July 4, 1950 LA VERNE E. CLIFCORN ET AL 2,514,027

METHOD OF CANNING FOOD PRODUCTS UNDER ASEPTIC CONDITIONS

Filed Aug. 13, 1947

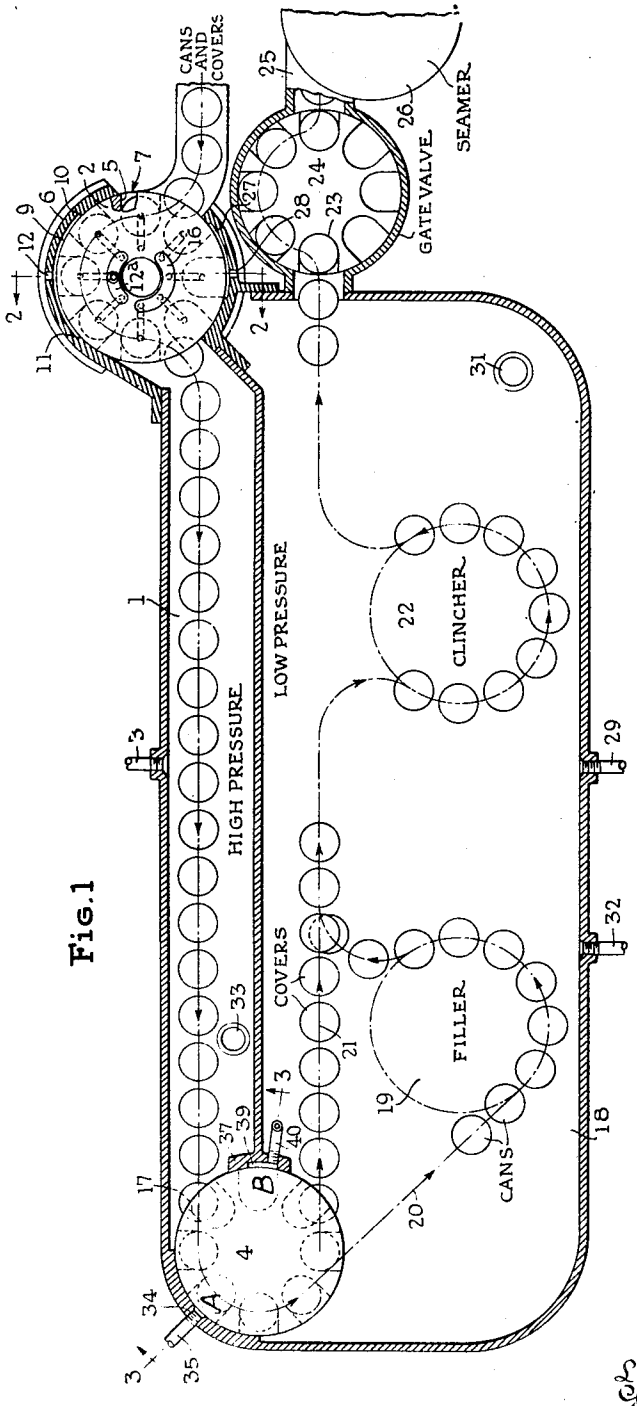


Fig. 1

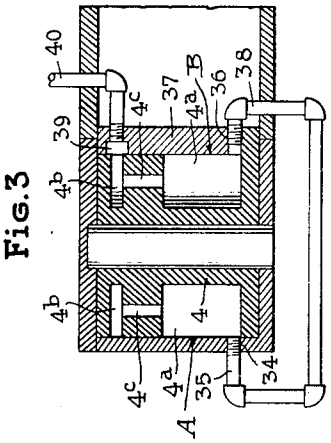


Fig. 3

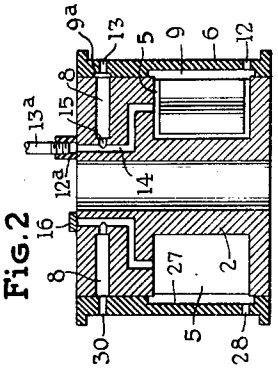


Fig. 2

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Patented July 4, 1950

2,514,027

UNITED STATES PATENT OFFICE

2,514,027

METHOD OF CANNING FOOD PRODUCTS UNDER ASEPTIC CONDITIONS

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Application August 13, 1947, Serial No. 768,462

3 Claims. (Cl. 99—182)

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The invention relates to new and useful improvements in a method of filling and sealing cans under aseptic conditions.

An object of the invention is to provide a method of the above type wherein an open-top empty can is subjected to jets of steam directed into the can for driving the air therefrom after which the can while freed of air is subjected to steam at a temperature and for a time sufficient to destroy all bacteria on the walls of the can and wherein the can while in a sterile condition and in a sterile atmosphere is filled with a sterile product and a sterile cover applied and secured thereto.

A further object of the invention is to provide a method of the above type wherein the can body is subjected to jets of steam for driving the air therefrom while in a pocket of a rotary valve transferring the can after freed of air into a closed sterilizer chamber maintained under conditions for destroying all bacteria on the walls of the can.

A still further object of the invention is to provide a method of the above type wherein a cover is transferred to the bacteria treating chamber with each can body and by pockets in the same rotating valve which pockets are freed of air by steam passing therethrough.

Another object of the invention is to provide a method of the above type wherein the can bodies and covers are sterilized in a steam sterilized chamber under high temperature and then transferred through a rotary valve to a sterile chamber maintained under a pressure slightly above atmospheric pressing for filling and closing.

A further object of the invention is to provide a method of the above type wherein the cover may be clinched to the can body in the filling chamber and the can then removed from said chamber and immediately presented to a seaming machine for hermetically sealing the can.

These and other objects will in part be obvious and in part hereinafter more fully described.

In the drawings:

Figure 1 is a view, partly in section and partly in plan, showing very diagrammatically one form of apparatus which may be utilized in carrying out the improved method;

Figure 2 is a sectional view on the line 2—2 of Fig. 1;

Figure 3 is a sectional view on the line 3—3 of Fig. 1.

Aseptic canning requires sterilization of the

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product, cans and covers, and subsequent filling and closing of the can under sterile conditions, as well as maintaining in a sterile condition the chambers, passageways and apparatus through which the cans, covers and products pass subsequent to their sterilization.

In the present method, the can bodies and covers are rendered sterile by subjecting the same to steam treatment under relatively high temperature and for a time sufficient to destroy all bacteria on the walls of the can body and cover.

In the present illustrated embodiment of an apparatus for carrying out the improved method, a steam chamber is indicated at 1. The can bodies are fed into this chamber through a rotary valve 2 which is provided with pockets for the can bodies and separate and independent pockets for the can ends. This steam chamber 1 is supplied with steam from any suitable source through a pipe 3. The exit end of the chamber 1 is closed by means of a rotary valve 4 having pockets for the can bodies and also pockets for the can ends. This steam chamber is therefore a closed chamber and is of sufficient length so that when said chamber is maintained under pressure and temperature sufficient to destroy any bacteria, the can will be retained within the chamber for a time interval so that the destruction of the bacteria will be accomplished.

It is important that when the can bodies and covers are passed into this sterilizing chamber 1 this be accomplished without feeding air into the chamber. Therefore, it is essential that air shall be removed from the can body and also from the pockets of the valve which pass the can body and the cover into the chamber. The valve 2 is provided with a series of pockets 5. The valve is located in a housing 6 having an opening to the atmosphere indicated at 7 in Figure 1. The can bodies are fed one at a time into the pockets of the valve as it is continuously rotated. The valve has a close running fit with the housing and therefore as the valve pocket passes into the housing, it will be closed thereby.

There is also a pocket 8 in the valve into which the covers are fed. The housing is provided with exhaust recesses 9 and 9a which extend along the inner wall from a point 10 to a point 11. The housing has exhaust openings 12 and 13 leading from the recesses 9 and 9a to an exhaust line or steam trap. These exhaust recesses do not extend beyond the point 11 in the rotation of the valve so that both the pocket for the can body and the pocket for the can end after they

pass the point 11 will be closed off from the steam supply header and the exhaust recesses.

In order to drive the air out of the can bodies and out of the pockets of the valves while the valve is rotating between the point 10 and 11, trere is a steam header 12a located above the valve and having a close running fit therewith which is supplied with steam from a pipe 13a. The valve has a port 14 associated with each pocket for a can body and this port leads to the pocket. When the port passes underneath the header, steam will pass through the port and be directed in a jet into the can body and this will drive the air out of the can body and also out of the pocket into the recess 9, and out through the exhaust port 12. This port 14 will receive steam under relatively low pressure all the time that it is passing beneath the header and when the port pases out from underneath the header, the pocket associated therewith will soon pass the point 11 and be closed off from the header and exhaust recess. There is also a port 15 leading from the port 14 to the pockets for the cover and steam will pass into the pocket and drive all air therefrom through the exhaust port 13. This pocket will be similarly closed off after it passes the point 11.

As the pockets pass the point 11 and out of connection with the recesses 9 and 9a, the can and the can end will be removed from the pocket and delivered to a suitable conveyor located in the steam chamber 1. These conveyors for the can bodies may be in the form of a screw conveyor or a chain with lugs spaced thereon or may be of any other desired construction. The same is true of the conveyor for the can ends. It is essential that the can and the can end will be maintained in a unit as they pass through the chamber.

The port 14 after passing from beneath the header 12a will move beneath a plate 16 which will close the port so that the pocket is not open to the atmosphere until it reaches the point where the pocket makes connection with the entrance opening 7 for the can bodies and covers. After the can bodies and covers have traversed the length of the steam chamber 1, they enter pockets similar to the pockets in the valve 2. These pockets are indicated in broken lines at 17. The purpose of the valve is to close the steam chamber 1 so that this chamber may, as noted, be maintained under high steam pressure. When aseptic canning non-acid products the temperature in this chamber 1 is preferably maintained at approximately 300° F., at which temperature the steam pressure will be approximately 53 pounds, whereas lower temperatures and pressure can be used when aseptic-canning acid products. Inasmuch as no air is fed into this chamber when the cans and covers enter the same, no time or steam will be consumed in sterilizing air that would otherwise enter the sterlizing chamber and the pressure therein will be wholly developed by steam and will not be a composite pressure of steam and heated air. In this way, the pressure indicated by a gauge connected to the chamber will give a true indication of the temperature of the steam therein and, therefore, the temperature necessary to destroy all types of bacteria can be accurately controlled by controlling the steam pressure in the chamber. Instead of steam at a high pressure, superheated steam may be used and the desired high temperature obtained.

The can bodies and covers are passed by the valve 4 into the chamber 18. The valve 4 has a series of pockets 4a into which the can bodies are fed from the chamber 1. There is also a series of pockets 4b into which the covers are fed. These pockets are connected by passages 4c. When the can body and can end enter the pocket from the chamber 1, high pressure steam will also fill the pockets. When sterile air or gas is used in chamber 18, it is desirable to prevent steam from being introduced by the valve pockets 4a and 4b into the chamber 18 as the pocket opens into this chamber and, likewise, it is desirable to prevent air or gas from being introduced by these pockets in the sterilizing chamber as the pocket opens into chamber 1. In order to exhaust these pockets, the following means is provided. The wall of the housing is provided with a port 34 to which is connected a pipe 35. When the pocket 4a reaches the position A and passes this port 34, steam in the chamber 4a and also steam in the pocket 4b for the can ends will pass out through this pipe 35. The pipe 35 is connected through suitable piping with a port 36 in the valve wall 37. The pipe connected to the port 36 is indicated at 38. This port 36 leads to the can chamber 4a and the exhaust steam passing through the piping will enter the chamber 4a at the position B and air or gas therein taken from the chamber 18 will pass into the can end pocket at 4b and thence into a header 39 to which a pipe 40 is connected which leads to the atmosphere or a steam trap. Thus the high temperature steam in the pocket when it reaches the position A will be exhausted therefrom and utilized in driving the air and gas from a pocket at the position B so that the empty can pocket is ready to receive the can body and can end as it moves into communication with the chamber 1.

It is essential that the atmosphere of this chamber 18 shall be sterile and maintained under a slight positive pressure so as to prevent any bacteria-laden air from entering the same. The chamber may be supplied with a sterile inert gas, sterile air or a mixture of either of these with steam or it may be supplied with steam alone. Disposed in this chamber is a filler indicated diagrammatically at 19. Associated with the filler and connected therewith is a sterile storage reservoir containing a pre-sterilized product. The product is sterilized and cooled in a sterilizer of any suitable well known construction and the product is fed to the sterilized storage reservoir where it is maintained under sterile conditions and thence fed to the filler. The sterilizer and reservoir are located outside of the aseptic canning apparatus described herein. It is essential that the capacity of the sterilizer must equal the capacity of the canning equipment. When the chamber 18 contains steam, or a mixture of steam with air or gas, it is preferable to employ a small filler bowl, so that the product will pass from the outside storage reservoir through the filler and to the can in as short a time as possible to minimize the amount of heat absorbed by the product from the chamber. Another advantage of utilizing a small filler bowl is that when the process is interrupted by shutting off the product supply, only a few cans will be filled in emptying the filler bowl before the chamber can be opened for inspection or adjustment.

It is also essential that before cans, ends or products are admitted to the chambers 1 and 18 that the walls of the chamber and all the apparatus contained therein should be first rendered sterile. This is accomplished by admitting high

pressure steam into the chambers through pipes 3 and 32 for a time sufficient to destroy all bacteria on the walls of the chamber and on the equipment enclosed therein.

After the can bodies leave the rotary valve 4, they are conveyed by any suitable mechanism to the filler 19 along the path indicated at 20. The covers, however, are separated from the can bodies and are conveyed along a path indicated at 21. After the can bodies have been filled with the product, they are brought back into the path of travel of the covers and a cover is placed on the filled can. The can and cover then pass through a clincher in the apparatus illustrated, which clincher is indicated at 22. A clinching device is a relatively simple mechanism requiring very little, if any, mechanical attention, whereas a seaming machine is a comparatively complex machine requiring frequent mechanical attention, consequently a preferred arrangement of the apparatus is to position the device requiring the least attention within the sterilizing chamber, and that requiring more attention outside the chamber in order that it may be conveniently accessible without entering the sterile chamber and contaminating the sterile condition within the sterile chamber when adjustments to the seamer and seaming head are required.

After the covers have been clinched onto the can bodies, they are passed into the pockets 23 of a rotary valve 24 of the usual type. This valve seals the exit of the chamber 18. The valve delivers the cans to a substantially closed tunnel 25 which leads to a seamer 26. In this seamer are the usual seaming devices for hermetically joining the cover to the can body. The tunnel is relatively short and, as noted, it is substantially closed and may be supplied with steam under low pressure so that there is no opportunity for the product within the cans having the covers clinched thereto contacting with bacteria before the cover is hermetically secured to the can body.

The housing 6 for the valve 2 on the side opposite the recess 9 is provided with a recess 27 and an exhaust port 28 leading from the recess 27 to an exhaust line to the atmosphere or connected to a steam trap. The pockets when open to the chamber 1 will be filled with steam under high pressure and as these pockets connect with the recess 27, the steam within the pocket will be exhausted to a certain extent into the exhaust line. Steam or sterile gas or sterile air is fed to said chamber 18 through a pipe 29. After the pocket passes the recess 27, then it is open to the atmosphere and when so open to the atmosphere the steam within the pocket will have been reduced to a very low pressure so that there will be no objectionable steam issuing through the opening 7 to the atmosphere. The cover pockets will likewise be brought into connection with an exhaust part 30 which likewise leads to the exhaust line. The time interval necessary to force the air from the can and the pocket by the steam jets from the steam manifold 12a is relatively short and therefore the valve can be made relatively small so that there are no mechanical difficulties in maintaining the valve sealed and in utilizing the valve for sealing the chamber 1 which is maintained under high steam pressure. When steam is utilized in the chamber 18, it may be that condensation will occur and a drain pipe 31 with the ordinary check valve is provided for this purpose.

While an apparatus has been described in detail which may be utilized for carrying out the

method, it will be understood that the improved method may be carried out in other ways than by the apparatus disclosed. While it is preferred to render the covers sterile by passing the same through the same valve as the can bodies and through the same high pressure steam, it will be understood that from certain aspects of the invention, the covers may be rendered sterile in other ways, as, for example, the covers may be supplied from cover stacks associated with the clincher and the covers rendered sterile in the stacks.

It is essential, however, in carrying out the improved method, that the can body and the inlet valve pocket shall be subjected to steam above atmospheric pressure for removing all air from the can bodies and the can and cover pockets, and while the can bodies are freed of air that the can and cover shall be subjected to a high pressure steam or some other sterilizing atmosphere at a relatively high temperature and for a time sufficient to destroy all bacteria on the walls of the can and covers.

As it is intended to sterilize and then quickly cool the product before it enters the filler, it is an essential feature of the improved method that the can body shall be filled with a sterile product in a sterile atmosphere of relatively low temperature so as not to impart excessive heat to the cool product while in the filler and in the can, and that a sterile cover be placed on the can body after it is filled and sealed thereto while in the sterile atmosphere.

We claim:

1. A method of aseptic canning of food products comprising sterilizing an open top can, sterilizing a cover therefor, filling a sterile product into the sterile can in a sterile atmosphere, applying the sterile cover to the filled can in said sterile atmosphere, clinching the cover to the can while in said sterile atmosphere for maintaining the gaseous head space of the can sterile and maintaining the can in an atmosphere slightly above normal atmospheric pressure while transferring the can with the clinched on cover to a closing machine disposed outside of said sterile atmosphere and seaming the cover to the can in said closing machine for hermetically closing the same.

2. A method of aseptic canning of food products comprising subjecting an open top can and cover therefor to a high temperature atmosphere for a time sufficient to destroy all bacteria on the walls of the can and cover, filling a sterile product into the sterile can in a sterile atmosphere, applying the sterile cover to the filled can in said sterile atmosphere, clinching the cover to the can while in said sterile atmosphere for maintaining the gaseous head space of the can sterile and maintaining the can in an atmosphere slightly above normal atmospheric pressure while transferring the can with the clinched on cover to a closing machine disposed outside of said sterile atmosphere and seaming the cover to the can in said closing machine for hermetically closing the same.

3. A method of aseptic canning of food products comprising directing steam into an open top can for driving air out of the can, subjecting the can while the air is removed therefrom, and a cover for the can, to a high temperature atmosphere for a time sufficient to destroy all bacteria on the walls of the can and cover, filling the sterile product into the sterile can in a sterile atmosphere, applying the sterile cover to the filled can

in said sterile atmosphere, clinching the cover to the can while in said sterile atmosphere for maintaining the gaseous head space of the can sterile and maintaining the can in an atmosphere slightly above normal atmospheric pressure while transferring the can with the clinched on cover to a closing machine disposed outside of said sterile atmosphere and seaming the cover to the can in said closing machine for hermetically closing the same.

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