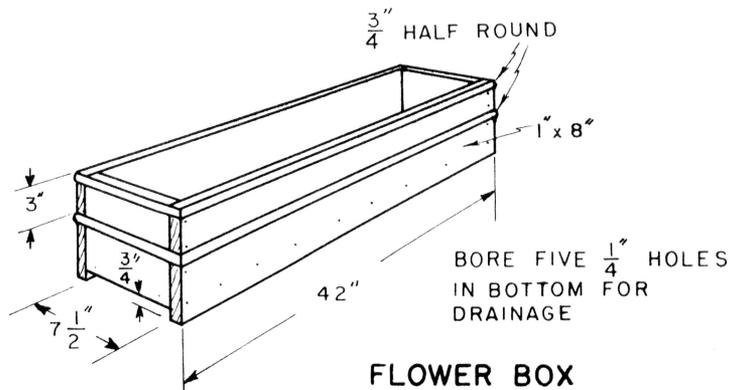
PROJECTS FOR WOODWORK I



BUSHEL CRATE

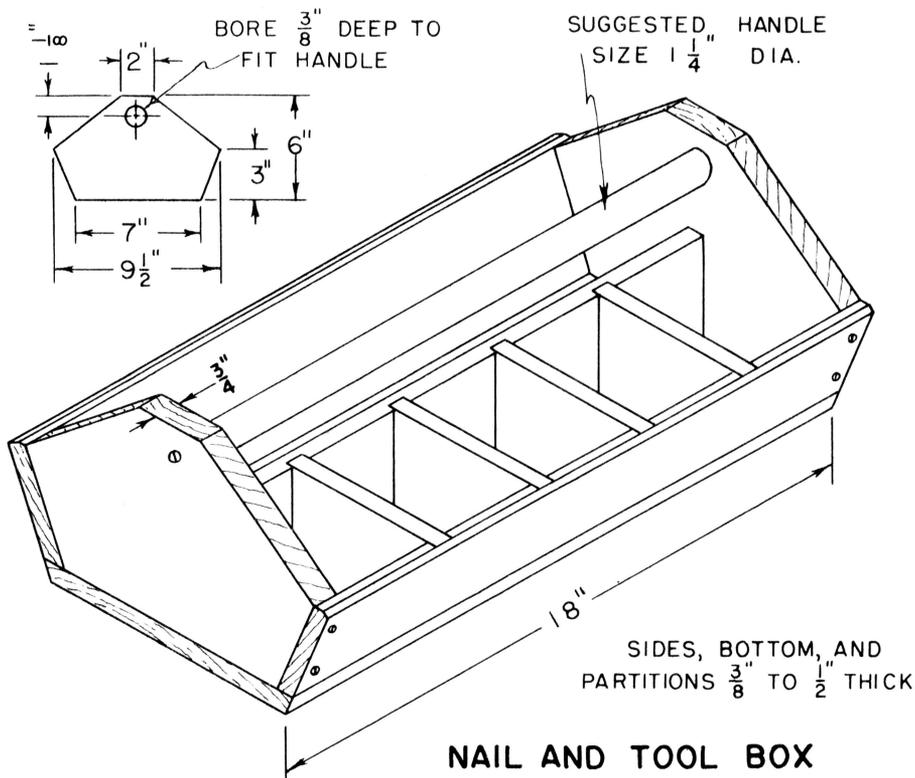
This piece is not as simple as it looks at first glance. Remember the dimensions shown are inside measurements. It will need to be assembled in such manner that nailing can be done easily.

Material required is 9 lath, 7 feet of 1"x2" material, 1/8 pound of 2d nails, and eight 6d nails. No finish is required.



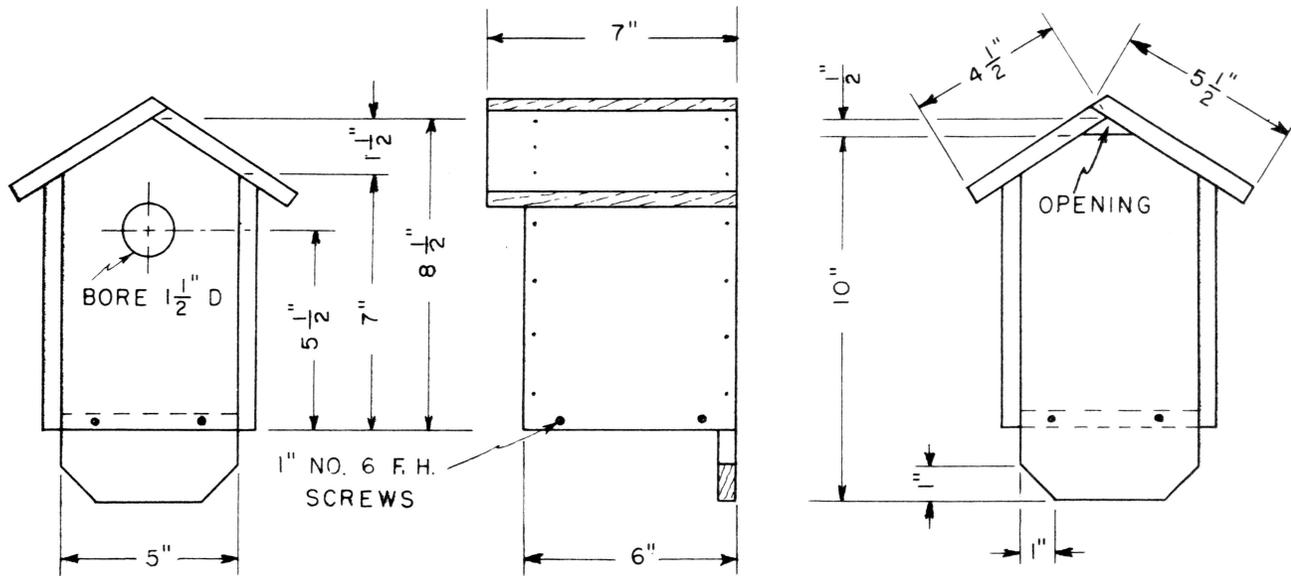
This flower box can be made from yellow pine or other planed lumber. Finish with an outside paint of a color which will blend in with its surroundings. The two bands of 3/4 inch half-round should be painted a darker color than the rest of the box. Other suitable material such as 1"x1" strips can be used instead of the 3/4" half-round if desired.

Material:—1 piece 1"x8"x12', 17 feet of 3/4" half-round.



Use any good grade of lumber available to construct this nail and tool box. Mill planed lumber is smooth enough.

The two end pieces may be clamped together and the edges of both finished at the same time. If a round handle is not readily available make one from a piece of 2-inch stock. First make the handle square; then plane down the corners until it is 8-sided; then make it 16-sided and finally round. Fasten the box together with flat head wood screws. Finish as desired.

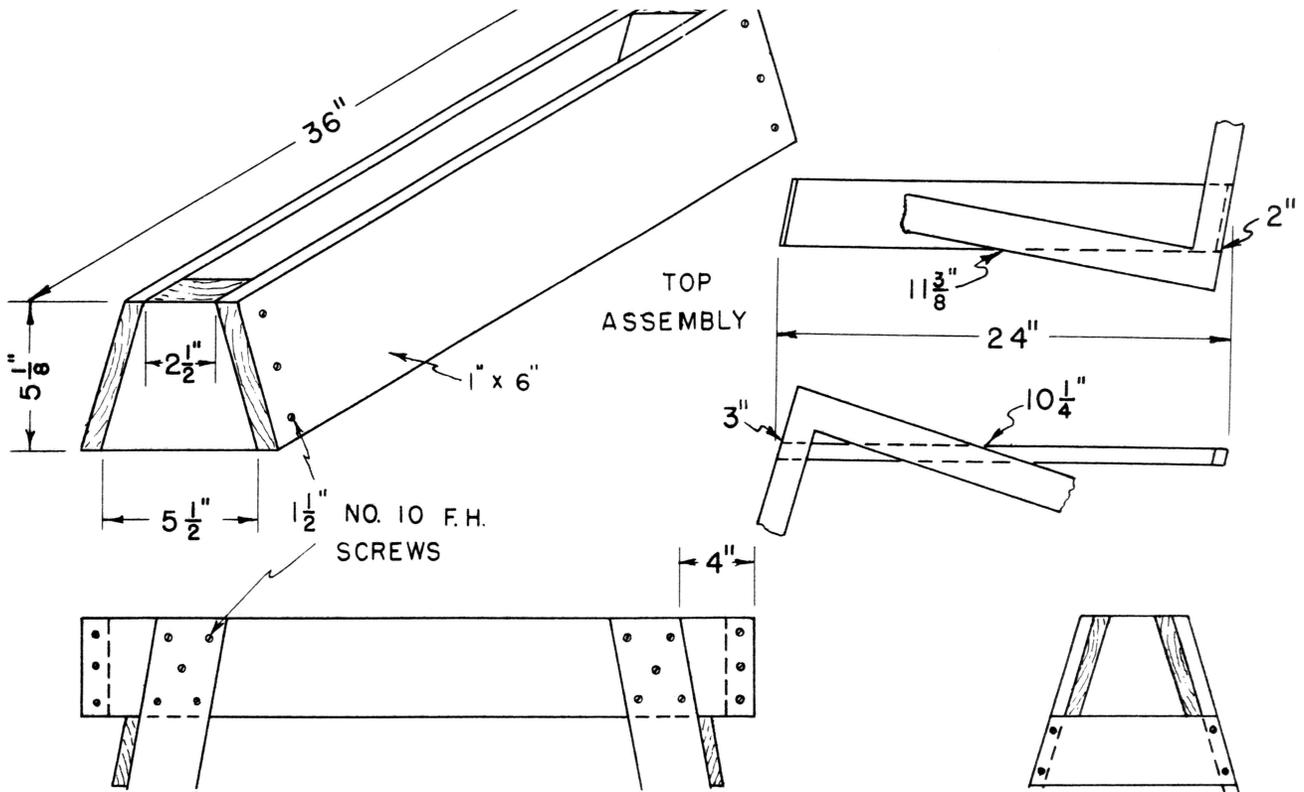


BLUE BIRD HOUSE

This bird house can be made from any lumber $\frac{3}{8}$ inch to $\frac{3}{4}$ inch in thickness either planed or unplanned. It need not be finished. If finish is applied it should be a dull color.

The floor is fastened with screws so it can be removed for cleaning. The bottom could be hinged at the back for easier access.

Conservation Bulletin 14, "Homes for Birds," may be obtained from Superintendent of Documents, Washington, D. C.

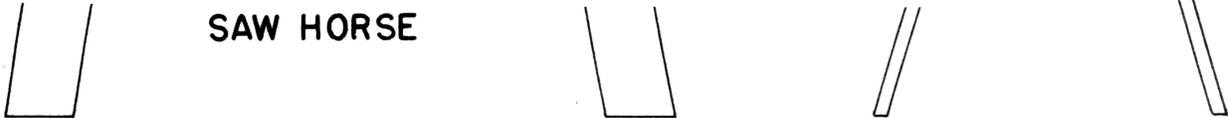


To make this sawhorse construct the top assembly first. Fasten the 1"x6" sides to the two end pieces with screws. Then plane the edges of the 1x6's flush with the ends.

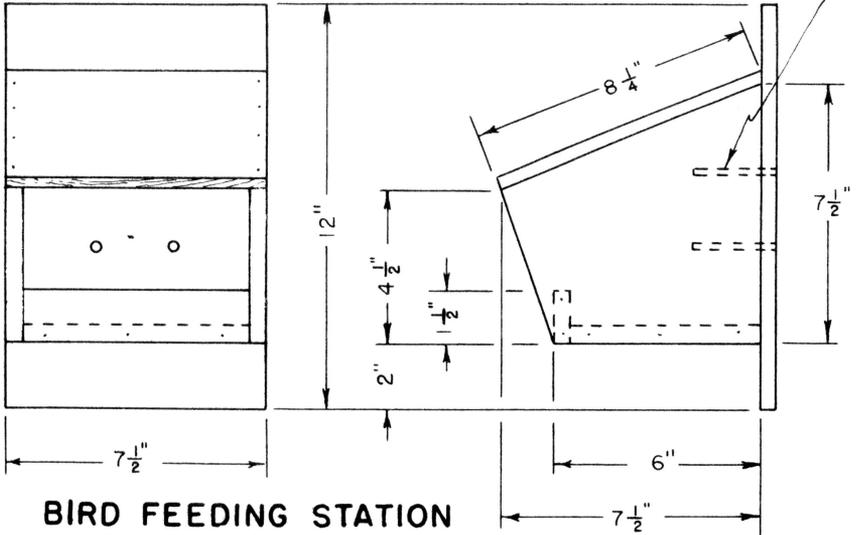
When top assembly is finished, attach legs and braces. No finish is needed.

Materials:—1 piece—1"x6"x6'; 1 piece—1"x4"x10'; 1 piece—2"x6"x1'; 40 screws—1 1/2 inch No. 10 F. H.

SAW HORSE



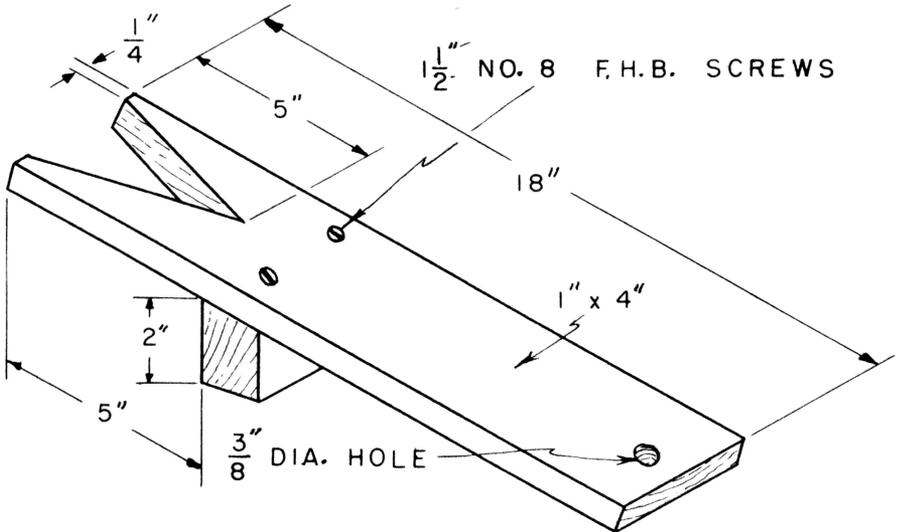
$\frac{1}{4}$ " x $2\frac{1}{2}$ " PINS FOR ROOSTS



BIRD FEEDING STATION

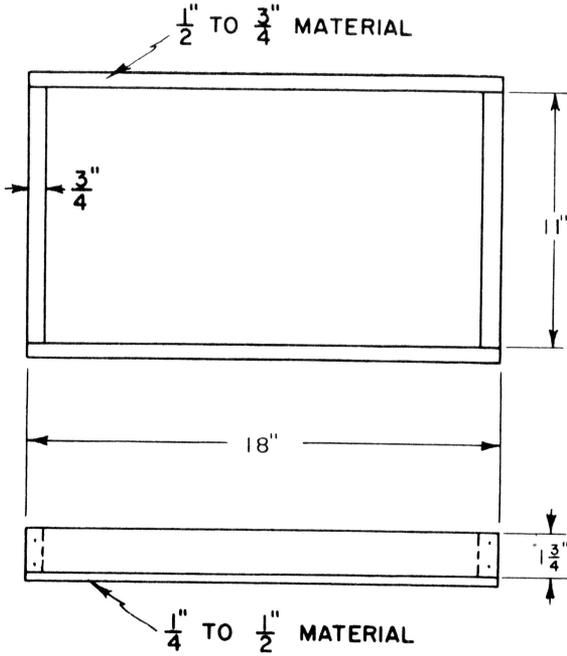
This feeding station also will be used as a rest shelter and nesting box by some birds. The box should be installed with the open front facing the south or east, a south exposure being preferred. When used for feeding it should be placed as high as possible and still be easily reached by a person standing on the ground.

This shelter may be made from any material available of either $\frac{1}{2}$ inch or $\frac{3}{4}$ inch thickness. It will be used more if no finish is applied.



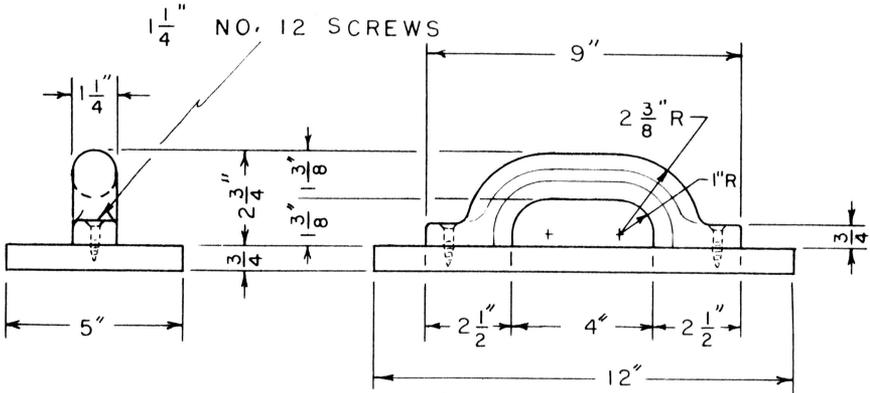
BOOT JACK

Use yellow pine or hard wood for construction. Finish as desired.



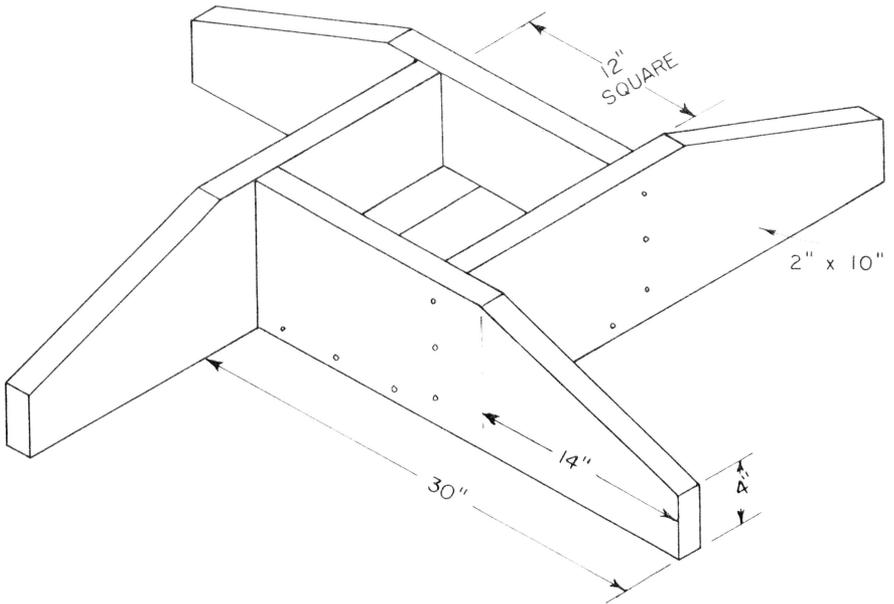
DISPLAY TRAY FOR FRUITS AND VEGETABLES

This display tray is for exhibiting fruits and vegetables at fairs. No finish is required.



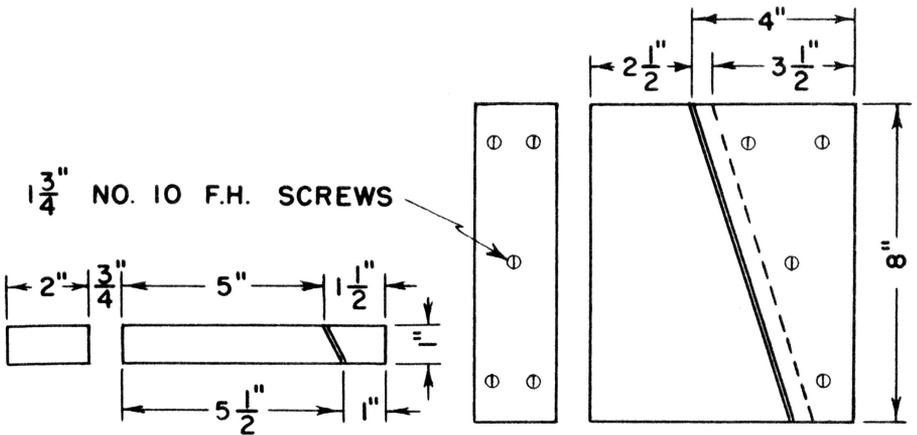
WOOD FLOAT

This wood float is for finishing concrete. It should be used to finish most outside concrete surfaces around the farm. The handle can be made from any material but hard wood is preferable. The float should be made from a soft wood such as white pine. When the float wears out the handle can be removed and used again. No finish is required.



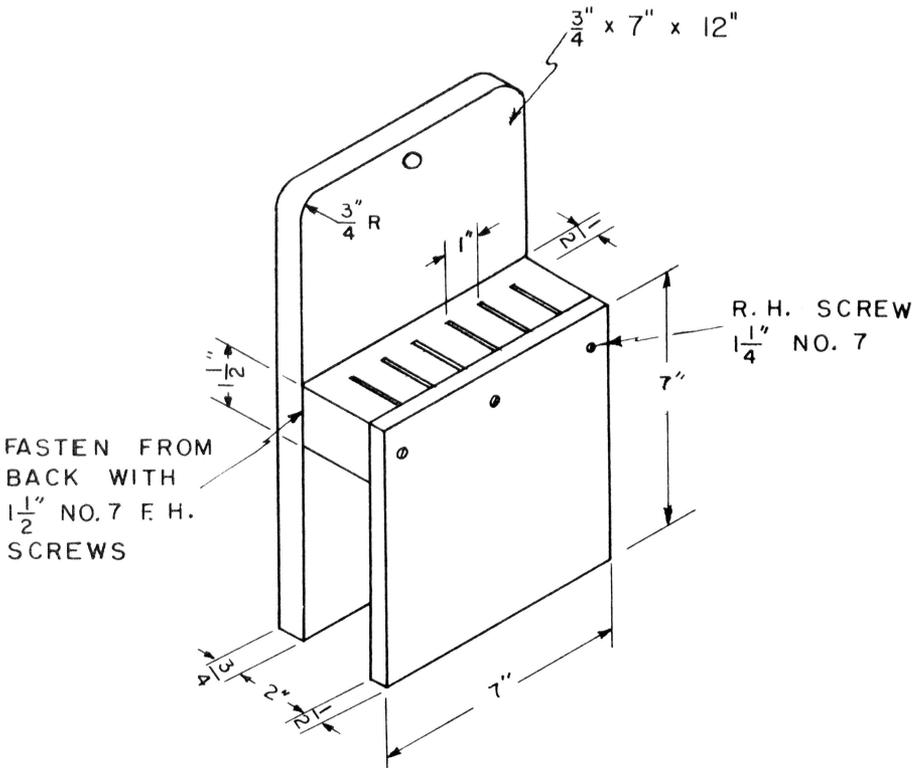
SALT BOX

This salt box is not easily overturned and may be made from any 2-inch material either planed or unplanned. One piece of 2"x10"x12' lumber is needed.

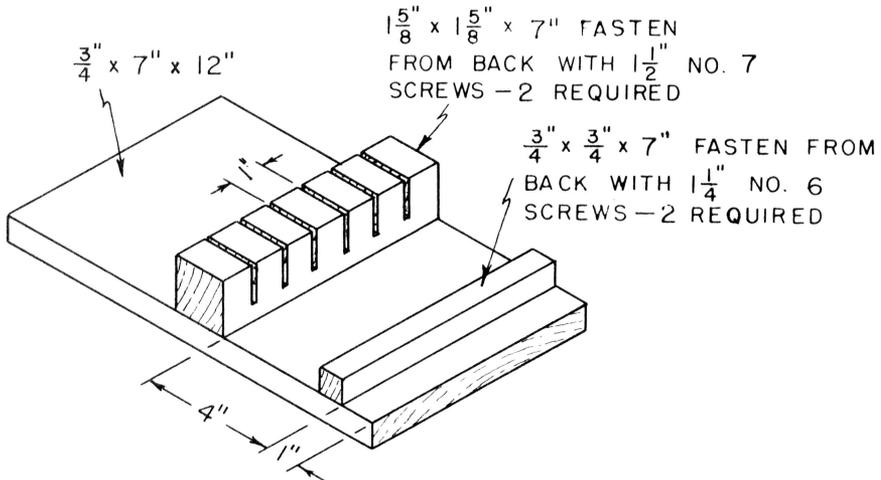


BENCH VICE AND STOP

This bench vice and stop may be made from oak or yellow pine. The two pieces with beveled edges may be ripped from one piece of stock by sawing at the proper angle. Drill and countersink holes to receive No.10 flat head screws for fastening to top of bench. No finish is required.



WALL KNIFE RACK

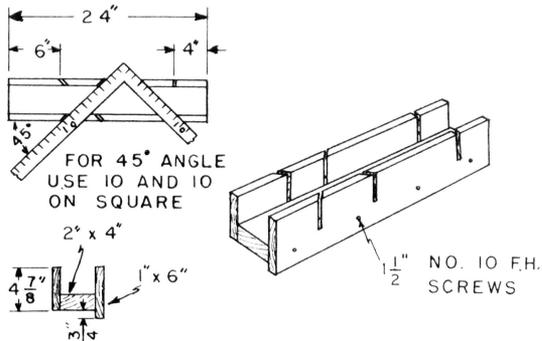


DRAWER KNIFE RACK

These knife racks may be made from any material available but hardwoods are preferred. They are designed to hold six knives; however, the design may be changed to hold any number. Be sure the slots are wide enough to admit the knives to be stored.

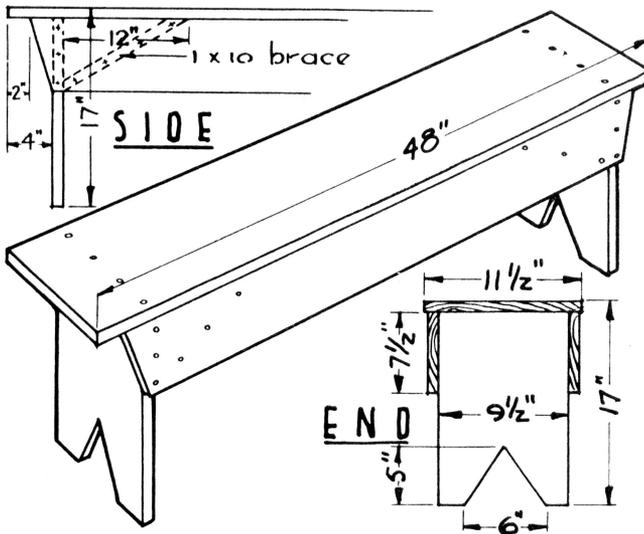
The finish used should be easily cleaned and the wall rack should be finished to blend with surrounding colors.

PROJECTS FOR WOODWORK II



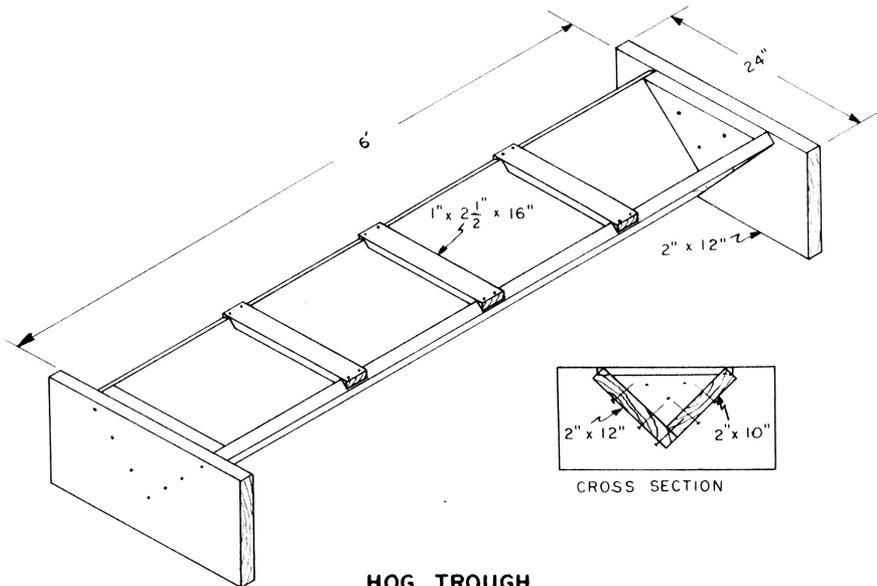
MITER BOX

Hard wood, preferably oak, should be used. However, yellow pine may be used if hard wood is not available. The most difficult part is accurately sawing the grooves. This can be done best with a back saw or a miter saw if one is available. No finish is required.



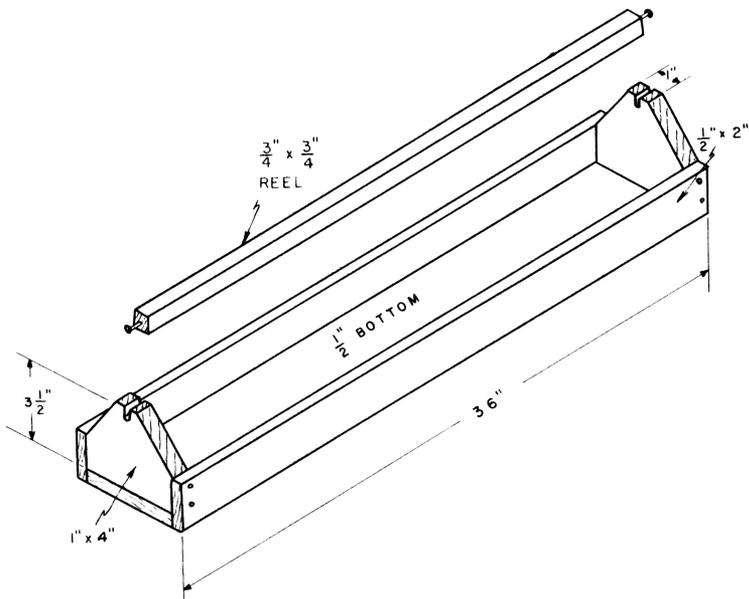
BENCH

This bench will find many uses on the farm. It is sturdy and simple to construct. Make a complete bill of materials before starting construction.



HOG TROUGH

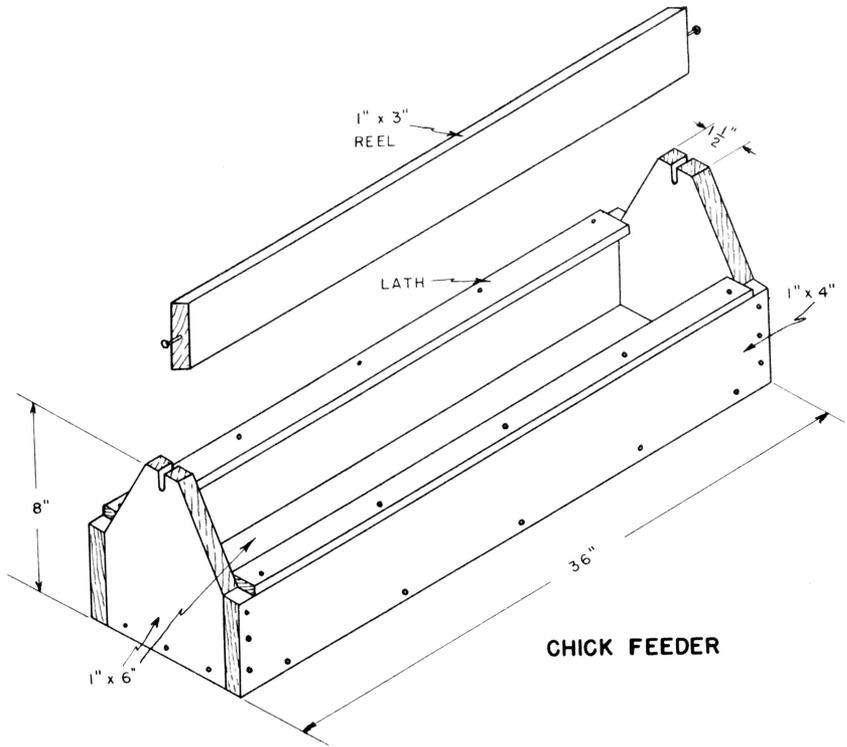
Yellow pine is a good material to use for this hog trough. The length shown is 6 feet. However, it can be made in other lengths. No finish is required.



CHICK FEEDER

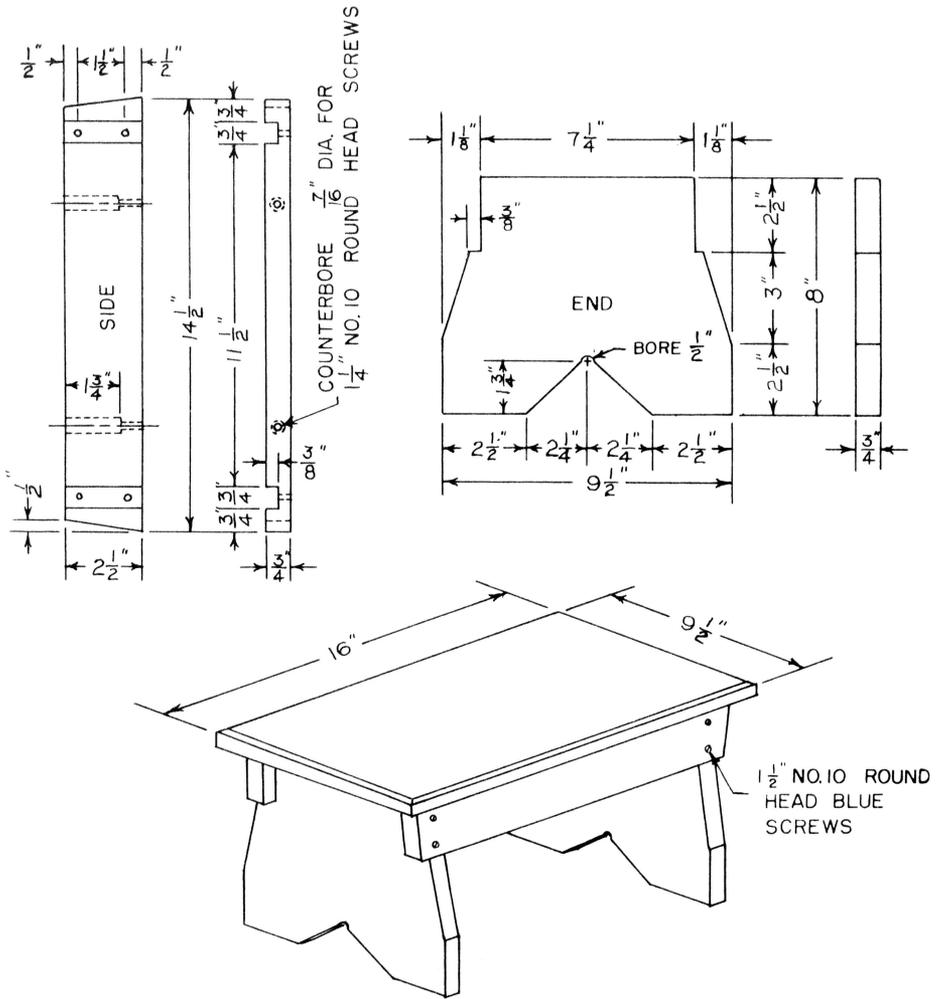
This feeder is for chicks up to three weeks old. Two feeders should be provided for each 100 chicks. No finish is required.

Material: 1 piece $\frac{1}{2}'' \times 4'' \times 4'$ (bottom and ends), 1 piece $\frac{1}{2}'' \times 2'' \times 6'$ (sides), 1 piece $1'' \times 1'' \times 3'$ (reel).



This chick feeder is for chicks from 3 to 8 weeks old. Three of these feeders should be provided for each 100 chicks. No finish is required.

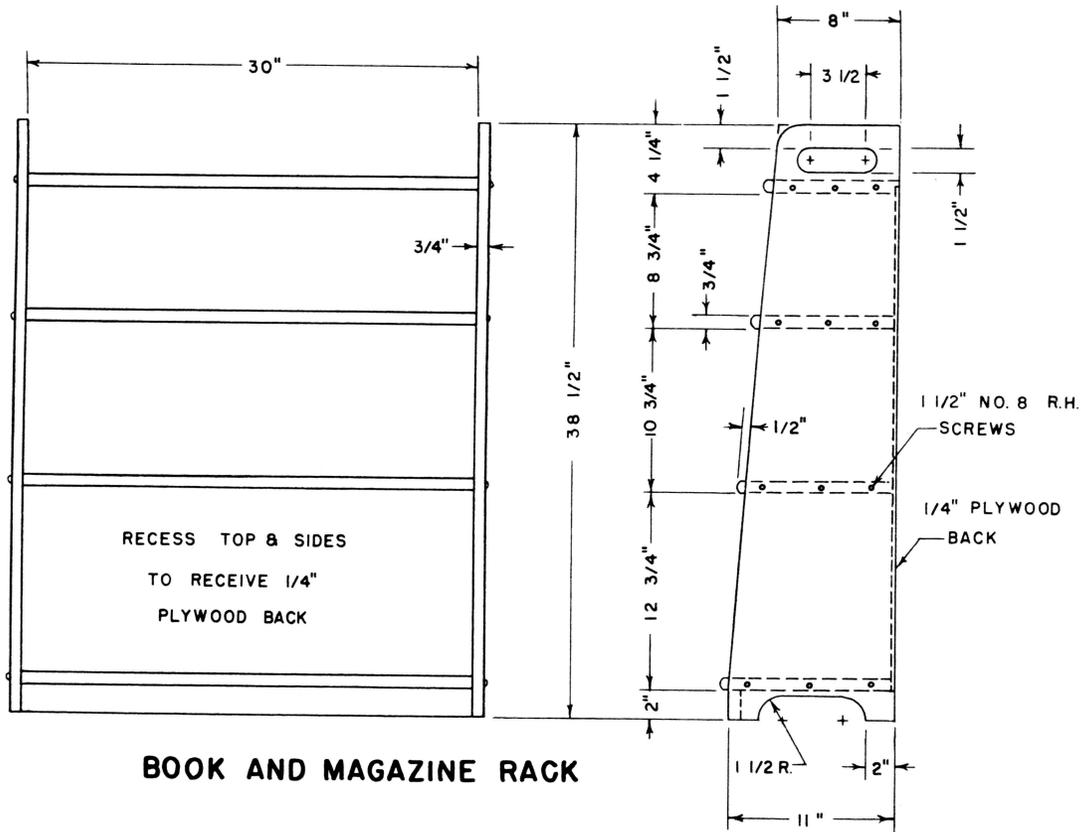
Material: 1 piece 1"x6"x4½' (bottom and ends), 1 piece 1"x4"x6' (sides), 1 piece 1"x3"x3' (reel), 2 lath (top edge of feeder).



FOOT STOOL

The foot stool should be made of oak, walnut or other suitable hard wood. The sizes of the parts may vary slightly if the stock does not dress conveniently to the exact dimensions, but be sure to carefully check other affected dimensions.

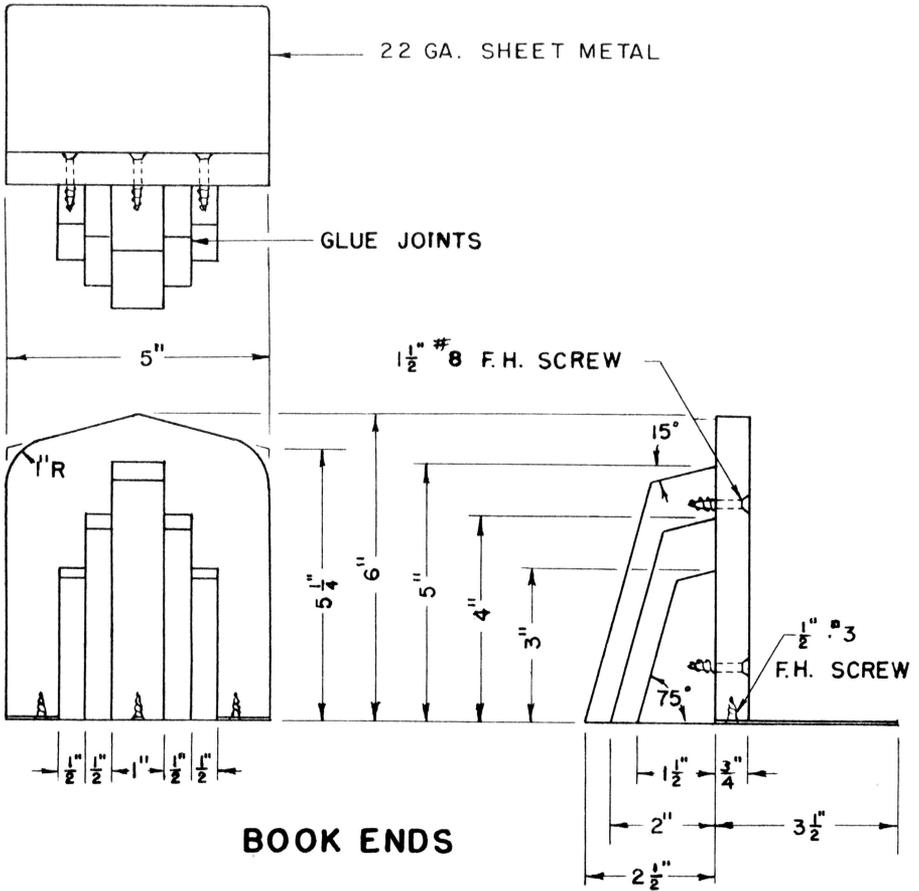
Desirable finishes are linseed oil or penetrating seal.



BOOK AND MAGAZINE RACK

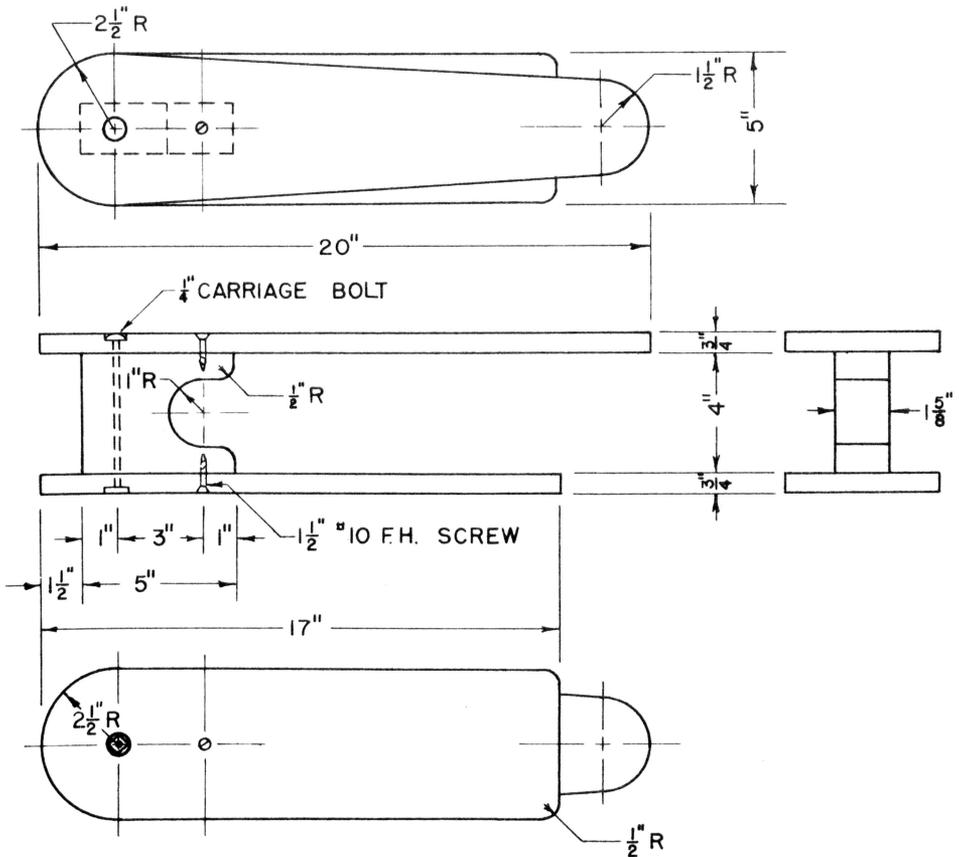
This book and magazine rack can be made from any wood available including 3/4" plywood but hardwoods are preferable. Use a linseed oil or penetrating seal finish. Stain may be used to obtain desired color before finish is applied.

Make a complete bill of material before starting the project.



These book ends should be made from hard woods. The triangular shaped pieces should be cut out and sanded then glued together before final assembly on the back piece. A combination of dark and light colored wood with a natural finish makes a pleasing appearance.

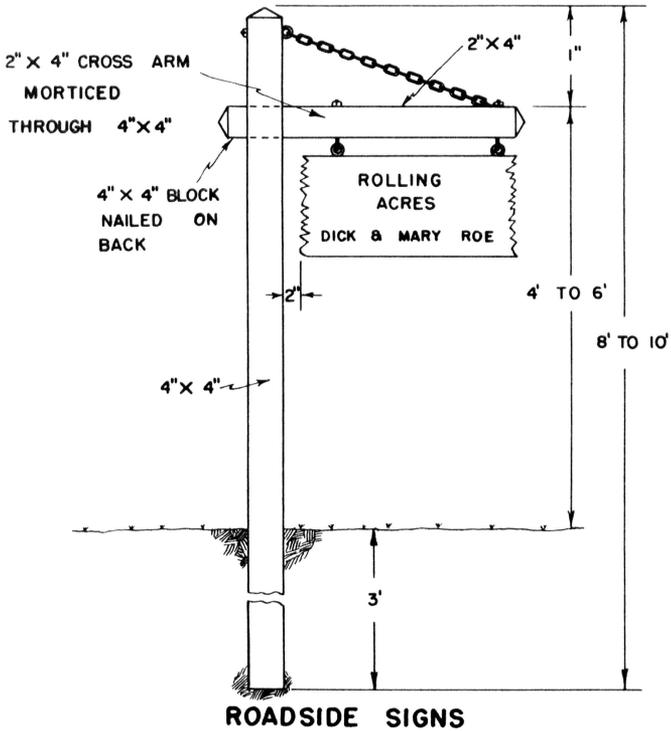
Be sure to allow for the thickness of the sheet metal when fastening the glued assembly to the back piece. To prevent the bookends from scratching other finished surfaces, glue green felt to the bottom.



SLEEVE BOARD

The sleeve board will be subject to heat and should be made of woods free of resins or pitch. Such woods as maple or poplar will be satisfactory.

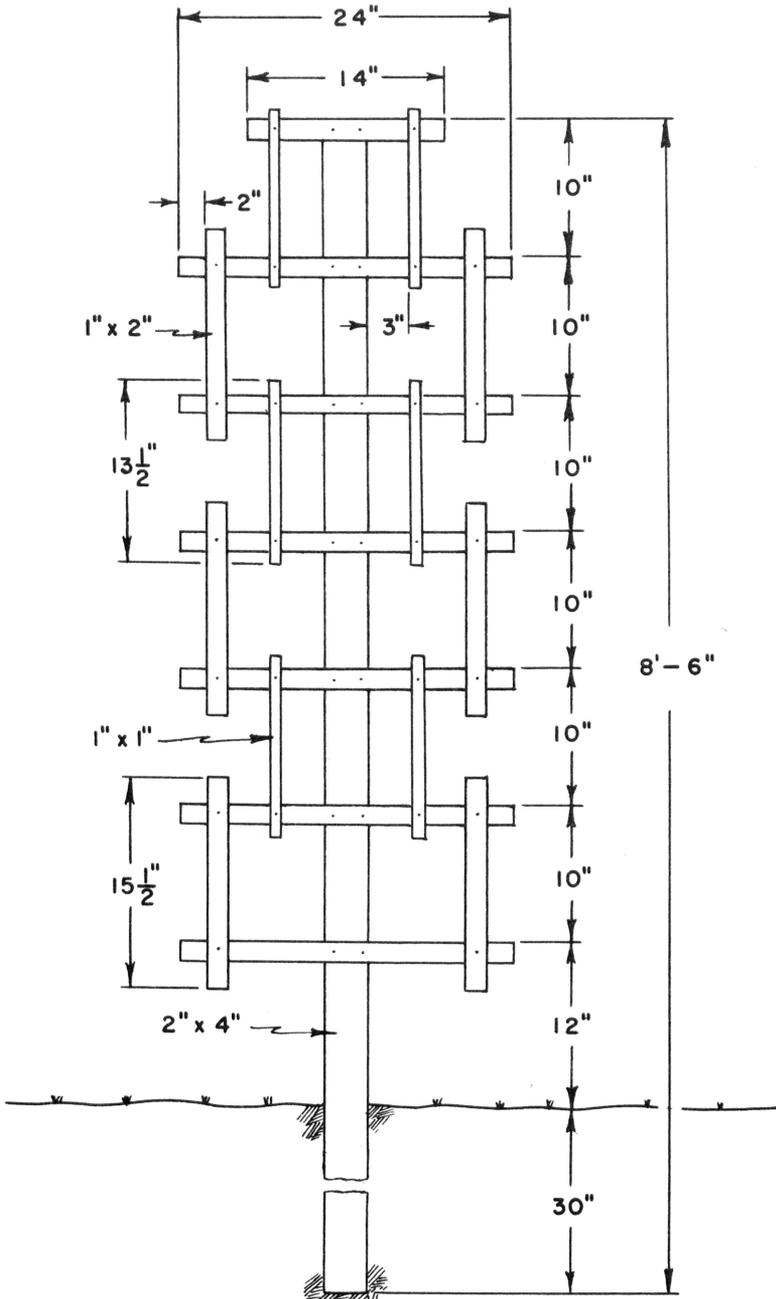
Pad board with several thicknesses of cotton flannelette or an old blanket. The pad should be smooth and about $\frac{1}{2}$ inch thick. Cover padding with a heavy muslin cover. Cut the cover 2 inches larger than the board. Make $\frac{1}{2}$ -inch casing for $\frac{1}{4}$ -inch elastic. Use enough elastic to hold cover snugly over board.



Roadside signs can be made in many different ways, this is one method of construction. They should be of durable construction and pleasing to the eye. The cross bar could be a 4"x4" cross lapped and bolted to the upright. The cross arm and upright could both be 2"x4" material but would not be as durable.

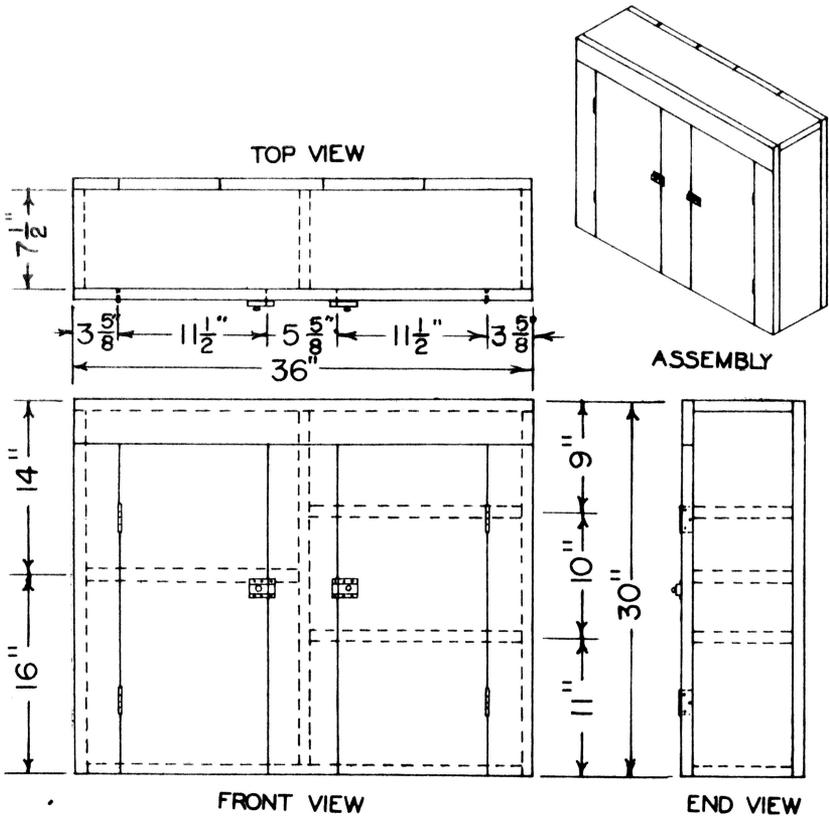
The length of cross-bar and name panel will vary with amount of lettering required. Paint panel white or other light color with lettering in black or dark green. Use a piece of cardboard to experiment with various sizes and spacing of letters to determine best appearance. Set the sign at right angles to the road and letter both sides of name panel. Usually, you'll get a better looking sign if a commercial sign painter does the lettering.

A piece of 1"x12" or 2"x12" will be wide enough for most name panels. Use screw eyes and eye bolts to attach name panel to crossbar.



GARDEN TRELLIS

A post or pole may be used for the support instead of the 2x4 if desired. Use pentac or other wood preservative on the part of the 2x4 upright set in the ground. When completed apply two or three coats of outside white paint.



MEDICINE CABINET FOR BARN

This medicine cabinet for the barn can be made from any planed material. Paint as desired.

Material:

2 pieces—1"x8"x10'

1 piece—1"x8"x12'

1 piece—1"x4"x8'

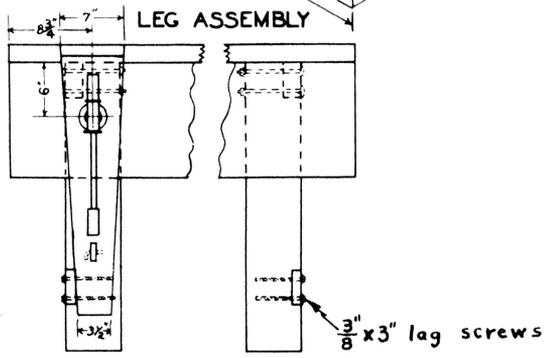
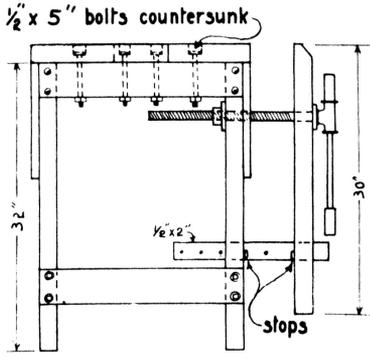
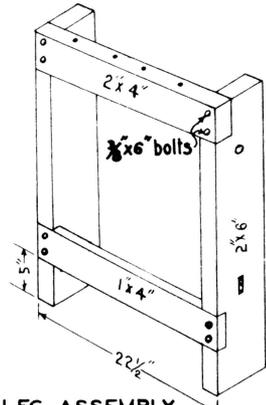
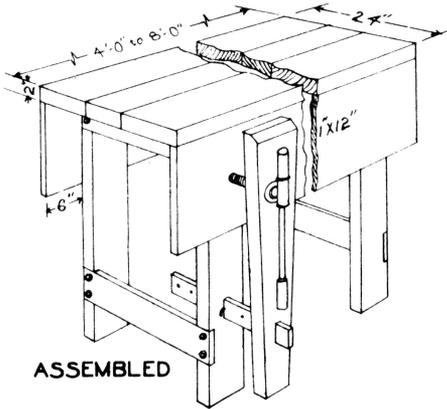
1 piece—1"x6"x3'

1 piece—1"x12"x5'

2 pairs small butt hinges

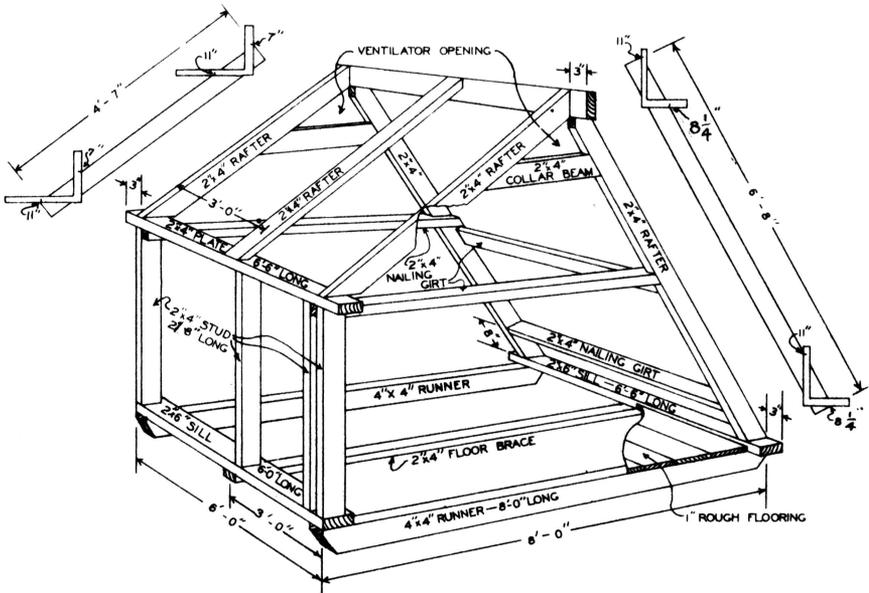
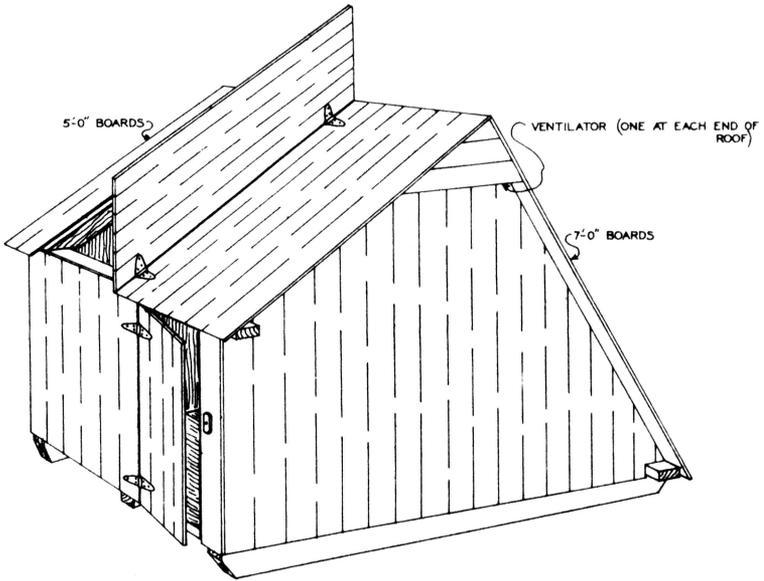
2 cupboard turns

PROJECTS FOR WOODWORK III



WORK BENCH

This work bench may be made of yellow pine, but the vise should be of hard material such as oak. The vise screw can be purchased at a hardware store. Mortise one leg for the sliding vise stop. Plug the countersunk holes in the top with wood plugs to leave a smooth even surface. Make a complete bill of materials before starting the exercise.



MODIFIED "A" HOG HOUSE

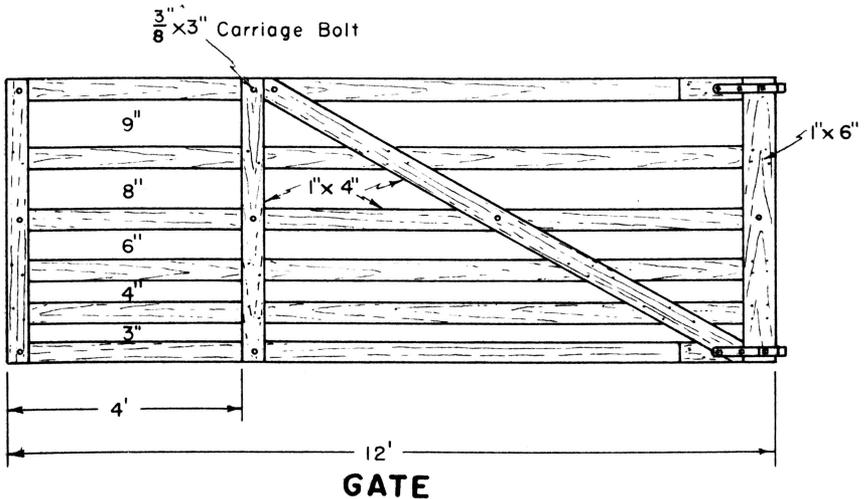
See opposite page for bill of material.

Bill of Material:

No. Pieces		Size	Purpose
2	Oak	4''x4''x8'	Runners
1	—No. 2 yellow pine	2''x6''x6'	Front sill
1	"	2''x6''x6'-6''	Rear sill
1	"	2''x4''x8'	Floor brace
4	"	2''x4''x2'-8''	Studs
2	"	2''x4''x6'-6''	Plate
4	"	2''x4''x6'	Nailing girts
2	"	2''x4''x6'-8''	Rear rafters
3	"	2''x4''x4'-7''	Front rafters
2	"	2''x4''x1'-10''	Collar beams
15	"	1''x6''x12' carsing	Roof
4	"	1''x6''x12' carsing	Siding, front
15	"	1''x6''x10' carsing	Siding, ends
5	"	1''x10''x12'	Floor
1	"	1''x4''x12'	Door battens

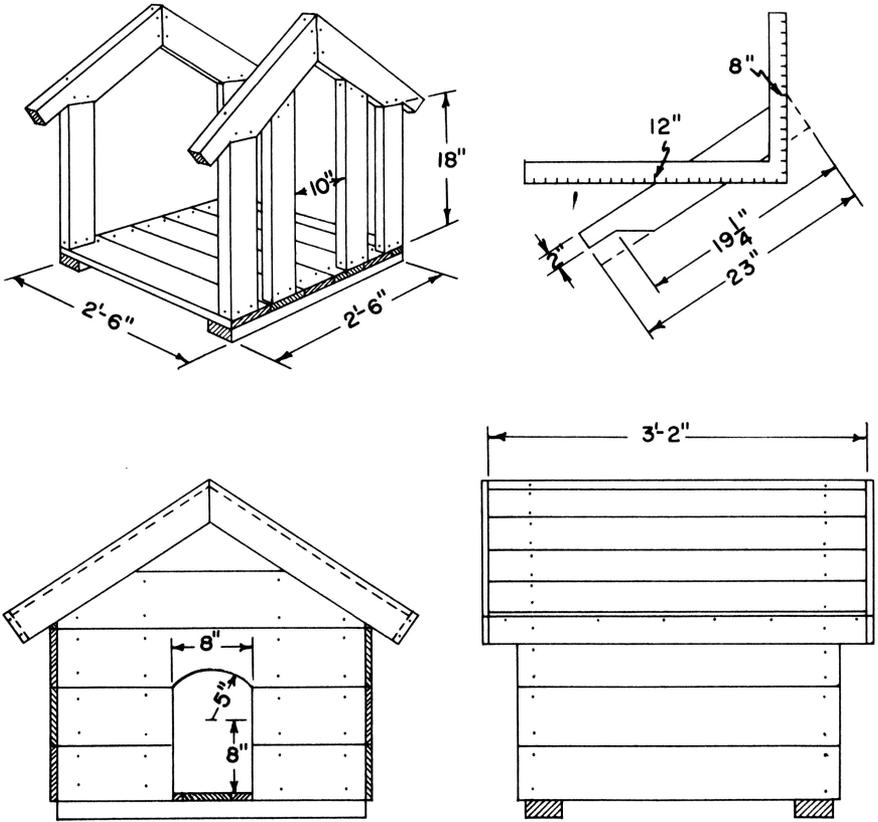
Hardware:—

- | | |
|-------------------------|---|
| 1 pair 6'' strap hinges | 3 lbs. 6d nails |
| 1 pair 8'' strap hinges | ½ gal. penta or other wood preservative for floor and runners |
| 2 hasps with screws | |
| 2 lbs. 16d spikes | 1 gallon paint |
| 2 lbs. 8d nails | |



This gate may be made from any material available either planed or unplanned. Cypress, if available, is a good wood to use.

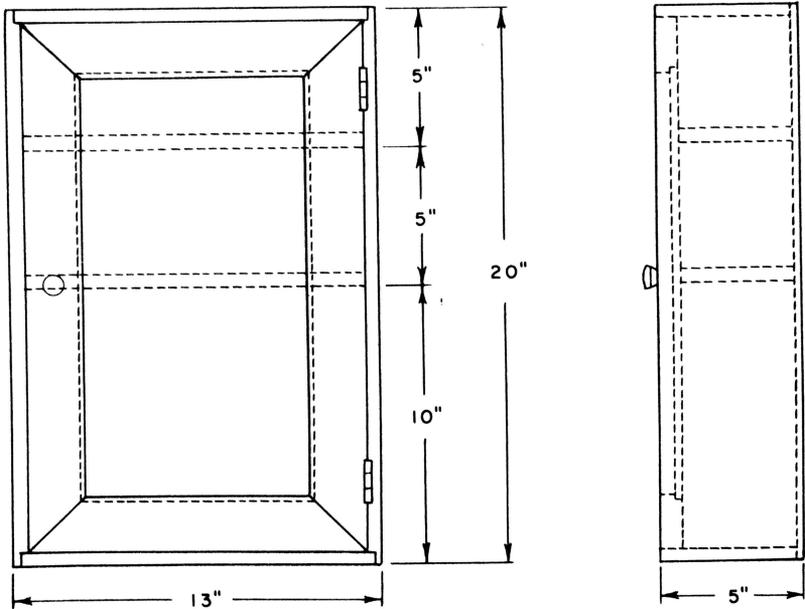
Material: 6 pieces 1''x4''x12'; 4 pieces 1''x4''x10'; 1 piece 1''x6''x10'; 9 carriage bolts ¾''x3'' with washers; 1 pair 12'' screw strap hinges with bolts; 6d and 8d nails.



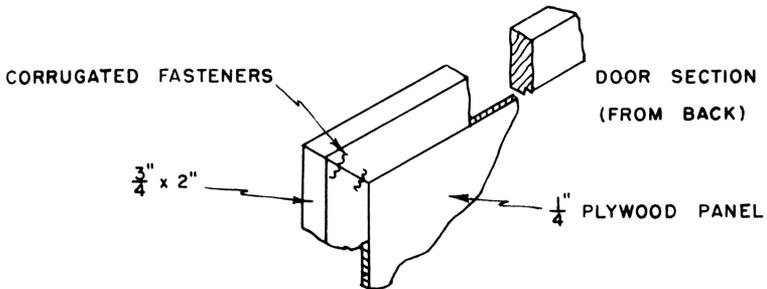
DOG HOUSE

This dog house may be made from any material available. The use of car siding or shiplap on the sides and ends will make a warmer shelter. The roof should be covered with roll roofing or asphalt shingles.

If the bottom boards are screwed in place they can be removed to facilitate cleaning.



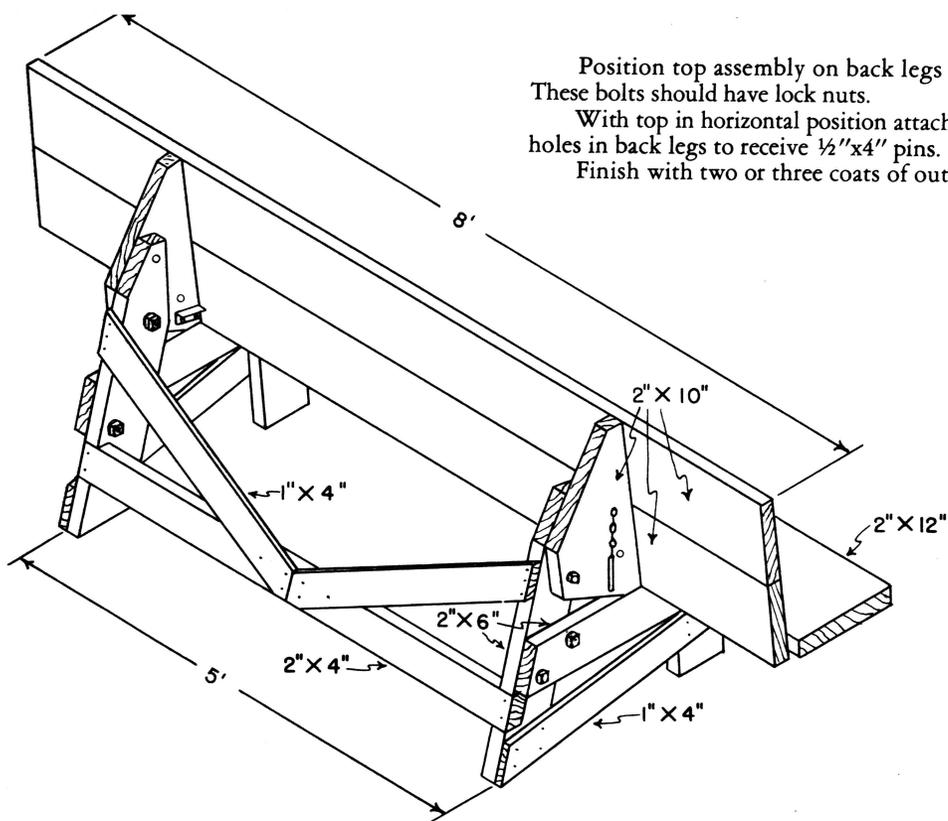
SIDES, TOP, SHELVES, & BOTTOM MADE OF $\frac{1}{2}$ " MATERIAL
 BACK & DOOR PANELS MADE OF $\frac{1}{4}$ " PLYWOOD



MEDICINE CABINET

This medicine cabinet is designed for use in the home. The $\frac{1}{4}$ -inch plywood back panel should be recessed into the side panels so the plywood will not show along the sides. An enamel finish is usually the most satisfactory.

This cabinet could be constructed from $\frac{1}{2}$ inch or $\frac{3}{8}$ inch plywood in which case the door could be made easily from one piece of plywood.



Position top assembly on back legs and bore holes for $\frac{1}{2}$ "x $4\frac{1}{2}$ " machine bolts. These bolts should have lock nuts.

With top in horizontal position attach the angle iron stops. Then bore $\frac{1}{2}$ " diameter holes in back legs to receive $\frac{1}{2}$ "x 4 " pins.

Finish with two or three coats of outside enamel.

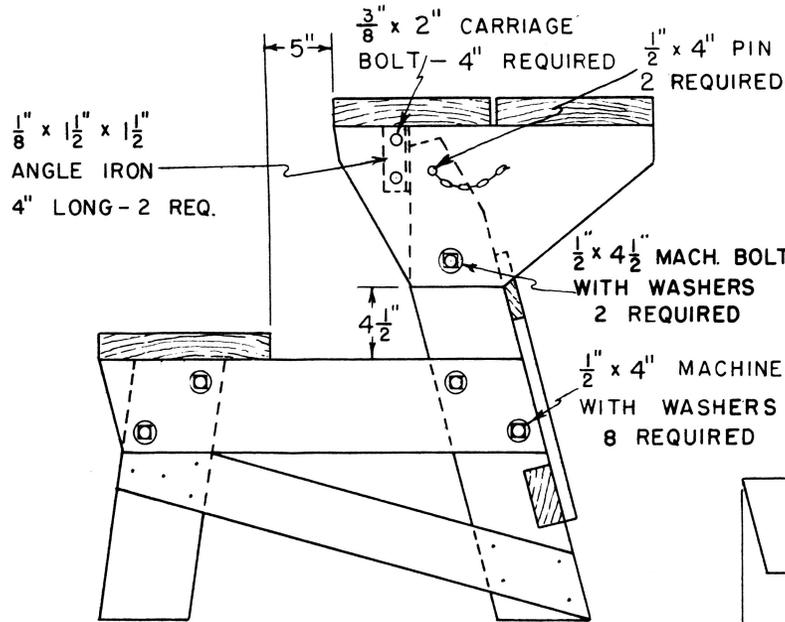
Bill of Material:

- 2 pieces 2"x10"x10"—Top and top support
- 1 piece 2"x12"x8'—Seat
- 2 pieces 2"x6"x8'—Legs and cross pieces
- 1 piece 2"x4"x6'—Back rail
- 1 piece 1"x4"x12'—Braces
- 2 angle iron stops
- 2 pins— $\frac{1}{2}$ "x 4 " with chain
- 4 each— $\frac{3}{8}$ "x 2 " carriage bolts
- 8 each— $\frac{1}{2}$ "x 4 " machine bolts
- 2 each— $\frac{1}{2}$ "x $4\frac{1}{2}$ " machine bolts
- 20 each— $\frac{1}{2}$ " washers
- 1 lb. 20d spikes
- $\frac{1}{4}$ lb. 6d nails
- $\frac{1}{2}$ gal. outside enamel

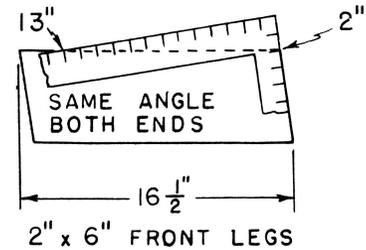
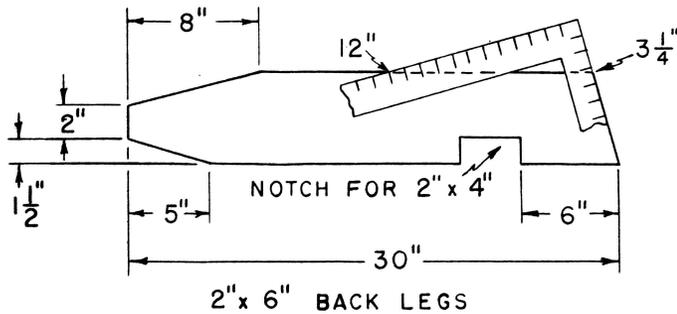
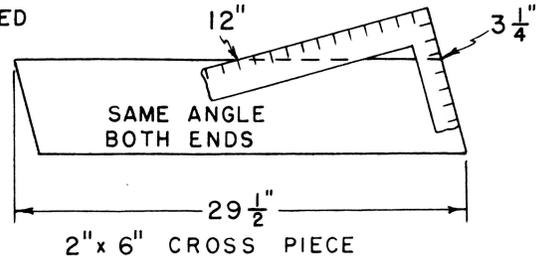
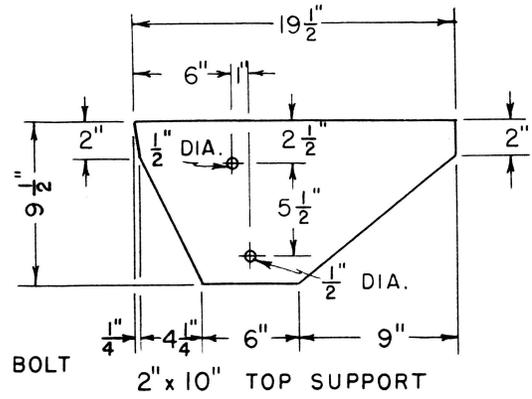
BENCH AND PICNIC TABLE

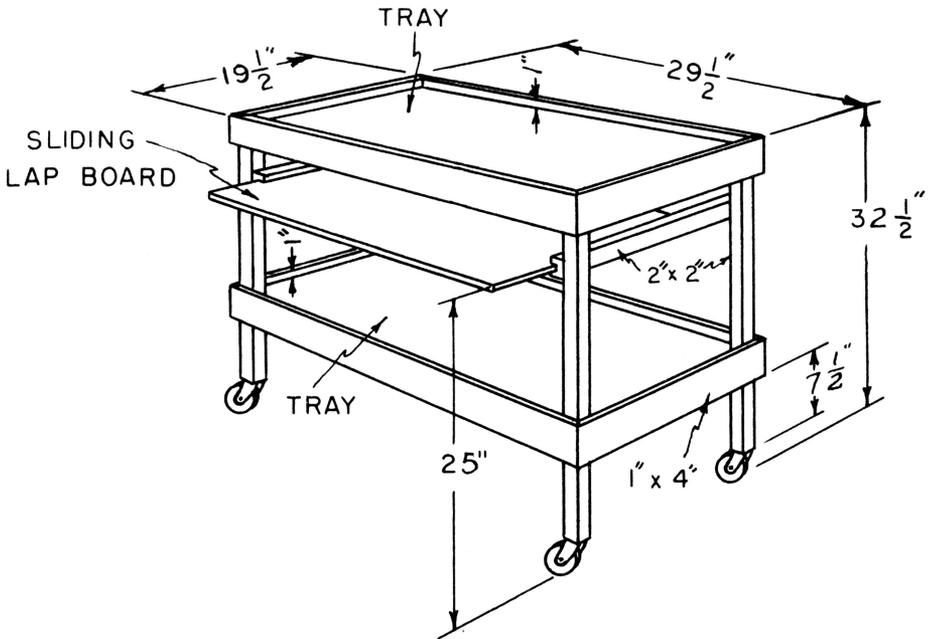
This picnic table also can be used as a bench by folding the top down for a back rest. Two of these tables placed back to back makes a conventional picnic table.

Make the leg assemblies first, then attach seat and back braces. Leave top assembly until last. Lay out the 2"x10" top support pieces and saw them to 19 $\frac{1}{2}$ " length. Then bore the $\frac{1}{2}$ " diameter holes. Leave ends square until top boards are nailed on, then make angle cuts shown in layout. Set top supports on ground or floor while nailing on top boards.



BORE HOLES WITH CROSS PIECE
CLAMPED IN PLACE ON LEGS





KITCHEN WORK TABLE

This kitchen work table can be made from any good grade of lumber. The 2"x2" rails supporting the sliding lap board should be made from hard wood to resist splitting. They should be screwed to the legs with flat head screws through bottom of slots. The lap board and top and bottom trays should be made from $\frac{3}{4}$ inch plywood.

The outside rails should be cut at 45° on the ends and fastened to the legs with 6d finish nails or flat head screws.

Casters should have ball bearings and soft rubber wheels. The diameter of the caster wheels should be at least 2 inches. It is desirable to have two of the casters with built-in locking features so the table will not roll when used for mixing.

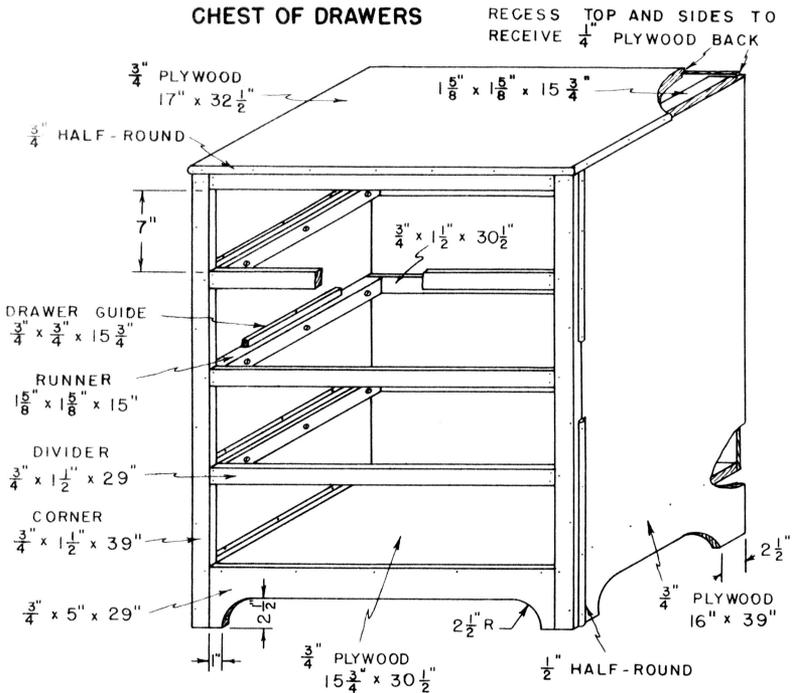
The finish should harmonize with the kitchen color scheme and be washable. Penetrating seal may be used for a natural finish or an enamel paint may be applied.

The tops and bottom trays can be covered with inlaid linoleum, vinyl plastic floor covering or laminated plastic.

Materials:

4 side pieces—1"x4"x29 1/2"
 4 end pieces—1"x4"x19 1/2"
 4 legs—2"x2" (length will
 depend on height of casters)

2 lap board supports—2"x2"x18"
 1 plywood lapboard— $\frac{3}{4}$ "x18"x23"
 2 plywood lapboard— $\frac{3}{4}$ "x18"x28"
 4 casters



This project will require the use of a bench saw.

The top, bottom and sides as well as drawer fronts of this chest of drawers are made of $\frac{3}{4}$ " plywood. Boards joined, doweled and glued together to make panels of required width also could be used. The corners and dividers are made from matching 1"x2" material.

Plywood is available in many wood finishes. Rotary cut fir plywood is usually the most readily available. This type of fir plywood has a wild zig-zag grain which would be hard to match; however, it can be used if the grain is not objectionable.

Use glue on all joints before fastening with nails or screws. This is easily done and will greatly increase the strength of joints. Nail heads which will show should be set and holes filled. Another method of concealing nail heads is to lift a small chip of wood with a $\frac{1}{8}$ " chisel where the nail is to be driven. After driving the nail, the raised chip is glued down over the nail head.

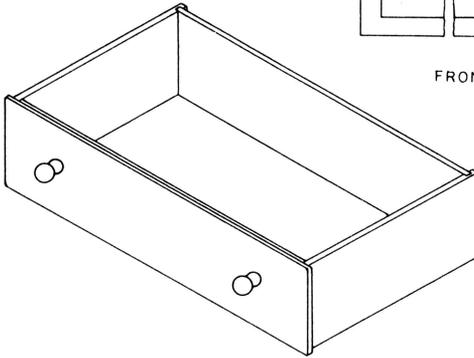
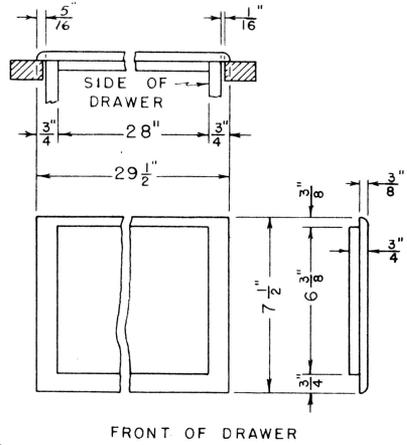
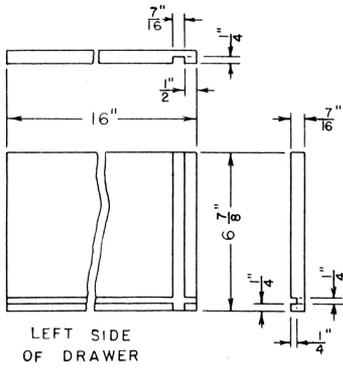
Use a finish of linseed oil and wax or penetrating seal. Stain may be used to darken the wood before applying finish.

Materials:—

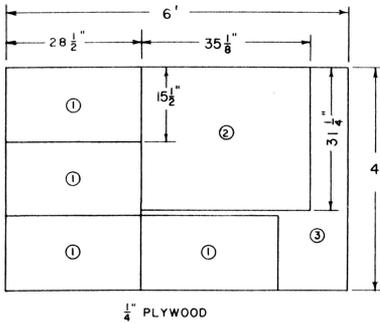
- 1 piece— $\frac{1}{4}$ " interior plywood 4'x6'
- 1 piece— $\frac{3}{4}$ " interior plywood 4'x6' or boards, joined, doweled and glued.
- 1 piece—1"x6"x30"
- 1 piece—1"x2"x8"—corners

- 1 piece—1"x2"x10'—dividers
- 1 piece—2"x2"x12'—runners
- 1 piece—1"x1"x12'—drawer guides
- 2 pieces— $\frac{1}{2}$ "x8"x12'—sides and back for drawers.
- 1 piece of $\frac{1}{2}$ " half-round 7' long
- 1 piece of $\frac{3}{4}$ " half-round 6' long

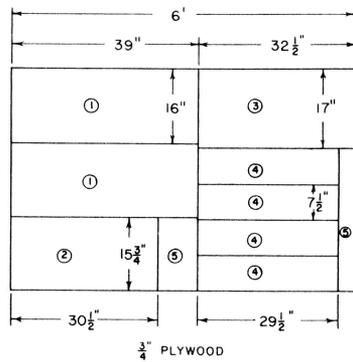
Note: If top is made from joined, doweled and glued boards the $\frac{3}{4}$ " half-round material will not be needed.



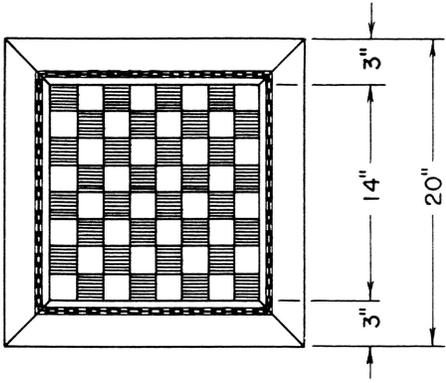
LAYOUT FOR CUTTING MATERIAL



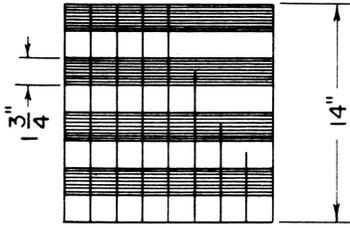
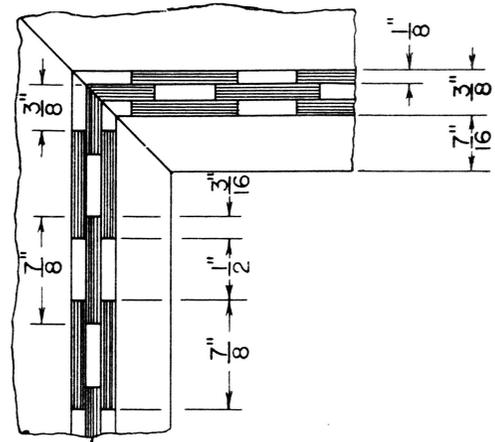
- ① - DRAWER BOTTOM
- ② - BACK
- ③ - WASTE



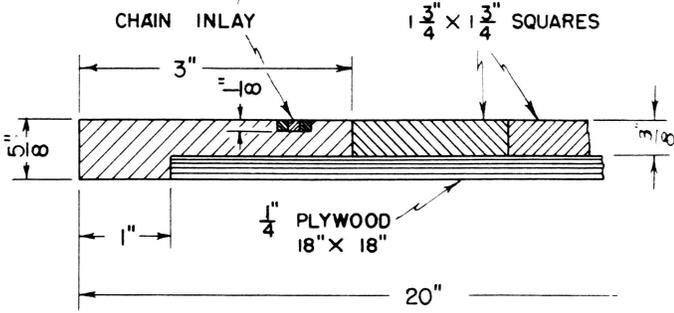
- ① - SIDE
- ② - BOTTOM
- ③ - TOP
- ④ - DRAWER FRONT
- ⑤ - WASTE



CHECKER BOARD



MAKE STRIPS 16" LONG TO ALLOW FOR SAW KERFS. SAW ACROSS STRIPS MAKING PERFECT SQUARE. REVERSE ALTERNATE STRIPS AND GLUE AGAIN.



CROSS SECTION

This checker board should be made from hard wood. Use dark and light colored woods such as walnut or cherry and maple to obtain contrasting colors of squares and chain inlay.
 The $\frac{3}{8}$ " x $\frac{1}{8}$ " slot in 3-inch strip to receive the chain inlay can best be cut with a power saw. The chain inlay can be omitted if desired. Use glue for assembly of all parts.
 Use a natural finish to bring out the contrasting colors of the wood.

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE AND THE UNITED
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J. W. Burch, Director, Agricultural Extension Service
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