Feb. 20, 1945. H. F. WATERS 2,369,765

METHOD OF PRESERVING COOKED FOODS

Filed June 22, 1940

Fig. 1.

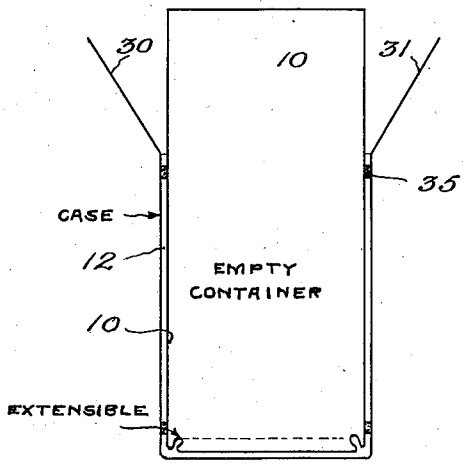


Fig. 2.

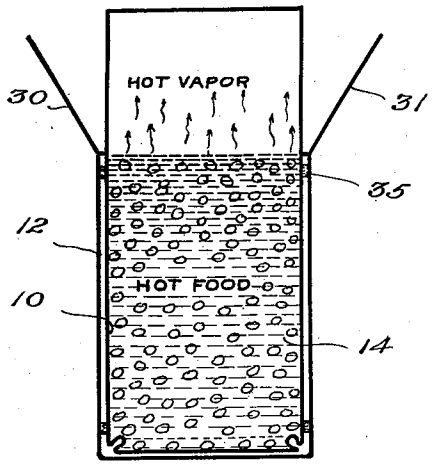


Fig. 3.

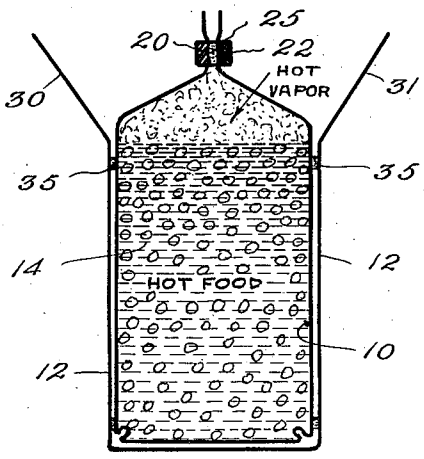
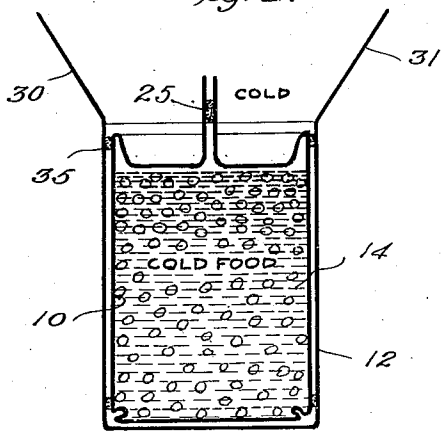


Fig. 4.



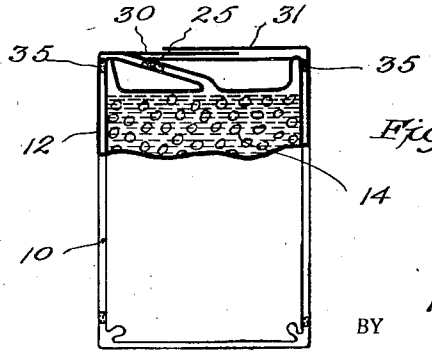


Fig. 5.

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METHOD OF PRESERVING COOKED FOODS

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Application June 22, 1940, Serial No. 341,798

6 Claims. (Cl. 99—186)

This invention relates to methods of preserving cooked foods, and provides improvements therein.

As heretofore practiced, foods, such as cooked vegetables, soups, fruits, meats, fish, fowl and the like have been preserved by sterilizing them by heat and hermetically sealing them in metal cans and glass jars. The process is commonly described as "canning." Industry has largely used metal cans for the preserving of foods, while in the home glass containers are generally used.

Metal containers and glass containers are rigid and after sealing there is usually a vacuum or a sub-atmospheric pressure within the container, so that a difference in pressure exists between the inside and the outside of the container. This difference of pressure is conducive to leakage and spoilage of the food which is encountered to a greater or less degree depending on the care and skill employed in sealing the containers, especially when the process is carried out in the home. Moreover metal and glass containers are relatively expensive. They are also relatively heavy and add considerably to costs when the goods go into commerce. Metal containers after they have been opened and the contents removed present a disposal problem, and in many places the landscape is disfigured by the presence of quantities of old cans. Glass containers are fragile, and there is a very considerable amount of breakage both in the preserving process and in handling.

By the present invention most of the disadvantages attendant upon prior methods of preserving foods are avoided, and many advantages are attained.

The present invention makes use of a flexible container, which after being sealed, is capable of yielding under pressure, so that the pressures inside and outside of the container may equalize, thus avoiding any strain upon the seal. This equalization not only occurs immediately following the packing, sealing and cooling of the contents, but throughout the life of the sealed container under the various conditions which affect the volume of the contents, such as temperature and barometric changes. The sealing of the container is more readily and reliably effected according to the present method than by previous methods. As the result of these advantages there is less spoilage of packed food.

Moreover there is a substantial saving in the cost of the containers used for preserving, and also a substantial reduction in the weight of the packaged goods. The container is more readily opened than metal or glass containers, and, after the contents have been removed, the disposal of the containers is very simple, the containers having very little bulk when collapsed and also being incinerable.

The package, according to the present invention, has the characteristics and advantages hereinbefore set forth.

One mode of procedure by which the present method may be carried out is illustrated in the accompanying drawing, wherein:

Figs. 1 to 4 inclusive are views illustrating the container at different stages of the process. As here shown the container is associated with a case.

Fig. 1 is a vertical sectional view of the container and its case prior to placing the food to be preserved therein.

Fig. 2 is a similar view with its hot food contents therein.

Fig. 3 is a similar view at the time of sealing the container, and showing the vapor in the space above the level of the food and below the seal.

Fig. 4 is a similar view illustrating the container after it has been sealed, and after the contents have cooled to atmospheric temperature.

Fig. 5 is a view of the completed package showing the container partly in elevation and partly in vertical section, and the case in vertical section.

Referring to said drawing, numeral 10 designates a flexible and impervious container, which is also inert to its contents. Such a container may be a bag formed of one of the known thermoplastic synthetic sheet materials, as for example, the sheet material known as "pliofilm," which is understood to be a polymer of molecules akin to rubber polymers. Sheet materials formed of cellulose esters or from vinyl esters may be used, as may also be paper treated so as to be impervious to hot water. Paper for example may be coated with a film of pliofilm or vinylite or with a suitable cellulose-ester compound. A case, indicated by the numeral 12, may be advantageously used with the flexible container 10, so as to support the container against the hydrostatic pressure thereon of its contents, and also to offer external protection to the container. When a case 12 is used in conjunction with a container 10, the container is advantageously made to have dimensions in all directions greater than the internal dimensions of the case, so that any increase of hydrostatic pressure is avoided and an increase of gaseous pressure above atmospheric pressure is also avoided under conditions of ordi-

nary handling, storage, etc., as described more fully in my application Serial No. 338,852.

The food to be preserved is placed within the flexible and impervious container 10. The container with the food therein is illustrated in Fig. 2, and the food is indicated by the numeral 14.

The food 14 within the container may be a soup, or a vegetable, as peas, to which water has been added, or a fruit, as peaches, to which water or a syrup has been added, or a meat, fish, or fowl to which water has been added. These foods within the container, and the water, syrup or the like, added to them give off water vapor and/or steam when hot.

The food 14 placed within the container may be cooked or partially cooked food, retaining its temperature, and giving off copious quantities of vapor and/or steam, and which has been sterilized by the cooking. The food within the container may also be cooked and sterilized within the container, as by means of heat applied thereto in any suitable manner, as by means of an external or internal electrical heating means for example, or by means of hot air. The temperatures employed in canning and preserving ordinarily range from 200° F. to about 300° F., and the sheet materials which are employed for the container are such as to maintain their form above the temperature at which they are used.

The sealing of the container 10 is carried out while the food in the container is hot and sterile and vapors and/or steam arising therefrom occupy the space in the container above the food level and below the seal. By doing the sealing while the vapors occupy such space, air is excluded from the space within the container below the seal, and a sterile condition is maintained within the container.

The sealing may be carried out in any convenient way. When the container is made of a thermo-plastic material, or is lined with a thermoplastic material, pliofilm for example, or has a band of thermo-plastic material applied thereto along the line of seal, the upper portion of the container 10 may be flattened so as to bring the material at the open end of the container together, and placed between a heated sealing member 20 and a resilient backing member 22. When the heated sealing member and flattened upper portions of the container 10 are pressed together between the heated sealing member 20 and the resilient backing member 22, and held therebetween for a short time, the thermo-plastic material of which the container 10 is made, or with which it is lined, is softened, and welds, and thereby hermetically seals the food within the container, the seal being indicated by the numeral 25. The sealing may be effected by any other means or method which will produce an effective and reliable hermetic seal, and will not be affected by the contents of the container. As previously stated, the hermetic seal 25 is effected at a time when the space within the container 10 below the seal is occupied by vapor and/or steam. This method of sealing is particularly advantageous for the home preserver, as he or she can practice it more easily and get better results than with glass jars and seals comprising rubber gaskets and clamping devices.

After the container 10 has been hermetically sealed, it is removed from the sealing means and brought to atmospheric temperature. The reduction of temperature may be effected by artificial means, or by allowing the container and its contents to stand until it reaches ordinary temperature.

When the temperature falls, the volume of the contents of the package shrinks or contracts, and the vapor and/or steam in the space above the food level and below the seal 25 condenses leaving a void above the food level. The pressure of the atmosphere acting on the container 10, and the material of the container being yieldable, the material above the food level yields as the vapor condenses, and collapses inwardly to an extent that the pressures on the inside and outside of the sealed container 10 are equal or substantially so. The container 10 also yields as the volume within the container is changed by other conditions, such as those produced by changes in temperature and barometric pressure. With the pressures on the inside and the outside of the hermetically sealed container 10 maintained substantially equal under all conditions normally encountered in the life and use of the container, there is no strain on the seal 25 itself and an hermetic closure is realized in a more reliable and lasting manner than with rigid containers where differences in pressure between the inside and the outside of the container necessarily exist.

When the container 10 is combined with the case 12, the flaps 30, 31 which close the open top of the case, may be turned in to close the top of the case and fastened together in any suitable manner.

For convenience in handling, the container 10 may be attached to the case 12 at its inner side by spots or strips 35 of adhesive, to hold the container in a spread position within the case 12. The adhesive spots 35 are so applied as not to confine the container against expansion or extension up to the limit permitted by the inner dimensions of the case 12.

The package itself is one consisting of a container of a flexible impervious material inert to the contents of the package and which retains its form at the maximum temperature of the food which is placed therein, the food being hot and sterile at the time the package is sealed. The food within the package is sterile, and the container is substantially devoid of air, the air having been excluded by the hot vapors above the surface of the hot food at the time of sealing. The material bounding the space occupied by the hot vapors at the time of sealing is collapsed upon the contents, the hot vapors condensing on cooling and leaving a void. The pressure of the atmosphere against the container causes the material bounding the void to yield, and the container, therefore, yields until an equilibrium between the pressures on the inside and the outside of the hermetically sealed container 10 is attained. With such an equilibrium of pressures on the inside and the outside of the container, there is no strain on the seal 25, and consequently the best conditions are obtained for maintaining the integrity of the seal. The container 10 is advantageously made of a thermoplastic sheet material, such as "pliofilm" or another of those previously mentioned, and the seal is advantageously an autogenous seal produced by heat and pressure on the thermoplastic material.

A case 12 of fiber board, or of some other type of board in the paper industry, is advantageously used to enclose the hermetically sealed container 10 and protect it. When combined with the case, the container 10 is larger in all dimensions than the interior dimensions of the case, so that the case holds the container 10 against the action

of hydrostatic pressure. The extensibility of the container 10 by reason of its greater dimension avoids increases of hydrostatic pressure, and also increases of gas or vapor pressure above atmospheric pressure under all conditions normally encountered in the handling and storage of packaged goods.

What is claimed is:

1. The method of preserving foods which comprises heating food to sterilizing temperatures and to cause vapors to emerge above its surface, introducing a predetermined amount of said hot and sterile food into a flexible-walled impervious container to leave a substantial head space filled with hot vapors emerging from said food, and then hermetically sealing said container whereby upon cooling of said food and condensation of said vapors the upper portions of the walls of said container will be collapsed by the atmospheric pressure.

2. The method of preserving foods which comprises heating food to cook and to sterilize the same and to cause vapors to emerge above its surface, introducing a predetermined amount of said hot and sterile food into a flexible-walled impervious container to leave a substantial head space filled with hot vapors emerging from said food, and then hermetically sealing said container while it is still filled with hot vapors at a substantial distance above the level of said food whereby upon cooling of said food and condensation of said vapors the walls of said container around said head space will be collapsed and a hermetically sealed sterile food package substantially free from air is obtained.

3. The method of preserving foods which comprises heating food to cooking and sterilizing temperatures to cause hot vapors to emerge above its surface, introducing a measured amount of said hot and sterile food into a flexible-walled container fluid-tight and fusible on at least the inner face thereof to leave a substantial head space filled with hot vapors emerging from said food, bringing the mouth portions of said container into a flattened face to face relation, and then applying heat and pressure to a transverse strip of said flattened mouth portions to hermetically seal said container while it is still filled with hot vapors whereby upon cooling of said food and condensation of said vapors the walls of said container around said head space will be collapsed and a hermetically sealed sterile food package substantially free from air is obtained.

4. The method of preserving foods which comprises heating food to cooking and sterilizing temperatures to cause hot vapors to emerge above its surface, introducing a measured amount of said hot and sterile food into a flexible-walled container constituted at least on the inner face thereof of a fluid-tight and fusible material to leave a substantial head space filled with hot vapors emerging from said food, said material having a temperature of fusion considerably higher than the temperature of said food, bringing the mouth portions of said container into a flattened face to face relation, and then applying heat and pressure to a transverse strip of said flattened mouth portions to autogenously and hermetically seal said container while it is still filled with hot vapors whereby upon cooling of said food and condensation of said vapors the walls of said container around said head space will be collapsed and a hermetically sealed sterile food package substantially free from air is obtained.

5. The method of preserving foods which comprises introducing a measured amount of food into a flexible-walled container constituted at least on the inner face thereof of a fluid-tight and fusible material to leave a substantial head space, said material having a temperature of fusion considerably higher than the cooking and sterilizing temperature of said food, subjecting said food in the container to cooking and sterilizing temperatures to cause hot vapors to fill said head space, bringing the mouth portions of said container into flattened face to face relation, and then autogenously and hermetically sealing said mouth portions while said container is still filled with hot vapors whereby upon cooling of said food and condensation of said vapors the walls of said container around said head space will be collapsed and a hermetically sealed sterile food package substantially free from air is obtained.

6. The method of preserving foods which comprises introducing a measured amount of food into a flexible-walled inner container constituted at least on the inner face thereof of a fluid-tight and fusible material to leave a substantial head space, said container being supported by an outer case having dimensions in all directions smaller than the corresponding dimensions of the container, subjecting the food within said container to cooking and sterilizing temperatures to cause hot vapors to fill said head space, bringing the mouth portions of said container into flattened face to face relation, autogenously and hermetically sealing said mouth portions while said container is still filled with hot vapors whereby upon cooling of said food and condensation of said vapors the walls of said container around said head space will be collapsed and a hermetically sealed sterile food package substantially free from air is obtained, and then closing said case about said container.

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