BULLETIN
OF THE
AGRICULTURAL AND MECHANICAL COLLEGE
OF TEXAS
(In cooperation with the United States Department of Agriculture)

OCTOBER, 1915

B-8

EXTENSION SERVICE
Bulletin B. 8
(Bulletin 6 Texas Engineering Experiment Station)

Household Conveniences and How to Make Them

BY

C. E. HANSON
Instructor in Mechanical Engineering, Collaborating With E. J. Fermier,
Professor of Mechanical Engineering

ADDRESS
CLARENCE OUSLEY
Director of Extension Service, College Station, Texas

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CONTENTS.

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HOUSEHOLD CONVENIENCES AND HOW TO MAKE THEM.

C. E. Hanson, Instructor in Mechanical Engineering, Collaborating with E. J. Fermier, Professor of Mechanical Engineering at the Agricultural and Mechanical College of Texas.

The household conveniences herein described are selected because they may be made with a small amount of work by almost anybody who has a few simple tools and the ability to use them. A second reason for their selection is the fact that their use yields a large return in comfort, economy, and sanitation.

The descriptions are the outgrowth of talks given by the author before meetings of the Home Demonstration Agents of Texas, where the lively interest shown demonstrated the demand for this bulletin.

WATER SUPPLY SYSTEMS.

In order to sustain human life, water is next in importance to air. A water system is a comfort, a great convenience and an essential aid to sanitation. It relieves the housewife of much of the drudgery of housekeeping.

The water systems here presented have been designed with a view of making them so simple and cheap that the most humble country home can afford one. If more complete water systems are desired, the reader is referred to Bulletin No. 57, U. S. Department of Agriculture, Washington, D. C.

The water system shown in Fig. 1, while very simple, affords a water supply and a convenient means of disposing of waste water through the kitchen sink. It is very desirable that the pump have a back outlet so that it may be connected up permanently with the water tank. The spout of the pump should have a valve, so that the only change that is necessary when it is desired to pump into the tank is to close the valve. If the pump does not have a back outlet, a garden hose running to the top of the tank may be attached to the spout each time it is necessary to fill the tank.

A vinegar barrel, or the equivalent, may be used for the tank. The top of the barrel should be left in place to serve as a cover. A hole is bored in the bottom of the tank so that when a 1″ x $\frac{3}{4}$″ bushing is screwed into it, and the other connections made, the tank will be water tight around the bushing. An elbow, a coupling, a bibb, and two short pieces of pipe of lengths to suit the positions chosen are necessary to conduct the water to the sink. Three pieces of pipe of suitable lengths, and two elbows will be needed to connect the pump and the tank. The sewer pipe should have a fall of about one foot in forty. The joints should be filled with Portland cement. The waste water need be conducted only a short distance from the house, where it may be used to irrigate a part of the garden.

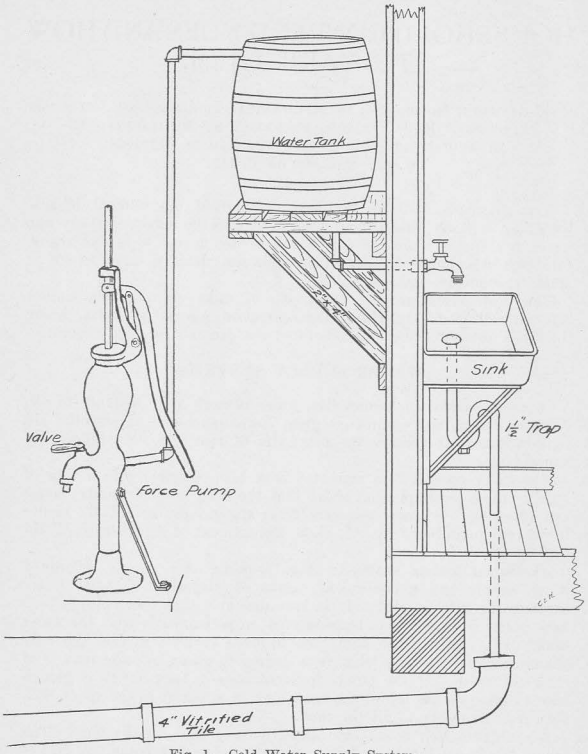


Fig. 1. Cold Water Supply System.

BILL OF MATERIAL FOR COLD WATER SUPPLY SYSTEM.

1 piece 2″ x 4″ x 12′ pine for platform 1 piece 1″ x 4″ x 10′ pine for platform	@ $25.00 per M	$ .30
1 50-gallon barrel for tank		1.00
3 ¾″ galvanized elbows 1 1″ x ¾″ galvanized bushing for tank 1 1¼″ x ¾″ galvanized bushing for pump 1 ¾″ galvanized coupling		.45

1 ¾″ compression hose bibb	.75
1 piece ¾″ galvanized pipe 3″ long 1 piece ¾″ galvanized pipe 12″ long 16 feet ¾″ galvanized pipe to connect pump to water tank, and tank to sink @ 5 cents	.90
1 18″ x 30″ cast iron sink, porcelain lined	3.00
1 pair brackets for the sink	.50
1 1½″ trap to fit the sink	1.00
3 feet 1½″ galvanized pipe at 12 cents	.36
50 feet of 4″ vitrified sewer pipe at 10 cents	5.00
1 force pump standard with cock spout, ¾″ hose coupling and back outlet	6.00
Cement for the sewer pipe	.25

If a force pump is already provided near the house, the other material for the water system may be purchased for about $13.00.

HOT AND COLD WATER SUPPLY SYSTEM.

The piping for the hot and cold water supply system as shown in Fig. 2 may be assembled by a plumber in town and then installed in the home by the owner. Two holes are bored in the top of the hot water boiler and one in the bottom for the bushings. The nipple that fits the bushing "A" should be threaded two or three inches on one end so that it will extend through the bushing and catch the coupling on the other side. These parts should be assembled before the bushing is screwed in place.

The base for the hot water boiler should be about 15 inches high. Set the boiler on this base. Next adjust the water front to its place in the stove and connect it with the boiler by means of piping and two unions. Fasten the hot and the cold water pipes to the wall by iron straps. Build a platform for the water tank at the desired height. Drive the spikes firmly into the studding. Set the water tank in place on the platform. Bore a hole through the wall large enough to admit the pipe from the tank. Connect the cold water pipe by means of the third union.

The water tank, pump and connections may be the same for this system as in Fig. 1. A large galvanized iron tank set on piles may be used. The conductor from the roof may be led to the tank so that the soft water will become a part of the supply. If a windmill is near the house, the tank should be connected with the windmill pump. If the house has an underground cistern, the soft water can be most conveniently and cheaply introduced into the kitchen by placing a pitcher-spout pump at one end of the sink and connecting the suction pipe with the cistern. The sink trap and sewer pipe are shown in side-view in Fig. 1.

BILL OF MATERIAL FOR HOT AND COLD WATER SUPPLY SYSTEM.

1 piece 2″ x 4″ x 18′ pine 1 piece 1″ x 4″ x 18′ pine	@ $25.00 per M....$. 45

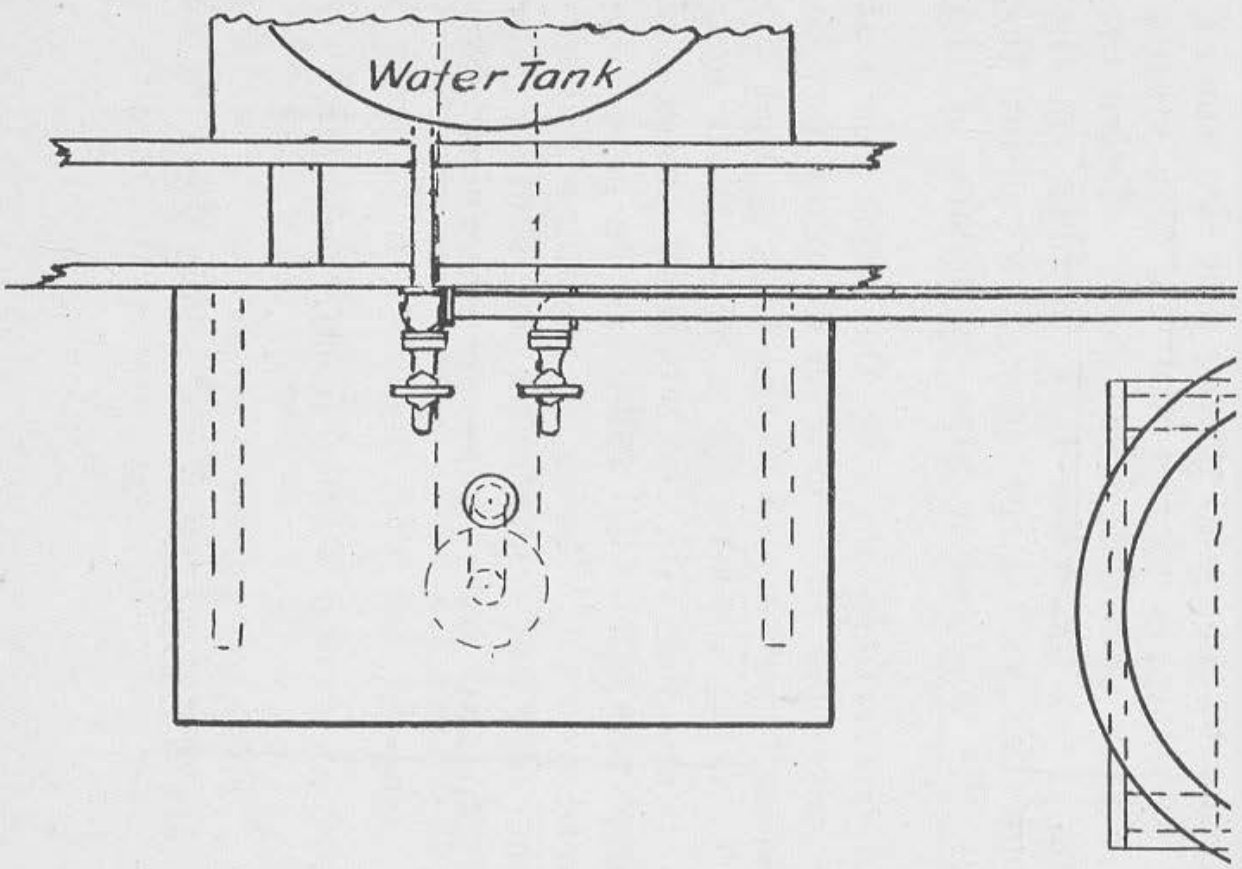
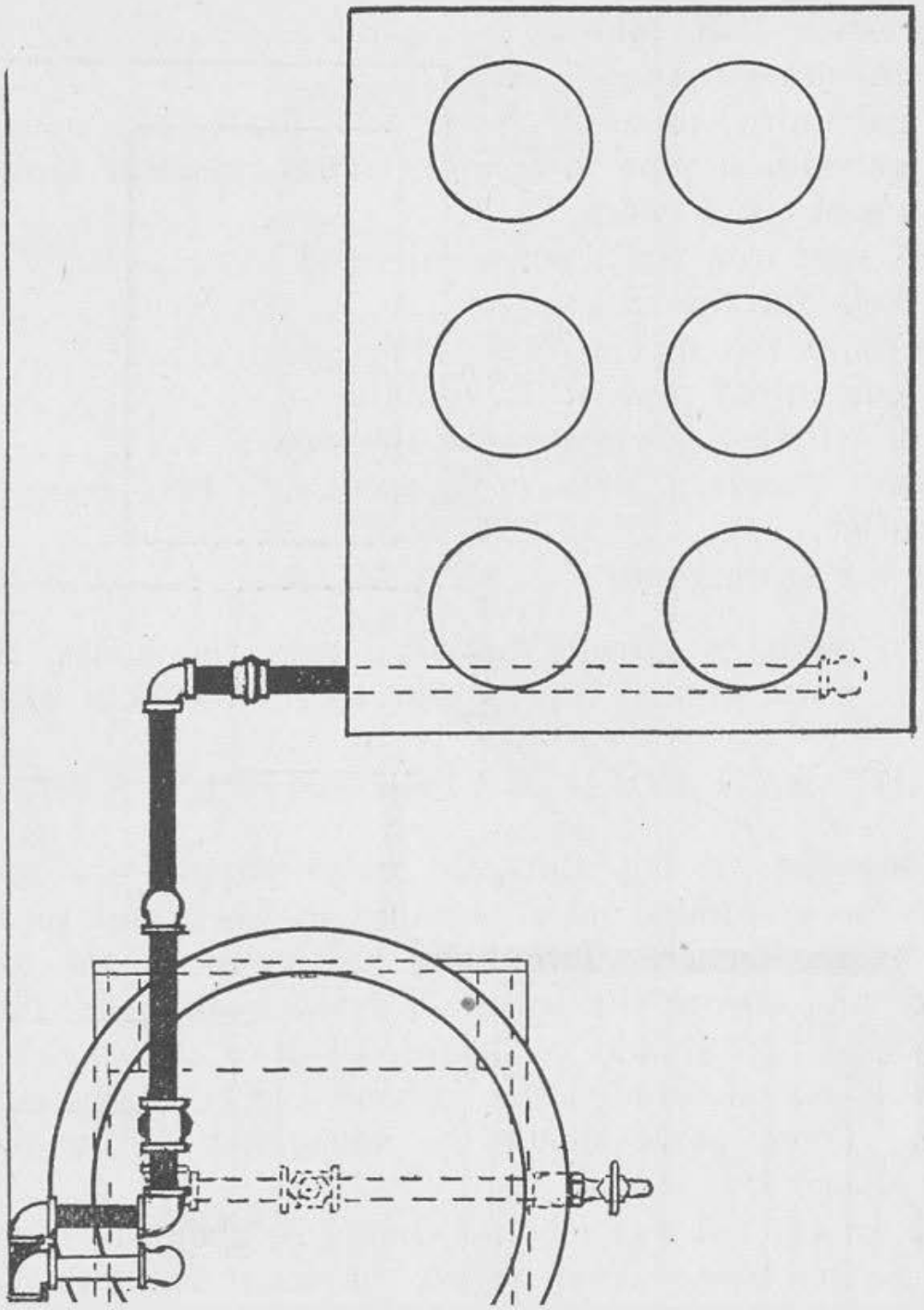


Fig. 2. Hot and



Cold Water Supply System.

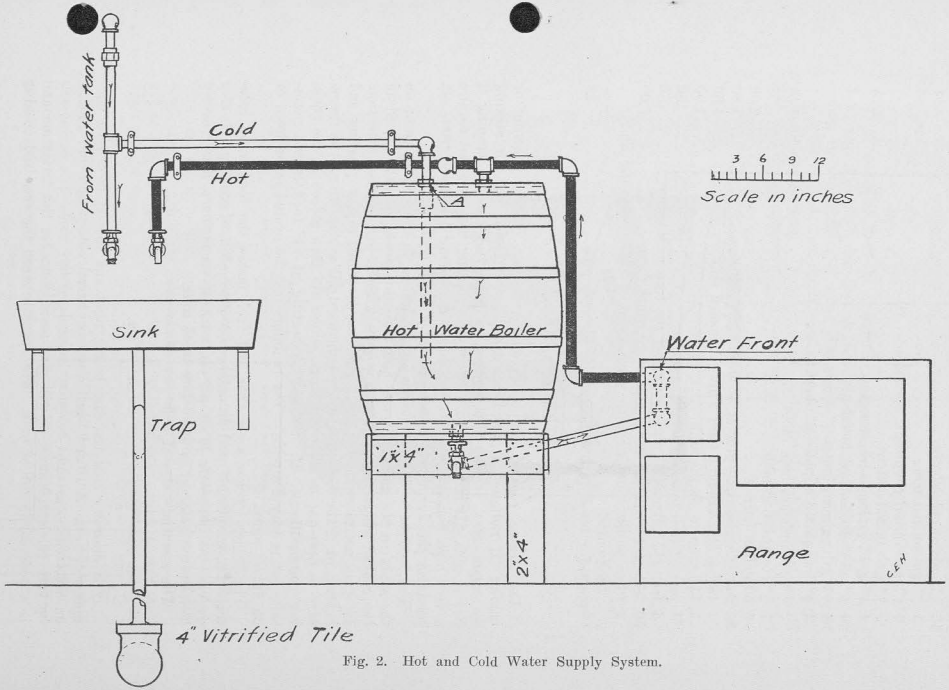


Fig. 2. Hot and Cold Water Supply System.

15 ¾″ galvanized elbows	
3 ¾″ galvanized tees	
2 ¾″ galvanized couplings	
3 ¾″ galvanized unions	
4 1″ x ¾″ galvanized bushings	..... 2.75
1 ¼″ x ¾″ galvanized bushing	
4 ¾″ galvanized nipples 3″ long	
4 ¾″ galvanized nipples 6″ long	
2 ¾″ compression hose bibbs	1.50
1 ¾″ compression bibb	.75
2 50-gallon barrels	2.00
36 feet ¾″ galvanized pipe at 5 cents	1.80
1 18″ x 30″ wrought steel white enameled sink	4.50
1 1½″ trap to fit the sink	1.00
1 pair of iron brackets for the sink	.50
4 feet 1½″ galvanized pipe to connect the trap with sewer	.36
50 feet of 4″ vitrified sewer pipe at 10 cents	5.00
1 force pump standard with valve spout, ¾″ hose coupling and back outlet	
Cement for sewer pipe and graphite for iron pipe	.25

FIRELESS COOKER.

The fireless cooker may be used for stewing, boiling, roasting or baking (if radiator is placed above and below food), and for making ice cream, etc. It may also be used for preserving food by keeping it hot or cold. It is particularly adapted to cooking that does not require a very high temperature but that does require long continued heat. It preserves the flavor better than any other method of cooking.

The food to be cooked should first be heated to the boiling point on the stove in the cooking vessel and then this vessel quickly placed in the cooker where the cooking continues without any further attention. If it is necessary to have a higher temperature, as for roasting and baking, or if the cooking is to be continued for a long time, it is necessary to heat one or more radiators, which are then placed in the cooking compartment. In this case preheating of the food is not necessary but is very desirable. The radiators may be heated in an oven or on an oil stove.

The fireless cooker saves time and fuel, makes the food more palatable and wholesome, and diminishes the discomfort of cooking. It also enables the housewife to do all the work of preparing a meal (except the serving) several hours before meal time.

The essential parts of a fireless cooker are:

A. *Case.*

It is desirable that the case be air tight and that it be a poor conductor of heat. A 10 or 20-gallon wooden barrel, a 45-pound tin lard can, an old trunk or a tight box may be used for the case. The barrel will be very efficient because it will give more room for the insulation and is a poor conductor of heat. The space between the case and cooking

compartment should be three or four inches. If it is desired to have two cooking compartments in the same case, the trunk or box should be used.

B. *Insulation.*

It is essential that the insulating material be a poor conductor of heat and it is desirable that it be a non-inflammable material. Wood ashes, in which there is some charcoal to prevent packing, is one of the most efficient non-conductors known and can be obtained without difficulty by anyone. It may be used as the insulating material around the cooking compartment. As insulating material for the cushion, use

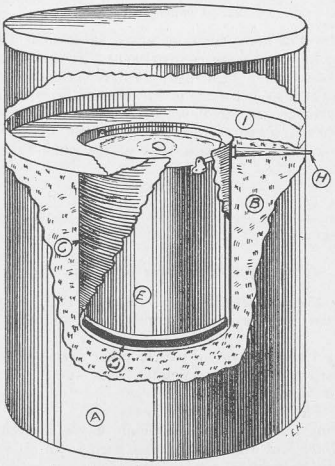


Fig. 3. Fireless Cooker from Lard Can.

hair-felt, woolen scraps, granulated cork, cotton, shredded newspaper, or any other good non-conductor of heat that will not soil the cushion. The insulating cushion should be about four inches thick and should press tightly against the sides of the case when the lid is closed. When not in use, it should be kept where it will dry out. Keep cooker open when not in use.

C. *Cooking Compartment.*

The cooking compartment should be just large enough to contain the cooking vessel or vessels and the radiators. It should be made of some material that will hold water and will not be injured by the hot radiators. It should have a tight-fitting cover. It should be vented

as shown at H in Fig. 3. If the cooking compartment is not vented, the insulating cushion will become wet and its efficiency as an insulator will be impaired. Without the vent, baking is impractical.

D. *Radiators.*

The radiators should be made of some material that will stand rough handling, and heating to high temperatures. The material should have a high specific heat and a high specific gravity. Soapstone is the best material for the radiators, but iron or concrete is satisfactory. As radiators, the following may be used (1) stove lids, (2) stone cut to shape, (3) concrete molded, as described later.

E. *Cooking Vessel.*

So that there will be as little air space as possible, the cooking vessel should just fit the cooking compartment. It may be any vessel having straight sides and a tight-fitting cover. Aluminum is to be preferred, because it does not rust, is durable and is easily cleaned. It is now possible to purchase triple cooker vessels, so shaped as to fit together in the cooking compartment with no lost space, thus making it possible to cook three foods separately at the same time.

F. *Hooks.*

Hooks for handling the hot radiators and cooking vessel may be made from heavy wire.

Material for the Cooker Shown in Fig. 3.

A. *Case,* a 45-pound tin lard can, diameter 12½", height 18".
B. *Insulation,* wood ashes thoroughly dried, or other non-conductor of heat.
C. *Cooking Compartment,* a pail or other vessel with straight sides.
D. *Radiator,* stove lids or concrete disk.
E. *Cooking Vessel.*
F. *Hooks,* bent into shape from heavy wire.
G. *Insulating Cushion,* made of closely woven undyed cloth.
H. *Vent Tube,* any tight metal tube, such as an oil can spout.
I. *Cover for Insulation,* made from a lard can cover.

Directions.

Take an extra lard can cover and with a mallet crimp it over an iron wheel, or other round object, used as an anvil, so as to decrease the diameter until it will fit loosely inside the lard can. Then cut out a hole in the center so that it will just slide over the cooking compartment vessel. With a nail puncture the cooking compartment vessel about one inch from the top, solder the oil can spout over this hole. Be careful to make it water tight. Hold the compartment in the case, four inches from the bottom, and locate the position where the spout is to go through the side of the case. Puncture a hole just large enough for the small end of the spout to go through.

Place ashes in the case A to a depth of four inches, then place the cooking compartment in position and pour the ashes around it loosely to the top. Solder the cover I in place to the top of the cooking compartment and to the sides of the case. It is essential that this be well done so that the ashes will not become wet from any water that is spilled in the cooker or from the steam that is condensed. Solder also where the vent tube projects through the case. Make a round cushion or pad thick enough to fill the space above the cooking compartment and a little larger in diameter than the inside of the can so that when the lid is pushed in place the space will be completely filled. The space above the cooking compartment should be at least four inches.

Fill the cushion with hair-felt, pieces of woolen cloth or other non-conducting material until it will fit snugly in place. Then sew up the cushion.

The radiators may be made of concrete or may be hewn to the proper size from an ordinary stone. If made of concrete, a mold should be used which is about 1¼ inches deep, and a little smaller in diameter than the diameter of the cooking compartment. A flat cover for a tin pail, a board 1¼″ thick, with a circle cut in it or even a circle made in the ground may be used as a mold for the disk. Fill the mold with a good concrete and trowel the top smooth. Bend a heavy wire into the shape of a U and then bend the ends outward at right angles. Push this wire into the center of the concrete disk until the eye is flush with the top. Remove enough of the concrete from around the eye so that the wire hook may be inserted. If desired, a piece of poultry netting or separate wires to serve as reinforcing may be put in the mold when making the concrete radiator.

EVAPORATION COOLER.

This cooler may be used to cool or preserve butter, milk, drinking water, meat, the food from one meal to another—in fact, anything that ordinarily would be put into a refrigerator. With a proper regard for convenience, the cooler should be located in a good breeze where the evaporation will be greatest. It is very easily made at a cost of but a few cents; it costs nothing to operate; the food is protected from the dust by the cloth, and this makes it sanitary; it avoids many tiresome trips to the cellar and preserves food that otherwise would spoil.

It would be well to have one cooler for the butter and milk, and another for other foods, as butter and milk readily absorb odors from other foods.

Material.

The material to be provided consists of the following:

(1) 1 piece 1″ x 12″ x 18″; clear pine, for the frame.
(2) 2 tin lard can covers, 12½″ in diameter, for the pans.
(3) 1 glass fruit jar, for the water supply vessel.
(4) 1 block of wood ½″ x 3″ x 5″, upon which the jar rests.
(5) 8 screws 1½″, No. 12.
(6) 1 piece of thick undyed cloth 24″ x 44″, linen preferred.

Directions for making the cooler illustrated on this page:

Saw and plane to dimensions 4 pieces $\frac{7}{8}$" x $\frac{7}{8}$" x 18" for the legs or standards, and two pieces $\frac{7}{8}$" x 8" x 8" for the shelves. Fasten the frame together with screws as shown in the drawing and as explained under the fly trap, page 19. The frame may be painted, varnished or enameled as desired. The block of wood should be at least one-eighth of an inch thinner than the depth of the upper pan.

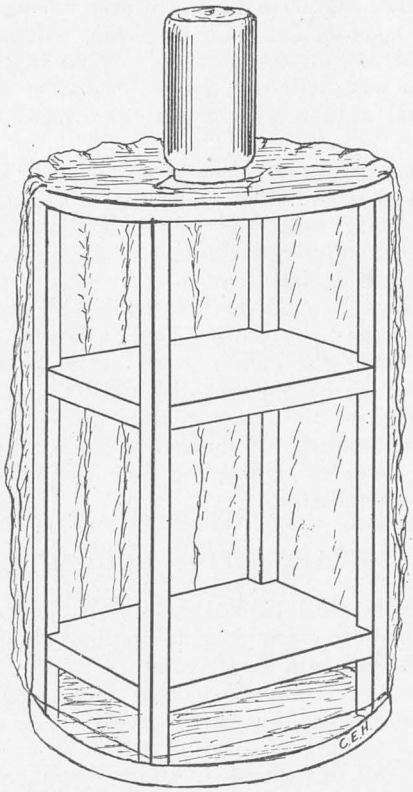


Fig. 4. Evaporation Cooler.

The cloth should be carefully hemmed along the 24-inch edges if these are not selvaged. The long edges should be cased deep enough to make the width of the cloth about 20 inches. Cords should be run in each of these casings and so tied that the distance around is a little less than the circumference of the pans. Instead of the cords in the casing it is very satisfactory to use rings bent up from galvanized wire size No. 9 or heavier. These rings will hold the cased edges of the cloth in the water pans. If the cords are used, the upper casing of the cloth should be weighted to hold it in place in the upper pan.

In the illustration, Fig. 4, the cloth is shown pushed back to show the construction better, but in operation the cloth should completely encircle the frame and the cased edges must be in the pans so as to be kept wet.

If this cooler is too small, make one of a size to meet your needs. For a large sized cooler make the shelves 1″ x 12″ x 2′, the legs 1″ x 2″ x 3½′. A tub or a specially made pan may be used for the bottom vessel. If the upper pan is smaller than the shelves, it will be necessary to nail two narrow boards diagonally across the top of the legs. These boards should be halved at the middle, making a smooth lap joint so as to support the top pan in a level position. The water supply vessel may be a glass fruit jar, a milk bottle or even a tin can. A transparent vessel is to be preferred, as it shows when it needs refilling. It should be large enough so as not to require too frequent refilling.

Operation.

Place the cooler in a shady place and where it will be in a strong breeze. The drier the air and the stronger the breeze, the greater will be the evaporation and the lower the temperature in the cooler. A high cooler with narrow shelves gives more evaporation surface. Under very favorable conditions the temperature in the cooler may be as low as 55° F. when the outside temperature is 100° F.

Pull the cloth together so that it will encircle the cooler completely. Pour a little water into the lower pan and enough into the upper to raise the level of the water to within one-fourth of an inch of overflowing. Fill the jar with water, place the wooden block over the mouth of it, invert quickly and set both together into the upper pan. Slide the jar on the block until a small part of the mouth of the jar projects over the edge of the block. The water will then be fed into the pan automatically and kept at a constant level in the pan. The water should not run down the cloth. The cloth should be of heavy linen. It is necessary that the cloth be thick and have a high degree of capillarity, so that it will keep itself moist when the evaporation is rapid. The cloth is moistened by capillarity from both pans.

The water should be changed every day, the cloth washed frequently, and the frame scalded and scrubbed occasionally.

THE COLD BOX.

A cold box is used for refrigeration purposes during cold weather. It is very easily and cheaply made, costs nothing to operate, and if there is a suitable window for it in the kitchen, it is more convenient than a refrigerator. Food placed in this box should be covered so as to protect it from dust.

Procure a 1″ x 12″ board long enough to make the entire box. With a plane straigthen and smooth both edges of the board and make them parallel. Saw off two pieces "A" for the sides of the box. These pieces should be long enough to reach from the outside window sill to the middle of the meeting rail of the upper sash. Saw off two pieces "B" for the top and the bottom of the box. Try these four pieces in assembled position in the window frame. The sides of the box must fit snugly between the outside stops. Nail the four pieces together with 8 d. nails. Saw off pieces "C" for the number of shelves desired. They should be ⅛″ shorter than the top and bottom boards so as to slide easily

in place. Saw out two 1″ x 1″ x 12″ cleats for each shelf. Nail these cleats to the sides of the box for the shelves to rest on.

Cut the wire screen to fit the back of the box. Tack it to "A" and "B" but not to the shelves. Place the box in position in the window casing with the screen to the outside. The front side of the box should be flush with the inside of the outside window stop so that the upper

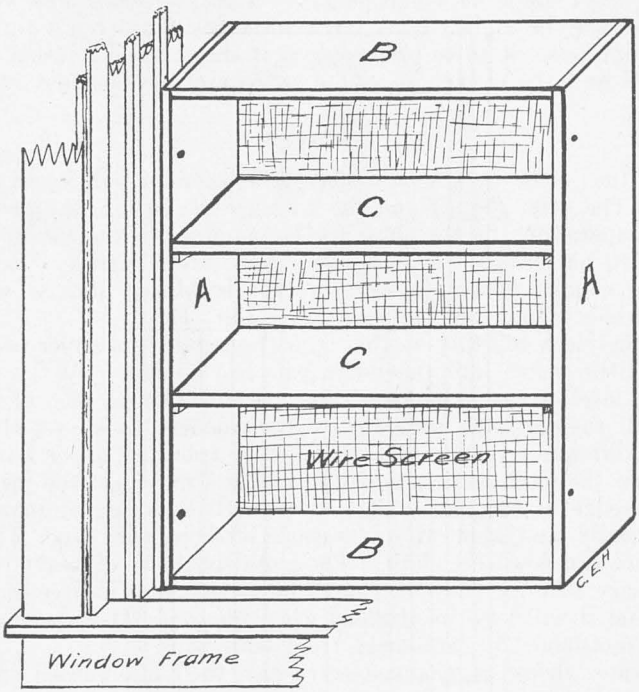


Fig. 5. Cold Box.

sash may be lowered if desired when the box is in use. Fasten the box to the frame or casing by a screw or a nail near the top and bottom of each side. If nails are used, they should not be driven clear in so that they may be removed when it is desired to remove the box. The lower sash forms the front of the box, and when it is closed the box should be fly-proof.

FLY TRAPS AND SCREENS.

DANGEROUS CHARACTER OF THE FLY.

The common house fly is not only an annoyance but a dangerous agent in the transmission of infectious diseases, such as typhoid fever, consumption, cholera and the pink eye. The flies transmit the disease germs by coming in contact with the food people eat, or the vessels and dishes that contain the food. It is therefore necessary to protect food intended for human consumption and to use all means possible to exterminate the fly.

Public school teachers, home demonstration agents, and other public officers should make it a point to disseminate knowledge as to the dangerous character of the fly, and as to the methods of prevention herein set forth. The attempt should be made to secure a united campaign against the fly. Farmers and others keeping stock should be encouraged to destroy all places where flies breed. Housewives should employ the means necessary to protect the food. Doctors and other officers of

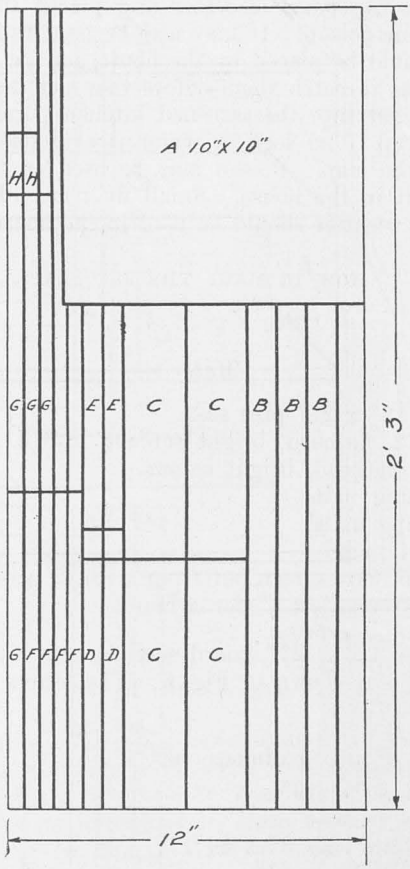


Fig. 6. Lay-out for Cutting Stock for Flytrap.

health should encourage the use of some form of sanitary closet. See page 22, Farmers' Bulletin No. 463, U. S. Department of Agriculture.

PREVENTION.

Flies breed in any fermenting organic matter, and especially in horse manure, requiring less than two weeks from the laying of the egg to the developing of the fly. The stables should be cleaned out thoroughly at least once a week so that the undeveloped flies will die. Other organic matter in which flies breed should be properly disposed of.

TRAPPING AND POISONING.

Flies should be trapped or poisoned before they lay any eggs. For this reason, fly traps should be used in the barns. The traps should be baited with something that will attract the flies. Water or milk sweetened with sugar, and a little vinegar added, makes a good bait. The fly trap should be emptied, cleaned and scalded every day. Formalin, diluted with five parts of water and placed in some small vessel makes an excellent poison. It may also be used as a bait for the trap. Another trap should be placed by the house, on the side where the flies usually stay, so as to catch them before they get into the house.

The flies that get into the screened kitchen porch can nearly all be caught with a trap if no food or water is available except that which is used to bait the trap. Poison may be used on the porch, but it is not safe to use it in the house. Small fly traps (Fig. 10), tanglefoot paper and the fly swatter should be used in the house when necessary.

HOW TO MAKE THE FLY TRAPS.

See Figs. 6, 7, 8, 9.

Material.

1 piece 1″ x 12″ x 27″ pine s2s.
16 1½″, No. 12, flathead, bright screws, or 8 d. nails.
4 1″, No. 8, flathead, bright screws.
8 6 d. finishing nails.
24 2 d. finishing nails.
30 8-oz. carpet tacks.
1 piece 1′ x 5′ wire screen cut from a roll 2′ wide.
1 piece of leather 1″ x 4″ for a handle.

From the 1″ x 12″ x 27″ board saw out the bill of stock as given below and in the way shown in Fig. 6. The letters in the bill of stock refer also to Fig. 6.

Bill of stock. Finished dimensions.

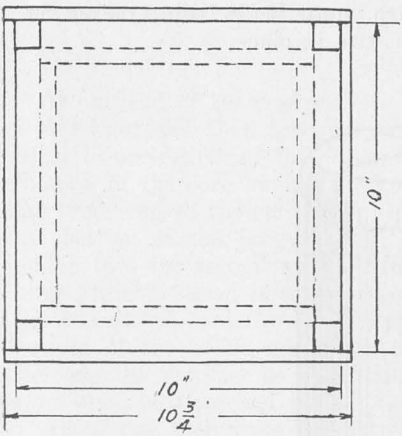
A 1 top ⅞″ x 10″ x 10″.
B 4 legs ⅞″ x ⅞″ x 15″.
C 4 bottom rails ⅝″ x 2″ x 8¼″.
D 2 strips ½″ x ⅝″ x 8¼″.
E 2 strips ½″ x ⅝″ x 7¼″.
F 4 strips ⅜″ x ⅝″ x 10¾″.
G 4 strips ⅜″ x ⅝″ x 10″.
H 2 pieces ⅜″ x ⅞″ x 2″.

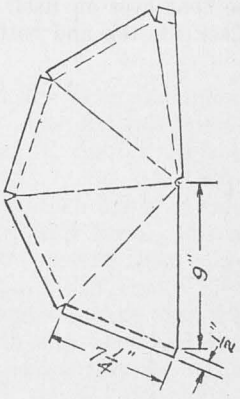
Directions.

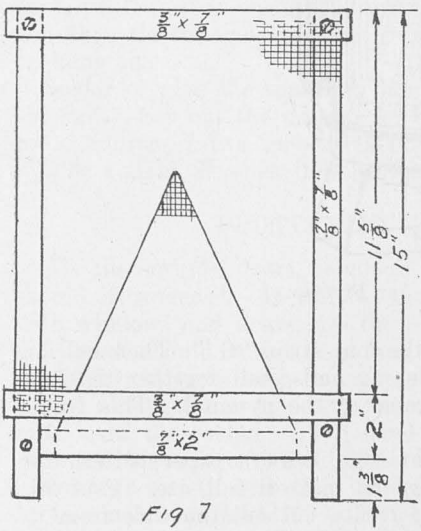
Smooth the edge of the board with a few strokes of the plane each time a piece is ripped off.

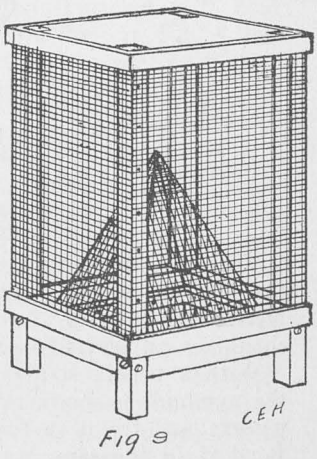
Smooth the legs and top, if necessary, with the plane. Saw out a notch in each corner of the top to fit the legs. If nails are used, drive

nails through the legs into the top and also into the bottom rails. Screws are to be preferred, as they make the trap much more substantial. If screws are used, bore a $\frac{1}{4}$" hole in the center and 7-16" from the top of each leg. Place the leg in assembled position in the notch in the top and with a $\frac{1}{8}$" gimlet, and the $\frac{1}{4}$" hole in the leg as a guide, bore a hole into the top "A" for the threaded part of the screw. Do









Figs. 7, 8, 9. Flytrap.

the same with the other legs. With a pencil, mark the position of the rails "C" on the legs. Through each leg bore three $\frac{1}{4}$" holes for the screws, as shown on the drawing (Fig. 7). Countersink all the holes bored in the legs for the screws. Drive the four screws fastening the

legs to the top. Hold the rails "C" in turn in assembled position against the legs and with a $\frac{1}{8}$" gimlet bore the holes for the threaded part of the screws. Drive the screw as each hole is bored.

With the tin snips or a pair of old scissors, cut out a piece of wire screen 1′ x $3\frac{1}{2}$′. Tack one end of it in place to one of the legs with a few carpet tacks. Wrap the wire screen around the trap, stretching it, and tack the other end to the same leg. The end of the wire should be bent over on itself to cover the sharp points before being tacked on. Tack the top and bottom of the screen wire in place.

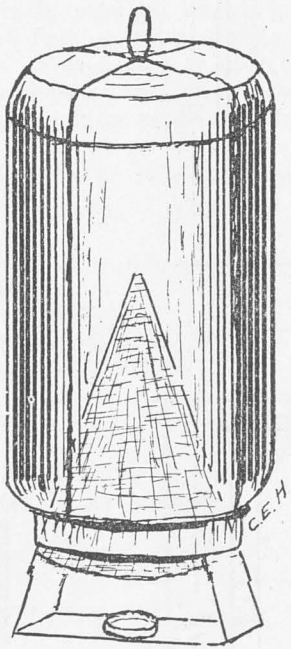


Fig. 10. Fruit Jar Flytrap.

With 2 d. finishing nails, nail on the four strips "G." Then nail on the four strips "F." With 6 d. finishing nails, nail together the four pieces "D" and "E" for the base frame of the pyramid. This frame should be an easy fit in the trap.

With a pencil, string, and straight edge, draw a paper pattern for the pyramid, as shown in the drawing, but make it full size. Fold this pattern and try it in the frame. If it fits, cut out the wire from it. Bend it in the same way and tack to the inside of the frame. Sew the lap together with a strand of wire. Cut off the apex of the pyramid, making a hole about the size of a pencil, through which the flies may pass into the trap.

Fasten each of the two "H" pieces to opposite rails with a small screw. These pieces are to be turned so as to hold the pyramid in place or allow it to be removed.

Fly trap shown in Fig. 10.

Material.

A 1 one-quart fruit jar.
B 1 strong cord or broom wire about 3 feet long.
C 1 fruit jar clamp or a piece of pasteboard.
D 1 small tin box or tin bottle stopper.
E 1 piece of wire screen 5″ x 10″.

Directions.

At one end of the cord make a simple knot. At the same end make a slip knot and then make three other slip knots at a distance apart, equal to one-fourth of the circumference of the neck of the jar. Place the end of the cord having the knots around the neck of the jar. Slip the other end of the cord through the first slip knot, then bring it over the bottom of the jar and down through the third slip knot. Put a match into the second and the fourth slip knots to prevent them slipping while the cord is tightened and tied to the third slip knot. Slip the end of the cord through the second slip knot and tie, then over the bottom of the bottle and down through the fourth slip knot and tie. Remove the matches as the string is slipped through the knots. The cord must be stretched tight. Cut the cord.

About one inch from the bottom wrap a cord around the jar, tying it to each cord that it crosses so as to hold them in place. With a third cord, tie the cords together where they cross on the bottom of the jar, and then tie the ends together to form a loop by which the trap may be hung up.

Solder or glue the small tin box to the clamp. This box is to hold the bait. Lay out the pattern for the cone, as was done in Fig. 8, but use a radius of five inches. Make the cone a little large, so that it will be a tight fit when it is held in place by the clamp.

PROTECTION BY SCREENING.

All the outside doors, windows, and kitchen porches of the house should be screened. It will be economy to buy the screen doors. For both windows and doors, use the galvanized or copperized wire screen. The mesh should be not less than sixteen (that is, sixteen strands to the inch), so as to keep out mosquitoes and other small insects.

The cheapest way to screen the windows is to tack the screen to the outside of the casing. Thin window strips should be nailed over the edges of the screen to hold it securely against the casing. The most convenient way to screen the windows is to make a frame from one-inch by two-inch material to fit in the casing and to cover both sashes. This material may be purchased at the lumber yards at a cost of about 1 or 2 cents per linear foot.

HOW TO MAKE WINDOW SCREEN FRAMES.

Material.

A 2 window screen hangers with screws to match and screw-eyes and hook for each screen. Cost about 10 cents.

B 1″ x 2″ cypress, redwood, or pine, in lengths that will give as little waste as possible.

C Window screen molding to cover the head of the tacks and give a finished appearance.

D Wire screen, 16 mesh, of a width that no trimming will be necessary.

E 10 d. finishing nails; 12 for each frame.

F 2 d. finishing nails for the strips; one for each foot of length.

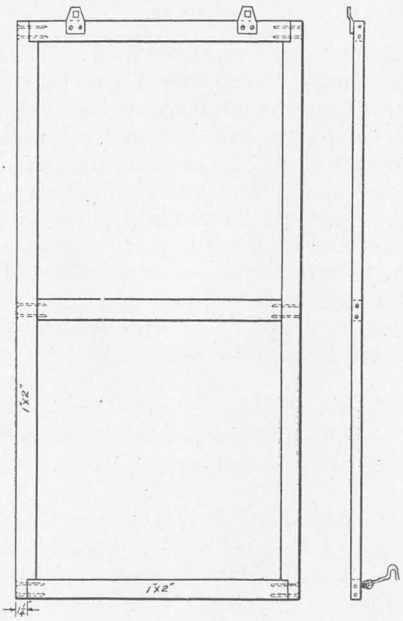


Fig. 11. Window Screen Frame.

Directions.

Saw off two pieces for each window of the 1″ x 2″ material ¼″ shorter than the length of the outside stop for the sides. Saw out the notches in these pieces as shown in Fig. 11. Saw off the pieces for the top and bottom just long enough that when they are nailed in place there will be ¼″ play between the sides of the frame and the window casing. See that the frame is square when these pieces are nailed together. Saw off the pieces for the middle of the frame and nail in place. Paint the frames before nailing on the screen. Tack one end of the screen wire to the frame. Place a 2 x 4 under one end of the frame and bend the frame slightly while the other end of the wire screen is being tacked to the frame. This will stretch the screen. Tack the sides of the screen in place and nail on the molding, mitering it at the corners.

Lay out the position of the hangers, using the same measure for each frame. Fasten the hangers to the frame with screws. Place the frame in position in the window casing, raising it about ¼″ by pushing a

wedge under the bottom. Fasten the other part of the hanger to the window casing with screws. Fasten the wire hook to the inside of the bottom of the frame. Pull the frame up against the stop and fasten the screw-eye to the casing.

These frames can easily be opened to drive out flies or to clean the windows and can be removed or replaced without removing the hangers. The frames should bear tight against all three of the outside stops. White mosquito bar can be purchased very cheaply and may be used as a temporary substitute for wire screen. It should last one season.

IRONING BOARD.

The ironing board shown in Fig. 12 should be fastened to the wall at the place where it will be the most convenient and at the height that will suit the person who is to use it. It may easily be lowered into position for use or folded up out of the way when it is not wanted.

Bill of Material.

1 1″ x 14″ x 5′ s2s clear pine.
1 1″ x 10″ x 5′ s2s clear pine.
3 3″ plain steel butt hinges.
2½ doz. 1½″, No. 12, flathead screws.

The above material will cost about 50 cents. From this material you should cut the bill of stock according to the directions which follow.

Bill of Stock.

A 1 board 1″ x 14″ x 5′.
B 1 wall strip 1″ x 4″ x 14″.
C 1 board strip 1″ x 4″ x 10″.
D 1 brace 1″ x 5″ x 4′.
E 1 brace support 1″ x 4″ x 10″.
F 1 piece 1″ x 2″ x 4″.
G 1 piece 1″ x 2″ x 4″.

Select the best side of the board "A" and smooth it with the plane for the top. With a radius of 4½″ lay out the semi-circle at the middle of one end of the board. If you do not have a compass, use a string and pencil. If necessary, plane or saw the other end of the board to make it square with one edge. Make a mark, on each edge, two feet from this end. Draw a straight mark from each of these lines, tangent to the semi-circle. Remove the stock with the rip saw and the compass saw and smooth the edges with the plane.

From the other board saw out the other pieces in the bill of stock to the dimensions given on the drawing. Smooth all the edges with the plane. Fasten "B" to "A" with two 3″ butt hinges. Bore three ¼″ holes through "C." With three screws, fasten "C" to the bottom side of "A" at a distance of 2′ 10″ from "B". Make the holes for the threaded part of the screws with a 5-32″ gimlet. Fasten "D" to "C" with a 3″ butt hinge. Through "B" bore three ¼″ holes. With three

screws fasten "B" to the wall at the height and place where the board will be most convenient. Bore three $\frac{1}{4}$" holes through "E." With three screws fasten "E" to the wall directly below "B" at such a distance that the board "A" will be level when the brace "D" is in position.

Bore two $\frac{1}{4}$" holes through "F" and one $\frac{1}{4}$" hole through "G." Fold the board "A" up against the wall and fasten "F" to the wall just to one side of "A," about two feet above "B." With one screw, fasten "G" to "F," so that the board will be held securely when "G" is turned.

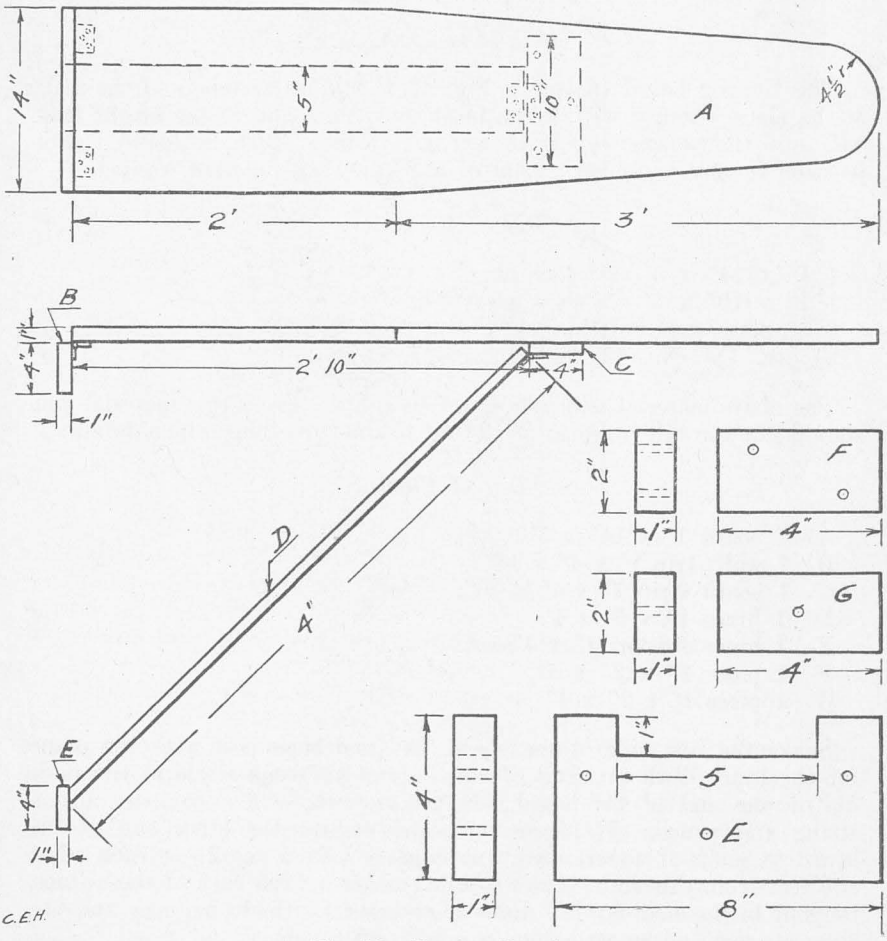


Fig. 12. Ironing Board.

KITCHEN WALL CABINET.

The factory-made kitchen cabinet is such a great boon to the housekeeper that, if possible, she should secure one, simple or elaborate as she may be able to afford. If a factory-made cabinet is out of the question, the wall cabinet here described will be found very satisfactory.

This cabinet is to be fastened to the wall at any desired height above the kitchen table and convenient to it.

Material. Nominal dimensions.

It will be necessary to secure the following material:

(1) 1 board 1″ x 12″ x 18′ clear pine.
(2) 2 boards 1″ x 4″ x 12′ clear pine.
(3) 1 board ⅜″ x 12″ x 6′ clear poplar, cypress, or similar wood.
(4) 1 piece ¾″ quarter round, 12′ long.
(5) 2 pair 3″ x 2″ surface hinges with screws to match.
(6) 1 cupboard catch.
(7) 1 elbow catch.
(8) A number of 8 d. and 6 d. finishing nails.
(9) Finishing material as desired.

Bill of Stock.

A 2 pieces ⅞″ x 12″ x 35″.
B 4 pieces ⅞″ x 12″ x 36″.
C 2 pieces ⅞″ x 2½″ x 34″.
D 2 pieces ⅞″ x 3″ x 33″.
E 2 pieces ⅞″ x 3¼″ x 33″.
F 4 pieces ⅞″ x 3″ x 16⅜″.
G 2 pieces ⅞″ x ½″ x 32¾″.
H 2 panels ⅜″ x 11⅜″ x 28″.
I 2 strips ⅞″ x 1½″ x 34″.

Directions.

With a plane, smooth, straigthen and make parallel the two edges of the 1″ x 12″ x 18′ board. Saw off the two "A" pieces for the sides and the four "B" pieces for the shelves, being careful to get the ends of all pieces square with edges and faces. Smooth both faces of these pieces with a plane. Nail them together with 8 d. finishing nails, spacing the shelves as shown in the drawing.

From the 1″ x 4″ x 12′ pieces saw and plane to dimensions the "C," "D," "E," "F," "G" and "I" pieces as given in the bill of stock. Nail the "C" pieces in place, nailing to the shelves as well as to the sides. Be sure that the cabinet is held square while these pieces are being nailed. Nail the "G" pieces in place.

With a ⅜″ bit in the plow plane, cut the grooves in the "D," "E" and "F" pieces 9-16″ deep, for the panels. Plow the grooves the whole length of the pieces. Lay out and cut the mortises in the "D" and "E" pieces, using the ¼″ auger and ¼″ chisel. Lay out and, with the saw and 1″ chisel, cut the tenons in the "F" pieces to fit tightly into the corresponding mortises.

Assemble the doors and after everything is properly fitted and the doors are square, take apart and apply furniture or Le Page's glue to the mortises and tenons but not to the panels. Assemble the doors quickly and clamp so tight that the glue oozes out. (Clamps may easily be made by nailing two-by-fours parallel on a floor or wall and far enough apart so that the door parts can be placed between them and

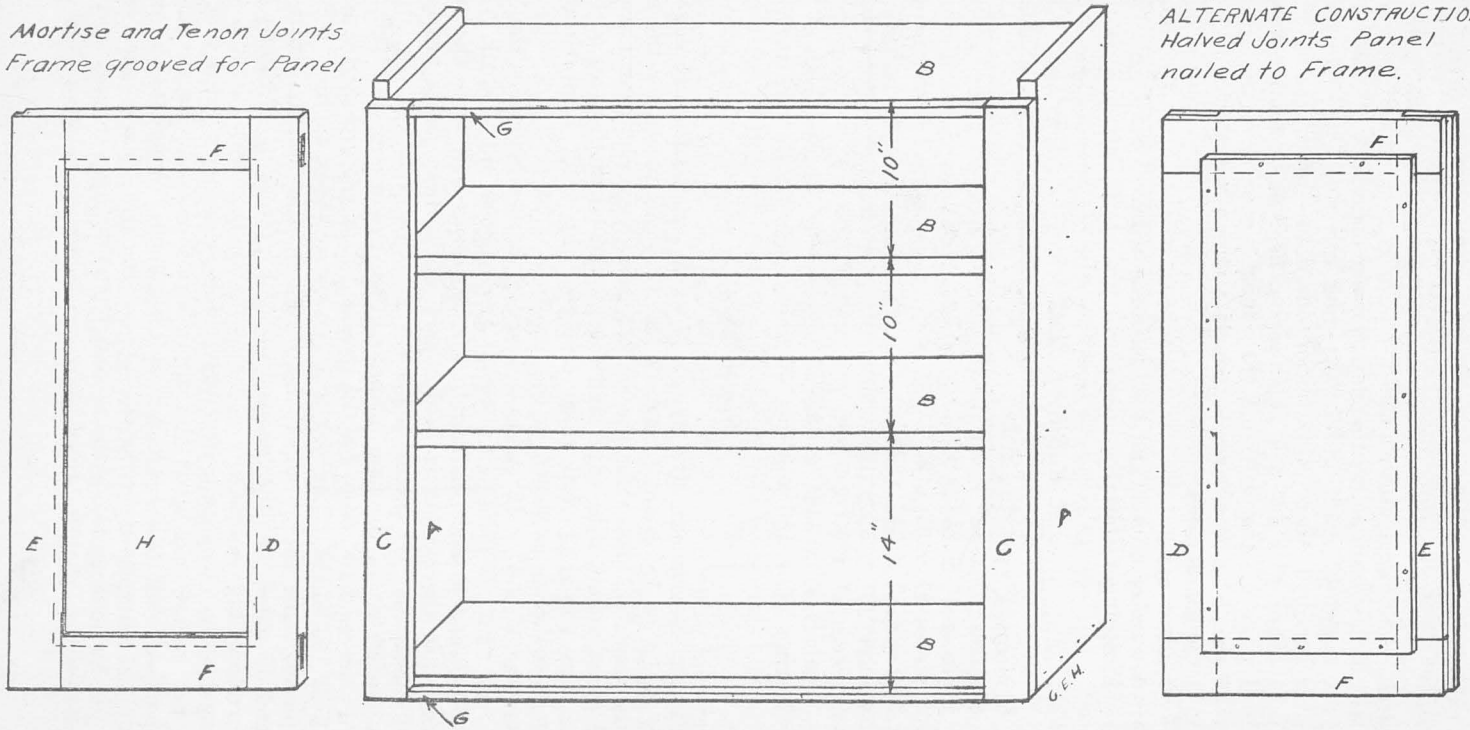


Fig. 13. Kitchen Wall Cabinet.

be forced together by driving wooden wedges between the two-by-fours and the door parts.) Wipe off all surplus glue with a cloth dampened with hot water. Be sure that the doors are kept square as the clamps are applied. Leave them in the clamps for one day. After the clamps are removed, smooth both sides of the stiles and rails with the plane.

Fit the doors in place. One the outside of the meeting stile of the left door cut a rabbet about ½″ wide and as deep as one-half the thickness of the stile. The width of the rabbet should be determined by trying the doors in place. Hang the left door, placing the hinges about 3½″ from the top and bottom of the door. In the meeting stile of the right-hand door cut a rabbet the same size as was cut in the stile of the left-hand door, but cut it on the opposite face. When the right-hand door is properly fitted, it should be hung as the left door was.

Fasten the elbow catch to the meeting stile of the left door so that it will catch on the first shelf above the bottom. Fasten the cupboard catch to the meeting stiles at a height where it can easily be reached when the cabinet is in place.

Attached near the bottom of the left door a small shelf may be made to hold the spice, tea and coffee canisters. Metal containers for sugar, etc., may be purchased and attached to the lower part of the right door.

Fit the cabinet to the place on the wall where it is to be fastened. On the under side and 1-16″ from the back of the two middle shelves nail or screw the "I" strips each ⅞″ x 1½″ x 34″.

The cabinet should now be painted all over at least two coats of lead white or zinc white and one coat of white enamel. Be sure that each coat is dry before the following one is put on. The curved portion of the quarter-round (item 4) should be similarly painted.

After the paint is thoroughly dry the cabinet should be fastened to the wall by nails or 1½″, No. 12, screws through pieces "I." The wall forms the back of the cabinet and should be papered or painted before the cabinet is put up. Using 6 d. finishing pails, fasten the painted quarter-round about the cabinet. This improves the appearance and makes a close fit next to the wall.

An alternative panel construction may be had by using half-inch double beaded ceiling for the body of the panel. In this case, item 4 of the bill of material would be 22 linear feet of 4″ wide double beaded ceiling ½″ thick. Saw the ceiling into pieces 28″ long. Chamfer the ends of all panel pieces, and the proper edges of the two outside pieces in each panel, on the unbeaded side; so they will fit in the groove plowed in the stiles and rails. Glue as directed above.

If a plow plane is not to be had, another construction may be used for either the ceiling or the solid panel. Nail the panel to the inside of the frame with 2 d. finishing nails. In this construction, the panel should lap about an inch on each rail and each stile. If the panels are nailed on, the two middle shelves should be made ½″ narrower than the top and bottom shelves.