Oct. 3, 1939. J. M. HOTHERSALL 2,174,514

METHOD OF PACKAGING MILK

Filed June 25, 1935 2 Sheets-Sheet 1

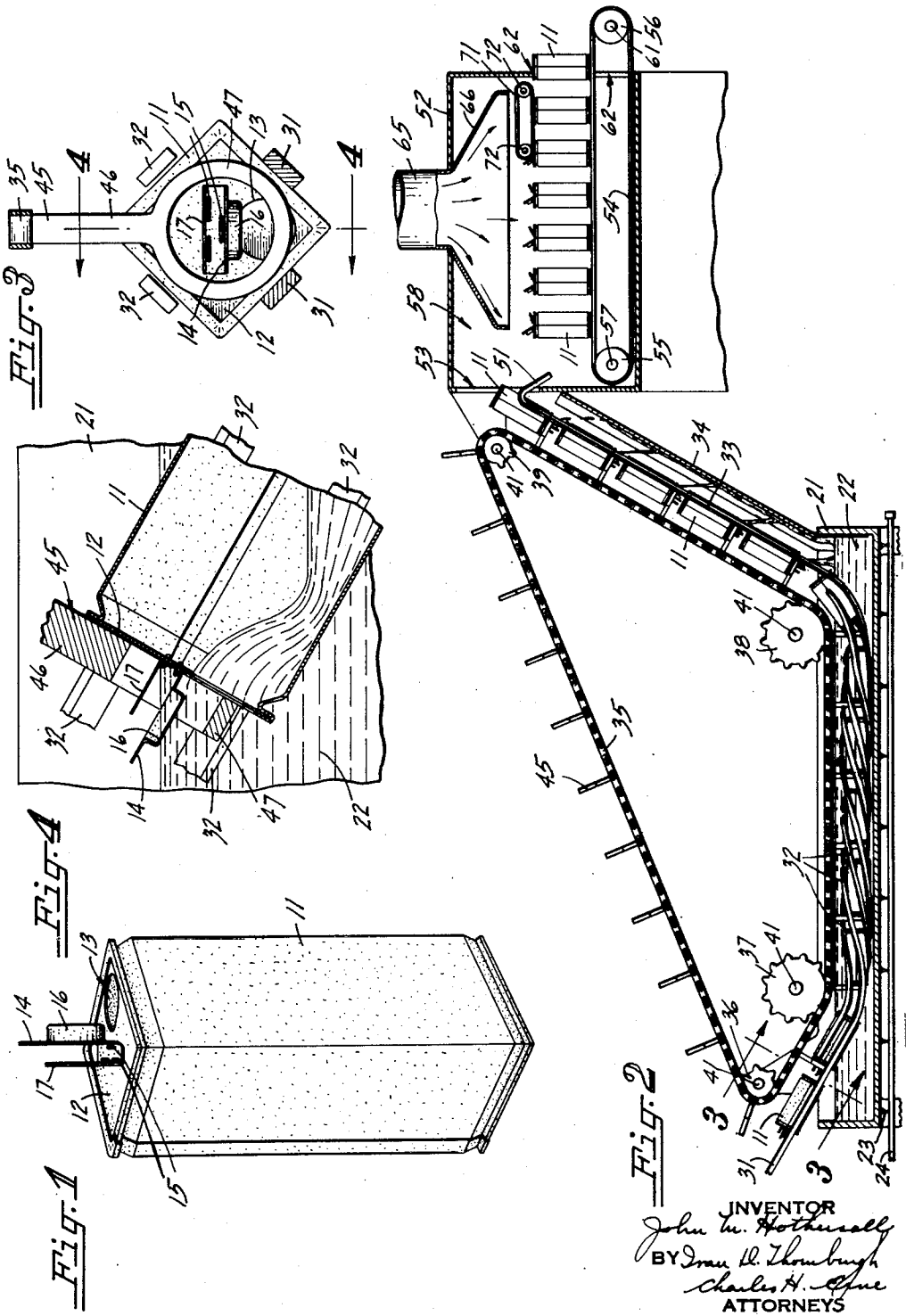


Fig. 3

Fig. 4

Fig. 1

Fig. 2

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Fig. 5

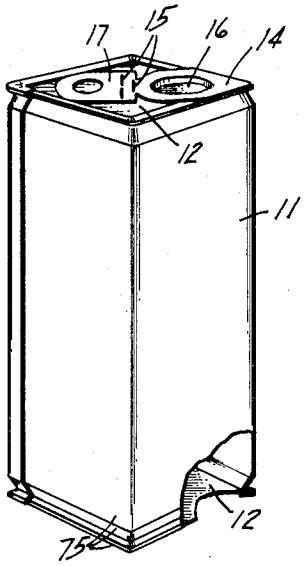


Fig. 6

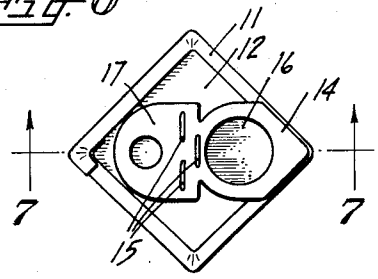


Fig. 7

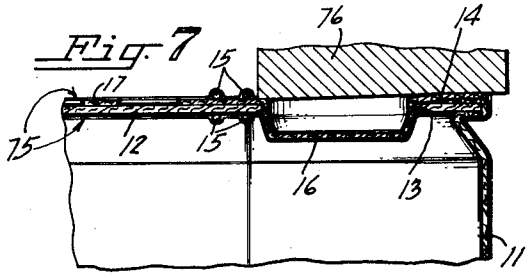


Fig. 9

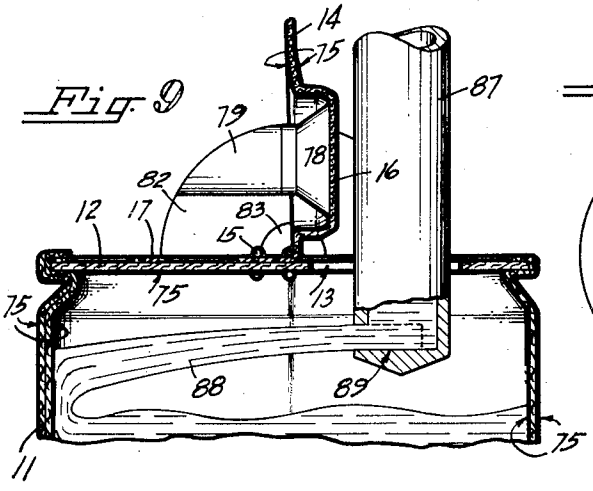


Fig. 8

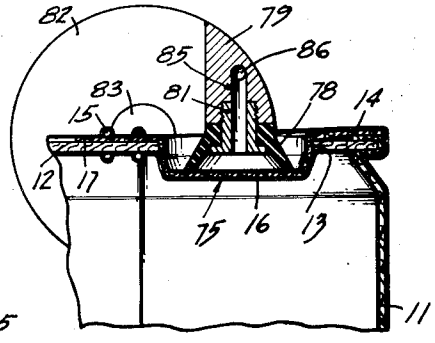
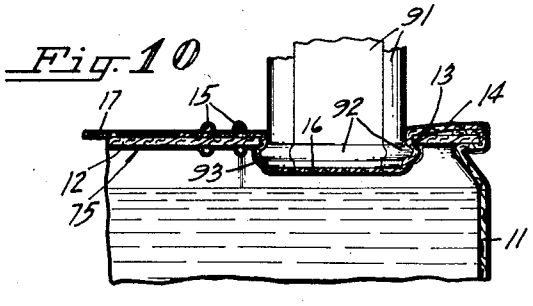


Fig. 10



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METHOD OF PACKAGING MILK

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Application June 25, 1935, Serial No. 28,369

3 Claims. (Cl. 99—181)

The present invention relates to a method of packaging milk in single service fibre containers and has particular reference to packaging steps which include the preparation of hermetically sealed and sterile empty fibre containers or cans which may be handled, shipped to the dairy and stored if desired without fear of contamination, which further include the easy opening of such cans, the filling of the same with milk and the final reclosing and sealing of the milk within the cans.

Fibre containers or cans that are suitable for use in such a packaging method are disclosed in my two patents, both for "Containers", Nos. 2,089,958 and 2,085,979, issued respectively on August 17, 1937 and July 6, 1937, and while other types of containers may be employed the container which is disclosed in Patent No. 2,085,979 just mentioned is illustrated in the drawings and will be described in connection with the instant case.

The present invention contemplates the production of a sterile or germ free hermetically sealed fibre container or can which will be conveniently prepared at a fibre can manufacturing plant and this fully sealed, empty can remains in its sealed and sterile condition until the time it is opened, irrespective of subsequent handling which may include shipment to some distance as to a dairy and storage at the dairy.

When ready for use in the packaging steps of the instant method the can is opened just enough to receive a filling tube or its equivalent and the same strictness of germ free conditions which are maintained in handling milk at the dairy continue while the can is quickly filled, after which the filled can is immediately closed and is then ready for delivery to the ultimate consumer.

An object of the present invention is the provision of a method for producing a sterile hermetically sealed fibre container adapted for easy opening, of a method for breaking the seal and opening the container only just enough for filling, of filling with milk, of closing the filled container and sealing so that the unit package which the ultimate consumer receives is an individual single service package of milk produced under sanitary conditions.

A further object of the invention is the provision of such a method wherein a fibre container or can is sterilized and hermetically sealed with heated paraffin or the like and is subsequently opened by reheating of such of the paraffin as is required to provide for a sufficient entrance of the milk into the can.

Another object is the provision of a method of few and simple steps for sterilizing and hermetically sealing liquid-proof fibre cans, for opening the same, for filling with milk and for sealing the filled cans, all of these steps being directed to providing a sterile and germ-free unit package.

Still another object is the provision of a method of packaging milk which utilizes a fibre container or can having a closing part by means of which it is closed during a hermetic sealing period or opened when the milk is introduced into the can, or again reclosed on the milk, this closure part being preferably finally reshaped to more securely provide an improved liquid seal for the can.

A further object of the invention is the provision of a packaging method of the character described wherein a fibre container is immersed in a bath of melted paraffin maintained at sterilizing temperatures, is rotated on a longitudinal axis while in the bath to distribute the sterilizing and liquid proofing paraffin on all surfaces, is drained of excess liquid as the can is removed from the bath and is thence cooled with sterile air prior to its being again sealed.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

The carrying out of the method steps of the instant invention may be done by relatively simple machinery both as to the can factory where the container or can is liquid proofed, sterilized and closed and also in the dairy where the can is opened, filled and reclosed and the necessary elements in one complete organization of such machines is more or less diagrammatically shown in the accompanying drawings together with a detailed showing of the can used, this disclosure affording a better and more complete understanding of the invention.

Referring to these drawings:

Figure 1 is a perspective view of a completely formed fibre container or can, this view showing the closure element in raised position and the can open;

Fig. 2 is a schematic longitudinal sectional view taken through the can dipping, draining and drying machine units and showing the passage of opened cans into and through a sterilizing and liquid proofing bath and also showing the draining of the can after its immersion and the drying

of the open can and the final closing of the empty can;

Fig. 3 is an enlarged transverse sectional detail taken substantially along the line 3—3 in Fig. 2 and showing a part of the conveying device in its association with an open can;

Fig. 4 is a schematic longitudinal fragmentary section illustrating the can as it is immersed into the sterilizing liquid the section lines 4—4 in Fig. 3 indicating the position of the sectional plane relative to the can, Fig. 4 being on a slightly larger scale than Fig. 3;

Fig. 5 is a perspective view of the container illustrated in Fig. 1, this view showing the container after it has been hermetically sealed and after it has passed through the sterilizing bath, one corner of the can being broken away to expose a section of its interior;

Fig. 6 is a plan view of the can illustrated in Fig. 5;

Fig. 7 is an enlarged sectional fragmentary view of a part of the sealed container illustrating graphically the application of a heating plate to the closing element of the can, section lines 7—7 of Fig. 6 indicating generally the plane of the section as to the can;

Fig. 8 is a similar fragmentary sectional view of the can illustrating graphically the first step in the opening of the sealed can;

Fig. 9 is a similar view illustrating the holding of the can opened and showing the introduction of milk into the can; and

Fig. 10 is a similar view of the can after it has been filled and showing the reshaping of the closure element which follows the completion of the filling step.

A fibre container suitable for passage through the various elements effecting the method of packaging milk under sanitary conditions may first be manufactured in any suitable manner to provide as one form the can illustrated in Fig. 1, this manufacture of the can forming no part of the present invention. Such cans are first introduced into the inclined entrance end of a can runway, this section of the runway extending into and beneath the surface of a bath of melted paraffin or other suitable liquid proofing material used for application to the can parts. This liquid is maintained at a sufficiently high temperature to effect complete sterilization of the container as it passes through the bath.

The cans are moved in processional order down the entrance incline and thence through a twisting or turning section of the runway which is in the bath. This can movement is effected by means of a conveyor chain which is provided with suitable flights that engage back of the cans and push them along.

These conveyor flights also hold the cans open so that as they are immersed below the surface of the liquid each can is filled with the heated paraffin and is also turned over and over during its passage along its twisted path within the bath. The paraffin which flows inside of the can is thus distributed onto every part of its interior surface. The outside surfaces of the can are also completely covered by the heated paraffin.

After passing through the twisted section of the runway, the cans are further conveyed up an inclined discharge section of the runway and in this latter passage the open end of the can is disposed at the bottom so that a substantial part of the paraffin drains out leaving a uniform relatively thin coating of paraffin on all of the can surfaces, both inside and out.

At the upper end of the inclined discharge chute the can is caused to turn end over end and falls in an upright position on a conveyor belt which operates in connection with a drying chamber through which the can is then conveyed. Sterile air is introduced into the drying chamber and is caused to flow inside of the can and the paraffin begins to set as it nears the end of its passage in this sterile atmosphere. Adjacent the discharge end of the drying chamber the cans move under an endless, constantly traveling top belt which presses down and closes each can by bending its closing element into closing position. The final setting of the paraffin at about this time completely and hermetically seals the empty can.

This can is absolutely sterile and remains so as long as it is sealed. In this condition it may be handled and shipped as desired, the can now presenting the appearance shown in Figs. 5 and 6 of the drawings. It is desirable that the can be cooled before this final closing to prevent development of a vacuum which will take place if sealed too hot. Proper control of the temperature of the sterile air used in the drying chamber brings the cans to the desired temperature and prevents creation of a vacuum which also prevents any resulting straining of the can seams.

When at the diary it is desirous of filling the can with milk for distribution to the ultimate consumer, the can is opened and filled. In order to effect an easy opening, the closing element of the can may be subjected to a heated plate or its equivalent so that the paraffin surrounding the sealed closure element is sufficiently softened to allow breaking of the seal. The opening of the can and the breaking of the seal may be done mechanically by engaging its closure element with a sucker head mounted to move up and down relative to the top of the can so that the closure element is lifted and the opening of the can exposed.

The milk is introduced through this opening while the closing element is held in open position after which the closing element may be returned to position within the opening.

A final sealing of the filled can to provide a liquid tight seal is preferably made by a reshaping of the closure element. One form of reshaping operation is disclosed in Fig. 10 wherein the walls of the closure element which engage the walls of the opening of the can are shown as being pressed outwardly or expanded. This produces an effective liquid tight closure. This completes the steps of the instant invention, a sealed and filled can unit being the result of the various operations. Such cans may then be delivered to the ultimate consumer as in the usual house to house delivery.

In carrying out the steps of the method invention a suitable fibre can 11 (Fig. 1) is first provided. This can is closed by top and bottom fibre parts 12, the top having a filling and discharge opening 13 formed adjacent an edge of the can. A closure element 14 preferably also made of fibre is secured to the top 12 in any suitable manner as by staples 15. This element comprises a drawn plug section 16, which is adapted to enter into and completely fill the opening 13 when the closure element is in a closing position, and a lifting tab 17. The plug section 16 is on one side of the staple connection 15 and the lifting tab 17 on the other.

This container 11 in this stage of its manufacture is fully formed, glued, etc., but its fibre walls are untreated. Prior to the first step of the instant invention which comprises coating the walls

and sterilizing, the closure element 14 is bent into the form illustrated in Fig. 1 and the opening 13 is exposed.

In Fig. 2 there is disclosed a part of a sterilizing apparatus which comprises a tank 21 adapted to contain melted paraffin 22 or other suitable liquid proofing material with which the walls of the can are coated. The tank contents may be suitably heated as by gas jets 23 disposed below the bottom of the tank and supplied with gas as by a gas line 24.

An inclined chute 31 which is the first and entrance section of a can runway, is extended from a position above the top rim of the bath down into the tank adjacent its bottom. This chute section merges into a twisting or turning section of the runway and comprises curved guide rails 32. This turning guide section 32 is of proper length and shape to cause a complete rotation of the can on its longitudinal axis during the time that the can is beneath the surface of the paraffin 22 within the tank 21, this section of the passageway being disposed below the level of the paraffin within the tank.

The guide sections 32 at the discharge side of the tank merge into the discharge section of the runway which includes inclined runways 33 which extend up from the level of the liquid to a considerable distance above the tank. A drain trough 34 is disposed parallel to and beneath the runways 33 and its lower end is immersed in the liquid within the tank and directs excess liquid back into the bath.

The cans 11 are caused to pass continuously through the chute 31, the twisted guide rail sections 32 and the runways 33 by the action of a conveyor chain 35. This conveyor comprises an endless chain and operates over sprockets 36, 37, 38 and 39 which are suitably mounted upon shafts 41 held or journaled in suitable frame parts. One of these may constitute a drive shaft for causing continuous travel of the chain.

Chain 35 carries a series of spaced flights 45 which are connected with certain links of the chain and which provide for engagement with the can to effect its passage through the apparatus.

Each flight 45 (Figs. 3 and 4) is preferably composed of an arm section 46 and a ring section 47, the ring being at the free end of the flight. When a section of the chain 35 comes into position for passage above and parallel to the chute rails 31, the flight or flights 45 associated with such chain section moves down against the top 12 of the can 11 as the latter rests upon the chute rails. The ring section 47 lays against the top of the can and the opening of the ring retains the plug section 16 of the closure element as well as the lifting tab 17 in raised position (see Fig. 3). This holds the discharge opening 13 of the can free and exposed. While held in this open position the moving flight 45 forces the can down beneath the surface of the paraffin bath (as illustrated in Fig. 4) whereupon the liquid pours into the can.

As the can still propelled by its flight 45, passes into the twisted guide sections 32 the inclined rails pressing against the rectangular walls of the can cause it to rotate on its longitudinal axis, the hole of the ring section 47 permitting free rotation. Accordingly the cans move forward beneath the surface of the paraffin within the tank and at the same time turn over, the can opening 13 allowing for free circulation of the liquid. The turning of the can prevents the forming of any air pockets and the liquid paraffin thoroughly covers all can surfaces both inside and out. The sterilizing temperature of the paraffin insures complete sterilizing of the can at this time.

The can still being propelled by its associated chain flight thence passes into and moves up the inclined runways 33. During the elevation of the can along these runways its opening 13 is disposed downwardly or at the lowest point of the can so that the paraffin which has filled the can flows back into the tank.

This draining of the paraffin is by way of the trough 34 so that the excess paraffin is returned to the tank without appreciable loss above the amount remaining upon the surfaces of the can. The upper part of the rails 33 are turned down at 51 and as the can upon reaching this part of the incline is still propelled by the moving chain flight 45 it turns end over end and is uprighted as it passes from the turned back runway ends.

A housing 52 is suitably disposed adjacent the discharge end of the runway and is formed with an opening 53 through which the cans pass as they drop from the discharge guides 51. A belt 54 is located adjacent the bottom of the housing and operates over pulleys 55 and 56 and the cans fall in upright position on this belt. Pulley 55 is mounted upon a shaft 57 which is arranged inside of the housing the chamber within the housing being designated by the numeral 58. The pulley 56 is suitably carried on a shaft 61 and pulley and shaft may be located just outside of a chamber opening 62 formed in the wall of the housing. This opening permits passage of the belt 54 and also cans carried thereby to the outside.

Provision is made for the introduction of sterile air into the chamber 58 and for this purpose an air supply pipe 65 passes through the top of the housing 52 and spreads out into a hood section 66 inside of the housing. This hood is disposed over the top of the cans as they are conveyed through the chamber on the upper run of the belt 54.

The sterile air forced into the chamber prevents any contamination of the cans at this stage of their treatment it being recalled that the cans are still in open position. This air is preferably of a temperature to cool the cans so that the paraffin is brought to a point where it is nearly solidified as it approaches the discharge opening 62 of the housing.

The closure element for each can is brought down or hinged into closed position on the can top just at this time of setting of the paraffin. This is accomplished by any suitable closure device such as a belt 71 which operates over suitable pulleys 72 and is located within the chamber 58 above and adjacent the discharge opening 62. As a can 11 passes under the belt 71 its plug section 16 and its lifting tab 17 are both pressed down into engagement with the top 12 of the can.

Since this is done at the time that the paraffin sets, the container is thereupon hermetically sealed and its interior is closed against the entrance of germs. The set paraffin holds the closure parts in close engagement and the hermetically sealed and sterile empty container then passes through the opening 62 and off of the belt 54 to any suitable place of deposit.

The use of sterile air passing into the chamber 58 which is at a temperature to bring the heated can to the point where its paraffin sets, is utilized to prevent closing of the can when

it is too hot. Such closure could be effected and the can hermetically sealed while hot but as the can cooled the vacuum formed on the inside would produce unequal strains on the can walls and seams and around the discharge opening 13. It has been found that this hot sealing is not as satisfactory as when the can is hermetically sealed at substantially room temperature.

This completes the steps for sterilizing and hermetically sealing the can which ordinarily will take place in the can manufacturing plant and the result is a sealed empty container which may be shipped to great distances and handled or stored over a length of time without fear of contamination.

Figure 5 illustrates the sealed sterile paraffin coated container 11, the exterior and interior surfaces of which are completely covered with a coating of paraffin designated generally by the numeral 15 (Fig. 7). When this can is ready for filling the closure element 14 is placed under a heated plate 76 or other form of warming element and the paraffin outlining the closure element is slightly softened by the heat. The can is then ready to be opened.

Lifting of the plug section 16 of the closure element 14 may be accomplished in any suitable manner, Figure 8 showing one form of mechanical device for doing this. A rubber sucker cup 78 is fastened to a boss 79 (see also Fig. 9) by means of a hollow screw 81 threadedly engaged in the end of the boss.

The boss 79 is formed on the face of a disc 82 which is suitably associated with an oscillating shaft 83 by means of which the disc may be turned back and forth and the suction cup 78 moved from a vertical position into the can closure plug engaging position shown in Fig. 8.

The central opening of the hollow screw 81 is preferably aligned with a port 85 which is formed in the boss 79 and this port may be connected with a passageway 86 leading to a suction device associated with the oscillating disc 82. When the suction cup 78 engages inside of the plug section 16 of the closure member a suction is drawn on the inside of the cup and as the disc 82 rotates, the cup while securely holding the plug section, raises that part of the closure member into the vertical or open postion shown in Fig. 9.

While the suction device still holds the closure member in open postion, the milk is introduced into the can through the opening 13 as illustrated in Fig. 9. For this purpose a filling tube 87 may be introduced into the can through the opening and milk indicated generally by the numeral 88 is caused to flow into the can by passage through the tube and by discharge through an opening 89 cut in the side wall of the tube. Such a tube may be so formed adjacent its lower end as to discharge the milk gently and in umbrella form and with very little foaming. This construction allows for the rapid filling of the can, the milk being thrown against the interior of the side walls of the can.

After the can has been filled to the proper level the milk is cut off, the filling tube 87 is withdrawn and the disc 82 is returned into the position shown in Fig. 8. The suction through the suction cup head is then replaced with air and the plug section 16 released from the cup The cup returns to vertical position leaving the plug closure in the can opening and closing the can.

To insure a further closing and a more permanent liquid seal provision is made for reshaping the plug section 16. This is best shown in Fig. 10. With the closure element 14 in can closing position an expanding device indicated generally by the numeral 91 is inserted within the plug section and is then expanded so that the plug wall is forced out. This may be done by sectional beads 92 formed on the expanding elements.

The side wall of the plug section 16 is thus reshaped or reformed an enlarged annular bead 93 being produced in the plug wall. This bead is located directly beneath the top 12 of the can and tightly engages the walls of the opening 13 providing a liquid closure and sealing the milk within the can.

This completes the operations incident to producing a unit package about which the present invention is chiefly concerned. The filled can sealed as shown is in condition to be delivered to the ultimate consumer and insures receipt by the ultimate consumer of a sanitary sterile filled unit package.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the steps of the process described and their order of accomplishment without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the process hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. The method of treating empty fiber containers under sanitary conditions for the subsequent packaging of milk, which comprises providing a fiber container having a closure element on a wall thereof, passing said container with said closure element in open position through a bath of heat liquefied paraffin to completely coat and sterilize the interior walls thereof including the closure element, removing excess coating material from the interior of said open container, partially solidifying said coating material and preventing contamination of the interior of the same by introducing a sterile fluid medium therein, and then hermetically sealing said sterile container by closing said closure element while said coating material is setting, whereby the sealed sterilized empty container may be subsequently opened, filled with milk, reclosed and resealed for distribution and consumption of the contents.

2. The method of treating empty fiber containers under sanitary conditions for the subsequent packaging of milk, which comprises providing a fiber container having a friction plug closure element hinged to an end wall thereof, passing said container with said hinged closure element in open position through and beneath the surface of a bath of heat liquefied paraffin to completely coat and sterilize the interior walls thereof including the closure element, removing excess paraffin from the interior of said open container by tilting the same into draining position, partially cooling and solidifying said paraffin coating and preventing contamination of the interior of the same by introducing sterile air therein, and then hermetically sealing said sterile container by hinging and pressing inwardly said plug closure element while said paraffin coating is setting, whereby the sealed sterilized empty container may be subsequently opened, filled with milk, reclosed and resealed for distribution and consumption of the contents.

3. The method of treating empty fiber containers under sanitary conditions for the subsequent packaging of milk, which comprises providing a fiber container having a friction plug closure element hinged to an end wall thereof, passing said container with said hinged closure element in open position through and beneath the surface of a bath of heat liquefied paraffin while twisting the same on its longitudinal axis to insure complete and uniform coating and sterilization of the interior walls thereof including the closure element, removing excess coating material from the interior of said open container by elevating the same with its open end in a lowered draining position, partially cooling and solidifying said coating material and preventing contamination of the interior of the same by passing the open container through a medium of sterile air, and then hermetically sealing said sterile container by hinging and pressing inwardly said plug closure element while said coating material is setting, whereby the sealed sterilized empty container may be subsequently opened, filled with milk, reclosed and resealed for distribution and consumption of the contents.

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