Nov. 20, 1951 LA VERNE E. CLIFCORN 2,575,863

METHOD OF ASEPTIC CANNING

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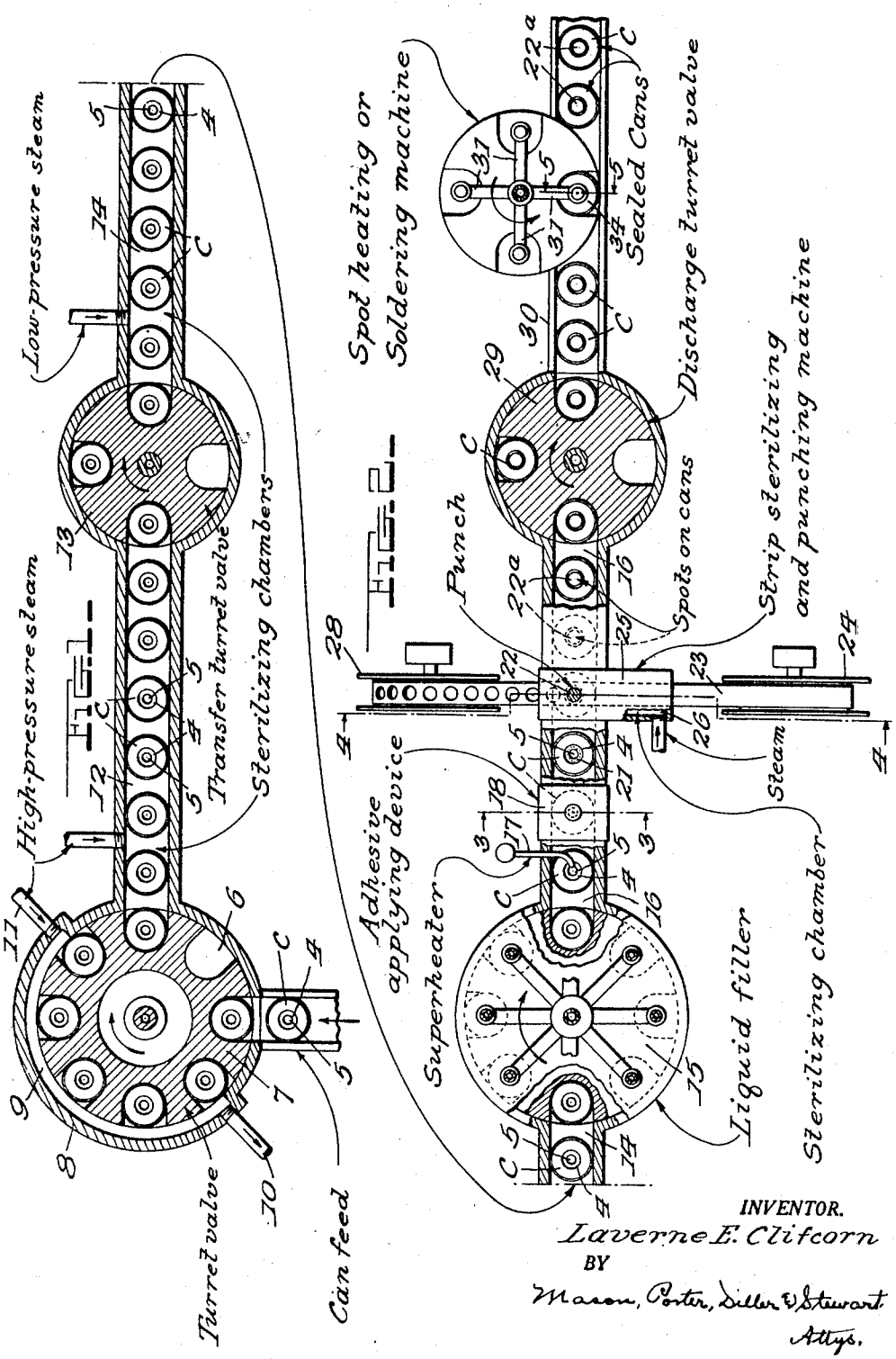

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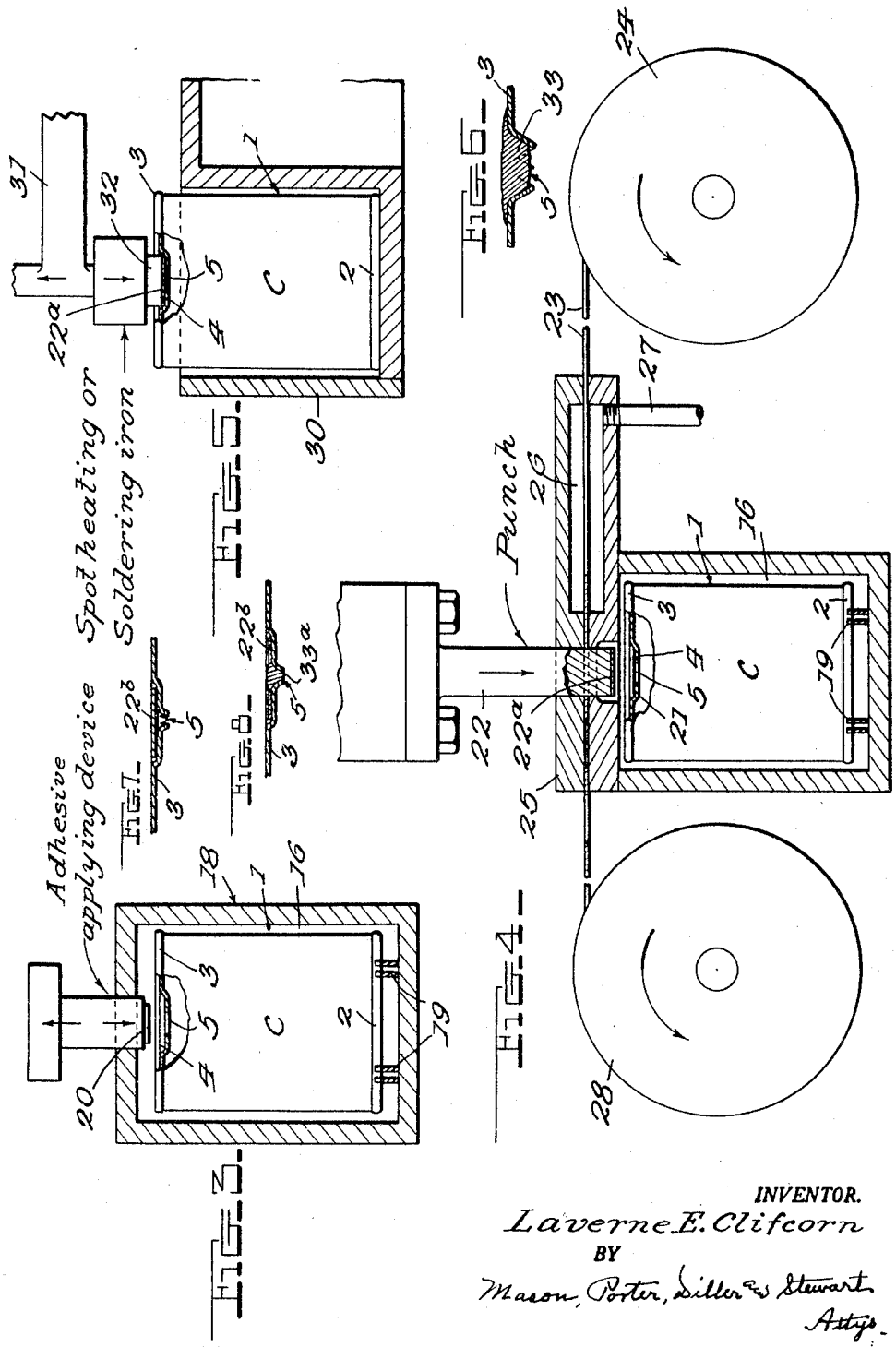

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METHOD OF ASEPTIC CANNING

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The invention relates to new and useful improvements in a method of aseptic canning of liquid or semi-liquid food products in metal containers having attached closure ends and a filling opening in one of the ends.

An object of the invention is to provide a method of the above type wherein a sterile container is filled with a sterile food product in a sterile atmosphere and while in said sterile atmosphere a sterile disc is secured to the container end for temporarily sealing the container, after which the container is removed to the open atmosphere and the container permanently sealed.

A further object of the invention is to provide a method of the above type wherein the container is subjected to treatment for removing the air therefrom, after which it is placed in the chamber maintained under steam at a temperature and for a time sufficient to destroy all bacteria on the walls of the container and in particular the inner walls of the container.

A still further object of the invention is to provide a method of the above type wherein the empty container is provided with a few drops of water, after which it is heated for converting the water into steam and thus driving air out of the container and wherein the container with the air removed therefrom is transferred to a chamber maintained under steam at a temperature and for a time sufficient to destroy all bacteria on the walls of the container and particularly the inner walls thereof.

A still further object of the invention is to provide a method of the above type wherein the sterile container, after it is filled with a sterile food product and while in a sterile atmosphere, is subjected to a jet of steam in the region of the end surrounding the filling opening for removing all foreign material therefrom, after which an adhesive or an adhesive flux is placed on the end surrounding said opening and a sterile disc is secured thereto so as to temporarily seal the container, all of which occurs while the container is in the sterile atmosphere, and after which the container is removed to the open atmosphere and permanently sealed.

A further object of the invention is to provide a method of the above type wherein the empty container is subjected to treatment for removing the air therefrom after which it is placed in a chamber maintained under steam pressure at a temperature and for a time sufficient to destroy all bacteria on the walls of the container, after which the can is bacteriologically sealed by adhesively attaching a sealing disc to the end for covering the filling opening.

A still further object of the invention is to provide a method of the above type wherein the sterile container after it is filled with a sterile

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food product and while in a sterile atmosphere is subjected to a jet of steam in the region of the end surrounding the filling opening for removing all foreign material therefrom after which an adhesive flux is placed on the end surrounding the opening and then a metal disc is applied to the adhesive flux and secured thereto so as to temporarily seal the container, all of which occurs while the container is in a sterile atmosphere, after which the container is removed to the open atmosphere and the metal disc is metal bonded to the end for permanently sealing the container.

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

In the drawings, which show diagrammatically an apparatus for carrying out the improved method:

Figure 1 is a horizontal sectional view through a portion of the apparatus showing the station wherein the air is removed from the container, also the station where the container emptied of air is subjected to steam at a temperature and for a time sufficient for destroying the bacteria on the walls of the container, and also a low pressure steam chamber into which the sterile container is transferred;

Figure 2 is a view partly in horizontal section showing the remainder of the apparatus which includes the stations wherein the container is filled with a sterile food product, the station wherein the foreign deposits are removed from the container end in the region surrounding the filling opening, the station wherein the sterile adhesive is applied to the container end around the filling opening, the station wherein a sterile disc is cut from a strip and placed on the container end for temporarily bacteriologically sealing the same, the turret for transferring the filled sealed container from the low pressure steam chamber to the open atmosphere, and the station wherein the disc may be heated and bonded to the metal of the end for permanently sealing the container;

Figure 3 is a sectional view on the line 3—3 of Figure 2;

Figure 4 is a sectional view on the line 4—4 of Figure 2;

Figure 5 is a sectional view on the line 5—5 of Figure 2; and

Figure 6 is a view showing a container permanently sealed by the fusing of a solder composition disc;

Figure 7 is a view showing a container having a sealing disc of non-metallic material adhesively applied thereto; and

Figure 8 is a view similar to Figure 6 but showing the opening closed by a solder tipping operation.

The invention has to do particularly with the aseptic canning of liquid and semi-liquid food products in metal containers. One form of metal container which may be used in carrying out the method is shown in Figures 3, 4 and 5. The container includes a body portion 1 to which a bottom end 2 is secured by seaming and a top end 3 is also secured to the body by seaming. As illustrated, the seams are of the double seam nature. So far as the present method is concerned, however, these ends may be snapped on and solder bonded to the body. The top end may be provided with a depression 4 in the center of which is a filling opening 5. The opening, as shown in these figures, is a smooth opening. In Figures 6, 7 and 8 the opening is shown as being formed so as to provide inwardly projecting tongues to assist in retaining solder when the opening is closed by fusing a solder disc, or by solder tipping.

The empty containers indicated at C are fed one after another into the pockets 6 of a rotatable turret 7. This turret is enclosed in a housing 8 and there is an arcuate chamber 9 on the inner face of the housing with which the pockets communicate during a partial rotation of the turret. Adjacent the receiving end of the chamber 9 is an exhaust pipe 10 and adjacent the other end of the chamber 9 is a pipe 11 which is supplied with steam. Before the cans are placed in the pockets in the preferred form of the invention, a few drops or a small quantity of water is placed in each can. The steam will heat the can and convert the water therein into steam and this steam will eject the air from the container. The air coming from the container and from the pockets of the turrets will be forced out through the exhaust pipe 10, so that the containers will be transferred from the turret into a high temperature steam chamber 12 substantially freed of air. Little air will also be fed into the chamber 12 from the pocket of the turret.

The steam in this chamber 12 is maintained at a temperature so that the containers while passing through the chamber will have been subjected to heat which will destroy all bacteria from the walls of the container both exterior and interior thereof. The containers C then pass through a transfer turret 13 of the usual type and are delivered to a low pressure chamber 14, which is maintained under a pressure slightly above outside atmospheric pressure. It is understood that this chamber 14 prior to the operation of the equipment is sterilized with high temperature steam after which a sterile atmosphere is assured by maintaining a low positive pressure of steam in order to prevent contamination of the equipment by airborne bacteria. It is also understood that the other units of the equipment wherein it is merely desired to maintain a sterile atmosphere will be similarly treated.

The containers are fed from the low pressure chamber 14 directly into a filler 15. This filler may be of any well known type wherein a sterile product can be filled into a sterile container while said sterile container is in the sterile atmosphere. The filling units of this filler may be of any well known type. For example, one type of filler which might be used with slight modifications is that shown in the patent granted F. G. Dickerson January 18, 1921, No. 1,365,773. These filling units are very diagrammatically illustrated at the left of Figure 2. The filling units travel with the containers so that while moving through the filling device, each container will be supplied with a sterile liquid or semi-liquid food product through the filling opening therein.

The containers filled with the sterile product are fed into the chamber 16 wherein there is a sterile atmosphere, preferably of steam. At the first station in this chamber 16, a jet of superheated steam is directed by the pipe 17 on to the area of the container end surrounding the filling opening. More than one pipe may be used, if desired. The purpose of these steam jets is to remove all foreign material from the outer surface of the can end in the region immediately surrounding the filling opening. The container then passes to the next station indicated at 18 wherein a sterile adhesive flux is applied to the container end in the region surrounding the filling opening.

In Figure 3, the chamber in which the container is having the flux applied thereto is indicated at 16, and also the conveying apparatus is indicated diagrammatically at 19. The fluxing device includes a pad 20 to which flux is applied in the usual manner so that the pad is saturated. This fluxing device extends through the upper wall of the chamber 16 and has an up and down movement imparted thereto so that the pad is brought into contact with the container end in the region surrounding the opening. The flux is rendered sterile before it is applied to the pad and this will form a ring of sterile adhesive flux around the filling opening 5 in the container end. Any suitable adhesive flux such, for example, as concentrated alcohol rosin flux, may be used for this purpose.

After the adhesive flux is applied to the container end, then the container is moved to the station where a metal disc is placed on the flux and pressed thereagainst for temporarily sealing the filling opening.

In Figure 4, one method of forming and applying a metal disc is illustrated. The container C with the flux applied to the filling opening, as indicated at 21, is fed beneath a punch 22. A strip of metal foil 23 is wound on a reel 24. The top wall 25 closing the chamber 16 has a lateral extension provided with a chamber 26 to which super-heated steam is supplied from the pipe 27. This chamber is of sufficient length so that the metal foil strip passing through the chamber will be rendered sterile. That is, all bacteria on the strip will be destroyed. This metal strip may be a tinplate with a rather heavy coating of tin or it may be of tinfoil or a solder composition. The punch 22 moves down in timed relation to the container C and forms a disc 22^a from the strip and carries it down and places it on the container end. The punch will press the disc against the adhesive flux ring and hold it there a sufficient time for the securing of the disc to the end and the sealing of the filling opening. This is a temporary seal for the container. It is understood that this disc which is shown as round may be rectangular or any desired shape and, as noted above, it may be cut and formed from a strip which is rendered sterile or may be preformed and rendered sterile and then applied to the container end.

As noted above, the disc is applied and the container sealed while still in a sterile atmosphere. It is obvious that these metal discs for sealing the container may be preformed and applied to the container end by other devices than those illustrated. The essential feature is that the sterile disc shall be placed on the sterile adhesive and temporarily secured to the container end for sealing the container while said

container is in the sterile atmosphere. The strip 23, after the disc has been punched therefrom is wound on to a reel 28. The attaching of the sterile disc by an external adhesive to the container end for bacteriologically sealing the container in a sterile atmosphere may be sufficient to form a permanent seal for the container, but it is preferred to permanently seal the container after it is removed from the sterile atmosphere and therefore this sealing of the container is referred to as a temporary seal.

After the container has been temporarily sealed, it is fed from the chamber 16 into a transfer turret 29 and from the transfer turret into an open trough 30 exposed to the atmosphere. The container is next brought to the station indicated at 34 in the drawings. At this station, there is a rotating turret having heating units associated therewith. In Figure 5, there is shown one of the heating units which is supported by an arm 31, and this arm carries a heating iron 32 for heating the metal disc and bonding the metal thereof to the metal of the can end. When the can end is made of tinplate and the foil strip is also made of tinplate, the tin on the end and the tin on the strip may be bonded together so as to permanently seal the container. This is done in the open and, therefore, the heating units can be very readily serviced. When the foil strip is made of a solder composition, as shown in Figure 6, then the disc may have a soldering iron applied thereto and the disc converted into a solder seal, as indicated at 33 in Figure 6. This tipping may be accomplished either with or without the use of solder when tinfoil or a solder composition disc is used.

While the flux is described as being applied to the can end before the application of the sealing disc or spot, it will be understood that the flux may be applied directly to the disc instead of the can end. It is essential, however, that the flux shall be sterile as well as the disc, so that the sterile can filled with the sterile product will be temporarily sealed by a sterile sealing means while in a sterile atmosphere. This temporary seal shall, of course, be of such a nature that it can be converted into a permanent seal in the open atmosphere without permitting any contamination of the interior of the container and the food product therein. In other words, the temporary seal is converted into a permanent seal without opening the interior of the container to the atmosphere.

In place of the metal strip, a non-metallic strip may be employed for sealing the container after it is filled and while in the sterile atmosphere. This non-metallic strip may be of a plastic material such as Pliofilm or ethyl cellulose. The sealing disc of any desired shape may be cut and formed from a sterile strip or preformed and sterilized. The disc thus formed is secured to the closure end by a sterile adhesive so as to close the filling opening and bacteriologically seal the can. With certain products, this closure may be sufficient and be a permanent closure of the container. If, however, it is desired to permanently close the container with solder bonding material, then the container is removed from the sterile atmosphere into the open atmosphere and the opening may be sealed by solder tipping in which case solder will be applied to the tipping iron and a suitable flux provided, if necessary.

In Figure 7 of the drawings, there is shown a non-metallic sealing disc 22b adhesively secured to the opening and this may be sufficient for permanently bacteriologically sealing the can. In Figure 8, the soldering operation has been performed by the tipping iron which will melt the ethyl cellulose and apply solder to the filling opening without bacteriologically breaking the seal of the can. The solder for sealing the opening is indicated at 33a.

It is understood that in each of the chambers containing steam used during the carrying out of the method, that suitable vents would be provided so as to take care of condensed steam and to provide means for dispelling air from the chambers when starting up.

It is also understood that the valve between a steam chamber and a low pressure steam chamber would be provided with a small bleeder pipe and port recess so as to prevent the steam taken into the valve pockets from being delivered into the low pressure steam chamber.

In carrying out the improved method, in certain steps a high temperature of steam is desired. This condition may be accomplished by utilizing high pressure steam or by superheated steam which may be at a relatively low pressure.

It is also obvious that while it is preferred to remove the air from the container through the aid of a few drops of water and heating the same so as to provide steam which will force the air out of the container, the air may be removed from the container by other well known means.

It is essential, however, that the container with the air freed therefrom shall be transferred to the high pressure chamber where it is subjected to a sterilizing atmosphere at a temperature and for a time sufficient to destroy all bacteria on the inner walls of the container.

While a metal container has been referred to throughout the description it will be understood that containers having non-metallic bodies and metal ends may be employed with the present method of aseptic canning for the reason that the method does not produce pressures in the containers such as is common during retort operations and therefore permits the use of containers of low internal pressure requirements. It is essential however, where metal to metal bonding or the application of solder is used for sealing the container that at least the end having the filling opening shall be of metal.

The apparatus shown may, of course, be greatly varied in the carrying out of the improved method. One type of apparatus which may be used for this purpose is illustrated in order to aid in an understanding of the improved method.

I claim:

1. A method of aseptic canning of liquid and semi-liquid food products in metal cans having attached closure ends and a relatively small filling opening in one of the ends comprising providing the empty can through said opening with a small quantity of water, subjecting the exterior of the can to steam for heating the can and the water therein so as to convert the water into steam for forcing the air out of the can through the filling opening, subjecting the exterior of the can while free of air to steam at a temperature and for a time sufficient to destroy all bacteria on the interior walls of the can, filling the can through said relatively small opening while in a sterile condition and in a sterile atmosphere with a sterile food product and bacteriologically sealing the filled can while in said sterile atmosphere.

2. A method of aseptic canning of liquid and semi-liquid food products in metal cans having

attached closure ends and a relatively small filling opening in one of the ends comprising providing the empty can through said opening with a small quantity of water, subjecting the exterior of the can to steam for heating the can and the water therein so as to convert the water into steam for forcing the air out of the can through the filling opening, subjecting the exterior of the can while free of air to steam at a temperature and for a time sufficient to destroy all bacteria on the interior walls of the can, subjecting the sterile can to an atmosphere of low temperature steam at a pressure slightly above atmospheric pressure to provide a sterile atmosphere, filling the can through said relatively small opening while in a sterile condition in said sterile atmosphere with a sterile food product and bacteriologically sealing the can while in said sterile atmosphere.

3. A method of aseptic canning of liquid and semi-liquid food products in metal cans having attached closure ends and a relatively small filling opening in one of the ends comprising providing the empty can through said opening with a small quantity of water, subjecting the exterior of the can to steam for heating the can and the water therein so as to convert the water into steam for forcing the air out of the can

through the filling opening, subjecting the exterior of the can while free of air to steam at a temperature and for a time sufficient to destroy all bacteria on the interior walls of the can, filling the can through said relatively small opening while in a sterile condition and in a sterile atmosphere with a sterile food product, removing all foreign material from the outer surface of the can end in the region immediately surrounding the filling opening, applying a sterile adhesive flux to said region surrounding the opening and applying a sterile disk to the adhesive while in the sterile atmosphere for bacteriologically sealing the filled can.

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