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WOODWORKING EXERCISES FOR THE AGRICULTURAL SCHOOL SHOP*

By H. B. White

Introduction

The increased use of machinery in farm operations has made it necessary for the farmer to make repairs and attachments that will prolong the life or add to the effectiveness of his equipment. To do this economically there must be an understanding of the use and care of tools. It is in response to this need that many schools are giving courses in shop work. When farm boys have an opportunity to do repair work with proper tools, they soon acquire skill in doing it. The ability to do repairing and to understand mechanical operations adds interest to farm work and also adds greatly to the conveniences for doing it. Furthermore, it often enables the boys to take advantage of more complicated tools and machinery and to get the best results from them.

Farm Shop and Work-Bench

It is not necessary to have a separate building for doing the repair work altho this would be very desirable. Often a corner or part of the machine shed makes a satisfactory place, as the machinery can be repaired during stormy days while under shelter.

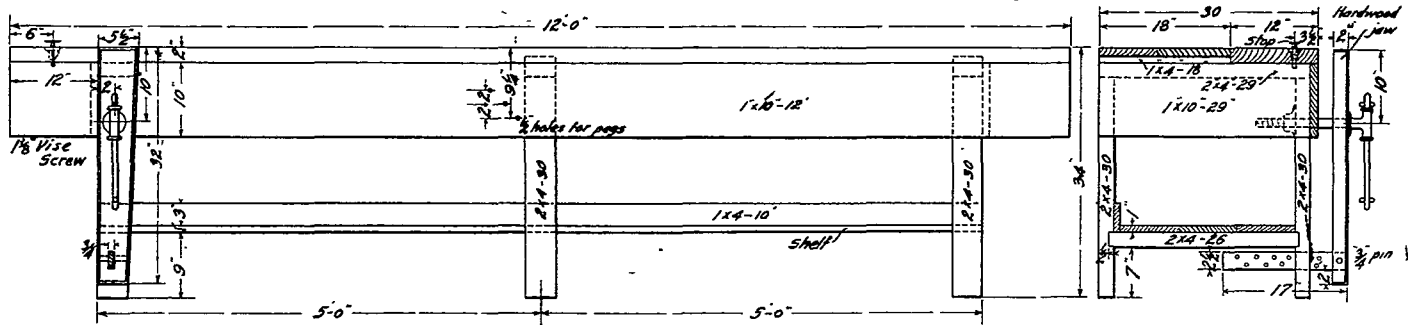
A plan is shown of a workbench that is large enough for almost any farm. It is very satisfactory to work at, as it is firm and provides plenty of room. The tools are to be hung along the wall or placed in cases on the wall. A window above the bench, opposite the vise, is desirable.

For a smaller bench that can be taken to the place where repairs are necessary, the farmers' workbench will be found convenient. Altho small, it has room for locking up the tools when they are not in use.

Farmers' Bulletin 347, published by the United States Department of Agriculture, Washington, D. C., gives directions for the arrangement of a shop building and equipment.

* Reprint of Agr. Exp. Sta. Bul. 135.

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Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.



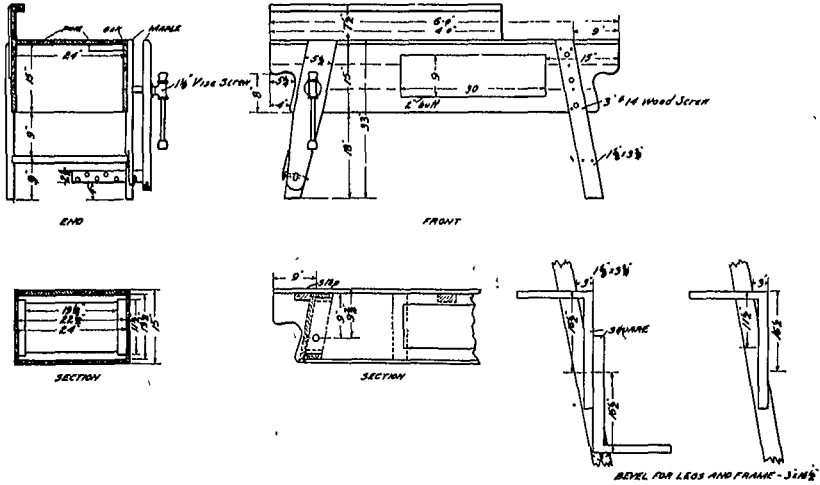
Note: To be fastened to wall

Workbench

Material: Pine

Pieces	Thickness	Width	Length
	Inches	Inches	Feet
1	2	12	12
1	1	10	12
1	1	10	12
1	1	8	12
1	1	4	10
3	1	8	10
2	1	10	29†
3	1	4	18†
6	2	4	30†
3	2	4	29†
3	2	4	26†
1*	2	6	32†
1	$\frac{3}{4}$	2 $\frac{1}{2}$	17†

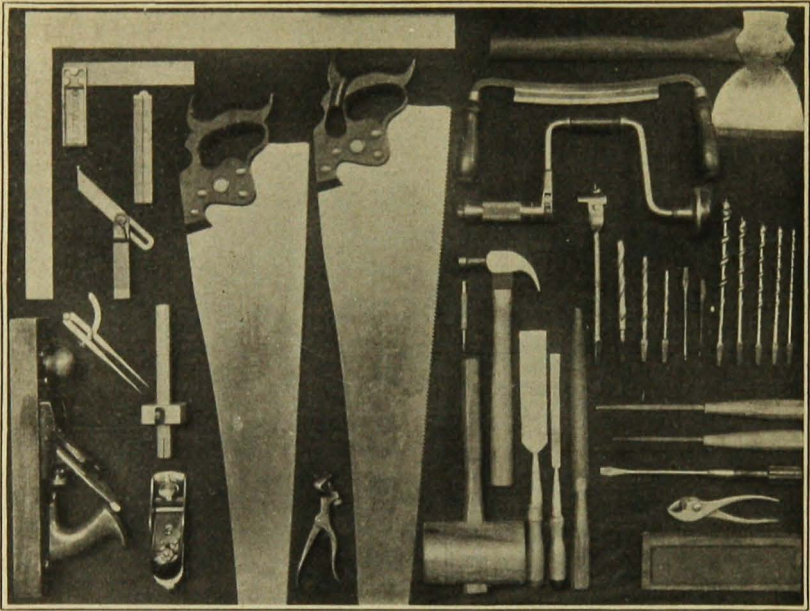
*Hardwood
† Inches



Farmers' Workbench

Material: Pine; (1) Maple; (2) Oak; (3) Dressed and matched

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
5	2	4	22½
4	2	4	13
2	2	4	24
3	2	4	36
(1) 2	2	6	36
1	1	7½	48
1	1½	1½	48
1	1	9	30
(1) 1	¾	2½	17
2	¾	2	16
(2) 1	1	6	72
(3) 26	1	4	72



Tools for Farm Shop

Rip saw, 28 in., 5½ pts.....	\$1.75
Hand saw, 26 in., 8 pts.....	1.75
Jack plane, 15 in., 2¼ in. cutter.....	1.25
Block plane, 6 in.....	1.00
Hammer, 1 lb.....	.60
Framing square, No. 100.....	1.25
Try square, 6 in.....	.40
Expansive bit, ⅞ to 3 in.....	1.00
Bits, ¼, ⅜, ½, ⅝ and ¾ in.....	1.25
Ratchet brace, 10 in.....	1.50
Twist drills, ¼, ⅝, ⅜ and ½ in.....	1.00
Socket firmer chisels, ½ and 1½ in.....	1.00
Mallet, mortised handle.....	.25
Drawknife, 8 in.....	.75
Screwdriver, 6 in.....	.50
Dividers, 6 in.....	.25
Saw set.....	.75
Marking gauge.....	.15
Oilstone, 1x2x7.....	1.00
Rule, 2 ft.....	.25
Wood rasp, 10 in. half round.....	.50
Saw vise.....	.75
Hand axe.....	.75
Nail set.....	.10
Sliding T bevel.....	.25
Gimlets, No. 5 and No. 7.....	.15
Pliers, 6 in.....	.75
Files, 5 in. and 6 in. slim taper.....	.20

Additional Tools.—If it is desirable to make up some of the more complicated articles shown on the following pages, it is necessary to have additional tools, such as clamps, scraper, spokeshave, fore plane, rabbet plane, and countersink.

Quality of Tools.—It pays to buy tools of good quality. In most cases their usefulness and length of life are determined by the material used in making them. The name of a manufacturer with an established reputation for making good tools is usually a guaranty of good quality. If the dealer sells a new brand, it is desirable that either he or the manufacturer stand ready to replace defective tools. Cheap tools of inferior quality are usually a disappointment to the purchaser.

Care of Tools.—Oil will need to be used on many of the bright tools to prevent rusting.

It is important to keep all edge tools sharp that the work may be accomplished with ease and accuracy. An edge satisfactory for most work can be procured by holding the tool on a grindstone or grinder in such a position as to form a bevel of twenty-five degrees, and then whetting on an oilstone at an angle of thirty-five degrees.

Each tool should have its place and should be returned to it when a job is finished. A good way to insure the return of tools is to draw an outline of them on the wall, then paint in the space with black paint.

Materials

Ash is suitable for use in making such articles as tool chests and butter-workers. It resembles oak somewhat but is not so strong. It works easily. Brown ash is commonly carried by dealers in hardwood.

Filler is pastelike material used for filling the pores of open-grained woods like ash and oak. It gives a smooth surface on which to apply varnish or wax. It can be obtained at paint or hardware stores. Directions are given on the can as to the method of using.

Hickory is the hardest, toughest wood in common use. Second growth is tougher and hence more desirable for handles. It is too hard to be nailed. It costs about as much as oak and is carried in stock by dealers in hardwood.

Oak is one of the best woods for cabinet work. There are two kinds used—white and red. White is the stronger and more valuable but is harder to work. Quarter-sawed oak costs more but is desirable for many uses, such as table tops. For the best work, oak should be kiln-dried. Hardwood dealers carry oak, as there is a considerable demand for it.

Paint is a protective covering of oil, white lead, zinc oxide, colors, etc., which conceals the surface it beautifies. Directions are given on the cans. It can be obtained at paint, hardware, or drug stores.

White pine is the one of many varieties of pine which is the most desirable for woodworking exercises. It can be obtained from dealers who carry a complete line of softwood lumber. It takes paint well or may be finished nicely with shellac.

Raw linseed oil is used for finishing hammer handles and similar work. It is very durable when worked into the wood by brisk rubbing with the bare hand.

Shellac varnish is used in work where quick drying is an advantage and should be applied with as little brushing as possible. It is best kept in a glass bottle or a fruit jar with a hole through the cover for the brush. A sheet of rubber with a

small hole in it through which the handle is thrust and which makes a tight fit on the handle will prevent evaporation. Shellac is carried in stock by all paint dealers.

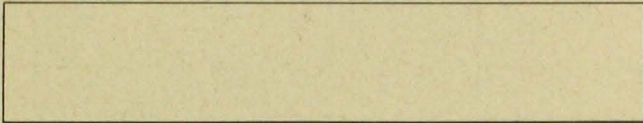
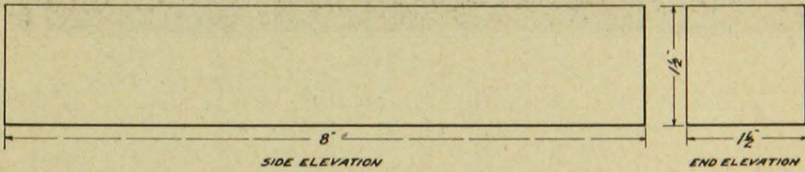
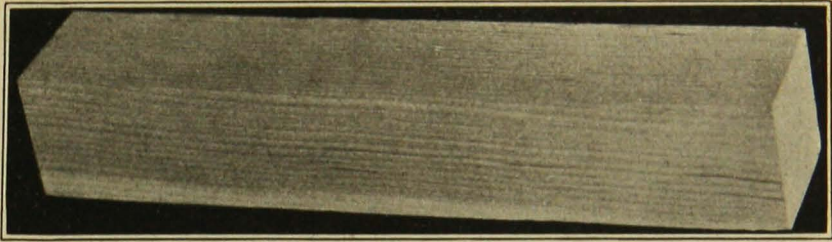
Stain is a coloring matter dissolved in oil, alcohol, or water, used to beautify wood. Many different colors can be obtained. It is very satisfactory for small pieces of woodwork and often nothing is applied but a coat of stain and one of wax.

Varnish is either a transparent resin or a gum dissolved in oil or spirits and is used on high grade work, such as tables and pianos. Be sure it is dry before handling. Directions are given on cans. See catalog of paints and varnishes for different grades.

Wax already prepared can be obtained from dealers who carry paints. It is used on many pieces where a dull finish is desired. It is applied with a cloth or waste and after fifteen minutes can be polished with a soft cloth or clean waste.

Selection of Exercises

The first six exercises can be used for class work in the order shown. The remaining exercises have proved satisfactory, and selection can be made according to the student's ability and the material on hand. The student should make a careful study of the exercise before he begins to get out his material. The dimensions given in the list of pieces are for finished size except for the first six exercises and the drawing board.



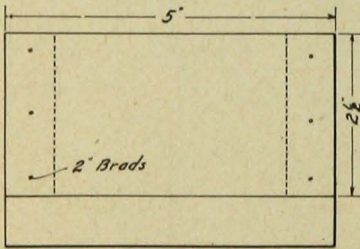
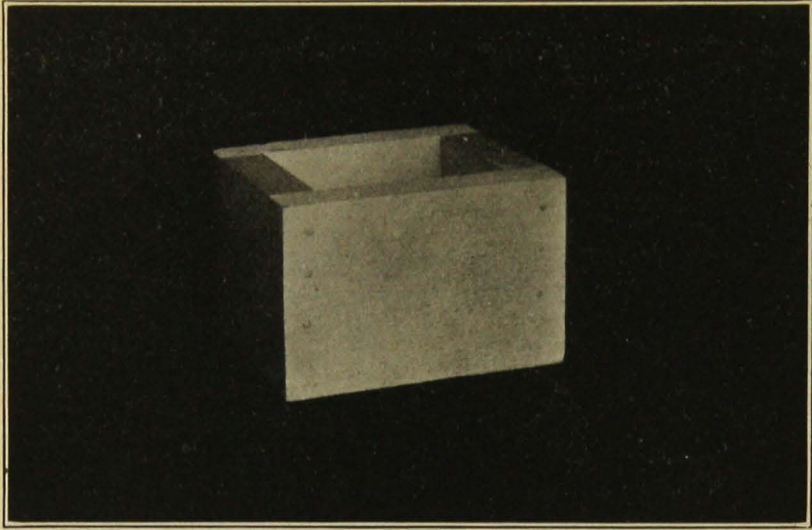
PLAN

1. "Squaring-up" Exercise

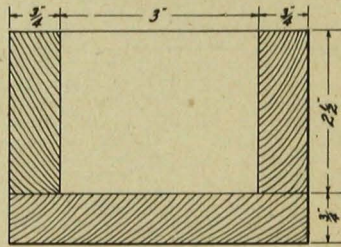
Gives practice in squaring and working to line

Material: Pine

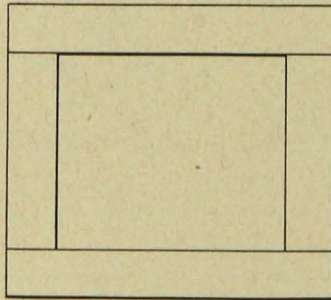
Pieces	Thickness	Width	Length
1	Inches $1\frac{5}{8}$	Inches $1\frac{5}{8}$	Inches $8\frac{1}{2}$



SIDE ELEVATION



END ELEVATION

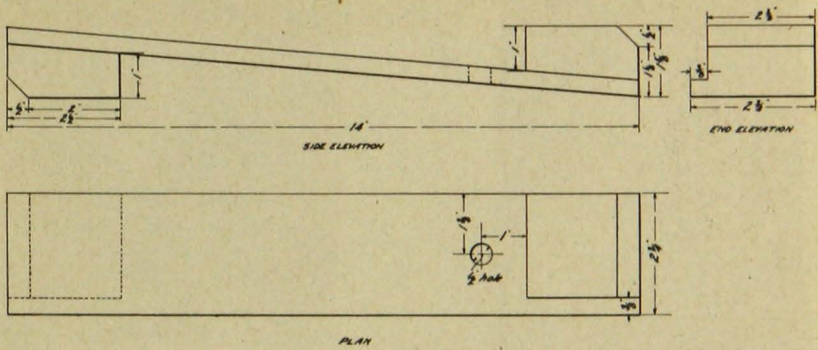
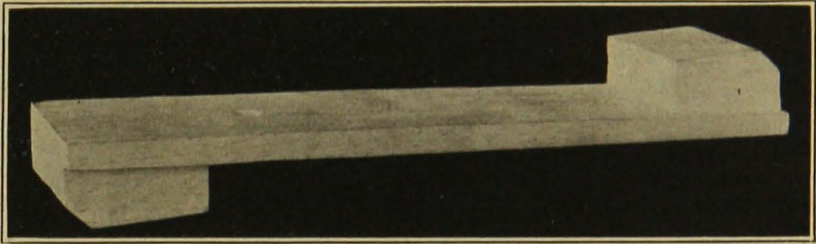


PLAN

2. Box

Suitable for practice in planing and nailing
Material: Pine

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	1	$2\frac{3}{4}$	18
1	1	$4\frac{3}{4}$	$5\frac{1}{4}$

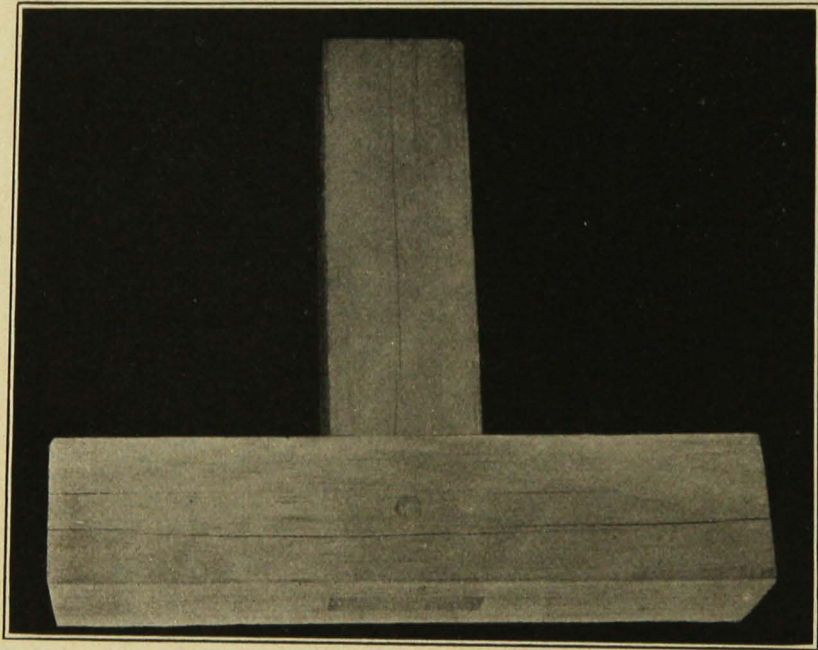


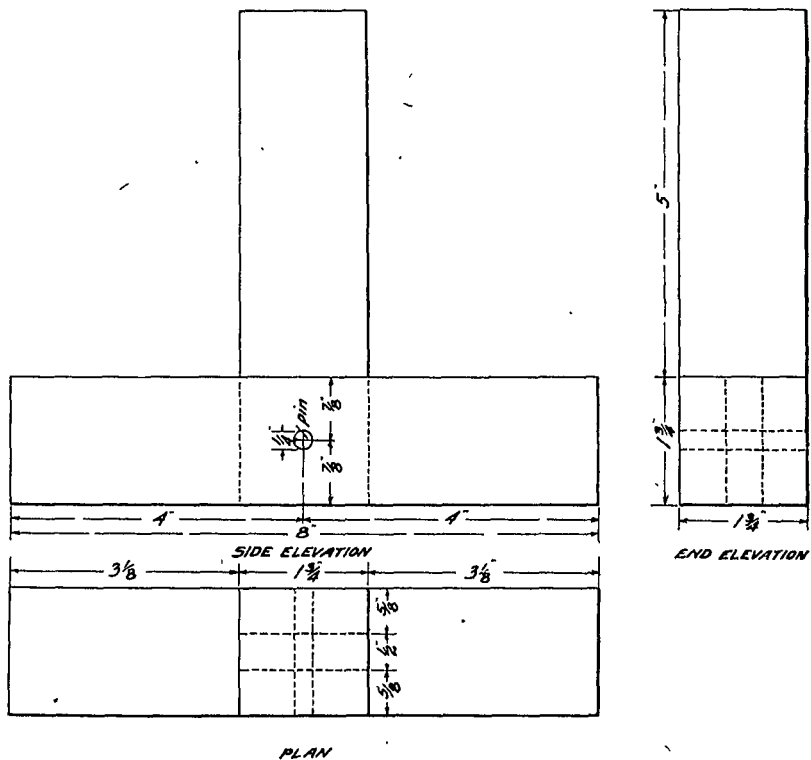
3. Bench_Hook

Gives practice in squaring and paring with chisel

Material: Pine

Pieces	Thickness	Width	Length
1	Inches $1\frac{3}{4}$	Inches 3	Inches $14\frac{1}{2}$



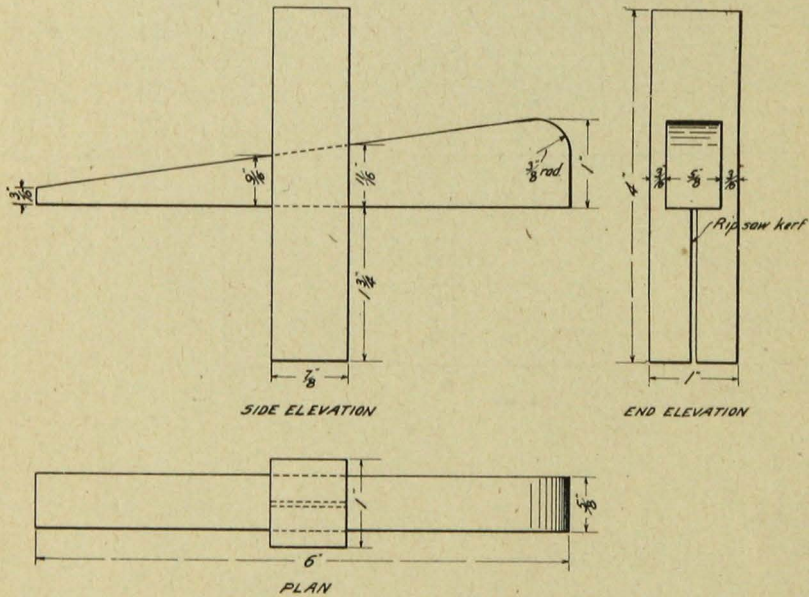
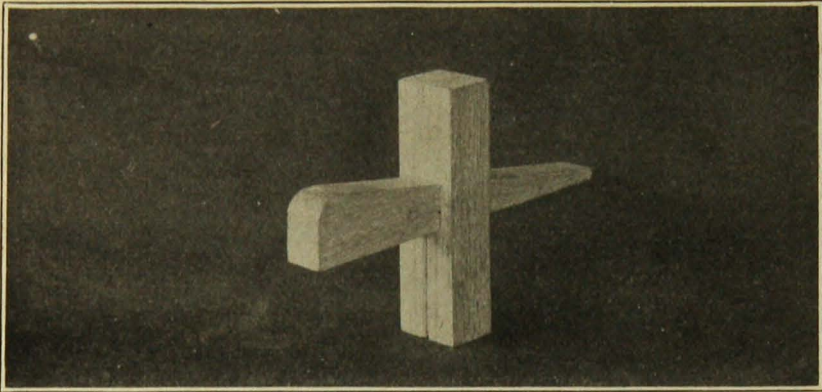


4. Mortise and Tenon Joint

Requires careful work in mortising and sawing

Material: Pine

Pieces	Thickness	Width	Length
1	Inches 2	Inches 2	Inches 15 $\frac{1}{2}$

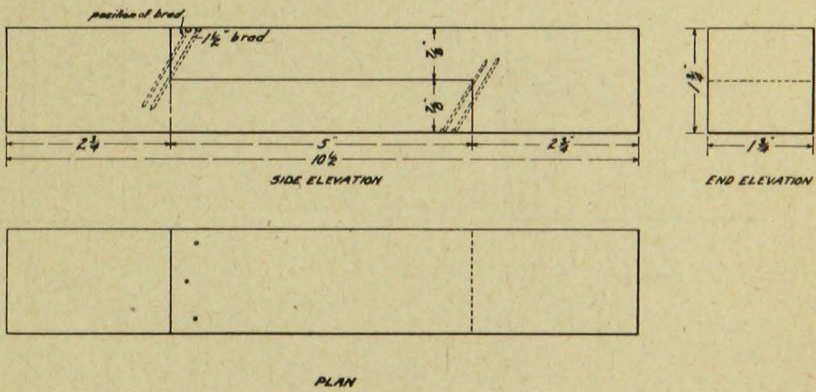


5. Saw Jointer

Gives practice in working small pieces

Material: Pine

Pieces	Thickness	Width	Length
1	Inches 1	Inches $1\frac{1}{8}$	Inches $10\frac{1}{2}$

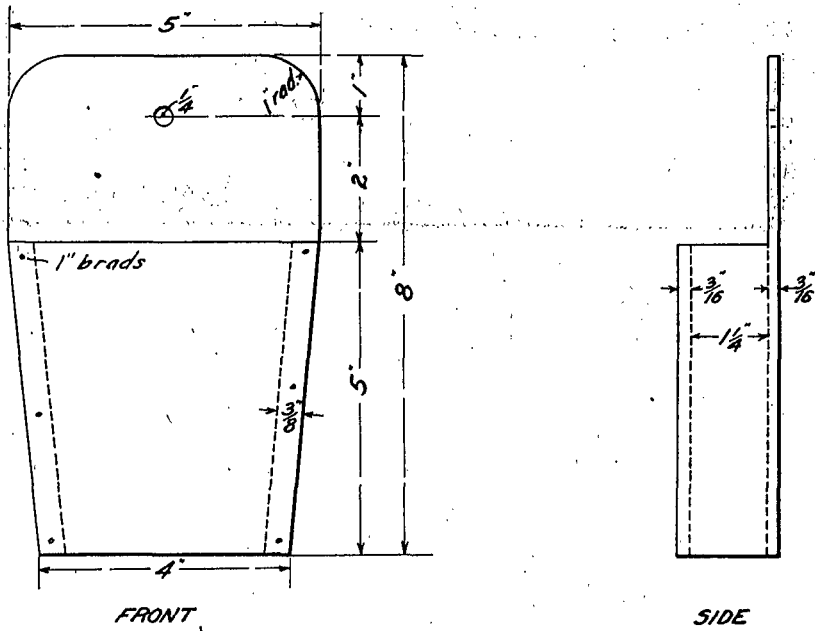


6. Halved Splice

Gives practice in accuracy and nailing

Material: Pine

Pieces	Thickness	Width	Length
1	Inches 2	Inches 2	Inches 16

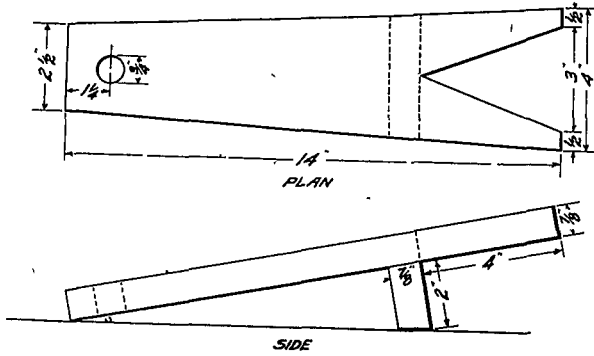


7. Whisk-Broom Holder

To be finished with stain and wax

Material: Pine

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	$\frac{3}{16}$	5	8
1	$\frac{3}{16}$	5	5
2	$\frac{3}{8}$	$1\frac{1}{4}$	$5\frac{1}{4}$

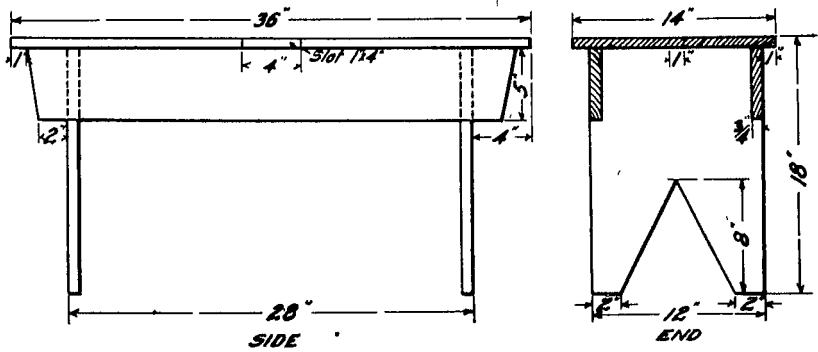


8. Bootjack

To be finished with stain and wax

Material: Pine

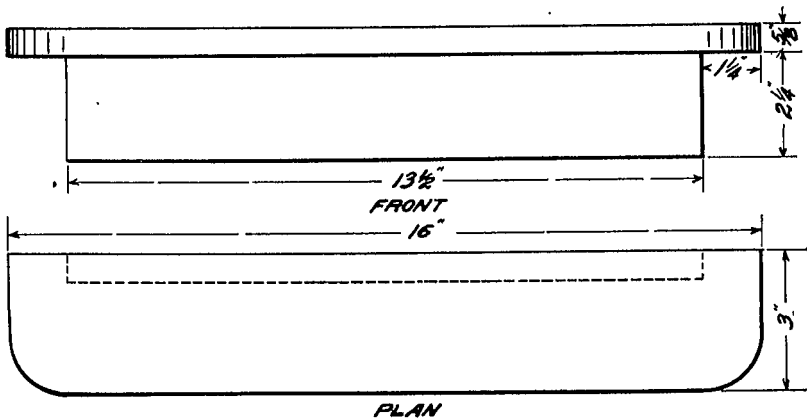
Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	7/8	4	14
1	1/8	2	4



9. Bench

To be finished with two coats of paint
 Material: Pine

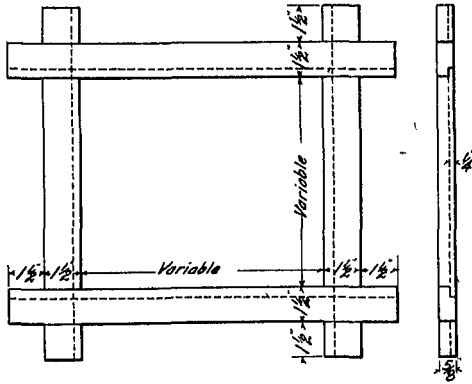
Pieces	Thickness	Width	Length
2	Inches $\frac{3}{4}$	Inches 12	Inches $17\frac{1}{2}$
2	$\frac{3}{4}$	5	34
1	$\frac{3}{4}$	14	36



10. Shelf

To be finished with stain and wax
 Material: Oak

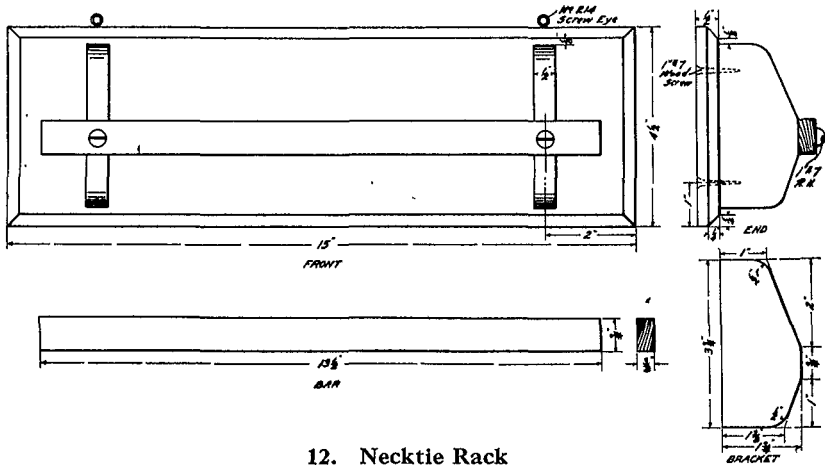
Pieces	Thickness	Width	Length
1	Inches 3	Inches 16	Inches 13 1/2
1	$2\frac{1}{4}$	$2\frac{1}{4}$	$13\frac{1}{2}$



11. Picture Frame

To be finished with stain and wax
 Material: Oak

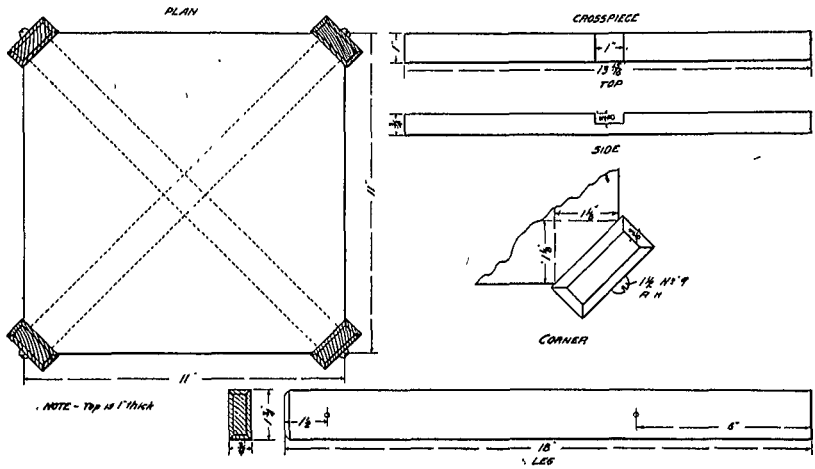
Pieces	Thickness	Width	Length
	Inches	Inches	Inches
2	5/8	1 1/2	variable
2	5/8	1 1/2	variable



12. Necktie Rack

To be finished with stain and wax or wood filler and varnish
 Material: Oak

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	3/4	4 1/2	15
1	3/4	3 1/4	13 1/2
2	3/4	1 3/4	3 1/2

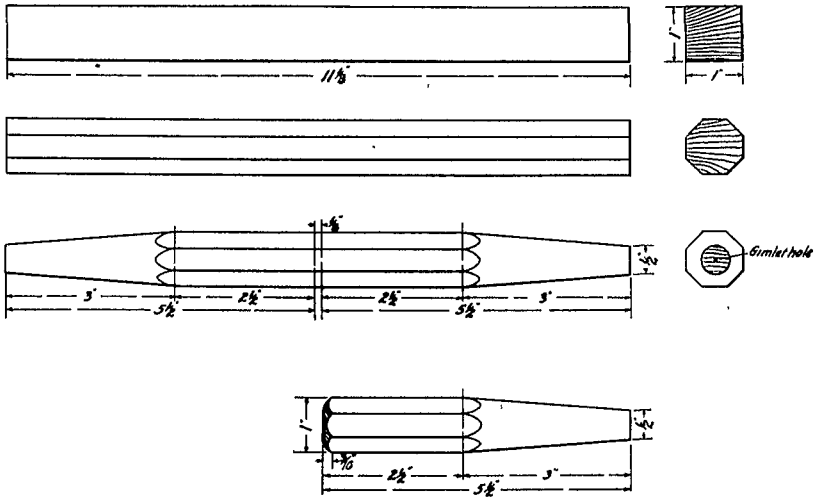


13. Plant Stand

To be finished with stain and wax

Material: Oak

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	1	11	11
4	3/4	1 3/4	18
2	3/4	1	13 1/8

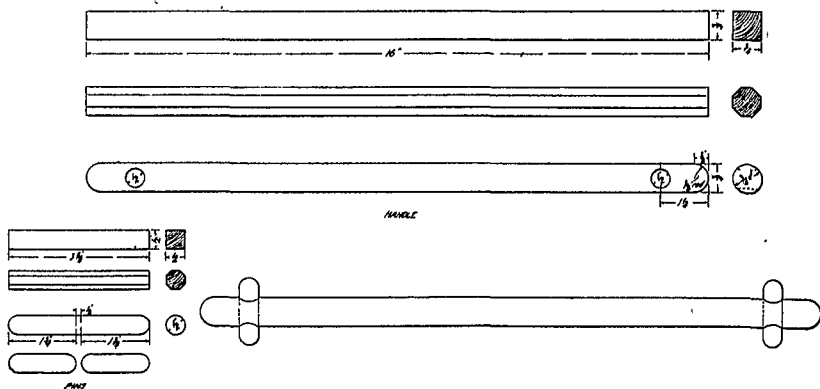


14. File Handles

To be finished by rubbing with raw linseed oil

Material: Oak

Pieces	Thickness	Width	Length
1	Inches 1	Inches 1	Inches $11\frac{1}{8}$

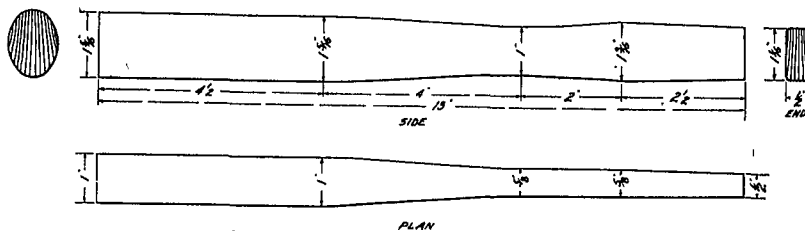


15. Vise Handle

To be finished by rubbing with raw linseed oil

Material: Hickory

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	$\frac{3}{4}$	$\frac{3}{4}$	16
1	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{8}$

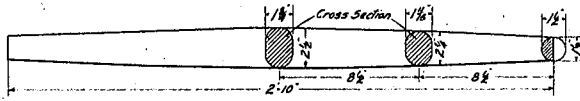
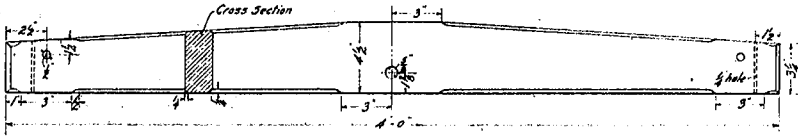


16. Carpenter's Hammer Handle

To be finished by rubbing with raw linseed oil

Material: Hickory

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	1	$1\frac{5}{8}$	13

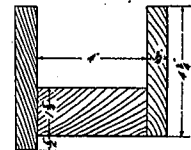
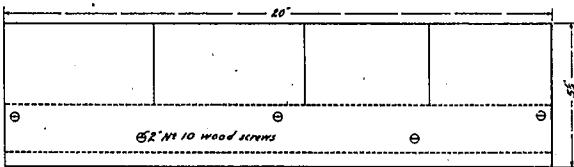
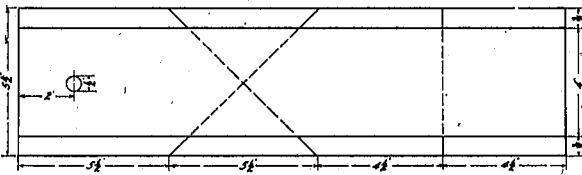


17. Evener and Singletree

To be finished with two coats of paint

Material: Hickory or Oak

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	2	4 1/2	48
2	1 1/4	2 1/2	34



FRONT

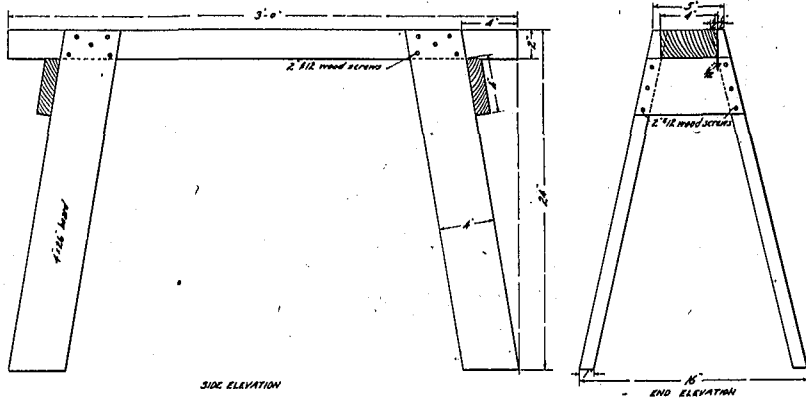
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18. Miter Box

To be finished with shellac

Material: Pine

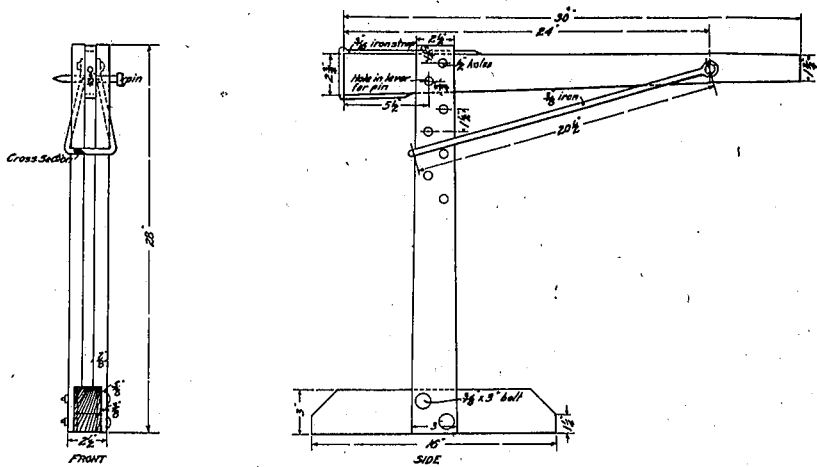
Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	1 1/4	4	20
1	3/4	5 1/2	20
1	3/4	4 1/4	20



19. Sawhorse

To be left white
Material: Pine

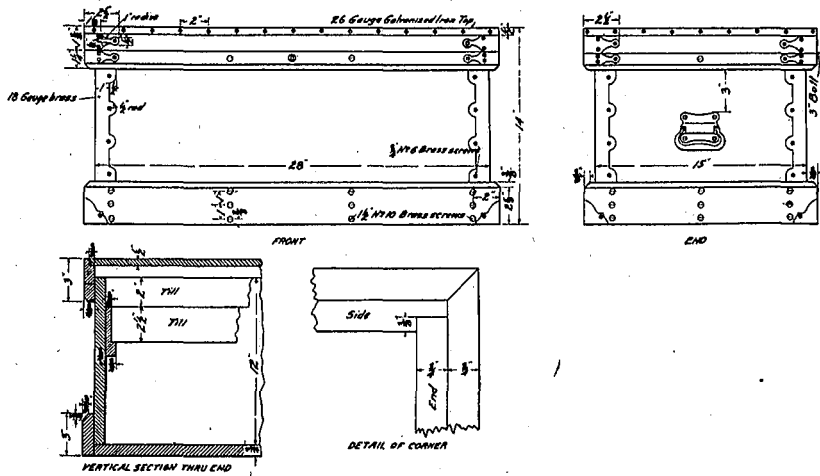
Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	2	4	36
4	1	4	26
2	1	4	8



20. Wagon Jack

To be finished with two coats of paint
Material: Oak

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
2	3/8	3	28
1	3/4	2 3/4	30
1	1 3/4	3	16

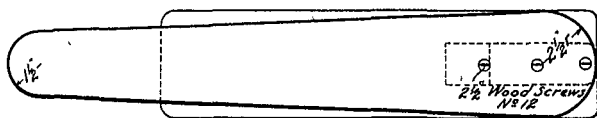


21. Tool Chest

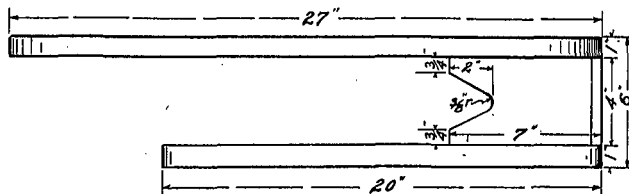
To be finished with two coats of paint

Material: Pine

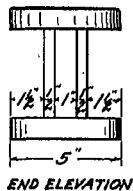
Pieces	Thickness	Width	Length
	Inches	Inches	Inches
2	3/4	12	14 1/4
2	3/4	12	28
2	3/4	3	16 3/4
2	3/4	3	29 3/4
2	3/4	1 3/4	16 3/4
2	3/4	1 3/4	29 3/4
2	3/4	1 1/4	16 3/4
2	3/4	1 1/4	29 3/4
3 D & M	3/4	6	28
3	1 1/2	10	15 3/4
1	1 1/2	7	26 3/4
1	1 1/2	7	25 3/4
2	1 1/2	1 1/2	26 3/4
2	1 1/2	2	25 3/4
2	1 1/2	3 1/2	13 1/2
3	1 1/2	1 1/2	6
3	1 1/2	2	6



PLAN



SIDE ELEVATION



END ELEVATION

22. Sleeve Board

To be finished with shellac
Material: Pine

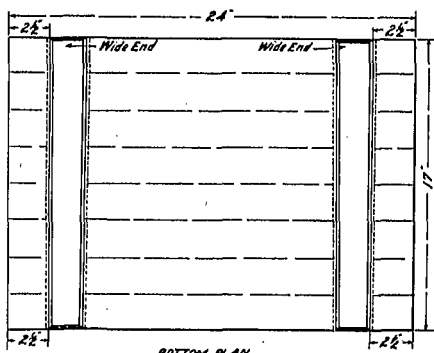
Pieces	Thickness Inches	Width Inches	Length Inches
1	2	4	7
1	1	5	27
1	1	5	20



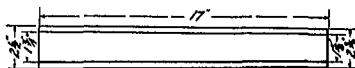
SIDE ELEVATION



END ELEVATION



BOTTOM PLAN

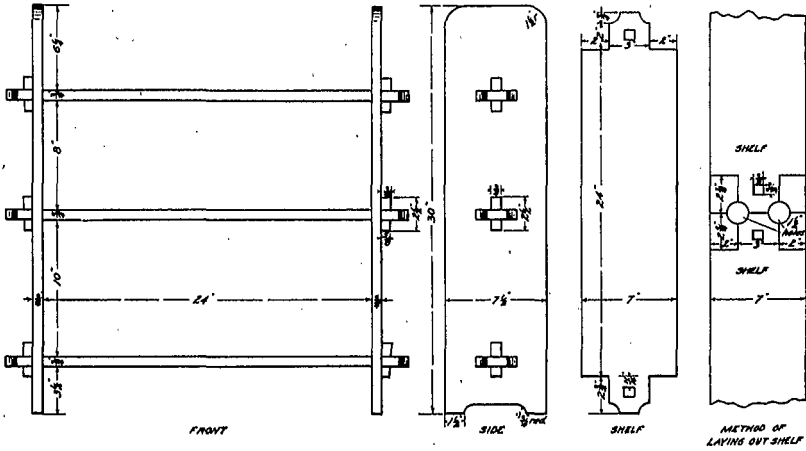


PLAN OF CLEAT

23. Drawing Board

To be left white
Material: White pine

Pieces	Thickness Inches	Width Inches	Length Inches
8	1	24	25
2	3/4	24	18

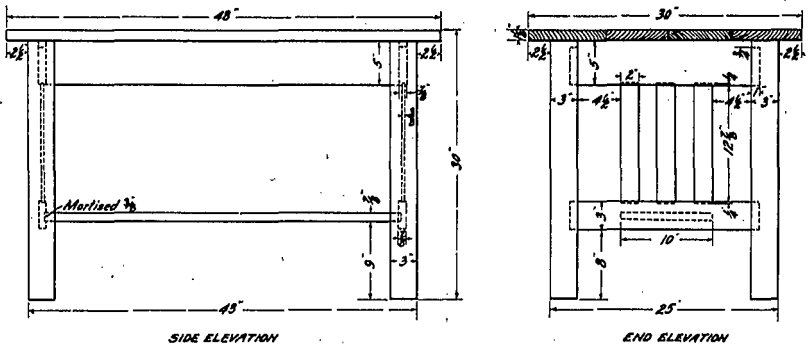


24. Knockdown Bookrack

To be finished with stain and wax

Material: Oak

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
2	$\frac{3}{4}$	$7\frac{1}{2}$	30
3	$\frac{3}{4}$	7	$29\frac{1}{2}$
6	$\frac{3}{4}$	$\frac{3}{4}$	$2\frac{1}{2}$

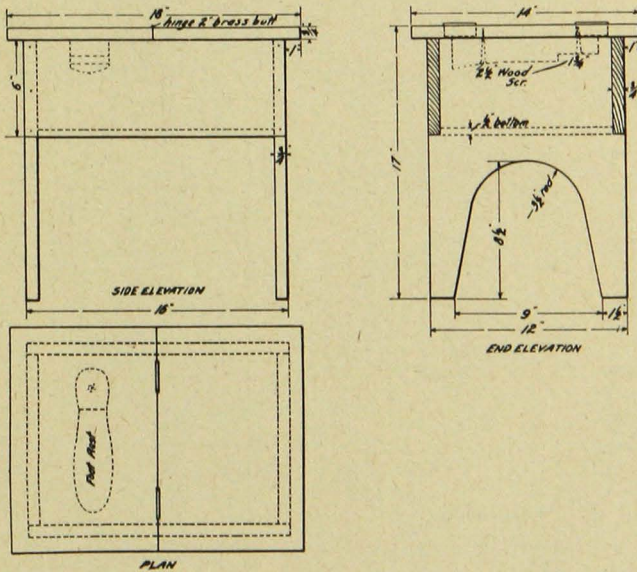
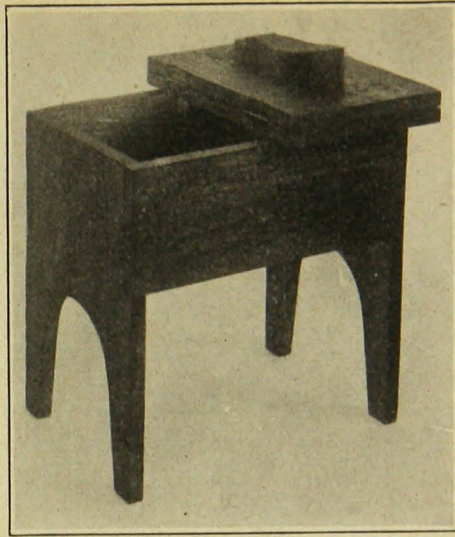


25. Library Table

To be finished with stain and wax, or filler and varnish

Material: Oak

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
4	3	3	28 ⁷ / ₈
2	7 ⁷ / ₈	5	21
2	7 ⁷ / ₈	5	39
2	7 ⁷ / ₈	3	21
6	7 ⁷ / ₈	2	13 ³ / ₈
1	7 ⁷ / ₈	10	39 ⁷ / ₈
1	1 ³ / ₈	30	48

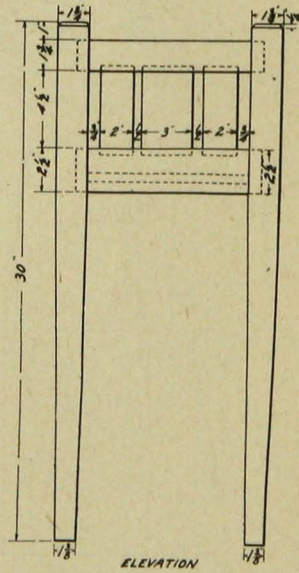
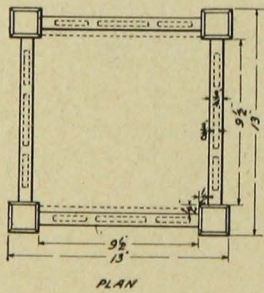
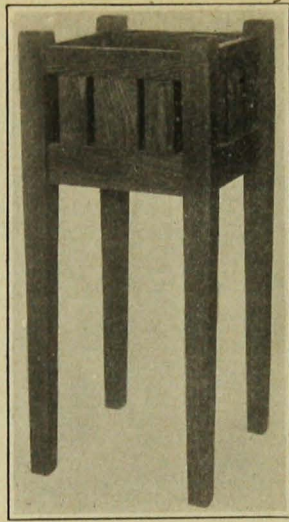


26. Blacking Stand

To be finished with stain and wax

Material: Pine with oak top

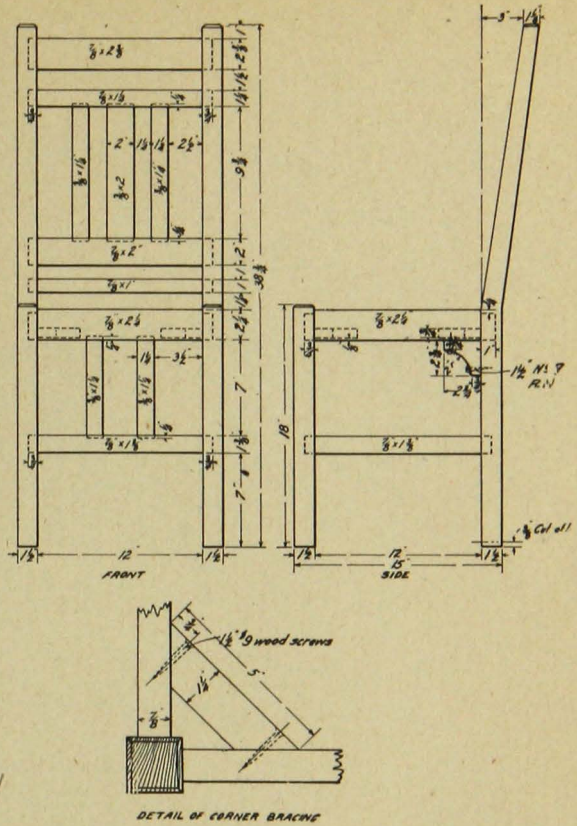
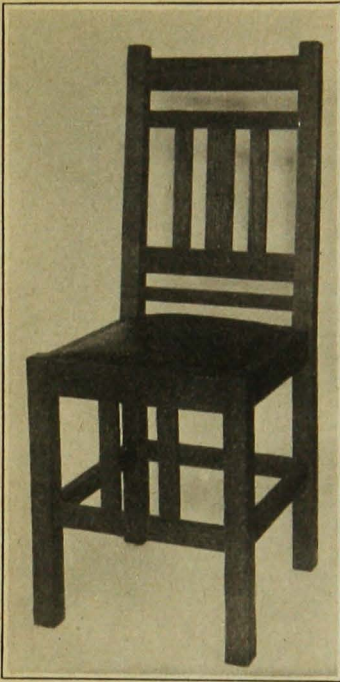
Pieces	Thickness	Width	Length
	Inches	Inches	Inches
2	$\frac{3}{4}$	12	$16\frac{1}{4}$
2	$\frac{3}{4}$	6	16
1	$\frac{1}{2}$	$10\frac{1}{2}$	$14\frac{1}{2}$
2 Oak	$\frac{3}{4}$	9	14



27. Workbasket

To be finished with stain and wax
Material: Ash

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
4	1 $\frac{3}{4}$	1 $\frac{3}{4}$	30
4	$\frac{3}{4}$	1 $\frac{3}{4}$	11 $\frac{1}{2}$
4	$\frac{3}{4}$	2 $\frac{1}{2}$	11 $\frac{1}{2}$
8	$\frac{3}{8}$	2	5
4	$\frac{3}{8}$	3	5
2	$\frac{3}{8}$	3 $\frac{1}{4}$	9 $\frac{1}{2}$
1	$\frac{3}{4}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$

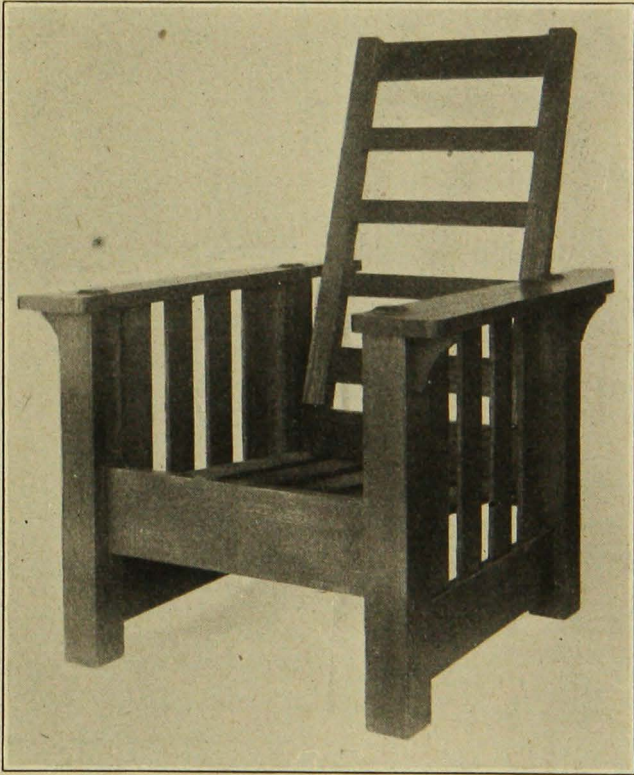


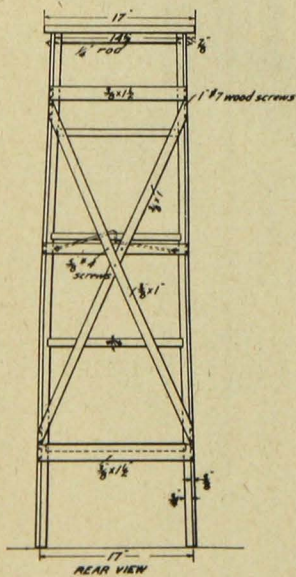
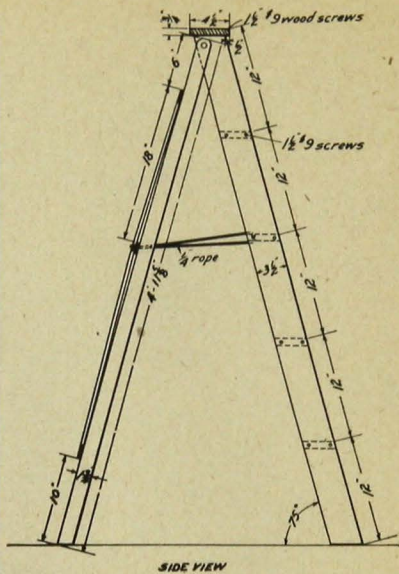
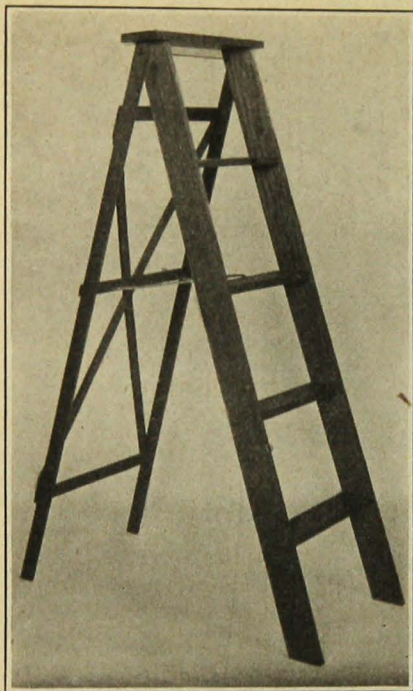
28. Chair

To be finished with stain and wax, or filler and varnish

Material: Oak

Pieces	Thickness	Width	Length
	Inches	Inches	Inches
1	1 1/2	5	39
2	1 1/2	1 1/2	18
2	2 1/4	2 1/4	13 3/4
2	2 1/4	2 1/4	13 1/2
4	1 3/8	1 3/8	13 1/2
1	1	1	13 1/2
1	2	2	13 1/2
1	1 1/4	1 1/4	13 1/2
1	2 3/8	2 3/8	13 1/2
4	1 1/4	1 1/4	5
2	2 3/4	2 3/4	2 3/4
2	1 1/4	1 1/4	10 1/4
2	1 1/4	1 1/4	7 1/2
1	2	2	10 1/4
1 Pine	2 3/4	12 3/4	12 3/4





30. Stepladder

To be finished with stain and wax

Material: Oak

Pieces	Thickness Inches	Width Inches	Length Inches
1	3/8	4	16 1/2
1	3/8	4	16
1	3/8	4	15 1/2
1	3/8	4	15
1	3/8	4 1/2	17
2	3/8	3 1/2	60
2	3/8	1 3/4	59 5/8
2	3/8	1	42
1	3/8	1 1/2	18
1	3/8	1 1/2	16
1	3/8	1 1/4	17

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ALLEN, E. G., Manual Training for Common Schools. Chas. Scribner's Sons, New York.....	\$1.00
BEATTIE, W. R., The Repair of Farm Equipment, Farmers' Bulletin 347. United States Department of Agriculture, Washington, D. C.....	Free
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GRIFFITH, I. S., Essentials of Woodworking. The Manual Arts Press, Peoria, Ill.....	1.25
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HICKS, I. P., Builders' Guide. David Williams Company, New York.....	1.00
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RITCHEY, S. E., Woodwork. The American Book Co., Chicago.....	1.45
SELDEN, F. H., Elementary Cabinetwork. Rand McNally & Co., Chicago...	1.00
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TATE, J. M., Training in Woodwork. Northwestern School Supply Co., Min- neapolis.....	.85
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