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CANNING FOR HOME USE

BY

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INTRODUCTION

The patriotism of Kentucky women has been exprest more and better home gardens, not only in country distri but in cities and towns as well. The gardens of women a children have become a large and helpful factor in the food sit tion. General interest has extended into plans for preventi waste of perishable produce by converting it into food for win use by means of canning and drying. Many requests for b letins on home canning and information regarding the ho canner and outfit have come to this office. As all printed mat prepared for members of Girls' Canning Clubs is intended o to supplement demonstration lessons given by the several Ho Demonstration Agents, it is not explicit enough to be helpful the general housekeeper who has not attended these demonst tions and who wishes only to know the simple, practical meth for successfully canning fruits and vegetables for home u For such purpose this bulletin has been prepared.

CIRCULAR NO. 62

HOME CANNING

Scientific methods of canning have, until recent years, been too complicated for home use and equipment. The advent of Girls' Canning Clubs in 1910 as an activity of the U. S. Department of Agriculture evolved the Home Canner and its accompanying equipment. This consists of hot-water canner and furnace combined, tin cans with solder-rimmed caps or covers, capping steel for soldering these caps on the cans, tipping iron for dropping a bit of solder on the exhaust-hole in the lid, flux and sal ammoniac for cleaning and tinning capping and tipping irons, and tongs for handling hot cans. This little outfit, which can be bought for $5.00 to $15.00 and which Canning Club girls use, has given rise to the popular opinion that possession of a "Canner" will enable anyone to can vegetables in tin, and, when once in tin, to sell them as successfully as do the Canning Club girls under their 4-H brand label. This wrong opinion is fostered by advertising literature of some manufacturers of canners.

The one thing needed for successful canning is scientific knowledge. Both the manager of a canning factory and the Home Demonstration Agents have it, and advise ways and means for employees and club members to practis approved scientific methods which are founded on elementary principles of bacteriology, chemistry and physics. If the intelligent housekeeper will practis these few principles, she will use a canner as a labor and time saver, but will have equally good results from the use of a wash-boiler, lard can or any cooking vessel deep enough to hold jars and having a tight-fitting lid to prevent steam from rapidly escaping.

except by means of a microscope. Those which make food spoil belong to three groups: *Yeasts, Molds* and *Bacteria.*

Yeasts thrive on food containing sugar which they cause to ferment into alcohol and carbonic acid gas. This gas we notice as bubbles in canned fruit when it is spoiling or "working." It causes jars and bottles to burst or it forces out the stoppers. Most yeasts are easily killed by the application of heat to 212 degrees F. (which is the temperature of boiling water) for one to ten minutes. Yeasts are also destroyed by acids, especially hot acids. We, therefore, are not troubled with this class of micro-organisms in canning tomatoes which are decidedly acid. Other vegetables which are not so acid require longer exposure to heat.

Molds thrive on foods containing sugar and starch, as well as in acid vegetables and fruits. Molds reproduce and multiply by spore formation and require longer application of heat to destroy them than do yeasts. Molds attack jellies and preserves more than they do vegetables. To kill the yeasts and molds we apply heat of 212 degrees F. for eight to thirty minutes in canning tomatoes, berries, cherries, currants, gooseberries, peaches, pears, plums and rhubarb. All molds require air to reproduce and multiply; therefore "exhausting," which expells air from the can, is an important part of the sterilizing process in canning.

Bacteria cause decay or putrefaction of food. They are, as a class, the most difficult of all micro-organisms to destroy, requiring application of heat at the temperature of boiling water for a period of at least one hour. In dealing with bacteria we have the added difficulty of destroying the resistant spores common to many species in this class of organisms. Spores resist heat of 212 degrees F., which is the maximum we can secure with the hot-water canner. We, therefore, resort to two methods of destroying spores; either the steam-pressure canner or "fractional sterilization," sometimes called "intermittent processing;" i. e., heating to 212 degrees F. for one hour each day for three successive days. Bacteria reproduce very rapidly; one bacterium which a hurried canning opera-

tion may have failed to kill, may produce, under favorable conditions, millions in twenty-four hours. This fact renders it *necessary to cool quickly* immediately after each heating in "intermittent processing."

The science of bacteriology gives the true explanation of successful home canning. It is known that micro-organisms and their spores are in the air and on everything which air touches and that they can be destroyed by heat. This science also shows that all micro-organisms are not destroyed by the same degree of heat; that one kind of food carries germs more difficult to kill than another. These facts explain why the same time of heating in canning tomatoes and corn will be successful with one and not with the other. Corn, beans, beets, asparagus, peas and sweet potatoes need a high temperature and for a long time; blackberries, gooseberries, apples, plums and tomatoes need to be exposed to boiling temperature for only a short time. (See processing tables, pages 30 and 32.)

Intermittent processing is necessary because boiling water temperature (212° F.) will kill only vegetative forms of bacteria. Spores still live and develop into bacteria after the first processing and can then be destroyed in the second processing. The third processing is a safeguard in case any spores failed to develop before the second processing.

Sealing

The method of sealing glass jars depends upon the kind of container used. Jars with lids having a composition ring which permanently seals during the cooking process are not advised as they will not permit exhausting. Jars having a screw top lid—the Mason jar—sometimes make a leaking seal because the lids have become sprung by dropping on the floor or by the use of an implement in forcibly removing the lid from the jar. Old lids should be replaced by new ones. Jars having glass lids fastened with a spring clamp are best. The spring lever-clamp gives a direct downward equal pressure of the lid upon all parts of rubber ring, making a tight seal. New rubbers should be bought each year for all glass jars. Thick-

ness and elasticity of the rubber ring are necessary in effecting a good seal, no matter what kind of glass jar or lid is used. Be sure the rubber ring is elastic and not of last year's stock. Rubber loses elasticity with age and a ring that was perfectly good last year is unfit for use this year. Test the sealing quality of all jars before canning by filling with water and inverting.

Tin cans sealed with hot wax are not advisable as they can not be used for "cold pack" canning. Tin cans sealed with solder are best of all, after one masters the tinner's art of using soldering irons.

Containers—Glass

There is no such thing as the best container for all products. Some things are better in glass and others are better in tin. Glass should always be used for canning berries, cherries, currants, gooseberries, plums, rhubarb and beets. The desirable points to look for in a glass jar are clear; white glass without blisters or bubbles, wide opening, short neck, pint and quart size; avoid half pint sizes.

If housekeepers have a supply of Mason jars, new lids should be purchased or else the old lids should be sterilized before using by boiling in water one hour each day for three successive days. Old food and bacteria are usually between the lid and the porcelain lining and will not be rendered sterile with the amount of cooking advised for canning.

The illustration on page 8 shows glass containers suitable for home use. Jar No. 3 is best for general home use in quart and pint sizes. Both the E-Z and Sure-Seal are standard. Their chief advantages are the glass lid and clamp fastening. Jar No. 3 has the same lid and fastening but has square corners and flat sides and is of clear white glass. This is recommended for display purposes or exhibit goods. Both Queen jar and Hazel-Atlas are recommended. A new jar, the Eureka, has no shoulder or neck and is, therefore, best. The old-fashioned Mason jar, No. 4, has the advantage of being easy to obtain and is cheaper than other jars in original purchase price, but, considering lost food and labor because the

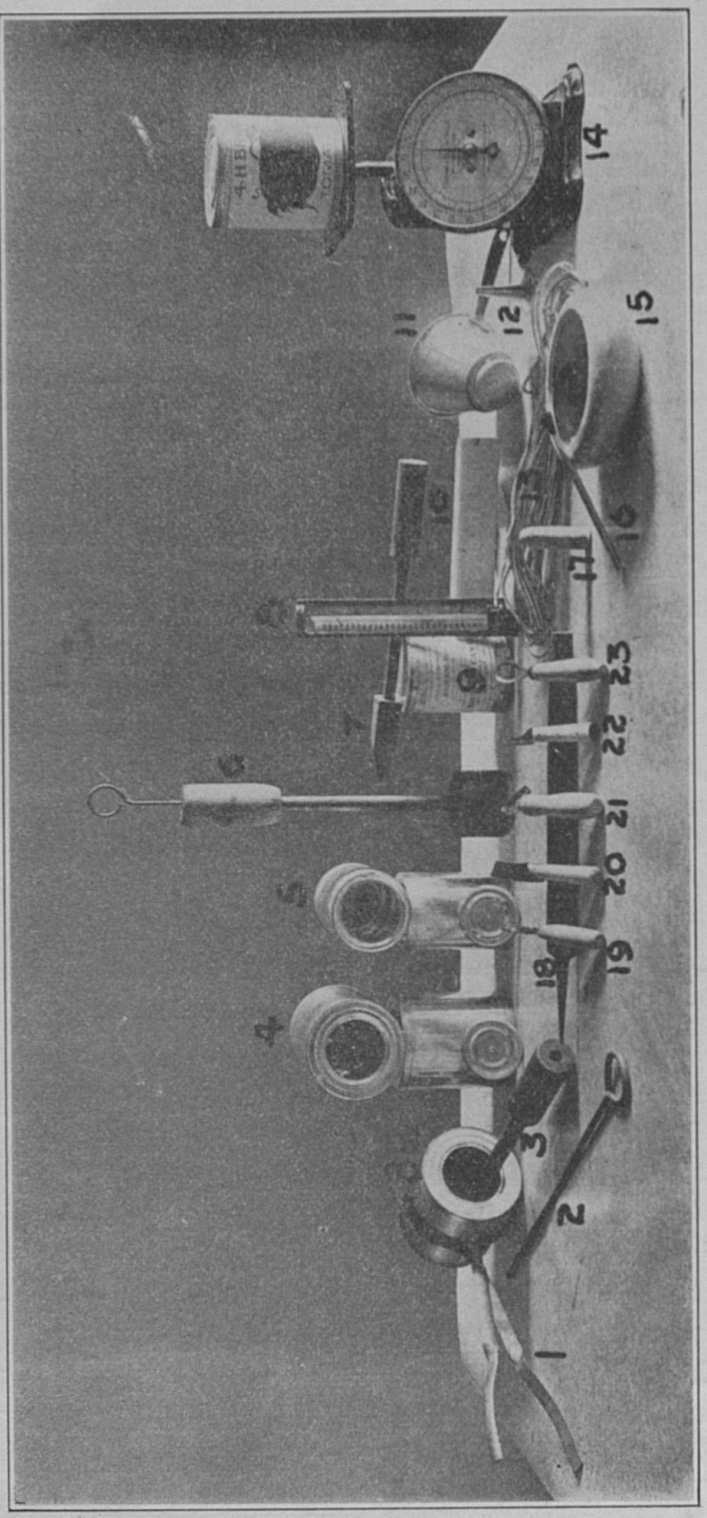
Containers—Tin

Packers' cans are tin cans with solder sealing and have some advantages over glass for home use as well as for commercial purposes of Girls' Canning Clubs. It requires about four times the length of time to can beans and corn in glass that it does in these tins because of the necessity of slowly tempering glass to the boiling point and of again cooling it after each processing. The time saved in the use of packers' cans will more than offset the expense of tin cans. Scarcity and high price of tin will compel housekeepers to use glass for home-use products, altho the use of cook stove evaporators will do away with the need for tin cans.

Packer cans have an opening of two and seven-sixteenth inches diameter and a cap or lid to fit the opening. The cap has a small hole in its center for "exhausting," and circumference of cap carries a hem or border of solder. This solder seals the can, when melted by the application of a hot capper, which is a heavy soldering iron of same diameter as cap. After sealing cap on can and partially cooking or "exhausting," a bit of solder is dropped on the exhaust hole, thus completing the seal.

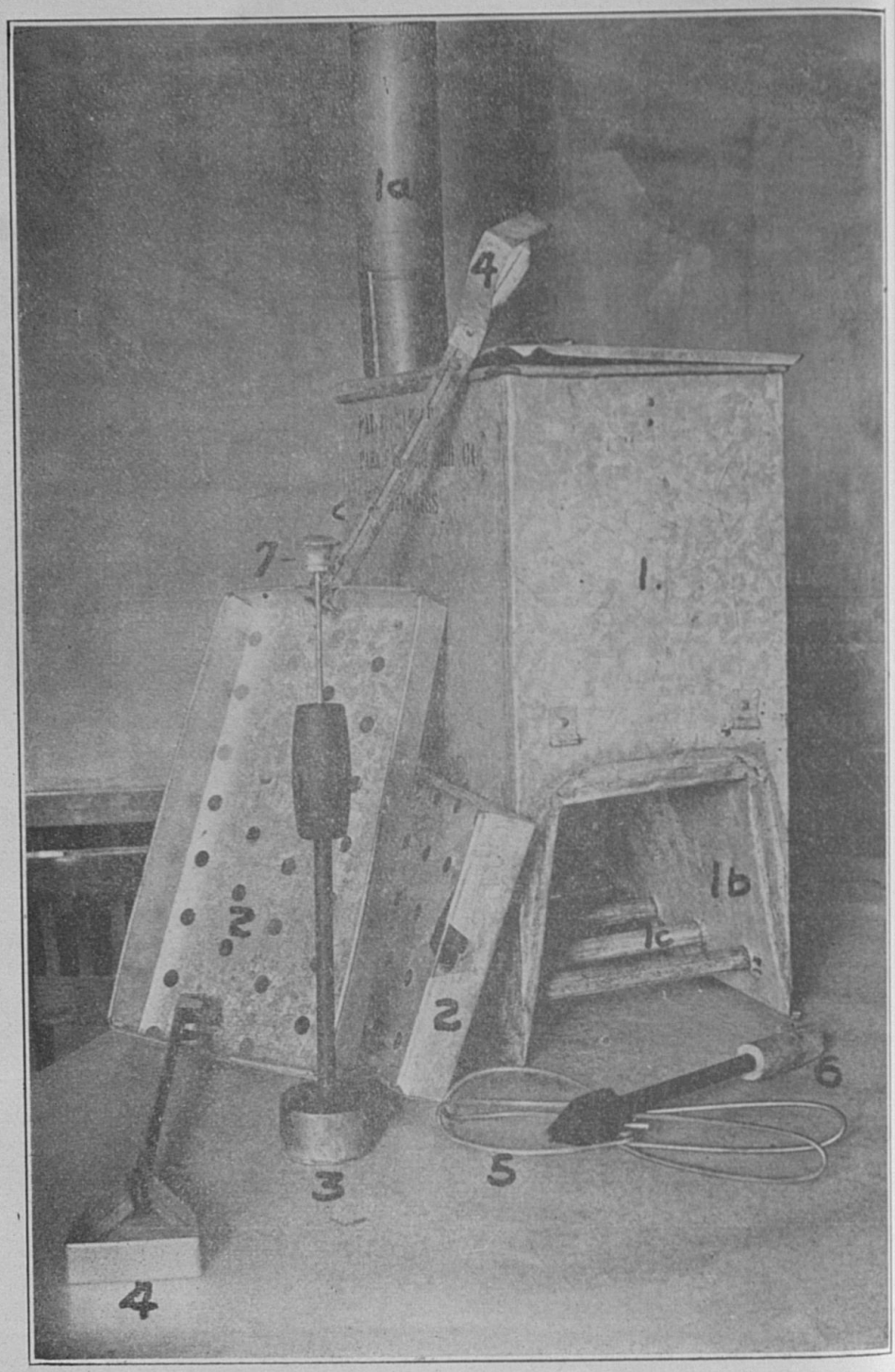
Canners

The best canners for home use are of two types; steam-pressure and hot water. The steam pressure canner gives best results in canning peas, asparagus, corn, beans, soup and meats. It is made of heavy pressed steel with tightly clamped lid, is provided with a safety valve, petcock and pressure gage, all arranged to confine entirely the steam generated until the accumulation of steam amounts to 5, 10, or 15 pounds pressure. Steam confined under pressure has greater sterilizing power as the temperature is above that of boiling water. A steam pressure of 15 pounds gives a temperature of about 250° F. Management of a steam-pressure canner requires skill and judgment; it is, therefore, not recommended to members of Girls' Canning Clubs nor for general home use until skill in canning has been acquired thru one or two years' experience with canners of hot-



TIN CAN ACCESSORIES

1. Can tongs for lifting hot cans.
2. Capping rod for holding lid in place while solder melts and seals.
3a. Sal ammoniac and solder (in old can) for tinning sealing irons.
3. Capping steel (in tinning mixture.)
4. No. 3 cans, cap with hem of solder and hole in center.
5. No. 2 cans, cap with hem of solder and hole in center.
6. Capper with rod in place.
7. Tipping iron for melting solder to close exhaust hole.
8. Thermometer.
9. Can of flux (muriatic acid and zinc) for making solder stick to tin.
10. Sal ammoniac in bars—it is broken like coarse salt and placed in can No. 3a for tinning.
11. Jar funnel, strainer and measure combined.
12. Bottle funnel attachment for No. 11.
13. Bunch of rope solder for tipping cans and tinning irons.
14. Scales.
15. Porcelain jar for holding flux into which Nos. 6 and 7 are dipped.
16. Brush or swab for placing flux where solder will stick.
17. Rubber finger or thumbstall for protection in peeling.
18. File for cleaning soldering irons Nos. 6 and 7.
19. Curved knife for removing cling peach stones.
20. Knife for cutting corn from cob.
21. Knife for removing pineapple eyes.
22. Knife for removing tomato cores and peeling.
23. Knife for removing peach and plum stones and mango centers.



TYPE A

1.
1a.
1b.
1c.
2.
3.
4.
5.
6.
7.

HOT WATER CANNER

Type A

1. Rectangular tank holding water, steam, two trays and 16 cans.

1a. Six-inch stove pipe carrying smoke from furnace.

1b. Furnace under tank.

1c. Pipe for grate bars. Water circulates thru these pipes and (1b) walls of furnace.

2. Trays for holding 8 cans each, also used for scalding tomatoes.

3. Capper for sealing caps on cans.

4. Tray lifters for lowering into, and lifting trays from tank.

5. Tongs for holding hot cans.

6. Tipping iron, for melting a drop of solder on exhaust hole.

7. Capping rod passing thru stem of capper to hold cap tight on can while soldering.

water types. As steam-pressure canners require quick heat they are suitable for gas stoves or blue flame gasoline stoves. Use of other fuels will occasion waste of fuel and time. It is adaptable to tin rather than glass containers, as rubber rings are easily softened by extra heat and pressure. This requires replacement of rings and adds to the complication of canning.

Management of Steam-Pressure Canner*

In the bottom of the steam-pressure canner (retort) pour boiling water to a depth of from 1 to 1½ inches. Place canner over the fire so that the water can boil vigorously. Put cans in the crate and lower this into retort. Put on the cover and screw down clamps so cover is on steam tight. Turn petcock so steam can not escape and adjust safety valve to the number of pounds steam pressure desired. Raise temperature by quick fire until the gage on cover of retort shows the desired steam pressure. Then open safety valve or petcock a little in order to let dead air escape. Partly close again so only a very small amount of steam can escape, but do not close entirely. Count time from the moment steam pressure in canner reaches the pressure desired.

Keep a steady fire going in order to maintain a uniform temperature until time is up. Then open petcock or safety valve to let all steam escape before unfastening the clamps or screws holding lid down. When the gage shows that all steam has escaped, unfasten the clamps, take off the cover, and lift the crate out. When canning in glass it is important to cool the retort without opening the petcock before removing the containers, in order to prevent loss of liquid from them. As soon as the jars are taken from the canner the lids should be tightened and a cloth spread over the jars to protect from drafts of air, until cold. If cans are used, test for leaks by immersing in cold water. If they are found, cans must be resoldered and again processed in canner.

*Farmers Bulletin No. 853.

Hot-Water Canner

The hot-water canner has the advantage of being cheaper and safe in the hands of children. By combining the furnace with a tank for holding water and cans, it permits canning to be done out-of-doors under the shade of a tree, taking canning away from the kitchen. Being low on the ground, cans are lifted in and out easily, even by children. The furnace enclosed in a jacket of galvanized iron prevents danger of children's dresses catching fire.

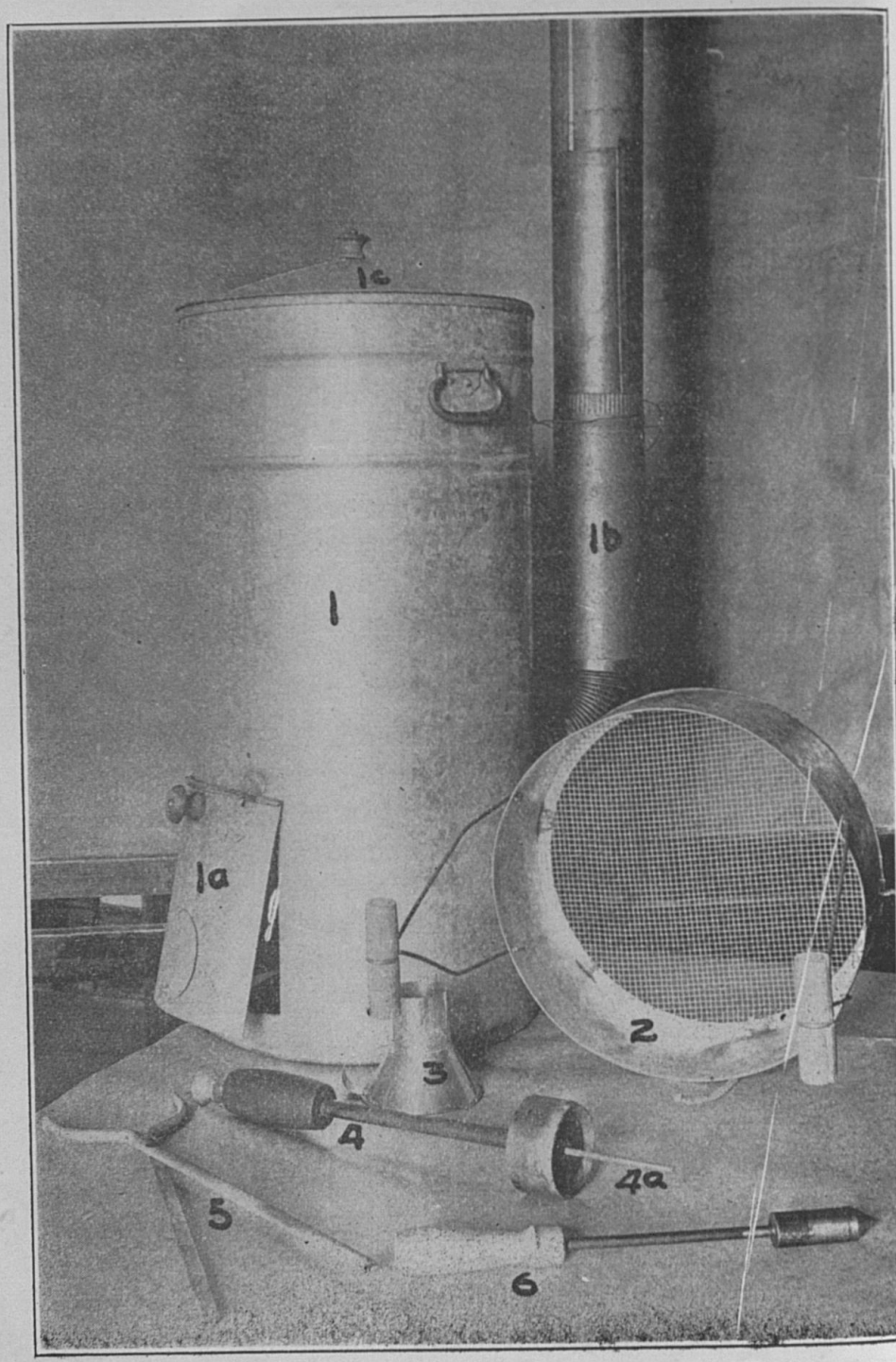
By resorting to "intermittent processing" or boiling for one hour each day for three successive days, all practical results of the steam-pressure canner are obtained. The commercial hot-water canner outfit includes furnace, water tank, two trays, tray lifters, capper, tipping iron and tongs. Home-made canners can easily be made by building a furnace under a wash boiler, lard can, galvanized tub or iron kettle and providing it with a close fitting lid and tray with lifters.

Operations in Canning

Operations in canning are *Washing, Scalding, Blanching, Packing, Exhausting, Processing, Cooling and Storing.*

Washing is as important as any part of the canning operation. Fruit and vegetables should be placed in water to loosen dust and dirt and then sprayed, or water changed often enough to remove dirt. Do not let fruit lie in water an instant longer than to soften dirt. Wash berries gently, few at a time. Pears and apples, peeled, should be kept under water till put in cans to prevent discoloration. Tomatoes should be washed in several waters or under small spray.

Scalding. When canning tomatoes, another canner or large kettle of water should be kept constantly boiling, a clean tub full of cold water should also be ready. If only one person is peeling, scald no more than one peck at a time. Place these in tray of canner (or in wire or splint basket) and lower into boiling water for 1 minute to loosen skins, then lift out and plunge into cold water for an instant; do not leave tomatoes in water but place in pan and immediately core, peel and place



TYPE B

HOT WATER CANNER

Type B

This canner has only one tray, large enough to hold 8 cans, altho tank space is deep enough to permit 8 other cans to rest on first row. The double wall surrounding furnace allows only a small amount of water which heats rapidly. The steam generated heats the water above the furnace and cans above the water. The wire basket may be conveniently used for steaming and blanching vegetables, especially when they are later to be dried.

in jar. The cold water plunge after scalding is necessary to harden the pulp under skin and check absorption of a bitter acid which scalding liberates from the skin. It also makes peeling easier.

Blanching. Immersing in boiling water for one to fifteen minutes with most vegetables is done to make them soft and shrunken for easier packing and to remove a sticky substance from the surface. Some fruits also need blanching, especially peaches, plums, and cherries. Steam blanching for most vegetables is better than hot water, in conserving their mineral food value.

Packing. Carefully place tomatoes and fruits in jar so as to economize space. Perfection in pack depends upon placing the maximum quantity (by weight) of fruit into a given container with the minimum amount of bruising and breaking. This requires judgment, practis and skill, but the reward in economy of space and jars and in additional beauty of product, fully repays all efforts in learning to make a "good pack." The bowl of a tablespoon or a small paddle made of flexible bamboo will greatly assist in compactly placing fruits in jar.

Exhausting. The method of sterilizing by heat consists of a double operation, "exhausting" and "processing." The first five to fifteen minutes cooking is done with the lid of container not completely closed, in order to allow the escape of air. As contents of can become heated expansion drives off what air is in the jar and its contents. In using tin cans, "exhausting" is especially necessary, as the oxygen in air, if left in the can, attacks the metal and produces metallic salts which impair flavor, color and market value of the product. In glass jars exhausting is necessary to prevent breaking of jars. Exhausting should be done slowly; i. e., bring water to boiling point gradually and count five to fifteen minutes, according to product and container; (see table), from time water boils, then close lid completely and continue sterilizing at boiling temperature for the required length of time (see table). This continued part of the sterilization period is called "processing."

Processing. Each product requires a different degree of

temperature and time to sterilize. This is determined by the nature of the product and the kind of micro-organism peculiar to that product. This period has been found by experience and made into a "Processing Table" (pages 30 and 32) to be referred to by the housekeeper in every canning operation. The canner is devised for convenience and economy of time and labor in processing, the object being to generate and confine steam in such a way that its heat will easily and evenly reach all parts of each jar's contents. In hot-water canners care must be taken to have the lid fit closely. While it is not intended that it be absolutely steam tight, it is necessary to confine most of the steam. The hot water covers only little more than half the height of the lower row of jars, their upper part and all of the upper row of jars must depend upon confined steam for sterilization.

Cooling. After the proper time for sterilization has elapsed, all heat should be withdrawn as quickly as possible. As soon as the jars are taken from the canner, the lids should be tightened and a cloth spread over the jars to protect them from drafts of air until cooled. Cooling jars too slowly will cause fibre of fruit to break unduly, making the product pulpy and injuring color and flavor. Tomatoes and corn will become brown. Danger of spoiling will also be increased by *slow* cooling.

Storing. The place of storing should be cool, dry and dark and protected from freezing. Wrap the jar in paper to secure darkness; it will then be easier to find proper storing quarters. The only danger from light is that it fades color.

Before beginning canning operations, the mixture of sugar and salt should be made and placed in a crock ready for use. Always add mixture when jar is about half filled with vegetables.

Salt-sugar mixture: Take 2 cups salt and 1 cup sugar; mix thoroughly. Sugar may be omitted as a conservation measure.

Canning in Glass

To sterilize jars, wash the jars and place them side down in a vessel, cover with cold water. Bring this water slowly to

the boiling point and allow to boil for fifteen minutes. Place on clean table upside down to protect from dust and insects. Sterilize the lids at same time—tie them together in a square of cheesecloth and on removing from water leave in the cloth until used. Prepare bath for rubber rings by adding one teaspoonful of soda to one quart of hot water. Allow rings to remain in this until used.

Place fruit or vegetables in jar to secure beauty and economy of space. When jar is about half full add salt or salt-sugar. Pack jar as *full* as possible and pour in water, juice or syrup to fill all spaces and to overflow the edges of jar. Wipe off edge and shoulder of jar with piece of new cheesecloth, place rubber, lid and clamp in position but do not close spring of clamp or screw Mason lid tight. Set aside until other jars are filled. Have water in canner luke warm when jars are placed in it. Bring to the boiling point slowly and allow ten minutes boiling for the exhausting period. Terminate exhausting period by closing spring of clamp or screwing tight the Mason lids, then continue boiling or processing for the period given in tables on pages 30 and 32.

Canning in Tin—Preparation

Select a shady spot out-of-doors, convenient to a good supply of water. Place a table or shelf with firm foundation perfectly level, in order that the melted solder will flow evenly to all parts of the sealing groove. The following should be at hand ready for use: bowl of flux for cleaning sealing irons (9);* a small amount of flux in a glass with brush or swab to be used in sealing cans (10 and 15); small pan of water and several six-inch squares of cheesecloth for wiping top of can before soldering; old can containing granular sal ammoniac and pieces of scrap solder for tinning irons (3a); can-tongs (1) for holding the can as it becomes hot.

On another table stack cans that have been previously sterilized by boiling, bottom side up to prevent entrance of dust and flies. Cans may be sterilized in the canner before

*For numbers see illustration, page 10.

beginning. With the cans on the table should be the sterilized caps, folded in a piece of cheese-cloth; large pans of water for chilling tomatoes after scalding; small trays or pans for peeling, and all equipment for preparing the vegetable and placing in cans; a clock, scales, crock of salt-sugar mixture with teaspoon for measuring; tablespoon or bamboo paddle for packing. Provide a covered garbage pail for peelings and refuse.

Put water in canner about four inches above its bottom, or to the depth of first tray. Make fire under canner, burn wood, coal or cobs. Have an extra canner, if possible, with water and fire for scalding and blanching. If working with one canner only, use tub or large kettle with a furnace of rock or brick built under it for this purpose. Gather a few stones together in a ring about six inches in diameter and six inches high. In the enclosure build a fire of clean cobs, charcoal or hard wood (do not use pine wood) and heat capper and tipper on these coals.

Canning in clubs or groups of six is advised if a large crop is to be canned. A canning unit of two canners and two or three cappers should have one person to wash, scald and cool; two to core, peel and pack; one to seal; one to exhaust and tip; and one to attend water and wood requirements of canner and sealing irons.

Sealing irons should be thoroly cleaned with gasoline or coal-oil when they are new. Remove all rust from the tinning edge of capper and surface of tipper with file or sand paper.

Tinning. Sealing irons must have a bright, polished plating or coating of tin in order to make the solder flow. If irons are not perfectly clean and bright, the solder will stick to them and defeat the whole object of this method of canning. After irons are cleaned with sand paper, heat them in fire of charcoal or clean corn cobs, as most woods will have a deposit of gum or smoke which will cause solder to stick to iron. Stir each iron in the sal ammoniac and solder mixture. Break up sal ammoniac lumps or bars and to one cupful of this coarse granular salt add two feet of rope solder broken into inch

pieces. Place this in an old tin can and vigorously work the hot iron in it, holding can with tongs as it becomes hot. When iron becomes coated with solder, wipe off the salt adhering to iron with a dry cloth and immerse iron in bowl of flux. Avoid burning hand with steam passing thru capper. The flux bath hardens the coating of tin on the capper or tipper and makes it permanent. If irons are not overheated or placed in smoky fire or allowed to come in contact with vegetable matter one or two tinning operations will be sufficient for the season's work. If any trouble is encountered with this operation, it will be best to have a canning club girl or professional tinner give help.

Flux can be made by placing strong muriatic acid in a glass or crockery bowl and adding as many strips of zinc as the acid will dissolve. Add as much water as you have acid and strain. Flux ready for use can be purchased from firms selling cans and it is better to use this prepared flux according to directions on can.

Canning in Tin—Operation

Prepare fruit as described for canning in glass. Pack a can to within ¼ inch of opening. (Cans should *not* be filled to top. Jars *must* be filled to the top.) Add one teaspoonful salt-sugar or salt to No. 2 cans; two teaspoonfuls to No. 3 cans. Add no water to tomatoes; to most other vegetables add water; to fruits, add syrup or juice. Wipe off top of can with clean piece of cheesecloth. Be sure to leave no speck of moisture in groove of top into which cap fits, else solder will not adhere and the seal of that can will have a "pin-hole" defect. Place cap in position and set can aside till several others are filled.

Sealing. While packing cans, have the capper heating. When several cans are filled, place them in a row on the level, firmly placed table or shelf. Place lid and with brush apply flux around circumference of lid. See that capper is hot, but not red hot. Experience will teach the proper degree of heat by holding near hand, as in testing heat of a flat iron. Wipe off ashes with dry cloth or one dampened with flux. Place cap-

per-rod thru capper. Hold capper handle in right hand, capper-rod handle in left and place end of rod in exhaust hole and press on rod handle to keep lid in position during the melting and hardening of solder. Drop capper on cap so that its circular edge rests on the rim of solder. As soon as this solder melts or "flows" rotate the capper. See that the solder flows evenly in all parts of the groove. Then lift the capper an inch or two above cap but continue to hold rod in place for about fifteen seconds longer. Seal the next can in the same way and a third and fourth, or as many as heat of capper is sufficient to make solder "flow." Return capper to fire and wait until it heats. If you have an extra capper, much time can be saved. When enough cans are sealed to fill canner, place them in trays and lower into canner for exhausting. Water should reach a little above middle of lower tray of cans and should be boiling. Place lid on canner. You will notice the water stops boiling when cans are put into canner, and several minutes will elapse before it boils again. Count exhausting period from time it boils again. Watch clock, do not guess exhausting and processing periods. After exhausting period has expired, lift trays out of canner and place on table for tipping. (See table for exhausting time of each vegetable and fruit.)

Tipping. Heat tipping iron, which has been tinned. Wipe with cloth dampened with flux. Apply flux to exhaust hole of five or six cans. Hold tipping iron in right hand, touch exhaust hole in cap with its point. Hold piece of rope solder in left hand and touch solder to shining surface of tipping iron. As soon as solder melts, lift quickly both tipping iron and solder; this leaves a drop of solder on exhaust hole and completes the seal. Return tray to canner having water *completely* cover cans, as the exhaust hole is now closed. Notice carefully if any bubbles of air are coming thru the water from a can. If so, take that can out and close the leak in the seal by supplying flux, then dropping some solder by means of the tipping iron. After removing and repairing any leaking cans, place both trays of cans in canner and process the required time. At end of processing period put these cans into tub of cold water to chill.

Vegetables

Asparagus. Use pint jars or No. 2 cans. Tenderness and flavor of the product will depend upon canning immediately after taking from the garden. Cut each stalk 4½ inches, or length that will exactly allow it to stand in jar nearly touching the lid. When enough stalks of uniform size and color have been selected to fill one jar, tie them together with a cord in a bundle, then blanch by standing bundle on end in a pan of boiling water, the water covering about two inches of the lower ends. Keep water boiling for three minutes, then cut the string and allow the entire length of stalks to stand in water; continue blanching for two minutes more. Take from hot water and immerse in cold water for an instant; peel or scrape tough covering of butt ends; pack by placing stalks in upright position, tips at top. When jar is partially full, add one stalk at a time to the center of the jar, crowding stalks to the circumference with paddle or spoon handle and continue filling the middle until jar will not hold another stalk. The blanching process has wilted the stalks so that they are pliable and will pack closely without breaking. Add enough warm water to fill all spaces and run over the edge of the jar. Add two teaspoonfuls of salt. Place rubber, lid and clamp in position. Exhaust ten minutes. Complete seal and return to canner. Process intermittently, i. e., one hour each day for three days.

Lima Beans. Lima beans and peas are the most difficult vegetables to can; when freshly taken from garden, young and tender, success may be expected. It is important that lima beans be small and of *uniform* size. Remove any that are over size. Blanch for ten minutes in a small amount of water. Fill pint jars to within ¼ inch of top. Add one level teaspoonful salt, cover beans and completely fill jar with water in which the beans have been blanched. Place rubber, lid and clamp on jar. Exhaust ten minutes. Completely seal jar and intermittently process, i. e., one hour each day for three successive days.

String Beans. Stringless varieties are best for canning

but any beans may be used. The younger and more tender the beans, the easier to sterilize; when bean in pod is about size of wheat grain, it is the best size for canning. Have all arrangements for canning complete before taking beans from garden. "One hour from garden to cans" should be followed in canning all vegetables, but with beans and corn it should be "immediately from garden to can." Wash and remove tip ends and strings; cut or break into pieces one to one one-half inches long (have all pieces same length). Put them in bag or square of cheesecloth, tie up the ends and blanch for five minutes. Lift bag from hot water and drop into cold water for a minute. If one cup of salt is added to two gallons of cold water, it preserves the color of the beans. Pack in either pint or quart jars using bowl of tablespoon to press firmly into place. Beans should be packed tightly and to top of jar. Add one level teaspoonful salt-sugar mixture to each pint jar; two teaspoonfuls to quart jar. Pour warm water slowly into jar to fill all spaces and to run over edge of jar. Place rubber ring, lid and clamp in position. Exhaust ten minutes. Completely seal jar and process 80 minutes if beans in pod are no larger than wheat grains and pint container is used. If beans are larger, process one hour each day for three days.

Carrots. Carrots are prepared in the same way as beets. Slice or cut into dice and can by same method as advised for beets.

Corn. Sweet or garden corn can be more economically saved by evaporation. Field corn makes a fine product if canned by this method as a little sugar is added to the brine. For both sweet corn and field corn select ears that have matured only to the milk stage. Remove husks but not stem. Cut off the tip and as far as grains are only blisters. Cut out all worm eaten spots so that no trace remains, or else discard all worm injured ears. Remove silk with brush that has never been used for any other purpose. Place in tray of canner (about 24 ears) and blanch with steam for 20 minutes. Immerse in cold water. Cut grains off cob with sharp knife, being careful to cut no deeper than half the depth of the grain. Scrape re-

maining half of grain from the cob with back of knife. Measure four pints of corn (after removal from cob); place in a mixing basin and add brine. Make brine by adding six teaspoonfuls salt and six teaspoonfuls sugar to four cups of water. Mix brine and corn thoroly and fill pint jars to within ¼ inch of the top. (This quantity will fill five pint jars or No. 2 cans). Place rubber, lid and clamp in position and exhaust ten minutes. Complete seal and intermittently process for three successive days. If sweet or garden corn is used, omit sugar from brine.

Okra. Select young, small pods of uniform size. Remove cap without cutting into seed pod. Blanch fifteen minutes. Chill in cold water with salt added to preserve color. Pack in pint jars. Add one level teaspoonful salt-sugar mixture; cover with water. Exhaust ten minutes. Process one hour each day for three days.

Peas. Select young, tender peas of uniform size. Remove from pod. Look over carefully and take out any that are over size. Blanch for ten minutes in small amount of water. Fill pint jars to within ¼ inch top. Add one level teaspoonful salt-sugar mixture, cover peas and completely fill jar with water in which peas have been blanched. Place rubber, lid and clamp on jar. Exhaust ten minutes. Completely seal jar and intermittently process, i. e., one hour each day for three successive days.

Peppers. Wash, stem and remove seeds. Blanch five to ten minutes. Dip in cold water. Pack in jar. Add one teaspoonful of salt. Cover with water. Place rubber, lid and clamp on jar. Exhaust ten minutes. Completely seal and process eighty minutes.

Pimentos—Spanish Peppers. Select sound, uniform peppers of medium size. To remove seeds, cut around the stem of each with a slender paring knife and remove the inside partitions. To peel, place the peppers in a hot oven from six to ten minutes (until the skin blisters and cracks), being careful not to allow them to burn. Then remove the skin with a slender paring knife. Flatten the peppers and pack in hori-

zontal layers to ¼ inch of top of container. No liquid is used. The processing brings out of the peppers a thick liquor which almost covers them in the can or jar. Exhaust ten minutes. Process twenty-five minutes.

Pumpkin or Winter Squash. Cut the pumpkin or squash into strips. Peel and remove seeds and stringy center. Slice into small pieces and steam in colander until tender. Run thru a ricer, pack loosely, and add enough water to cover. Exhaust ten minutes and process intermittently two days.

Sweet Potatoes. The canning of sweet potatoes successfully is difficult because the product should be dry and mealy and where air spaces are left there will be discoloration.

Select absolutely sound potatoes of uniform size. Boil or steam until three-fourths done. Peel and pack hot at once. Can must be firmly packed to leave no air spaces. Exhaust thirty minutes. Process for two and one-half hours continuous boiling.

Spinach and Greens. Wash and remove all wilted or overripe leaves. Blanch ten to fifteen minutes in a steamer or colander placed over pan of boiling water. Plunge for an instant into cold water. Pack tightly by using the bowl of a tablespoon for pressing. Add a level teaspoonful salt-sugar to quart jar, half teaspoonful to pint jar. Completely fill air spaces with warm water, pour till it runs over the edge of jar. Place rubber, lid and clamp in position. Exhaust ten minutes. Process two hours.

Tomatoes. Select about one peck uniform in color, size and degree of ripeness. Place in canner tray, or wire or splint basket, stem end down, immerse in boiling water for one minute. Remove and plunge into cold water for one-half minute. Do not let them remain in cold water. Remove core with sharp, *pointed* knife *before* peeling. Be careful not to cut thru seed wall in removing core. Cut away, with sharp knife, any green skin or black seams from stem end of tomatoes, finish removal of skin and at once place tomato in container. After reading above directions the following arrangement of steps in canning tomatoes in tin will be helpful for reference.

Steps in Canning Tomatoes in Tin

1. Select
2. Wash
3. Scald
4. Chill
5. Peel
6. Pack
7. Salt
8. Dry the Groove of Can
9. Place lid
10. Apply flux
11. Seal rim
12. Exhaust
13. Tip
14. Process
15. Chill

Canning Tomatoes in Glass

If the tomato is larger than opening of jar, press gently the sides of tomato with thumb and all fingers and the tomato will change its shape into an oblong mass slipping easily into the mouth of the jar. The even pressure upon five points will not break nor bruise tomato, but it will at once regain its shape when in the jar. Those too large to go into the jar this way should be cut in pieces to fit all crevices and completely fill the jar to the running over point after all whole ones are placed. When jar is about half full, add two teaspoons salt-sugar mixture. As you place tomatoes in jar keep smooth or bud end lying against the glass, fill center by packing in smaller or cut tomatoes. Use perfect and uniform sized tomatoes for circumference of jar and smaller and cut pieces for every space and crack. The beauty of the product will depend upon the patience and skill used in getting the jar *full* of tomatoes. When entirely full, wipe off edges of jar with new piece of cheesecloth; place rubber, lid and clamb in position but do not close spring of clamp or screw Mason lid tight, and set aside until other jars are filled, or until all the scalded tomatoes are prepared and placed in jars. When enough jars are ready to fill canner have water in canner lukewarm and place jars on tray in canner and close lid of canner. Exhaust for ten minutes after water reaches boiling point, after which jars should be removed from canner, one at a time, and lid completely sealed. Return each jar to canner and continue cooking or processing for twenty minutes. Remove jars to table and cover with cloth to prevent breaking of glass. When cool immerse them in pan of cold water (under running water if possible) till jars and contents are cold as the water. Place

on table or shelves upside down till morning to see if seals are perfect. If so, wrap in paper and store.

Vegetable or Soup Mixture. Use either garden or field corn. Contents should be in proportion of ½ tomatoes, ¼ corn, ¼ okra, carrot and onion (any one, any two or all). Blanch corn 20 minutes, cut corn off cob by slicing it in two cuttings, first the tips of grains, then the body of the grains; do not cut too close to cob nor scrape. Scald, core and peel tomatoes as for canning and cut into small pieces. Blanch okra and carrots fifteen minutes and cut into slices. Measure the proportion of each vegetable that is to fill one jar ¼ inch from top. Place rubber, lid and clamp on jar. Exhaust ten minutes. Complete seal and process intermittently, i. e., one hour each day for three days. Cool immediately after each processing.

Vegetable Soup (concentrated.) Any desired mixture of vegetables may be packed for home use. The cut pieces of tomatoes or peppers or other vegetables left from canning the whole product can well be utilized in soup mixture. A good combination consists of 1 quart concentrated tomato pulp, 1 pint young, tender corn or tiny lima beans, 1 pint okra, 4 teaspoons salt-sugar mixture, 1 small onion chopped, ½ cup chopped sweet red pepper. Cook the tomatoes, pepper and onions, put thru a sieve to remove seeds, and cook down to about the consistency of ketchup and measure. Prepare the corn or beans and okra as for canning; add these with seasoning to the strained mixture and cook all together for ten minutes. Pack and proceed as for the above mixture.

CANNING VEGETABLES (HOT-WATER PROCESS).

Do not attempt to use this table without reading all directions carefully.

Vegetable.	Blanch, Minutes.	Liquor.	In Tin.			In Glass.	
			No. of Cans.	Exhaust, Minutes.	Process.	Jar.	Process.
Asparagus	3 to 4	Brine (heavy)	2	10	Intermittent or 2 hours	Pint	Intermittent or 2 hours continuous
String beans	3 to 8	Brine	2	10	Intermittent	do	Do.
Do		do	3	10	do	Quart	Intermittent.
Lima beans	2 to 5	Salt, sugar, water	2	10	do	do	Do.
Beets	Cook ¾ done, peel	Brine	2	10	1 to 2 hours	do	1½ to 2 hours.
Carrots	Cook ¾ done, scrape	do	2	10	1 hour	do	1 hour.
Corn	1 to 3 (blanch on cob)	Salt, sugar, water	2	10	Intermittent	do	Intermittent.
Okra	10 to 15	Brine	2	10	do	Pint and quart.	Do.
Peas (very young)	1 to 3	Salt, sugar, water	2	10	45 minutes first day, 35 minutes second and third days.	Pint	Same as No. 2.
Peas, medium	3 to 8	do	2	10	Intermittent	do	Intermittent.
Potato, sweet	Cook ¾ done, peel	Pack dry	3	10	3 hours	Quart	3 hours.
Rhubarb		Cold water	2	10	15 minutes	do	15 minutes.
Soup mixture		Salt, sugar	2	10	2 hours or intermittent	do	2 hours or intermittent.
Tomato		do		10	20 minutes	Pint	15 minutes.
Do		do	3	10	20 minutes	Quart	20 minutes.

NOTE.—String beans packed in No. 2 cans are preferable because more surely sterilized.

Corn, lima beans, and peas should never be packed in larger containers than No. 2 and should be processed always intermittently. Corn is cut from cob after blanching.

Soup mixture containing corn and lima beans should be processed intermittently.

The brine used is made of 2½ ounces salt to 1 gallon of water, except for asparagus, which contains 4 ounces to 1 gallon.

Beets and rhubarb when packed in tin must be put in enamel-lined cans.

Fruits

Canned fruits differ from preserved fruits in that the former are sterilized and sealed with little or no sugar. Preserving embraces an elaborate process of slowly extracting the juices of fruit and substituting syrup. Knowledge and skill, used in the operation will secure a product plump and firm.* The time and sugar required for preserving make canning and evaporation more popular methods of saving fruits. Altho fruit can be canned without any sugar, the flavor is much better if a little is added; it penetrates the fruit at the time of processing and, acting on fruit acids during weeks and months before it is used, gives a blend that is not obtained from adding sugar at time of using the fruit. Make syrup by adding sugar to water and heating to boiling point. Strain to remove scum. A table for convenient reference in making syrup in canning all berries and fruits is here given.** This shows the period of blanching, density of syrup and length of time for exhausting and processing.

Apples. Peel, core, and quarter apples. Remov e any spots. (Allowing apples to remain in salt water until packed in container will prevent discoloration.) Fill jars as full as possible; cans, to one-fourth of top. Add syrup No. 1. Exhaust and process. (See table page 32.)

A more economical way of canning apples is to make a sauce. This may be done by steaming the apples until tender and passing them thru a sieve or ricer. To each gallon of pulp allow one cup of sugar. Exhaust until the sugar is dissolved, pack hot, exhaust and process as for canning apples. As a conservation measure all sugar may be omitted and added at time of using.

Berries. For blackberries, huckleberries, raspberries, practically the same methods of canning may be used. The conditions of the fruit will have much to do with the quality of the product. Berries should be gathered in shallow trays or

*Circulars on preserves, jellies, marmalades and jams can be obtained from Home Demonstration Agents.

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CANNING FRUITS (HOT-WATER PROCESS).

Fruit.	Blanch.	Sirup.	In Tin.			In Glass.	
			No. of Can.	Exhaust, Minutes.	Process, Minutes.	Jar.	Process, Minutes
Apples	1 minute	No. 1	3	10	8	Quart	12
Berries		No. 3	2	10	10	do	10
Cherries, sweet	15 seconds	do	2	10	20	do	25
Cherries, sour	do	No. 4	2	10	20	do	25
Currants		No. 3	2	10	15	do	15
Figs	Soda blanch	do	2	10	25	do	30
Gooseberries		do	2	10	15	do	20
Guava	15 seconds	No. 4	2	10	20	do	25
Do	do		3	10	25	Pint	25
May haw		No. 3	3	10	20	Quart	25
Peaches	15 seconds	No. 4	3	10	15	do	20
Pears	do	No. 3	3	10	20	do	25
Plums	Prick with needle	No. 4	2	10	12	do	15

NOTE.—Berries, cherries, currants, figs, gooseberries, May haws and plums, when packed in tin, must be put in enamel-lined cans.

To make the sirups recommended, boil sugar and water together in the proportions given below until sugar is dissolved. Strain all impurities out of the sirup before using:

Sirup No. 1, use 14 ounces to 1 gallon water.
Sirup No. 2, use 1 pound 14 ounces to 1 gallon water.
Sirup No. 3, use 3 pounds 9 ounces to 1 gallon water.
Sirup No. 4, use 5 pounds 8 ounces to 1 gallon water.
Sirup No. 5, use 6 pounds 13 ounces to 1 gallon water.

The sirup for canned berries is made out of berry juice instead of water.

baskets and not in deep vessels which allow them to be bruised. The flavor of canned berries will be finer if sugar is used in canning. It is best to make this into a syrup. The use of berry juice instead of water in this syrup will give a richer color and flavor. (See table, page 32, for density of syrup and exhausting and processing periods.

Gooseberries. Since green gooseberries contain sufficient acid to preserve them without processing, they may be packed, like rhubarb, in cold water. (For canning ripe gooseberries see table, page 32.)

Canned Strawberries. Wash, cap and weigh berries. For every pound of berries use one-half pound of sugar. Select from your weighed-out berries all that are small and soft; mash these and stew without adding water. Strain the juice thru a sieve and add to it the weighed-out sugar. Bring this syrup to a boil, remove from the stove and when it is cooled add to the remaining berries. Bring slowly to a boil and boil for five minutes. Skim at this time, then cover with cloth and set aside in the pan in which they are cooked until next day.

Sterilize pint and half-pint jars and bottles. Fill jars with the cold berries by lifting them from the syrup with a fork. After all berries are removed from syrup pour enough syrup into each jar to cover completely the berries. Put the remainder of syrup in bottles or small jars to be used for flavoring desserts. Place rubbers and lids on jars, corks loosely in bottles, and process all in a water-bath for ten minutes. If berries are extra large, process twenty minutes. Completely seal jars and bottles and set aside to cool.

Cherries. When canned whole, cherries should be blanched for fifteen seconds to prevent splitting. For sour cherries use No. 4 syrup; for sweet ones No. 3. (See table, page 32.) Cherries a little under ripe are best.

Peaches. Select firm, sound, uniform peaches for canning. Put aside the soft, broken ones for jam. Immerse in boiling water about one minute or until skins slip easily. Remove, plunge for a minute into cold water, and slip off the skins. Cut into halves and pack at once, placing the halves

in overlapping layers, the concave surface of each half being downward and the convex surface facing the glass. Fill each jar with syrup (see table, page 32) and paddle carefully to remove air bubbles. Exhaust and process. (See table.) Peaches lend themselves readily to the "fancy pack." Study the size and color of the peaches and the container and pack accordingly.

Pears. Select pears firm, slightly underripe. Peel, remove any specks, blanch rapidly. Blanching makes them pliable so that they pack well. Pears may be either halved and packed like peaches, sliced or packed whole. When packed whole leave stems on and place each layer stems up, letting the second row fill the spaces between the two stems and repeat. Fill spaces with syrup. (See table, page 32.)

Plums. Select sound, uniform fruit. Prick each plum several times with a needle to prevent bursting. Pack firmly into the jars; processing will shrink the plums and allow them to float unless packed very tightly. Fill with syrup No. 4. (See table, page 32, for exhausting and processing.)

Rhubarb. Because of its extreme acidity, rhubarb can be canned safely without processing. Select young, tender rhubarb and cut either into two inch pieces or into lengths to fit jar when placed vertically. Pack in sterilized jars in vertical rows. Cover with fresh, cold water and allow jars to stand ten minutes. Drain off the water and again fill to overflowing with fresh, cold water. Use cleansed rubber ring cap and seal at once.

Credit is accorded for some of the technique presented in this circular to Misses Mary E. Cresswell and Ola Powell of the States Relations Service (South) and to Dr. A. W. Bitting, Secretary National Canners Association.