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Home Canning of Food Products

— BY —

J. E. GRISÉ. B. S. A.

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INTRODUCTION

The preservation of animal and vegetable food products from any essential alteration assumes a greater importance than ever before in home economics.

The continual increase in the price of canned goods and the considerable annual losses of the sub-products of the vegetable-garden have induced the Honorable Minister of Agriculture to come once more to the assistance of the agricultural community in authorizing the publication of this bulletin.

This pamphlet contains a brief outline of the various processes actually used in the preserving of fruits, vegetables and meats.

The methods herein indicated are simple, practical, of easy execution and very economical.

Readers will find the explanation of the few technical terms which it was necessary to use in the first and second parts by referring to the glossary entitled "Useful Explanations to Readers."

If I can contribute by this bulletin to assist, even to a small extent, the District Representatives, the Household Science Schools and the Women's Institutes in their home economics propaganda and if, at the same time, I am successful in giving a new impetus to this branch of agriculture so much important as remunerative, I will consider myself largely paid for my work and I will not ambition any better reward.

J. E. GRISÉ, B. S. A.

Quebec, September 11th, 1917.

USEFUL EXPLANATIONS TO READERS

Aerobic:	This name is given to a certain number of small beings that cannot live or develop without the help of the air.
Albuminoid:	Very common substance in the nature, saltish. The white of an egg is an almost pure albuminoid matter.
Anaerobic:	Contrary of the word "aerobic".
Azote:	Gas forming the four-fifths of the atmospheric air.
Azotized:	Containing azote.
Bacterium, Yeast, Ferment, Mold.	Small being living at the expense of an aliment and causing its alteration.
Bacteriology:	Science or study of bacteria.
Dessication:	Action of drying. To suppress by means of artificial or solar heat the water contained in a food product.
Eatable, Edible:	Aliment proper to the nourishment of man.
Factors, Atmospherical:	Air, heat, dampness.
Hermetically sealed:	Perfectly closed.
Hydrate:	Chemical body composed of water and of one acid.
Micro-organism:	Small living being invisible to the eye.
Microscope:	Instrument which makes things bigger to the eye.
Microscopic:	Very small. Which can only be seen with a microscope.
Omnipresence:	Which is present everywhere, in all places.
Oxygen:	Gas forming the respirable part of the air.
Rarefaction:	Suppression of the air out of a receptacle.
Processing :	Sterilization.
Receptacle:	Any vessel, metal or glass jar that can contain a liquid.
Spore:	Egg. Reproductive organ of a bacterium, yeast, mold, etc.
Sterilization:	Destruction of ferments of all kinds contained in a product.

HOME CANNING OF FOOD PRODUCTS

PART I

GENERAL ELEMENTS

CHAPTER I

DEFINITION, OBJECT, ORIGIN, PRINCIPLES

Definition

Canning is the art of keeping an aliment through sterilization by heat and of maintaining same in this condition in a hermetically sealed container.

In other words, it is then solely an attempt to keep food by the use of means liable to protect same against the influence of certain external causes, such as: bacteria, yeasts, molds, air, heat and consequently to have same retain its original properties for an indefinite length of time. This period of conservation depends only on the care and rapidity exercised in handling the product, that is: **from its picking until its complete sterilization.**

This latter point specially deserves to draw the attention of those interested, owing to its primordial importance in the obtaining of canned goods of a superior quality.

If a large number of housewives and farmers complain, some through lack a sufficient knowledge, others for want of care, to have only obtained, up to now, canned goods of inferior and even mediocre quality; the reason is that the time which elapsed between the picking of the product and its handling or again up to the various operations connected with its canning, was long enough to permit of the product (fruit or vegetable), to be deprived of a certain part of its water and aromatic properties by the influence of the numerous atmospherical factors, and consequently to furnish only quite tasteless products also bereft, in some cases, of their nice distinctive color.

There is a close correlation between the quality of a canned product and the length of its keeping. As for the latter, quality is also dependent

on the care and **specially** on the rapidity of operation, and this from both a domestic and industrial standpoint.

One must then conclude from this fact that the product, once picked, must be canned immediately. This is the great secret for the obtaining of canned goods of a superior mark.

I will have, moreover, the opportunity to insist on this important point further on in this bulletin.

Object

The object of home canning chiefly assumes an economical character.

The farmer obtaining a nice crop, either of fruits or vegetables, will certainly not choose the finest specimens for canning purposes, when he can realise a much greater benefit by selling his goods in a fresh and natural state on the market.

He will rather, after the selection is made, take the fruits and vegetables of inferior quality (it must be understood that this is in regard to size and color, as only good and perfectly ripe products should be used for canning) which would yield a smaller price than the one he could insist upon if they were presented in the form of canned goods.

If it is true that in order to command high prices on the market, it is necessary to pack only products of a superior quality, this is not the case when canned food is intended for home consumption. And even if the crop was plentiful, a farmer is always to be blamed for leaving in the field a product of poor quality as the latter, when canned, will be sold at a remunerative price or procure to his family a wholesome and hygienic daily dish, till the next crop, and this at a very small cost.

Moreover, in doing so, he will be aware of the quality of the aliment used by his family, he will be sure that it is not mixed with any other body liable to give, it is true, a nice appearance to the product, but also to alter the nature of its original and essential properties; there will be a greater variation in the daily alimentation, it will be more healthy and digestive, since the vegetable diet is known as such. By taking advantage of all the **sub-products** derived from his farm, he will effect a considerable saving in lessening the amount of his purchases of canned fruits and vegetables, etc., from his grocer or elsewhere, and for which articles he has to pay high prices.

It will result from this fact that the farmer, although he will be working in his own interest and that of his family, will be in a position to help to the solution of a more general problem. Wherever we are or go, we always hear the same formula, the same complaint: **"it costs much money to live!"**

If my understanding is right, the high cost of living is due to the fact that food products of first importance sell dear. Then, if the farmer, being able to provide himself with his own canned goods, does not contribute to increase the number of consumers in towns and cities and by the fact, to increase the demands for food, the result will be that, the market being besieged to a smaller degree, prices will go down, will be more even and also more proportionate to the budget of the laboring class.

Origin

Prior to our studying the principles and the different modes of food canning, it would probably be a good idea to note, as briefly as possible, the origin and the history of this industry, so important and remunerative; convinced in advance that the farmers who want to progress and who are desirous of acquiring a few notions, both theorically and practically, of the various agricultural industries, will appreciate this short historical account which I take the liberty to insert in this bulletin.

This industry is essentially of French origin. Towards the end of the XVIII century, one of the most important military measures enacted by the French Government and which offered particular interest to the economists and manufacturers of that time, was that of an offer of 12,000 francs (about $2,400.00) to the discoverer of a safe and sanitary method of keeping provisions.

The chief object of this offer was the obtaining of a better quality of victuals, at the same time reducing the annual loss occasioned in military stores through waste and corruption.

At this date, this offer of 12,000 francs was very liberal and immediately retained the attention of a great number of connoisseurs and specially of manufacturers.

Nicholas Appert (1750–1841), at the same time a skilled confectioner, brewer and distiller, was amongst those who began, in 1795, a series of experiments on the subject.

His researches lasted about 10 years and it is only towards the end of the year 1804 that he obtained his first success.

His discovery consisted in submitting the aliment to the action of heat for a variable length of time, according to the nature of the product and in obtaining afterwards the hermetical sealing of the container in which it was to be kept.

Instead of stopping his researches after this first success, he ardourly pursued his experiments, making use of various products both of animal and vegetable origin, and improved his discovery to such an extent that

he published, in 1810, the results of 15 years of steady and intelligent labour.

The reward promised by the French Government was then awarded to him and he has been afterwards universally recognized as the discoverer and the father of this industry.

Although this discovery was the result of an exclusively military measure, the great advantage of keeping food in such a beneficial way and at the same time agreeable to the taste, by means of such a simple and efficient process, particularly arose the attention of the manufacturer and also of the housewife.

As a consequence of this happy discovery, from 1815 to 1830, several canning plants were installed in various parts of Europe.

This industry saw life in America, in the State of New York in 1819, in Boston in 1820, and became so prosperous during the last century that in the United States only, there are more than 3000 canning plants, with an annual output of nearly 3,000,000,000 glass containers and cans of food representing the fair total of $250,000,000.

Prior to the introducing of the process discovered by Appert, one had recourse, in order to keep products, either to the use of salt, vinegar, to drying, smoking or again to the use of sugar, but these processes only concerned a very limited number of aliments.

Moreover, the nature of the latter was susceptible of so many changes and their handling was entailing such a loss that when Nicholas Appert made his discovery, these methods were completely abandoned, not only by the manufacturer but by the farmer and housewife as well.

Principles

Although his method was exact, Appert was ignorant of the real cause of the keeping of food. On this point, his theory was completely false.

In order that an aliment may be kept and may retain its original properties, he said, it is necessary to provoke the complete exclusion of the air out of the glass jars or bottles by submitting the latter to the action of a sufficient heat.

Before arriving to the expression of this hypothesis he evidently had endeavoured, at first, to heat the product in a receptable and to afterwards pour same into the jars. Seeing that the results obtained by this operation were of no good effect on the product, he concluded that the real cause of conservation consisted in the entire suppression of the internal air.

Those who continued his work also attached a great importance to

FIG. 1

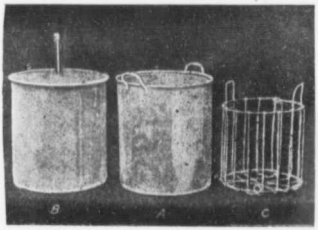


FIG. 2

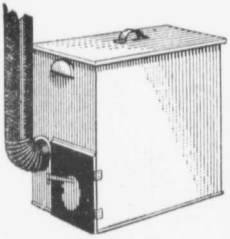


FIG. 3

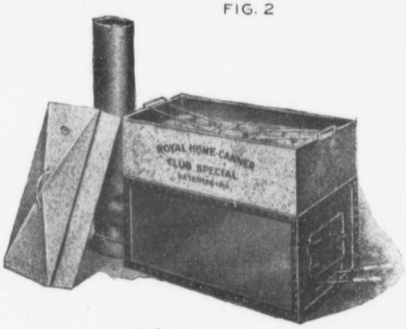


FIG. 4

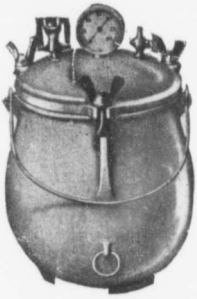


FIG. 5

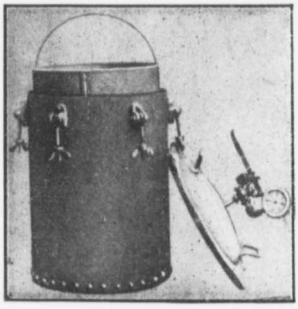


FIG. 6

the prejudicial effects of the air and made every possible exertion so as to obtain a complete vacuum.

This theory of Appert was so much admitted as being the only one that was true, that when tin cans appeared on the market, they had sometimes two or three holes, so as to perfectly eliminate the air.

A few years later, the well known chemist, Guy Lussac, was designated by the French Government to try and throw more light on the matter.

His numerous researches brought him to conclude that the alteration of the aliments was due to a series of oxidations and that the only means of preventing this was the complete rarefaction of the air.

This new theory similar in all respects to Appert's was consequently accepted until the discovery of a new science, the bacteriology, furnished the right explanation.

It is now known that all aliments, water, air, containers or any other vessels used in the handling of food products, are bearers of bacteria and other micro-organisms, that the application of heat is intended to destroy same and that the hermetical closing of the container prevents, afterwards, all causes of fermentation which would happen if the germs were coming in contact with the product.

This new science has also demonstrated that all these microcospic beings are not all killed at a similar temperature. Some spores have a great resistance; certain products are also the vehicule of types of microbes of a greater resistance than some others.

These facts clearly show why certain vegetable products such as: corn, pumpkins, etc., necessitate a higher temperature during quite a considerable time, whereas others such as: raspberries, strawberries and a few other small fruits, only demand a rather low temperature during a rather short time.

From our studying of the present article, we can deduct the two following principles that constitute, properly speaking, the fundamental basis of the conservation of edible products by the Appert process:

I.—**Complete sterilization of the product and vessels used while manipulating the said product.**

II.—**Hermetical sealing of the container PRIOR or AFTER the sterilizing process, with a view to exclude all harmful germs.**

In a subsequent chapter, we will see, in studying the various methods by which to proceed in the canning of each particular product, whether of animal or vegetable origin, why we must in certain cases seal hermetically or not the containers before they are handed over for sterilization.

CHAPTER II

YEAST—BACTERIUM—FERMENTATION

Although this more theorical than practical chapter may appear of a rather abstract nature, the numerous inquiries received from a certain number of farmers and housewives interested in home canning and desirous to obtain information as to the cause of their repeated failures in the packing of fruits, vegetables and meats, have induced me to insert in this bulletin a brief account of the development of these invisible organized beings, which are the only cause of decomposition of vegetable and animal substances, and of the practical means at our disposal to fight same in an efficient manner.

These few notions will only serve to make the lectors better understand the "why" of each operation in the different processes that will follow.

Bacteria and yeasts exist in the air, in the ground, on all animal or vegetable substances and even in the living organism.

But, in spite of the universal existence of these infinitely small beings, the exact knowledge of their nature and structure is hardly forty years old.

There is a great number of varieties of these micro-organisms: some are harmful, others,—the majority—are serviceable.

Yeast

The yeast is composed of only one cell. Its mode of reproduction consists in the development of a bud on the surface of the cell, which breaks after some time to give birth to another plant similar to the first one.

Bacterium

The bacterium spreads more rapidly than the yeast and its mode of reproduction is also different of the former.

As the yeast, it is formed of only one cell invisible to the naked eye and which can only be studied with the help of a microscope.

This cell contracts itself, divides and gives birth to another similar cell. Its mode of multiplication is accordingly simple and rapid.

Bacteriologists have esteemed that a single bacterium can produce, within 24 hours, 17 millions of similar organisms, if all the favorable conditions of dampness, heat and proper nourishing surrounding are combined.

Spores

A good number of varieties of yeasts and bacteria are productive of spores.

Just as the seed of a plant, these spores can retain their vitality for a time shorter or longer, even if they were exposed to the influence of certain factors which would kill the organisms that gave them birth.

Condition of Existence

Yeasts and nearly all bacteria require, in order to develop and multiply, the oxygen of the air. In this case, they are called "aerobics."

To the contrary, some kinds of bacteria seem to grow just as well, when in the shelter of the air, consequently without the help of oxygen. These bacteria are called "anaerobics".

From these facts, we consequently infer that the exclusion of the air, naturally containing oxygen, is not always a protection,if a bacterium "anaerobic" finds its way into a glass jar or a tin can when the latter is being sealed.

It is the presence of these yeasts and bacteria that cause the alteration of aliments. Chemical changes occur which are revealed to us either by escaping gasses or by the unpleasant taste of some victuals.

The development of a bacterium does not take place within a substance containing a strong percentage of sugar; but in a suitable liquid body with only a small part of sugar, its growth is rapid.

Food with a large percentage of albuminoid also affords an excellent medium for their multiplication, specially if the degree of dampness and heat is favorable.

Eggs, milk, meats, fish and leguminous products such as: beans, peas, etc., are very rich in azotized principles owing to the omnipresence of bacteria; the keeping of these aliments consequently presents certain difficulties. Their example is a striking one, particularly in a warm and wet weather when all these strongly azotized substancess poil in a very short time.

As regards the yeasts, they develop excessively fast when they are in a medium formed of a diluted solution containing hydrates in addition with mineral and azotized constituents.

The acidity of a few vegetables is so high and that of albuminoid substances so small that very few yeasts and bacteria develop into same. Cranberries (blueberries), rhubard and citrons belong to this class of vegetable products.

The same as some vegetables, fruits as a whole, owing to their sour-

ness, do not constitute a favorable midst for the development of bacteria. Canned fruits are rather altered by the growth of yeasts.

The temperature is still an essential factor for the propagation of micro-organisms. Some species require a very low temperature; others a very high one, up to 125°F. and even more.

If a bacterium is productive of spores, the complete destruction of the latter will only be succeeded at the temperature of boiling water, or 212°F. during one hour and for a longer time in some cases.

However, the greatest number of these species are destroyed at the temperature of boiling water during a lapse of time of 10 or 15 minutes.

This leads us to the conclusion that in order to kill a spore the temperature must be higher than that of boiling water or that the article to be kept must be submitted to 212°F. for a longer time or again under pressure for a shorter time.

Yeasts and their spores are more easily destroyed by heat than the spores of a bacterium.

If it is naturally impossible to ascertain what kind of organisms are existing in any food, it is however known that most of the fruits do not offer a suitable nutritive midst and, as a general rule, in submitting them during 10 or 15 minutes to the temperature of boiling water, the yeasts which develop, the same as in the juices of fruits, are thoroughly done away with.

After all deductions are made, fruits, thanks to their small percentage of albuminoid substances, are consequently kept more easily than the aliments rich of the latter.

If the fruits, as well as all the other instruments used in canning, are perfectly sterilized and if the glass jar or tin can is hermetically sealed, there is no reason to prevent their keeping for one year and longer (excepting a small loss of texture and flavour), although canned fruits suffer a certain damage even under the most favorable conditions.

It is not necessary that the container be hermetically closed when a fruit is kept with a large addition of sugar (one pound of sugar for each pound of fruit), because thick syrup is not propitious to the development of harmful germs.

However, glass containers closing hermetically are more recommendable for the keeping of such articles than large open receptables, because molds come freely on the wet surface of these strongly sugared substances when the latter are exposed to the air.

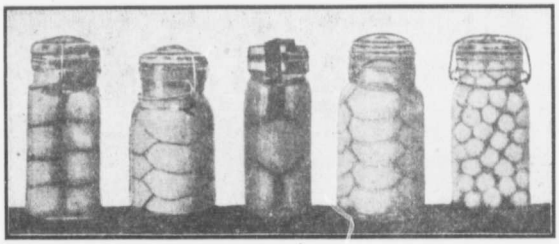
Mold

Spores are very light and are constantly being transported by the wind. Being, however, a little heavier than the air, they end by settling

on the various objects which they meet. If it happens to be a substance containing the required dampness and nourishment, very tenuous threads will form, will penetrate into the mass and ramify. Within a comparatively short time new spores are produced and the multiplication goes on quickly.

This internal vegetation is not, however, as much prejudicial to packed goods as the work of bacteria and yeasts.

These spores are killed by exposing the food to a temperature of 150° to 212°F. after which they must be placed in a dry and cool place, and carefully covered, so that new spores carried by the wind will not deposit on their surface.



PART II

METHODS OF PRESERVATION

CHAPTER I

APPERT PROCESS

Besides the numerous methods of preservation such as: air, drying-kiln and evaporator **dessication,** the **enrobing,** the use of **antiseptics**, **coldness,** there is the preserving method which consists in making use of the **heat**, or the **Appert process.**

This latter method can be subdivided into five sub-methods which we will classify as follows:

1.—"Cold-pack" process.

2.—Cooking of the product **before** it is placed in the container.

3.—Cooking of the product **after** it has been placed in the container.

4.—Fractional or intermittent sterilization.

5.—Cooking of the product and placing of same in a special receptacle in which the vacuum is effected.

(1) The "cold-pack" method is often used for the preserving of rhubarb, of gooseberries and of a comparatively small number of small sour fruits.

This process is not given as a practical one for the very simple reason that most of the products thus preserved will have to be cooked before consumption and because their cooking at the very moment of their canning is a saving of time and labor.

If this method is employed one will have to proceed as follows:

1° Clear the product of all its vegetable parts such as envelope, stem, leaves, etc.

2° Remove all gummy substance or earthy particles adhering to the peel of the fruit by washing same in cold water.

3° Place in a strainer or any other perforated vessel and pour enough of boiling water for the fruits in the center of the mass to be perfectly scalded.

4° Immediately put the product into the glass container or tin can and add very cold and clear water previously sterilized, until the receptacle is filled.

5° Seal the container hermetically.

If the above operations are carefully accomplished and are practised without interruption, there is no reason why the products hereabove mentioned should not be preserved in a practically fresh condition.

(2) This second method, which consists in the sterilization of the product before its pouring into the container, is unquestionably, the oldest and still the most employed.

Well followed, this method is wonderfully successful for the preservation of most of the fruits, but is not to be used for vegetables in general, specially for vegetable greens, foliaceous vegetables, corn and meats.

Its disadvantage consists in occasioning more work and in allowing new spores or bacteria to deposit on the product while it is being canned.

(3) The third process, which consists in cooking or sterilizing the product after it is canned, is certainly the most simple and economic. It is applicable in the preserving of all edible vegetable or animal substance (fruits, vegetables and meats).

By this method, the sterilization is done in the containers in which products will be preserved, rendering impossible, by this fact, the introduction of new spores or bacteria once the food has been carefully sterilized or cooked.

This process demands considerably less work than the former, does not burn so much fuel and is by far the most effective.

(4) The fractional or intermittent sterilizing process consists in submitting the product to the influence of heat during three periods (each of them to be rather short) during three consecutive days.

It is based on the fact that some spores or bacterian species are much more resistant than others and are not killed by a single period of sterilization.

So, during the first period, bacterian cells are destroyed, but spores requiring a higher temperature are not.

During the 24 hours following the first cooking, spores which have not been destroyed germinate and produce new cells whose destruction the second period of sterilization should accomplish.

Finally, a third cooking, the third day, will destroy the new cells formed by spores that would not have germinated before the second period of sterilization and this to be absolutely sure of the thorough destruction of all micro-organisms, either in a growing state or in that of a spore (egg.)

This process would specially be recommendable for the preserving of vegetables, because products growing into the ground or on its surface such as beans, peas, asparagus, etc., are of a much more difficult steri-

FIG. 7

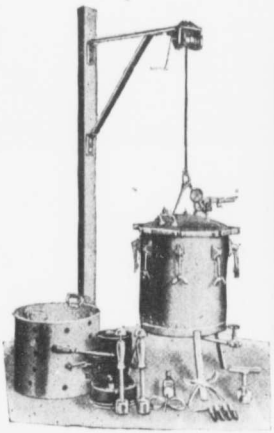


FIG. 8

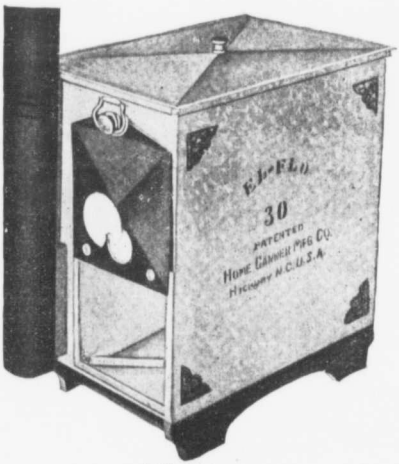


FIG. 9

lization: the soil being productive of several kinds of very resistant microbes.

However, after all deductions are made, if we consider the loss of time and the increase of work necessitated by these three successive cookings, the process referred to is not at all satisfactory.

It is not of a nature to encourage the preserving of a large quantity of the most necessary food products such as: corn, peas, tomatoes, foliaceous vegetables, etc. Moreover, it occasions the expense of three times more fuel and, **as a rule, the product is overcooked.**

(5) This fifth and last method, which consists in submitting the product successively and without interruption to the action of boiling water, cold water and to the sterilizing process before it is packed, is excellent and efficient, but is not practicable for a good many housewives and farmers in this province. Its user is obliged to purchase a receptacle with a special covering which permits of making the vacuum into same once the product is in.

After this short study of the five methods based on the Appert process and presently in use in the packing industry, both from a domestic and industrial standpoint, we are forced to admit that the **third method** mentioned is by far superior to all others for the three following reasons: saving of time, of labor and fuel. Moreover, it has the great advantage of being easily employed in the preservation of all perishable products.

Its efficiency and particularly its easy and economical application caused same to be chosen in preference to others, however excellent.

In the description of the various processes of vegetable, fruit and meat packing which will be the object of the fourth part of this bulletin, we will only employ this method of preservation.

CHAPTER II

STERILIZATION

This means the complete absence of organised beings (harmful germs) on preserves or in their interior.

In the first part of this bulletin we have had the opportunity of making a brief study of the structure, of the development and of the work of microorganisms; we have seen how food is altered by their growth and their extraordinary propagation and, finally, we have ascertained that these microscopic beings in a growing state are destroyed at the temperature

of boiling water, but that the spores and more resistant kinds of bacteria are not destroyed by the same temperature unless they are exposed to it during two hours or more.

Bacteria and yeasts which develop within the food are not so easily destroyed as those growing on the surface, and above all, of the microbes which have set on a smooth surface such as, for instance, utensils or containers used in handling the product.

The equipment employed in the manipulation of the product is just as liable of being contaminated as the product itself. **For this reason, every instrument: knife, strainer, container, etc., must be sterilized in the same way as food.**

The sterilization of the packing material is obtained by soaking same in boiling water for 10 or 15 minutes.

Glass jars and caps must be soaked in cold water and gradually heaten up to 212°F. equally maintaining this heat for 10 or 15 minutes.

When possible, containers should not be taken out of boiling water until we are ready to fill them with the food to be preserved.

This work must be performed in a very clean room, carefully swept and free from dust. Clothes and wiping cloths used during the packing should also be very clean.

Several kinds of sterilizers are actually in use both for domestic and commercial purposes.

They can be classified as follows:

HOT-WATER BATH OUTFITS

1.—Home- made out fits

Ordinary kitchen receptacles such as: a tin boiler, a metal or galvanized tub, a milk bucket, a wash boiler (fig. 1) and finally a large boiler used for cooking meats or in making syrup or maple sugar.

These various kinds of receptacles should have a cover perfectly fitting the upper edge of the side so as to retain inside during the sterilization as much steam as possible. Moreover, they will have to be equipped with a false wooden or metal holed bottom, destined to support glass jars or cans with a view of preventing their direct contact with the bottom of the receptacle, and also in order to allow the free circulation of water and steam around and under the containers.

2.—**Hot-water bath, commercial outfit**

This sterilizer will particularly be used by farmers desirous of devoting themselves to commercial canning (fig. 3).

This bath has a fire-pot, a smoke chimney,a sterilizing vat and a movable tray permitting of removing from the bath, all at one time, glass jars and tin cans, once their content has been sterilized.

This equipment is light and can be moved easily from one place to another.

This sterilizer together with the ordinary kitchen utensils above mentioned are generally known as (**hot-water bath**).

3.—**Water-seal outfit**

This oufit (fig. 2) consists of a double-walled vat, of a wire basket destined to plunge the containers into the water and to remove them after their complete sterilization, and of a cover equipped with a thermometer showing the degree of heat, and the edges of which, being of the same height as the vat, penetrate into the open space between the two walls of the latter. Thus, two water columns are obtained which can give a higher and more equal temperature.

STEAM-PRESSURE OUTFITS

Quite a considerable number of these are now to be found on the market (fig. 4,8,9). All of them are efficient, give entire satisfaction and should be used in greater numbers in our rural districts for the packing of fruits, vegetables and meats and also of the sub-products liable to be preserved.

My intention is not to undertake the enumeration of these various outfits. I will simply content myself with mentioning a couple of those that are in greater use and which have, up to now, proved entirely satisfactory to those who have employed same for the packing of farm products.

1.—The **"National" Jr Outfit No. 5** is, without contest, the most desirable equipment for a farmer who is desirous to start in commercial canning. This sterilizer has a **daily capacity** of 300 to 500 glass containers or tin cans. This autoclave (fig. 7) is fed with gasoline. One gallon is sufficient to maintain a very intense blue fire for about ten hours. The same as for a gasoline heater, the flame can be regulated according to wishes. Once the desired pressure has been reached it will not be necessary to have a very intense heat to keep it to the same height.

The boiler is made of steel and can carry up to 30 lbs pressure. A

steam-gauge indicating the pressure is fixed on the center of the cover, as well as a pet-cock and a safety valve.

The bottom part supporting the boiler and containing the serpentine (rolled pipe giving access to the gaseous mixture and which is the fire box of the outfit) retains enough heat to allow the steam-gauge to register a pressure of 5 lbs within five minutes.

The outfit is very simple of operation, very economical, durable and gives satisfactory results.

2.—Another very recommendable outfit is illustrated by fig. 5.

Its construction is such that it can carry from 5 to 30 lbs pressure; it is equipped with a movable perforated boiler, a steam-gauge, a safety valve and a pet-cock.

The same as the former, it can be regulated so as to obtain various temperatures.

3.—The farmer who already has a steam-heating installation on his farm can easily manufacture himself an autoclave such as the one described in bulletin No. 10, entitled" **Le Potager Canadien".**

This sterilizer or autoclave would simply consist of a strong wooden box, 3 inches thick, the outside part of which is reinforced by wooden or iron cross-pieces.

The inside of the box must be lined with strong sheet-iron as well as the inner side of the cover.

The seams occasioned by the assembling of the sheets of iron must be well soldered and the cover, kept in place with hooks or clamps, must close air-tight.

The box in question must have the following equipment:

a.—Steam pipe.

b.—Exhaust pipe.

c.—Safety valve.

d.—Steam-gauge marking the pressure.

e.—Thermomether registering the heat.

This sterilizer, if well made and equipped with all the above mentioned accessories, can only give but very satisfactory results, and every farmer interested in commercial canning should take the time necessary to make one himself instead of purchasing one from manufacturers of canning outfits and at a cost which is always high.

Its operation is very easy.

The air must firstly be excluded of the retort as much as possible, other-

wise, the steam-gauge would not register the right degree of heat on account of the gaseous mixture of air and steam which would form during the process of sterilization.

In order to operate this air exclusion, a small pet-cock placed on the cover or on the upper side of the box and which will be left slightly open during the operation, will thus permit of the steam continually penetrating into the autoclave to expel the air which is emprisoned therein.

Once the sterilization is over, **one will never open the pet-cock to let the steam out,** and the following is the reason:

During the sterilizing process, a strong pressure is exercised on the sides of glass jars or tin cans. This pressure is only counterbalanced by the outside pressure, that is, the one existing in the autoclave. Consequently, if the steam is eliminated after the operation, a sudden depression will necessarily occur in the autoclave, while the pressure existing in the glass jars or tin cans will remain the same. As a consequence, the outer resistance failing, the sides of the containers will not stand the inner pressure and the result will be that all the jars or cans will collapse.

It is then necessary, once the food has been sterilized, to shut the steam pipe **and allow the pressure to fall down by itself.**

When the steam-gauge hand has returned to zero, the pet-cock is opened and when the sterilizer is free from water and steam, the cover is lifted so as to remove the containers.

When taking the cans out of the autoclave, one will generally notice that they are swollen: **this is a good note.** The contrary would lead to believe that the soldering is defective.

After the cans have cooled for a few hours, they retake their former shape.

4.—Small aluminum pressure cooker.

This small apparatus is the most efficient from the double standpoint of domestic canning and of the preparation or cooking of meats and soups for daily consumption.

It is very easily operated, does not need much fuel and gives excellent results. It can also be used on an ordinary coal stove just as well as on a gas or gasoline heater.

More details as to its shape and accessories would be needless. A single look at the picture (fig. 5) will make the subject more comprehensible to you.

HOW TO OPERATE WITH THE HOT-WATER BATH AND THE WATER-SEAL CANNER

Many difficulties will be overcome in the use of these two kinds of sterilizers if the following remarks are well taken note of and observed.

1.—Glass bottles or tin cans must stand on a small movable platform, which has sufficiently of holes to permit of the air circulating freely around and under the containers.

2.—Add enough water into the sterilizer so that the tops of glass jars or tin cans will be covered by at least one inch of water.

3.—Start calculating the time or the number of minutes allowed for the processing as soon as the water is boiling.

4.—Once the sterilization is over, allow the water to cool a little, remove the containers immediately and seal air-tight.

A certain part of the liquid in the containers may be lost during the sterilization if the latter are not wholly covered by the water in the retort, if the caps do not press sufficiently hard upon the rubber gaskets and if the false bottom (movable bottom) does not permit of the free circulation of air under the containers.

OPERATION OF THE VARIOUS MAKES OF AUTOCLAVES

In order to obtain the best results with the various autoclaves the following precautions will have to be carefully observed:

1.—As soon as the container has been filled with the product to be preserved it must be placed in the sterilizer.

2.—Have sufficient water for same to reach the level of the false bottom, but not higher.

3.—Once the autoclave has been filled with the food containers to be sterilized, it will be hermetically closed.

4.—Keep the air-cock or regulator completely open, so as to permit of the air escaping out, shutting same immediately afterwards so as not to occasion a useless loss of steam.

5.—The steam-gauge handle must register the **desired pressure** before commencing to count the time required for the sterilizing of the food.

6.—Maintain, by means of the air-cock or regulator, an even pressure during all the time of the processing.

If a gas heater is used, the pressure can also be regulated by lessening

the intensity of the flame or again in partly removing the sterilizer from the fire when in the case of an ordinary kitchen stove.

7.—Allow the steam to fall down until the steam-gauge handle will register **zero** before opening the autoclave.

8.—Containers must be sealed air-tight as soon as they are out of the sterilizer.

CHAPTER III

UTENSILS REQUIRED FOR CANNING

Whatever may be the kind of apparatus used in the sterilizing of food, a certain number of other utensils are indispensable to the preparation of food before it is submitted to this process.

These articles are the following: **enameled** receptacles with top, for handling and scalding fruits or vegetables; strainers, paring knives, wire basket, also enameled and used in connection with the blanching of certain vegetables, special tongs with which to remove containers from the autoclave or hot water when the sterilization is over; spoons, preferably of silver, so that acids contained in the fruits will not attack the metal thereby giving to the canned goods a bad taste and color; wiping cloths, cheesecloth which is used in some cases for the scalding of small fruits; plenty of cool and clear water and finally any utensil which may be of a nature to facilitate the obtaining of canned goods of **first quality** (fig. 10, 11, 12, 13, 15, 16, 17, 18).

KINDS OF RECEPTACLES USED

(a) Glass containers

Glass bottles or jars of various sizes and shapes (fig 26) may be used in canning fruits, vegetables or meats for home purposes.

However, the most commonly used are the following:

1.—Glass jar sealed by means of a metallic band screwing upon a glass lid so as to strongly press the latter on a rubber gasket thus operating a thorough hermetical sealing (fig. 20).

2.—Glass jar also equipped with a glass lid, a rubber gasket and two wire levers, one of which can be pulled back on the lid to keep it in position and the other, fixed on the side and intended to effect an hermetical closing (fig. 22).

3.—Glass jar with a special top, hermetically fixed by succion on the circumference of the receptacle. This kind of container is not practical

except for industrial purposes as the top is only set by a special machine which is rather expensive.

Although large neck bottles or glass jars, not furnished with an hermetical closing top, are not to be used in ordinary canning, they can easily be employed for the preserving of fruits, jams, jellies, marmalades and all other preparations into which a large quantity of sugar is added. Such preserves can be kept free from insects and dust by means of a piece of paper upon which a slight coat of paraffine is applied hot, or simply of paraffine poured on the surface of the product when in the case of jellies or marmalades.

Before the food to be preserved is deposited into the glass jars, the latter should be tested as to their hermetical closing, well washed and afterwards placed in a receptacle full of cold water so as to sterilize them for a few minutes by heating the latter on the stove. The glass jars will remain immersed in hot water until we are ready to fill them with the product.

In order to test glass bottles closing by means of a metallic band acting as clamp, we simply set the lid without the rubber and the clamp is strongly screwed upon the lid. If the blade of a knife can be introduced easily between the upper edge of the metallic band and the lid, the former is defective.

Another very simple means is to screw the metallic band slightly on the rubber gasket and to pull the latter out of its position. If, once pulled back, it takes its former position, the metallic band is again defective.

A glass top not equally pressing all around on a receptacle must not be used.

The wire levers setting the top on the rubber gasket let us hear a **little snap noise** when they are brought back in place. If they do not press sufficiently, a little bending will give the desired result.

Only rubber gaskets or rubber bands of good quality must be used. It is not necessary to say that a new rubber will be used each time a glass jar is utilized anew.

These gaskets will be of pure rubber preferably.

The food to be preserved will be poured into the glass jars while the latter are still hot, after which the rubber band and the lid are immediately set in place. However, the hermetical closing will never be made **prior** to the sterilization, whatever may be the kind of glass jar used.

Glass jars must always be handled carefully. After their sterilization, they will never be placed in contact with a cold body such as: metal, stone, cold water or yet in a current of air. As well, glass jars will never be put

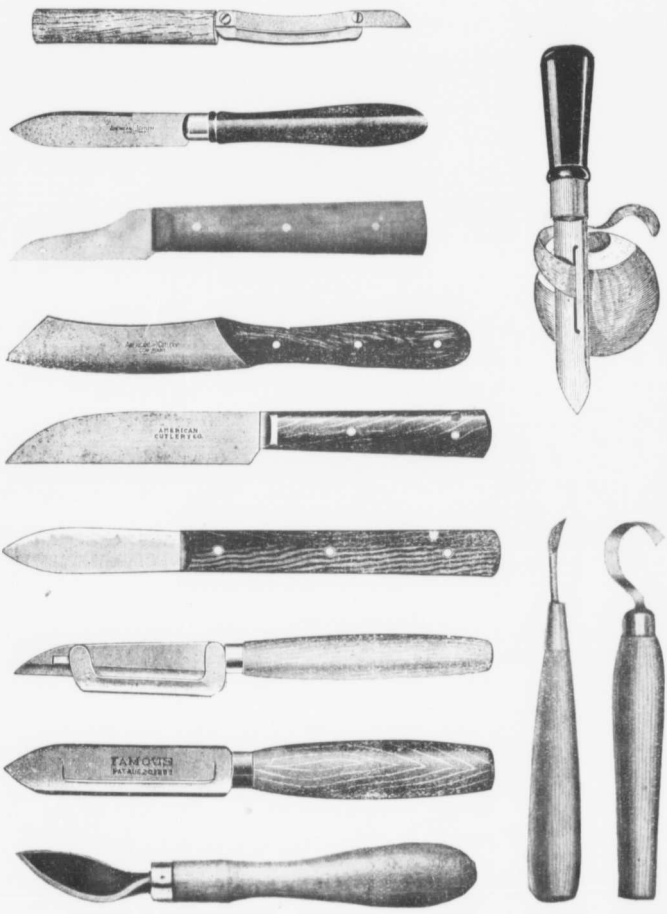


FIG. 10 A B

FIG. 10.—Paring knives.
" 10a—Instrument used in removing the stone of the fruit.
" 10b—Instrument used in removing the core of the fruit.

in boiling water for the sterilization of the food. In both cases, glass jars would unavoidably **collapse.**

Cold jars should always be placed in cold water and inversely. Never heat the water in the sterilizer before the glass jars have been placed therein.

The lever intended to keep the lid in place on the rubber gasket **must not press too hard, but just enough.** If it is too hard and presses too strongly the glass jars will break during the process. If, to the contrary, it is too weak and does not press enough, a considerable quantity of the liquid will flow out of the jar. Hence, the absolute necessity of **testing** the receptacles before they are used.

Before bringing to a close these few data on the various kinds of glass jars and their use in the canning industry, I believe that a few details as to the use of earthenware vessels or jars actually sold on the market will be useful (fig. 24). The same as glass jars, the capacity of the former ranges from one pint to one gallon. They can be successfully used for home canning purposes. These containers close in the same way as glass jars equipped with levers and the same care must be exercised during the sterilization.

They will be carefully washed and completely sterilized prior to being filled with the food.

The only difference existing between these crockery receptacles and glass jars resides in the sterilizing process. The time allotted for the sterilization of food in glass jars will be increased by 10% or 20% for the sterilization or cooking of the same food in crockery jars.

This point is very important and deserves the consideration of those interested, for the following reason: because earthenware containers do not transmit the heat as quickly as glass jars or tin cans and if the cooking period is not advanced by 10% or 20% as directed above, the result will be that the product will be imperfectly sterilized and the injurious germs or yeasts will only be partly destroyed.

On the other hand, after a thorough sterilization, the food will cool much less quickly than in glass jars and this, in virtue of the same principle which makes earthenware transmit the heat with much more difficulty than glass or tin; hence, the necessity of plunging the crockery jars into a bowel filled with cold water for a **few moments**, after they have been taken out of the autoclave or of the hot-water bath. This rapid cooling of the food is important in order that it may retain its firm texture and its agreeable flavour. Food preserved in tin cans or glass jars does not

require to undergo the cold water bath after the sterilization, tin and glass permitting same to cool quickly enough.

(b) **Tin Cans** (fig. 21)

Mostly all products can be preserved in ordinary tin cans. A certain number, however, should be preserved in enameled tin cans, or the inside of which is "laquerred" which hinders the acids in the food from exercising a chemical action on the side of the container and to form tin salts which, in many cases, may cause poisoning or seriously injure the health. Foliaceous vegetables, vegetable greens, beets, strawberries, cherries, pumpkins, fish, chicken and meats must always be preserved in sanitary enameled cans in preference to any others.

Tin cans are also very practical for the canning at home of fruits, vegetables, specially vegetable greens, soups and meats. Their use is considered very efficient by several practical men in this way that the oprations are simplified and that the accomplishment of more work in a given time is rendered possible.

The handling of food thus preserved in tin cans is done with greater ease, specially in regard to transport and storing.

Size of cans

The various sizes of cans advantageously used in home canning are the following:

Can No	Size of Can	Diameter of opening of soldered cap cans
1	2 5/8″ x 4″	2 1/16‴
2	2 5/16″ x 4 9/16″	2 1/16″ or 2 7/16″
3	4 1/8″ x 4 7/8″	2 1/16″ or 2 7/16″
10	6 3/16″ x 6 7/8″	2 1/16″ or 2 7/16″

Styles of Cans

There are actually on the market two types of cans particularly used for the preservation of food products.

1.—The **sanitary can** whose cap is of the same diameter as its own; it closes air-tight by means of a special machine called sealer.

The circumference of the cap destined to come in contact with the

side of the can is hemmed with a special composition of rubber and paper which makes the can air-tight when the cap is fastened to it. Soldering is not necessary with this kind of can.

There are also several types of cans a little different from the ordinary sanitary can. They are manufactured to permit the use of special machines.

If this kind of container is used, we will always ascertain the efficiency of the can sealer and the hermetical closing of the can by putting them to the following test: put two or three tablespoonfuls of water in the can and close same air-tight; the can will afterwards be immersed into a vessel containing boiling water for about three minutes. If air-bubbles arise from the can to the surface of the water, this will indicate that the closing is not hermetical and that, consequently, the work of the seaming machine is defective. The contrary will show that the container is air-tight and that all cans filled with foodstuffs may be sealed without having to fear a failure.

2.—The **ordinary tin can** with a cap of a smaller diameter than that of the can and set to the latter with solder.

The outside part or edge of this cap is bordered with a thin coat of solder which is liquefied by the application of heat (with a round capping steel) and which makes an air-tight closing.

When purchasing ordinary tin cans, always clearly specify the **kind of cans** you are anxious to have; whether common tin cans or enameled tin cans (laquerred). The same precaution applies to sanitary cans.

Regarding the buying of caps, always ask for caps whose outer edge is furnished with solder or solder-hemmed caps, and mention the diameter of **opening of the cans.**

For the canning of whole fruits as well as for some vegetables, cans with an opening of 2 7-16" in diameter and even larger are preferable.

As it would not be economical to purchase several round capping steels, it is strongly recommended that only cans of the largest opening, (or 2 7-16") be employed, thus necessitating the purchase of only one capping steel of the same diameter.

CHAPTER IV

HOW TO OPERATE THE HERMETICAL SEALING OF TIN CANS

(a) **Sanitary cans**

Two very distinct operations are necessary to effect the hermetical sealing of sanitary cans.

When the can is placed on the base of the sealing machine and is firmly kept in position by the upper chuck, the first operation consists in crimping or seaming the cap to the can. The superior edge of the cap and the circumference of the can are sufficiently bent in advance for the seaming to be made quickly and without any difficulty.

The second operation consists is strongly pressing the seam effected by the first operation until an hermetical sealing is obtained.

The indication of these two operations, it is true, gives but a very undetermined idea of the manner of operating the hermetical sealing of these cans with a hand or mechanical sealing machine, but every farmer or person desirous of using this kind of container will, of course, have to procure a sealing machine, and written instructions as to its use are usually furnished by the manufacturers. Cans of all sizes may be sealed with this machine. A sufficient number of movable chucks of various diameters accompany same and can be easily set as required.

It would, moreover, be suplerfluous to make here the complete enumeration of the various pieces of the machine: a single look at the picture (fig. 31), will give an exact idea of its action and of the operations hereabove described.

(b) **Ordinary tin cans**

These containers are sealed hermetically with solder. Alike the sanitary cans, they are closed prior to being sterilized.

Hereafter is the enumeration of the material required when soldering if necessary: a small alcohol or oil stove (fig. 33), a round capping steel, a tipping copper (fig. 32), a lump of sal ammoniac, a small brush, a few fragments or small pieces of zinc, a few sticks of solder, a soft brick for the polishing of steels, a file, a **special liquid mixture** and a small cup or salver, whether of earthenware, glass or stone, into which the liquid mixture will be deposited.

Preparation of the special liquid mixture (soldering flux)

This composition consists in a solution of zinc with muriatic or chlorydric acid. It will be obtained by the following process: pour two or three ounces of muriaric acid into an earthenware, glass or stone receptacle and add a few fragments of zinc (small pieces) until complete saturation of the acid. Once the fragments of zinc are thoroughly dissolved, the solution will be diluted in twice its volume of water and filtered through a piece of cloth. The flux thus obtained will be left to settle during 12 or 16 hours before being used. When about to use same, stir the liquid enough so that it will be perfectly homogeneous and see that it is kept free of dust and all other foreign bodies. When this compound is applied, care should be taken not to spill any on one's clothes.

This liquid is intended to clean the tipping coppers and steels and to brush the tin on the spots where solder is to be used, so that it may adhere to the tin perfectly.

This preparation can also be purchased, ready to be used, from druggists or hardware merchants.

Powdered resin can also be substituted to it.

How to tin the round capping steel ?

The steel must, at first, be carefully cleaned with a file or knife blade, then heated enough so that it may dissolve a small quantity of solder into sal ammoniac (sal ammoniac can be obtained from a druggist). It is afterwards turned into the mixture formed of solder and sal ammoniac until it is entirely covered with solder.

How to tin the tipping copper ?

It is tinned in the same manner as the former, it is not necessary, however, to dissolve as much solder. It is also advisable to file and sharpen same from time to time so as to smoothen the triangular surfaces and at the same time to correct the end or point of the copper. This point must be very sharp.

It must be very clean and its surfaces free from any particles of smudge or burned matters. When the end of the copper is hot enough, a small quantity of solder is dissolved preferably in the center of a brick of sal ammoniac, after which the point of the copper will be turned around two or three times into the mixture, so that it will be thoroughly covered with solder.

CHAPTER V

HOW TO USE CAPPING STEELS AND TIPPING COPPERS

Round capping steel (fig. 34)

After having ranked on a table a certain number of cans filled with food, set the caps in position and applied around the edge of the latter a small quantity of the liquid mixture (mixture of muriatic acid and zinc) referred to in a previous paragraph —this liquid is applied in the following manner: one finger is placed on the cap, on the little vent hole in the center, so as to keep the cap in position, and with the small brush, the liquid is applied on the solder around same. The finger must rest strongly enough so that the compound will not flow inside the can — the irons which we will have placed to heat during the preparation and the canning of the food will be taken out of the fire pot, so as to be ready to commence soldering as soon as warm syrup or boiling water will have been poured on the food. This warm liquid is intended to chase the air which is imprisoned in the can, and the latter must be sealed air-tight before the cooling of the food, otherwise it would facilitate a new introduction of air.

The little vertical sliding rod inside the steel is firstly introduced into the small center vent on the cap so that the latter may be kept firmly in place. The steel is afterwards brought down vertically on the four soldering spots and half a revolution on the right side and another on the left are quickly executed,the same movements being repeated a second time. The left hand must lie **rather heavily** on the center rod so as to maintain the cap, but on the other hand, we must **never** bear hard on the capping steel, its weight alone is sufficient. If the rotary movements given the steel are quickly and carefully executed, the soldering will be perfect.

When the iron is removed, a minute inspection of the seam should take place. If the soldering is not found to be perfect, the operation is practised anew or the small vents are closed with the tipping copper, using, of course, a stick of solder.

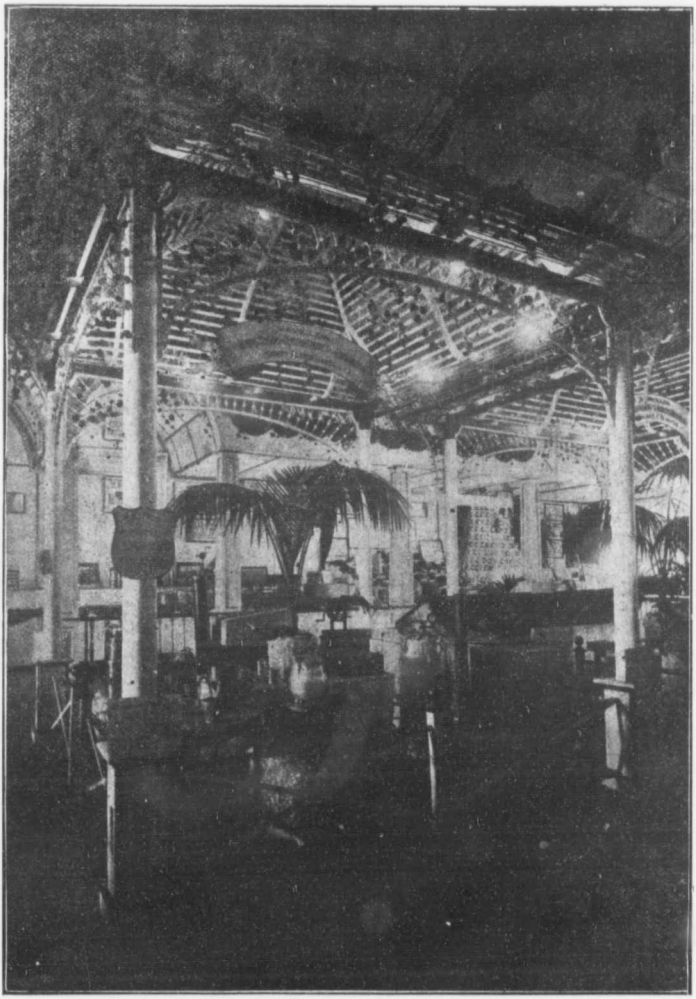
If caps with no soldering on the outer edge are bought, a stick of solder is used and is slightly applied on the cylinder of the capping steel, the latter having previously been placed on the cap and the same movements as described above being executed.

There are also round capping steels with a small gasoline tank on the cylinder (fig. 19). These steels are very practical, quickly heaten and are entirely satisfactory.

Common tipping copper (fig. 35)

With the small brush, soaked in the solution of zinc and muriatic acid, which we will hold as obliquely as possible, we will slightly strike the small vent hole in the center of the cap. The end of a stick of solder of the smallest possible diameter (wire solder is actually sold for this purpose) is placed on the opening upon which the hot copper tip is applied. Press a little in giving the copper two or three rotary movements and remove promptly. With a little practice and great care we will very quickly obtain a perfect joint.

A promising housewife.



Display of the most recommendable types of home canning outfits.
(*Quebec Provincial Exhibition, 1917*)

PART III

SELECTION, PREPARATION AND STERILIZATION OF THE PRODUCT

CHAPTER I

SELECTION

The first choice of the product must be made at the very moment of the crop: **it is the most important** and on this choice success is depending for a great part.

It is true to say that there are several ways of defining the word **selection**. For more precision I will say immediately that in the present case, this selection must solely be made amongst fruits or vegetables of the same variety. It is then necessary to grow **but one variety**, specially the one which is known as being the most advantageous for canning purposes.

This is elementary and the farmer is well aware that it would be altogether illogical to seed or plant a certain variety of vegetables or fruits on a certain area whereas he would grow another variety on the neighboring plot. How will the varieties be able to retain their characteristics, if their cross-breeding is facilitated by their being placed one close to the other?

Moreover, in order to make a success of this industry, it is imperative that each process, intended to transform the product, **be made in due time.** In other words, each operation consisting in the scalding or sterilization of the product, **requires a limited time and varying with each variety of fruits or vegetables.**

Besides, of the same species of fruits, some varieties are harder, tougher, more resistant to the processes to which they are submitted than other varieties. For instance, if apples or pears of different varieties are placed in a glass container, it would be impossible to sterilize each of them during the length of time required, unless a previous selection be made; which would entail a loss of time, would need labor and would command a higher price, in the case of commercial canning.

In the case of non selection and uniform sterilization, the varieties of tender fruits and vegetables would be overcooked, would lose their good

texture and aromatical principles, whereas harder and more resistant varieties would be but imperfectly sterilized.

The fruit only possesses its good flavour when it is ripe. For canning purposes, the fruit must be picked before it is **completely** ripened except in a few cases.

The fermentation of soft fruit, that is of a small percentage of acidity, follows the complete maturity very closely; for this reason it is always preferable to pick same before it is **too ripe.**

As already stated, the canning of the product **must immediately follow its picking.**

For this purpose, do not pick but just the quantity of fruits or vegetables that you will be able to can the same day: otherwise they will lose a part of their water and aromatical principles, will become harder, tougher, will necessitate a longer period of sterilization and will give but canned products of inferior quality.

The most recommendable varieties of apples are those that are rather sour. Late automn and winter varieties are also excellent.

Apricots must not have reached their complete maturity if they are intended for canning.

Varieties of wild or cultivated cherries furnish a much refreshing and appreciated dessert. They must be ripe but not too much.

Peaches must still be firm. Those that are too soft afford much difficulty in keeping.

To the contrary, **pears** must be thoroughly ripened. If they are not sufficiently, place them in a spot where they will do so promptly.

Plums, when too ripe, do not keep well.

All the small fruits such as: **strawberries, raspberries, gooseberies, currants, blackberries,** etc., must be picked when still firm, but well ripened.

Corn is very difficult to keep, if we do not hurry in canning same **immediately** after the crop. This is due to the fact that corn ferments very rapidly once it has been picked.

A grain of corn must pass through five different phases before ripening. At the moment of its formation, it contains nothing but water ; later on, as the vegetation is progressing, this water successively transforms into **milk,** cream, dough and flour. It is at the moment that it has turned into cream that corn must be picked for canning purposes.

Tomatoes must present a firm texture, be well ripened and colored.

FIG. 11

FIG. 12

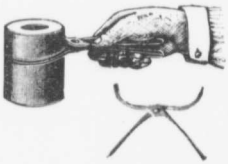


FIG. 13

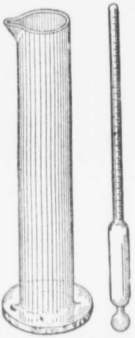


FIG. 14

FIG. 15

FIG. 16

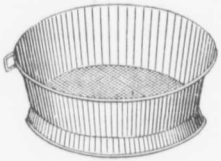


FIG. 17

FIG. 18

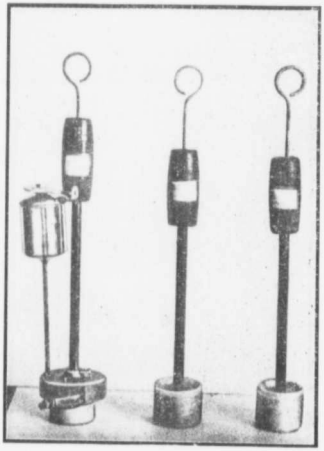


FIG. 19

The picking of **peas** and **beans** must take place while they are still yellow and tender.

In the case of beans, the pods must be of average size and picked prior to the formation of the grain, whereas for peas, the grain must be formed and still be tender.

Cauliflower, when ripe, keeps very easily.

The following varieties of vegetables are recommended by the Horticultural Service:

Tomatoes: I.X.L., Chalk's Jewel, Wonder, Perfection, Success, Stone (late), Prosperity, Favorite, Coreless.

Corn: Early Evergreen, Late Evergreen, Crosby, Crosby's Improved, Stowell's.

Peas: French Canner, Hosford's Market Garden, Advancer, Admiral, Alaska, Eclipse.

String Beans: Golden Wax, Yellow Refugee, Green Refugee.

CHAPTER II

PREPARATION AND STERILIZATION

In the second part of this treaty, in studying briefly the few methods most commonly used for the packing of animal and vegetable products, we have made our own the one which, owing to its easy execution, its practical and economical character, offered most advantages and interest.

This process which we will adopt as type comprises the following operations:

1o—**Picking of the product.**—The picking of the product must only be made when we are ready to pack same. Never pick **in advance** a large quantity of fruits or vegetables: you will lose in regard to grade and length of conservation. It would, moreover, be useless to renew these details, enough having been said of the matter in a previous paragraph.

2o—**Classification of the product.**—The classification aims to the choice of a first, second and third grade amongst the fruits or vegetables which we have just picked. This selection is based on the degree of ripeness, on color and size. Although secondary in home canning, this selection is most important from a commercial standpoint. In most cases, the buyer is more influenced by the nice appearance of the product than by its real

value, and it is the producer's interest to make a judicious selection of his product before putting same on the market.

When the product is too bulky to be put up complete and has to be divided, a classification, in such a case, is altogether useless, unless products of inferior grade are to be found amongst the crop of fruits or vegetables.

For most of the fruits that may be kept complete, this classification is then necessary. The same thing applies to beans, peas, certain varieties of tomatoes of ordinary size, corn, if preserved on cob, etc.

3o—**Cleaning and washing of the product.**—This operation consists in the removal of the stem, leaves or other vegetable or earthy particles adhering to the envelope of the product and afterwards, in washing it in very clear and cold water.

4o—**Blanching or scalding of the product.**—Blanching consists in plunging vegetables and certain species of fruits in a bowelful of boiling water. This immersion varies with the species and the variety. It is of one or two minutes only for soft fruits and most of small fruits, and of four to five minutes—sometimes more—for hard fruits, such as: apples, pears, etc.

The scalding is obtained in placing the product in a wire or wicker-basket or any other perforated receptacle which we plunge into a bowelful of boiling water.

Vegetables, as a whole, require a longer immersion.

Before definitely leaving the product in boiling water for the length of time allowed for the operation, dip same two or three times so that the water which has penetrated into the interior may be renewed.

Foliaceous vegetables, on account of their composition and texture, should rather undergo the "steam process". This steaming is practised in an ordinary boiler or enameled receptacle of sufficient size, into which a wire or wooden movable bottom intended to support the product above the boiling water, is placed. This steam blanching lasts from 15 to 20 minutes.

The effect of the scalding process is:

a—to remove more easily the envelope of certain fruits.

b—to eliminate the injurious acids and to improve the sour taste of a few products.

c—to provoke the circulation of the coloring matter of the product, which is afterwards coagulated by cooling.

d—to reduce the volume of foliaceous vegetables and greens.

5o—**Cooling of the product.**—After it has been taken out of the hot-water bath, the product must be dipped immediately into a bowelful of cold water. This immersion must not be continuous, but must be done two or three times so as to renew the water that has penetrated into the interior. This latter point is particularly important for the **blanching** of the product.

The cooling must be done promptly, and the product taken out immediately after.

This cooling is intended:

a—to harden the pulp of the fruit or vegetable so as to facilitate the removing of the envelope or peel.

b—to coagulate the coloring matter circulated in the flesh of the fruit by the blanching, thus permitting the product to retain its nice distinctive color. Moreover, this coloring matter, once coagulated, is dissolved with much more difficulty during the sterilization.

c—to facilitate the handling of the product when packing same into cans or jars.

6o—**Division of the product.**—The fruit put up complete always keeps its flavour better than one that has been divided: hence, the advantage of keeping to the product its natural shape. This is an important point in commercial canning.

It is admitted that the consumer prefers to pay a little dearer for whole canned fruits or vegetables. This is particularly true for tomato preserves. Certain canners manufacture rather large quantities of preserves which they offer to consumers as **tomatoes**, whereas it really is but a simple **tomato sauce.**

The intention of the purchaser, in asking for tomato preserves, is to **eat tomatoes** and not to drink their juice.

It is, however, true that tomatoes belonging to certain varieties are too voluminous and cannot be put up in their entirety in glass jars or tin cans. In this case, the fruit must naturally be divided, but it is strongly advisable to cut it only in halves.

Except tomatoes, corn on cob, beans and peas, the other fruit-vegetables or foliaceous vegetables are usually divided into a certain number of parts according to their size. However, these parts must not be too small; because, during the sterilization, the pulp of the vegetable becomes tender and is reduced. If the parts are too small, we are exposed to have canned goods without consistence and flavour.

7o—**Filling of the receptacles.**—When the previous operation is over, remove the jars or cans from the hot-water bath and fill them immediately with the product to be packed up to **1-4** or **1-2** inch of the top.

The product will be pressed into the receptacles as closely as possible.

In a precedent paragraph, something has been said of the reduction of the pulp or flesh of the fruit or vegetable under the influence of heat. If the fruit has not been sufficiently pressed in advance, when the sterilization is over, an empty space varying from one to four inches will be noticed in the bottom of the receptacle. Preserves thus lose much of their appearance and are consequently more difficult to market.

This rising of the product to the surface of the liquid in the receptacle is particularly noticed in the case of fruit preserves. The cause is often to be found the effect of a too thick sirup. You will find, in this part of the bulletin, a table giving the various quantities of sugar and water to be mixed in order to obtain a sirup of one density or another according to the species of fruits to be preserved.

After the product has been poured into a glass jar or a tin can, fill the spaces left between the fruits with hot sirup. In the case of a vegetable, add a light warm brine, which you will have been careful to prepare in advance, or again boiling water with a teaspoonful of salt per **quart of product.**

We must make exception for tomatoes which are juicy enough by themselves to fill the empty spots. The same quantity of salt is added however.

8o—**Closing of the receptacles.**—Tin cans are hermetically sealed **before** the sterilization. To the contrary, glass jars are but **partly** sealed during the cooking, and their hermetical sealing will be operated only **after** the complete sterilization. The reason is that during the sterilization a rather strong pressure is produced in the interior of the jar occasioned by the formation of steam and by the clearance of a certain volume of gas from the product. Contrary to the side of the tin can, that of the jar is not elastic and would surely collapse, if the elimination of gasses and surplus of steam was not made easy.

It is for this reason that we will never operate the air-tight sealing of a glass or crockery jar before the sterilization.

Jars equipped which a metallic band screwing upon the glass lid must be closed in such a way that it will still be possible, after a thorough cooking to complete the screwing by at least one quarter or one third of a revolution.

As regards jars provided with wire levers, only the bail holding the lid (fig. 23) must be set definitely; the lower lever is only snapped when the cooking is over (fig. 25).

9o—**Sterilization of the product.**—After the receptacles have been closed, we will proceed without delay to the sterilization of the product. A few minutes delay might be sufficient to occasion a failure or entail a considerable depreciation of the grade and value of canned food. So as to obviate to this difficulty, always get ready at one time the proper number of food containers that will require to undergo the processing.

For more details as to the cooking with the various sterilizers, please refer to the second part of this work, page 22.

10o—**Cooling of the product and testing of glass jars.**—Upon their removal from the sterilizer, close jars air-tight, place **top-side down** on a table or a shelf until complete cooling of the product.

If the liquid substance leaks out of the jars the sealing is then defective. In this case, unclose the jar, place a second rubber gasket, reseal and sterilize anew during a few minutes, specially if the product has cooled too much.

11o—**Wrapping of the product.**—Owing to the bleaching of food canned in glass containers, caused by the bad influence of the light; it will be found necessary to wrap the jars into common paper or old newspapers if we intend to **store** the preserves for a few months.

12o—**Storing of the product.**—All products, whether of animal or vegetable produce, whether packed in glass receptacles or tin cans, must be kept in a **dark** place, also **dry** and **cool.**

13o—**Packing of the product for marketing.**—Wrap each of the jars into many sheets of paper (old newspapers), line the bottom and sides of the box with two or three sheets, dispose a thick enough layer of hay or straw on the paper already placed in the bottom and on the sides of the box and cover this small cushion of hay or straw with more sheets of paper. Afterwards, place the glass jars upright one by side the other, arranging small hay or straw pads between them. If the box is large enough to permit the packing of two rows of jars, one on top of the other, do not omit to put another preserver of hay or straw between the two rows. To end, nail the top and write plainly in big letters the words "fragile" or "glass, handle with care".

It is important, in order to make a good packing, to fill as thoroughly and solidly as possible all the empty spots between the jars so that they will not move.

CHAPTER III

PREPARATION OF SIRUPS AND BRINES

Sirups

The making of a sirup consists in boiling given quantities of water and sugar during a variable time, according to the degree of density that is desired to be obtained.

Sirups are usually employed in the canning of fruits.

For fruits of delicate texture and flavour, the following quantities are used; 3 quarts of sugar in 2 quarts of water.

For fruits whose texture is not so delicate and requiring a smaller quantity of sugar, sirup made of the following mixture will be used: 2 quarts of sugar in 3 quarts of water.

With the use of either of these mixtures, sirups of various densities will be obtained easily if the indications hereafter mentioned are well observed.

1o—**Thin sirup.**—(12 to 20% density).—To obtain this sirup, the cooking must be ended when sugar is thoroughly dissolved. This sirup must not be sticky. It is used in the canning of fruits whose taste is sweet and the texture and color of which are not too delicate, such as: apples, cherries, peaches, etc.

2o—**Medium thin sirup** (20 to 40% density).—Cooking must stop when it has begun to thicken and is sticky when cooled on a spoon.

This sirup must be used in the canning of fruits of a delicate texture and flavour, such as: blackberries, gooseberries, raspberries, mulberries, etc.

3o —**Medium thick sirup** (40 to 50% density).—The evaporation of this sirup will last as long as it does not become sufficiently thick to pile up on the edge of a spoon or easily twist around the latter.

It is used in the preserving of species or varieties of sour fruits, such as: sour apples, apricots, currants, etc., and delicate colored fruits, such as: strawberries, red raspberries, etc.

4o—**Thick sirup** (50 to 64% density).—This sirup will be so thick that it will be hard to pour into the food containers. It is particularly used in the putting up of jams or strongly sugared preserves.

The use of a density gauge (fig. 14) will give much more exact results.

FIG. 20

FIG. 21

FIG. 22

FIG. 23

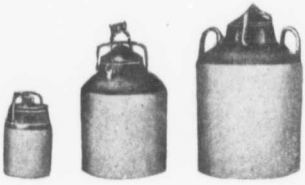


FIG. 24

FIG. 25

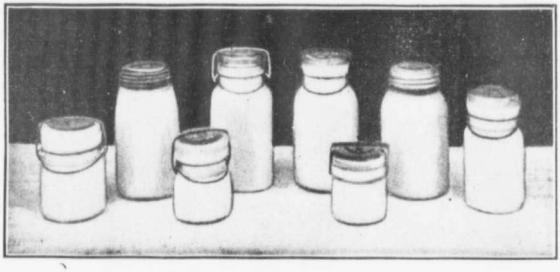


FIG. 26

With a view to facilitating to house-keepers, the making of sirups, we have prepared the table given below:

TABLE FOR MAKING SIRUPS

Water	Sugar	Density
5½ quarts	1½ lb	12%
8½ "	3 lbs.	15%
10½ "	4½ "	18%
9½ "	6 "	24%
9 "	7 "	28%
6½ "	7 "	35%
1½ "	2 "	40%
1 "	2 "	50%
2 "	6 "	60%
4½ "	16 "	64%

If proportions given in the above table are used, the cooking will cease immediately after the sugar will be completely dissolved.

Brines

For the canning at home of vegetables, it is preferable and more expeditive to add the salt immediately after each jar or can will have been filled with the product and boiling water poured into it. The quantity of salt required is, teaspoonful per quart of vegetables or—which is the equivalent—per one quart jar or can.

This quantity of salt will be proportionate to the dimension or capacity of each receptacle.

In the case of commercial canning and when a considerable quantity of preserves must be canned daily, brine prepared in advance will save time and greatly facilitate the work.

The table shown hereafter gives the proportions of salt and water to be used for the obtaining of brines of various percentages:

TABLE FOR THE PREPARATION OF BRINES

Water	Salt	Per cent
12 gallons, 1 quart, 1 pint	1 lb	1
12 " 1 "	2 lbs.	2
12 " 1 pint	3	3
11 " 3 quarts	6	6
11 " 2 "	8	8
11 " 1 "	10	10
11 "	12	12
10 " 2 quarts, 1 pint	15	15
10 " 1 "	18	18
9 " 2 "	24	24

It is not to be forgotten that most vegetables as well as meats lose much of their taste and quality if too much salt is added. It is then advisable to use a little **smaller** than **larger** quantity for the conservation of these foodstuffs.

TABLE GIVING THE CAPACITY OF CONTAINERS

Number of cans or jars contained in a bushel of fruits or vegetables:

Bushel	Product	No 2 can or one pint jar	No 3 can or one quart jar
1	Apples	30	20
1	Peaches	25	18
1	Pears	45	30
1	Plums	45	30
1	Small fruits	50	30
1	Tomatoes	22	15
1	Lima beans (shelled)	50	30
1	Pod beans	30	20
1	Corn	45	25
1	Peas (shelled)	16	10

EFFECT OF ALTITUDE ON THE LENGTH OF STERILIZATION

The length of the sterilization varies with the altitude. In the first 1000 feet (above the sea lovel), changes are not important enough to be worth mentioning. Above 1000 feet, the period of processing should be increased by 10% and this, for every additional 500 feet.

At the sea level,the water is boiling at 212° F. and once this degree has been reached, it gives its maximum of heat.

At 500 feet above the level of the sea, it starts boiling at 211° and so on.

A glance at the following table will enable you to ascertain the increase of the period of sterilization as the boiling degree of water falls down.

Altitude	Degrees	Approximate number of minutes for the sterilization
Sea level	212°F	50
500 feet	211°F	50
1,000 "	210°F	50
2,000 "	208°F	60
3,000 "	206°F	70
4,000 "	204°F	80
5,000 "	202°F	90
6,000 "	201°F	100
7,000 "	199°F	110

PART IV

CANNING METHODS

CHAPTER I

VEGETABLES

Before studying the different processes hereafter described, readers are requested to peruse attentively the second chapter of the third part of this bulletin. All details relating to the various operations connected with the preparation and sterilization of the product are therein indicated.

This chapter has been inserted to prevent repetitions in the description of the processes concerned by the present part.

Tomatoes

Plunge tomatoes into a bowelful of boiling water for about 1½ minutes or—which is better—until the skin splits and is easily removed. Remove and cool immediately in cold water. Peel, taking care to remove the hard or whistish part, where the stalk was adhering, as well as any other rotten or greenish part. Thus prepared pack **whole** in cans or jars. If too bulky, cut in **halves** only and, with a spoon, press—without mashing them—so as to fill empty spaces, and add a level teaspoonful of salt per quart jars or cans. Then seal containers as mentioned in chapter II of the 3rd part.

The length of the processing differs with the kind of sterilizer used.

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	22
Hot-water commercial bath	22
Water-seal, 214° F	18
Steam-pressure outfits or autoclaves:	
Under 5 lbs pressure	15
Under 10 lbs pressure	10

Corn

Remove husks and silks and scald during 5 minutes. Some harder varieties will require to be scalded during 10 and even 15 minutes. Afterwards dip in cold water. With a well-sharpened knife, cut corn from the cob at one-half or two-thirds. With the back of the knife, scrape all what remains in the cells, but do not cut the cells proper. Fill cans or jars, packing lightly to $\frac{1}{4}$ inch of top, filling spaces with boiling water; add a level teaspoonful of salt and seal containers.

The period of sterilization is as followns :

Hot-water bath outfits :	Minutes
Ordinary kitchen receptacles	180
Hot-water commercial bath.	180
Water-seal, 214° F	120

Steam-pressure outfits :	
Under 5 lbs pressure	90
Under 10 to 15 lbs pressure	60

Corn on the cob

Husk and remove any other vegetable particle. Scald during 5 to 15 minutes. Cold dip and pack into half gallon jars or gallon cans. Pack ears, alternating butts and tips, so that they will be vertically disposed in the containers. Corn will thus have a nicer appearance. Fill the containers with boiling water and add 2 level teaspoonfuls of salt per gallon. Seal jars or cans and sterilize as follows:

Hot-water bath outfits :	Minutes
Ordinary kitchen receptacles	180
Hot-water commercial bath.	180
Water-seal 214° F.	90

Steam-pressure outfits :	
Under 5 lbs pressure	60
Under 10 to 15 lbs pressure	50
Under 20 lbs pressure	35

Corn: Other process

Scald cobs during 10 minutes. Remove and cool in cold water. Cut corn as previously explained and grind to pulp with a food chopper. Cook the product thus obtained in a kitchen frying-pan or boiler and add one level teaspoonful of salt per quart of product, a little butter and sugar. Cease cooking when the mixture has assumed a pastelike mass. Pack jars or cans to 1-4 inch of top, seal and sterilize as hereafter described:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	180
Hot-water commercial bath	180
Water seal, 214° F	120
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 10 to 15 lbs pressure	50

Once sterilized, cooled and packed, the product will assume a solid mass and will keep the shape of the receptacle in which it was contained, once removed. The house-keeper will easily cut it in convenient slices to be prepared in various dishes. Thus consumed, this product is very nourishing and palatable.

Pod beans

Remove strings and the two ends of the pods, and blanch in boiling water or—preferably—in live steam for 5 to 10 minutes. Dip in cold water and pack jars or cans immediately in pressing the product as closely as possible. When containers have been filled with boiling hot water, add one level teaspoonful of salt to each quart of food, seal and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	120
Hot water commercial bath	120
Water-seal, 214° F.	90
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 10 lbs pressure	40

Lima beans (large beans), **peas and other similar fruit-vegetables.**

Scald or blanch in live steam for 10 to 15 minutes. Cool the product and pack without delay. Fill the empty space in containers with boiling hot water and add one level teaspoonful of salt for each quart of food. Seal containers and sterilize as per the following table:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	180
Hot-water commercial bath	180
Water-seal, 214° F.	120
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 10 to 15 lbs.	40

Cauliflower

Plunge into cold brine (½ lb. salt to 12 quarts of water) and allow to remain therein for one hour. Blanch 3 minutes (in boiling hot water) and dip quickly into cold water. Divide in convenient parts and fill containers. Add boiling water, one level teaspoonful of salt per quart of product, seal and process for the length of time given below for the particular type of outfit used:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	60
Hot-water commercial bath	60
Water-seal, 214° F.	40
Steam-pressure outfits:	
Under 5 lbs pressure	30
Under 15 lbs pressure	20

Root and tuber vegetables, such as: **carrots, beets, turnips, potatoes, parsnips, salsify.**

After grading for size, color and degree of ripeness, wash the product thoroughly so as to remove any earthy particle that may adhere to its envelope. Plunge in boiling water long enough for the skin to loosen and be scraped easily with a knife. Dip quickly into cold water and remove or pare the skin of the tuber or root. Pack whole vegetables, slices or cross-

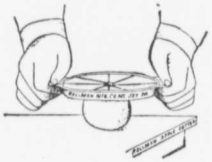


FIG. 27

FIG. 28

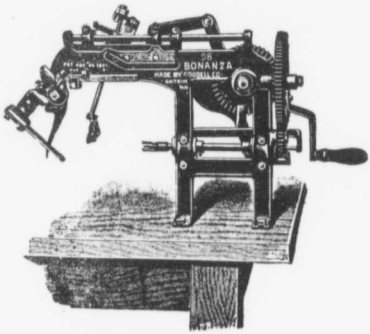


FIG. 29

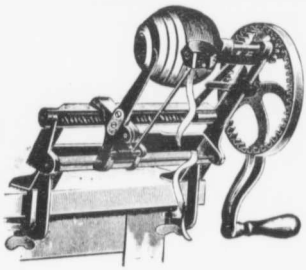


FIG 30

FIG. 28.—Machine used in removing the stone from cherries.
" 29.— " " in paring apples.
" 30.— " " for paring and slicing apples.

section pieces. Add boiling hot water until the can or jar is full. Add level teaspoonful salt to quart, cap and sterilize for the length of time given below:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	90
Hot-water commercial bath.	90
Water-seal, 214° F.	80
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 10 lbs pressure	40

Asparagus

Submit asparagus to the influence of steam for 15 to 20 minutes. Cool immediately after by dipping in cold water. Asparagus stalks may be divided in various ways. They are usually cut in lengths to fit the containers in which they are to be kept. In this case, they are packed upright. They also can be divided in lengths of 2 to 2½ inches. When the receptacle is full, pour boiling water to fill the empty space, add a level teasp onful of salt per quart of product, seal and process as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	90
Hot-water commercial bath.	90
Water-seal, 214° F.	60
Steam-pressure outfits:	
Under 5 lbs pressure	50
Under 15 lbs pressure	25

If asparagus are picked too late and tin cans used, it is strongly advised, in such a case, to sterilize twice. The number of minutes hereabove mentioned is reduced to three-quarters for the first cooking, after which a little hole is practised in the side of the can, in order to let out gasses which have formed therein, and we sterilize anew for about fifteen minutes.

VEGETABLE GREENS AND FOLIACEOUS

Cultivated greens: Cabbages, common garden cress or water cress, endive, cabbage sprouts, spinach, dandelion, rape leaves.

Sub-products: Cabbage, turnip and beet leaves.

Wild greens: Wild cress, purslain, dandelion, wild mustard, etc.

All these varieties and species of vegetables as well as the sub-products above mentioned may be preserved as follows:

Wash clean and rid the greens of dry or diseased leaves. Blanch in live steam for 15 minutes and plunge immediately after into cold water. Cut into convenient lengths (not too long) and pack tight in jars or cans. Dress or spice product to taste. Fill containers to top with boiling hot water, add one level teaspoonful of salt per quart, close and process as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	120
Hot-water commercial bath	120
Water-seal, 214° F.	90
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 15 lbs pressure	40

A little olive oil will improve the flavor of such preserves.

Mushrooms

Many very poisonous plants closely resemble edible mushrooms. Caution must then be exercised in the picking of these plants, unless of course, we grow them ourselves.

Can mushrooms immediately after picking, if not, it will be useless to try and keep them: you will meet with failure.

After being washed, plunge into boiling hot water for about 5 minutes. Cool promptly and pack in glass jars. If small, pack them whole; if large, they may be cut in two or four sections. Fill jars with boiling water and add one level teaspoonful of salt per quart of food. Seal containers and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	90
Hot-water commercial bath.	90
Water-seal, 214° F.	80
Steam-pressure outfits:	
Under 5 lbs pressure	50
Under 10 lbs pressure	30

Melon, squash, pumpkin

Pare and cut into convenient sections. Blanch during 3 minutes. Cold-dip and pack as closely as possible in jars or cans. Fill with boiling water, add one level teaspoonful of salt per quart and cap containers. Process as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	120
Hot-water commercial bath.	120
Water-seal, 214° F.	90
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 10 lbs pressure	40

Egg-plant

Remove envelope of egg-plants and cut the latter into cross-pieces, $\frac{1}{2}$ to $\frac{3}{4}$ inch thick. Blanch 3 minutes in boiling hot water into which one level teaspoonful of salt will have been added per quart. Cool and pack in jars. Fill the latter with boiling water, add one level teaspoonful of salt per quart of food, cap and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	50
Hot-water commercial bath.	50
Water-seal, 214° F.	45
Steam-pressure outfits:	
Under 5 lbs pressure	45
Under 15 lbs pressure	30

VEGETABLE COMBINATIONS

Corn and tomato combination

Blanch corn on cob during about 5 minutes and cool immediately. Cut the corn from the cob as already explained. Scald tomatoes 1½ minutes and cold dip. Remove skin and unripe parts and cut into four or six pieces.

After that, mix thoroughly two parts of tomatoes with one part of corn and pour into jars or **enameled** tin cans. Add one level teaspoonful of salt per quart of mixture and seal. The processing, according to the style of outfit used, is as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	120
Hot-water commercial bath	120
Water-seal, 214° F.	120
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 15 lbs pressure	45

Corn, tomato and string bean combination

Use one part of corn, one part of beans and three parts of tomatoes.

Prepare corn and tomatoes as above indicated. Wash beans clean. Cut into 1 inch lengths and blanch 4 minutes. Scald tomatoes 1 to 3 minutes and corn, 5 minutes. Mix thoroughly and pour into jars or enameled (laquerred cans), add a little salt, if desired; close receptacles and start processing as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	120
Hot-water commercial bath	120
Water-seal, 214° F.	120
Steam-pressure outfits:	
Under 5 lbs pressure	60
Under 15 lbs pressure	45

IMPORTANT NOTES

1o—It sometimes happens that canned tomatoes stored during a certain time become acid and, by the fact, of a very disagreeable taste. This acidity will be easily corrected by the addition of 1-4 of a level teaspoonful of paste soda per container, when they are consumed.

2o—It is to be remarked that corn swells a little during the processing. We will consequently avoid packing cans or jars too full.

3o—A prolonged sterilization does not affect in any way the quality of canned corn.

4o—Corn preserves of a yellowish or reddish appearance mean that the picking has not been made on time and that the grain has attained the dough stage.

5o—**A prompt cooling** of the corn after its blanching is very important in order that it may keep its natural shape and color.

6o—Corn, beans, peas and asparagus, canned, may be of a nicelooking appearance and have, nevertheless, a sour taste and a disagreeable smell. This will be prevented if vegetables are packed immediately after their picking. A prompt cooling after the processing will clarify the liquid and harden the product.

7o—If peas are picked too late, the skin or envelope will crack after cooking. Moreover, the liquid will be cloudy and will give a bad appearance to the product. Some waters of high mineral content have a tendency to favor cloudiness of the liquid.

8o—When packed beans are removed from the sterilizer, they are inclined to change of color and to become somewhat white. After a few days, if well dressed and duly sterilized, they will recover their natural color.

9o—As much as possible, beets will be packed **whole**. For blanching, always leave the root and about one inch of leaves. They should be scraped but not peeled.

10o—Vegetable greens and foliaceous are always blanched in live steam and never in a hot-water bath. In this way, the product retains the greatest part of its mineral salts and volatile acids. These products lose in bulk during the processing, if blanching has been badly executed.

11o—Water used in the preservation of food products must be soft and pure. Water rich in mineral substances is not to be used in the packing of any food.

12o—A high percentage a mineral principles gives a red-grayish color to vegetable greens and foliaceous and hardens vegetables such as beans and peas.

CHAPTER II

FRUITS

Soft and tender fruits: Peaches, plums, apricots, cherries, strawberries, raspberries, blackberries.

Place fruit in a strainer and pour cold water over it until well rinsed. Remove leaves, stems or stalks which adhere, stones, (fig. 10a and 28) and pack immediately in jars or tin cans. Fill containers with hot sirup, rather boiling, of 18% density (see page 41), seal jars or cans and process as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	16
Hot-water commercial bath.	16
Water-seal, 214° F.	10
Steam-pressure outfits:	
Under 5 lbs pressure	8
Under 10 lbs pressure	5

Another recipe for strawberries

Only fresh, ripe, firm and sound berries should be used. After washing as indicated in previous recipe, add 8 ounces of sugar and 2 tablespoonfuls of water per quart of berries. Pour mixture into an enameled receptacle and boil slowly for 15 minutes. Cover again the receptacle and allow berries to cool gradually for several hours (8 to 10 hours and even more). Pour product into jars sterilized in boiling water or enameled tin cans equally sterilized, while receptacles are still hot. Seal the latter and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	8
Hot-water commercial bath.	8
Water-seal, 214° F.	6

Steam-pressure outfits:

Under 5 lbs pressure	5

Strawberries canned by this recipe will not rise to the top of the sirup in containers.

Acid or sour fruits: Gooseberries, currants, blueberries, wild cherries.

Rid fruits of all vegetable particles and rinse in cold water. Immerse in boiling hot water for one minute only. After cooling in a bowelful of cold water, fill jars or cans. Pack fruits closely in containers by striking on side of the latter. Pour hot sirup of 28% density, until jars are filled, seal and sterilize as hereafter indicated:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	16
Hot-water commercial bath	16
Water-seal, 214° F.	12

Steam-pressure outfits:

Under 5 lbs pressure	10
Under 15 lbs pressure	5

Hard or firm-textured fruits: Apples, pears and quinces.

Wash, pare and core fruits (fig. 29 and 30). Cut into triangular or cubic sections, of reasonable size. Scald about 1½ minutes and cool immediately.

Fill cans or jars, pour hot sirup of 18 to 28% density, close and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	20
Hot-water commercial bath	12
Water-seal, 214° F.	12

Steam-pressure outfits:

Under 5 lbs pressure	8
Under 10 to 15 lbs pressure	6

When a large quantity of apples is to be prepared, before scalding, it is advisable, after each fruit is divided, to drop the pieces into slightly salted water, so that it may keep its color.

The apple flesh, exposed to the air for a few minutes, turns yellow and will afford preserves of poor quality.

Apples packed whole

Wash, pare and remove core, if desired. Pack whole in 1 gallon cans or jars. Pour hot sirup of 18% density until container is well filled. Seal and sterilize as follows:

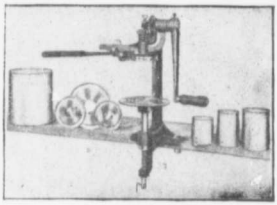
Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	16
Hot-water commercial bath	16
Water-seal, 214° F.	10
Steam-pressure outfits:	
Under 5 lbs pressure	8
Under 10 lbs pressure	5

Fallen apples, spotted, worm-eaten or diseased may be equally canned, by the same process, after they have been carefully washed clean.

Pineapple

Use nothing but sound and ripe fruits. Clean, pare and cut into pieces or cross-sections. Scald for 10 minutes and cold-dip. Pack in jars or **enameled** cans and add hot sirup of 18 to 20% or 28 to 30% density. Seal and process as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	35
Hot-water commercial bath	35
Water-seal, 214° F.	25
Steam-pressure outfits	
Under 5 lbs pressure	25
Under 15 lbs pressure	18



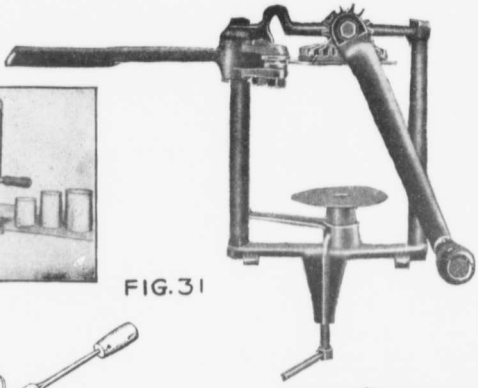


FIG. 31

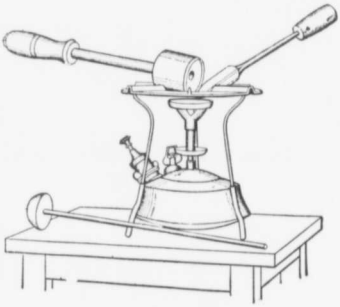


FIG. 32

FIG. 33

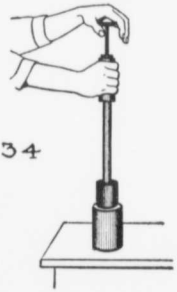


FIG. 34

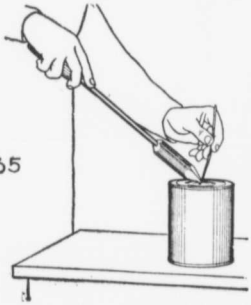


FIG. 35

Grapes

Fruit must be ripe and fresh picked. Wash and pour immediately into jars or enameled cans. Add hot sirup of 12 to 20% density. Seal and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	20
Hot-water commercial bath	20
Water-seal, 214° F.	15
Steam-pressure outfits:	
Under 5 lbs pressure	15
Under 15 lbs pressure	8

Wild grapes

Wild grapes should be treated in the same manner as cultivated grapes. Use hot sirup of 40 to 50% density.

Wild plums

Sort fruits as to size and degree of ripeness. Wash and pack immediately in jars or enameled cans. Add hot sirup of 12 to 20% or 25 to 30% density. Seal containers and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	16
Hot-water commercial bath	16
Water-seal, 214° F.	12
Steam-pressure outfits:	
Under 5 lbs pressure	12
Under 15 lbs pressure	8

Figs

Select and classify fruits. Scald in boiling hot water during 6 minutes and cold-dip. Pack fruits in jars or enameled cans. Fill containers with hot sirup of 25 to 30% density, seal and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	40
Hot-water commercial bath	40
Water-seal, 214° F.	30
Steam-pressure outfits:	
Under 5 lbs pressure	25
Under 15 lbs pressure	20

Rhubarb

Wash stems and cut into small pieces, 3-4 inch long (do not remove envelope or skin). Scald for 2 minutes, cool and pour immediately into jars (do not use tin cans). Add hot sirup of 48 to 50% density, seal containers and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	20
Hot-water commercial bath	20
Water-seal, 214° F.	15
Steam-pressure outfits:	
Under 5 lbs pressure	15
Under 15 lbs pressure	10

CHAPTER III

MEATS

Poultry.—1st recipe

Kill fowl, pluck and draw at once. Wash carefully and cool for some time. Thus prepared, place in a wire basket or cheesecloth and boil until meat can easily be removed from bones, take out of boiling liquid, remove meat from bones and pack closely into jars or enameled cans. After the liquid that has served in the cooking of fowl has been allowed to concentrate one-half, fill jars or cans and add one level teaspoonful of salt per quart of meat. Seal containers and sterilize as follows:

Hot-water bath outfits:	Hours
Ordinary kitchen receptacles	3
Hot-water commercial bath	3
Water-seal, 214° F	3

Steam-pressure outfits:	
Under 5 lbs pressure	2
Under 10 lbs pressure	1

Poultry.—2nd recipe

Kill, pluck, draw, wash and cool fowl. Cut into convenient sections. Scald parts so divided and cool in cold water. Fill jars or enameled cans, add boiling hot water and one level teaspoonful of salt per quart of meat, seal containers and process as follows:

Hot-water bath outfits:	Hours
Ordinary kitchen receptacles	3
Hot-water commercial bath	3
Water-seal, 214° F	3

Steam-pressure outfits:	
Under 5 lbs pressure	2
Under 10 to 15 lbs pressure	1

Spring chicken, fried

After preparing and cleaning chicken, season to taste and fry until the meat is about three-fourths done. If you prefer to keep a whole chicken, break the neck and both legs, fold and tie under body. Pack immediately into a glass jar or enameled tin can. A quart jar will hold two to four chickens, according to size. Fill jar with liquid from the frying-pan, seal and sterlize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	90
Hot-water commercial bath	90
Water-seal, 214° F	60

Steam-pressure outfits :

Under 5 lbs pressure	40
Under 10 to 15 lbs pressure	40

Fresh beef

Cut into pieces about 3-4 pound in weight and roast or boil slowly for one-half hour. Cut each piece again into 4 or 5 parts and remove bones, excessive fat and gristle. Pack closely into jars. Fill with gravy from the roasting pan or pot liquid concentrated to one-half its volume. Seal containers and sterilize as follows:

Hot-water bath outfits :	Hours
Ordinary kitchen receptacles	3
Hot-water commercial bath.	3
Water-seal, 214° F.	3

Steam-pressure outfits :

Under 5 lbs pressure	2
Under 10 to 15 lbs pressure	1

Corned beef

After beef has been properly corned, remove from the brine and soak two hours in clear water, which will have been changed once. Place meat in a wire basket or cheesecloth and boil slowly for half an hour. Remove from the boiling water, plunge into cold water, remove gristle, bones and excessive fat. Cut into small pieces and pack in jars or enameled cans as closely as possible. Seal containers and sterilize as follows:

Hot-water bath outfits :	Hours
Ordinary kitchen receptacles	3
Hot-water commercial bath.	3
Water-seal, 214° F.	3

Steam-pressure outfits :

Under 5 lbs pressure	2
Under 10 to 15 lbs pressure	1

Pork

Can only lean portions of pork meat. Place meat in a wire basket or cheesecloth and boil or roast for 30 minutes. Cut into small sections and pack closely into jars. Seal containers and sterilize as follows:

Hot-water bath outfits:	Hours
Ordinary kitchen receptacles	4
Hot-water commercial bath	3
Water-seal, 214° F.	3
Steam-pressure outfits:	
Under 5 lbs pressure	3
Under 10 to 15 lbs pressure	1½

Lamb

Boil meat until it is about three-fouths done. Season to taste and cut into small pieces. Fill jars or enameled cans and pour liquid from the griddle or pot when it has concentrated to one-half its volume. Seal containers and sterilize as follows:

Hot-water bath outfits:	Minutes
Ordinary kitchen receptacles	90
Hot-water commercial bath	90
Water-seal, 214° F.	60
Steam-pressure outfits:	
Under 5 lbs pressure	40
Under 10 to 15 lbs pressure	30

Rabbit, squirrel

The recipe is the same as in the packing of lamb meat.

SUGGESTIONS

Never keep rhubarb in tin cans, unless enameled and unless the sirup is of 30% density, at least.

Food products preserved in tin cans must be deposited into glass containers, crockery jars or enameled receptacles, as soon as cans are opened.

On account of the increase in volume or swelling of corn, peas and Lima beans, while cooking, be careful not to pack jars or cans too closely.

Do not use too much salt in the canning of foliaceous vegetables, tomatoes and corn. The addition of a little sugar before the processing improves the grade of the product and shortens, in some cases, the period of sterilization.

A continuous sterilization causes certain fruits to tarnish, apples particularly.

In the second part of this work, 3rd chapter, it has been said that water must never be warmed in the sterilizer before containers are introduced therein. This depends, to a certain extent, on the kind of sterilizer used. If a hot-water bath, it is preferable that water be rather lukewarm, as jars will have already been filled with hot brine or boiling sirup.

As a conclusion, always keep in mind that the successful application of one process or another and the obtaining of a first-grade product, depend on the fact that all the operations connected with its canning, succeed one another without interruption.

TABLE giving the number of minutes allowed for blanching and sterilizing vegetables, fruits and meats.

PRODUCTS	Blanching or Scalding	Hot-water bath outfits			Steam-pressure outfits		
					Under pressure		
VEGETABLES		Ordinary kitchen receptables	Hot-water commercial bath	Water-seal, 214° F.	lbs 5	lbs 10	lbs 15
Tomatoes	1½	22	22	18	15	10	....
Corn	5	180	180	120	90	60	60
Corn on the cob	5	180	180	90	60	50	50
Corn (other process)	10	180	180	120	60	50	50
Pod beans	5–10	120	120	90	60	40	.....
Lima beans	10–12	180	180	120	60	40	40
Peas	10	180	180	120	60	40	40
Cauliflower	3	60	60	40	30	.....	20
Carrots	5	90	90	80	60	40	.....
Beets	5	90	90	80	60	40	.....
Turnips	5	90	90	80	60	40	.....
Potatoes	5	90	90	80	60	40	.....
Parsnips	5	90	90	80	60	40	.....
Salsify	5	90	90	80	60	40	.....
Asparagus	15	90	90	60	50	.....	25
Cabbages	15	120	120	90	60	.....	40
Cress	15	120	120	90	60	.....	40
Endive	15	120	120	90	60	.....	40
Cabbage sprouts	15	120	120	90	60	.....	40
Spinach	15	120	120	90	60	.....	40
Dandelion	15	120	120	90	60	.....	40
Rape (leaves)	15	120	120	90	60	.....	40
Cabbage "	15	120	120	90	60	.....	40
Turnip "	15	120	120	90	60	.....	40
Beet "	15	120	120	90	60	.....	40
Purslain	15	120	120	90	60	.....	40
Wild mustard	15	120	120	90	60	.....	40
Mushrooms	5	90	90	80	50	30	.....
Melons	3	120	120	90	60	40	.....
Squash	3	120	120	90	60	40	.....
Pumpkin	3	120	120	90	60	40	.....
Egg-plant	3	50	50	45	45	.....	30
Corn and tomato combin.	5–1½	120	120	120	60	.....	45
Corn, tomato and string bean combination	5–1½–5	120	120	120	60	.....	45

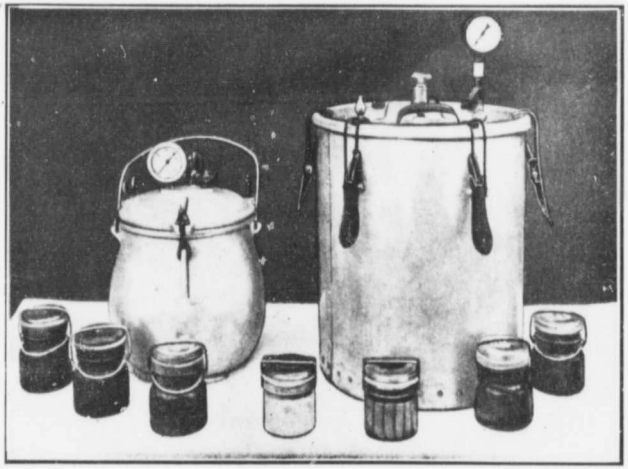
Table giving the number of minutes allowed for blanching and sterilizing vegetables, fruits and meats *(continued)*.

FRUITS							
Peaches		16	16	10	8	5	
Plums		16	16	10	8	5	
Apricots		16	16	10	8	5	
Cherries		16	16	10	8	5	
Strawberries		16	16	10	8	5	
Raspberries		16	16	10	8	5	
Blackberries		16	16	10	8	5	
Strawberries, other recipe		8	8	6	5		
Gooseberries	1	16	16	12	10		5
Currants	1	16	16	12	10		5
Blueberries	1	16	16	12	10		5
Wild cherries	1	16	16	12	10		5
Apples	1½	20	20	12	8	6	6
Pears	1½	20	20	12	8	6	6
Quinces	1½	20	20	12	8	6	6
Apples (packed whole)		16	16	10	8	5	
Pineapple	10	35	35	25	25		18
Grapes		20	20	15	15		8
Wild grapes		20	20	15	15		8
" plums		16	16	12	12		8
Figs	6	40	40	30	25		20
Rhubarb	2	20	20	15	15		10
MEATS	Cooking						
Poultry	¾ cooked	180	180	180	120	60	
" (another recipe)	Scald	180	180	180	120	60	60
Spring chicken	¾ cooked	90	90	60	40	30	30
Fresh beef	¾ hr	180	180	180	120	60	60
Corned beef	½ hr	180	180	180	120	60	60
Pork	½ hr	240	240	180	180	90	90
Lamb	¾ cooked	90	90	60	40	30	30
Rabbit	¾ cooked	90	90	60	40	30	30
Squirrel	¾ cooked	90	90	60	40	30	30

The various lengths of sterilization given in this table are based on 1000 feet altitude and on the use of one quart jar or can.

If the container is of a smaller capacity, shorten cooking by a few minutes ; if it is greater, lengthen the processing.

Agreeable and useful pastime.



The most recommendable types of autoclaves.

Summary of Operations

Process recommended: Sterilization of the product after it has been placed in the receptacle

1o—Classify the product (1st, 2nd, 3rd grade)

2o—Remove all vegetable or earthy particles.

3o—Wash in very pure and cold water.

4o—Place in a wire basket or cheesecloth and scald (water or live steam). Vegetables will remain therein 2 to 5 minutes, fruits 1 to 3 minutes, meats 5 to 10 minutes or again, roasted or boiled for ½ hour.

5o—Dip into cold water for ½ minute.

6o—Pack as closely as possible in jars or tin cans.

7o—Pour hot sirup on fruits and a light warm brine on vegetables.

8o—Close jars partially. Solder cans hermetically

9o—Place containers into the sterilizer. If a hot-water bath is used, immerge jars or cans completely. If a steam-pressure outfit is used, pour water to the level of the false bottom and place containers on the latter.

10o—Sterilize fruits for 12 to 20 minutes, tomatoes 25 minutes, corn 3 hours, other vegetables 1½ to 2½ hours, meats 3 hours.

11o—Remove canned food from sterilizer and seal jars air-tight.

12o—Cool, wrap and store containers in a dark, dry and cool place.

INDEX

PART III

SELECTION, PREPARATION AND STERILIZATION OF THE PRODUCT

PART IV

CANNING METHODS

ERRATA

Page 8, line 11, read *1820* instead of *1830*.

Page 11, line 30, read *substances spoil* instead of *substancess poil*.

Page 28, line 22, read *superfluous* instead of *suplerfluous*.

Page 41, line 21, read *1 teaspoonful per quart of vegetable*.

Page 60, line 3, under 5 to 15 lbs pressure. read *30*, instead of *40* minutes.