United States Patent [19]

Henfrey

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[54] **METHOD AND APPARATUS FOR OPENING PLASTIC CONTAINERS**

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[52] **U.S. Cl.** **222/1**, 222/90

[51] **Int. Cl.** **B67b 7/26**

[58] **Field of Search** ..... 222/81, 89, 90, 80, 1; 128/214 D, DIG. 24; 150/8

[56] **References Cited**

UNITED STATES PATENTS

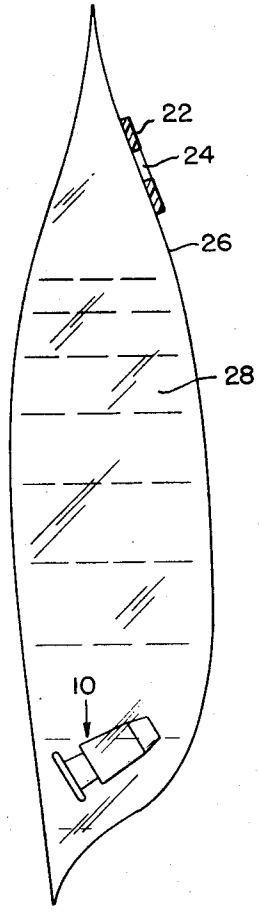
3,599,836	8/1971	Hegi	222/90
3,554,256	1/1971	Anderson	150/8
3,255,923	6/1966	Soto	222/81 X
3,596,801	8/1971	Barnack	222/81

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Assistant Examiner—John P. Shannon
Attorney, Agent, or Firm—Theodore B. Roessel; Roger Aceto

[57] **ABSTRACT**

Disclosed is a method and apparatus for aseptically opening sealed containers such as plastic bags or the like containing a sterile liquid wherein a punch member for piercing the container is placed within the container and sterilized with its contents. The punch, which is thrust through a die member on the outside of the container to pierce the container wall, thereafter acts as the pouring spout.

4 Claims, 8 Drawing Figures



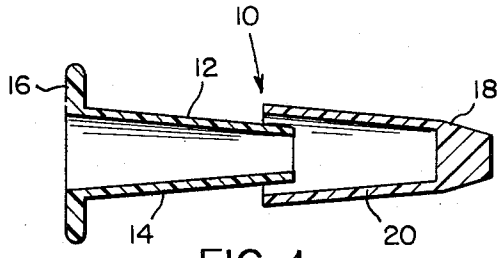


FIG. 1

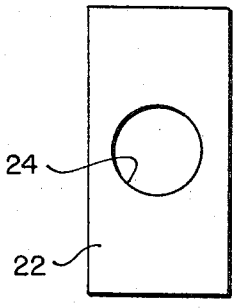


FIG. 2

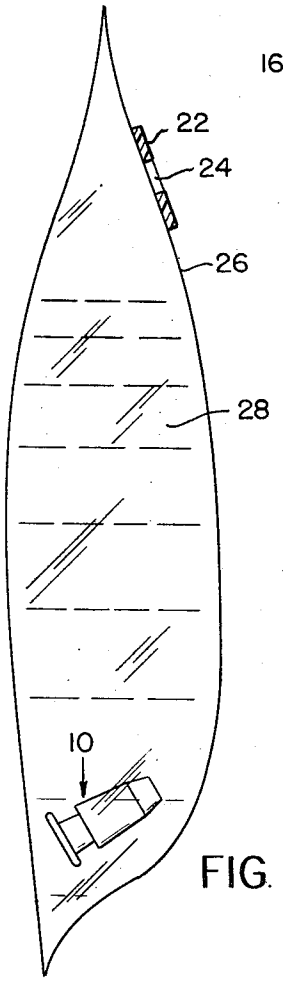


FIG. 3

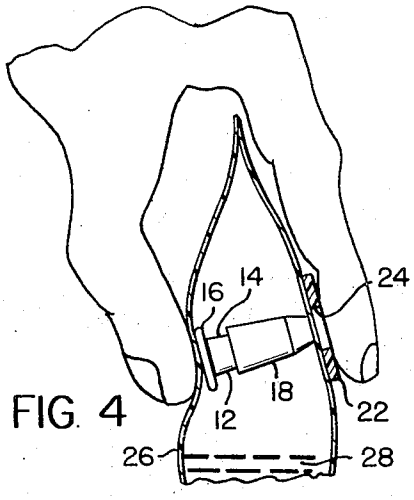


FIG. 4

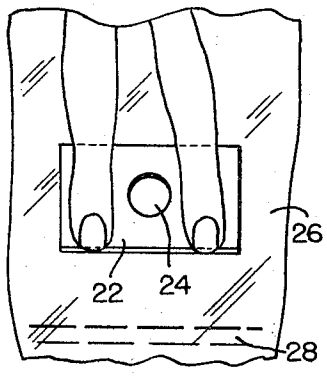


FIG. 5

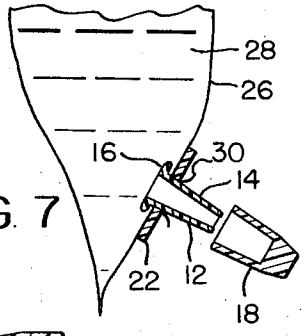


FIG. 7

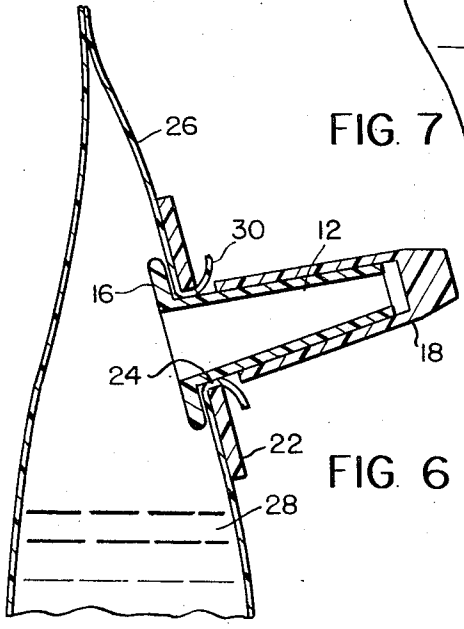
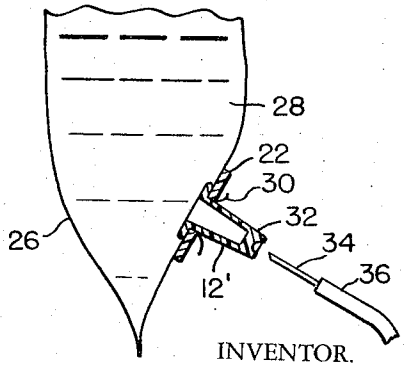


FIG. 6

FIG. 8



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METHOD AND APPARATUS FOR OPENING PLASTIC CONTAINERS

BACKGROUND OF THE INVENTION

This invention relates to a method and apparatus for opening flexible containers of plastic material and has special application to containers used for storing sterile liquids.

For many reasons it is becoming increasingly desirable to supply liquid in bags or containers of plastic material instead of bottles for hospital and similar applications. At present the potential advantages of using a container of plastic material have been more than offset by the fact that it has not been found possible to manufacture such a container which can be opened aseptically at a price low enough to warrant throwing the container away after use.

SUMMARY OF THE INVENTION

According to the present invention, a method for opening a sealed flexible container of plastic material includes the step of using two interlocking members, one of which is inside and the other outside the container, to perforate the container wall.

Further, according to the invention, apparatus for opening a sealed flexible container of plastic material includes a male punch member and a co-operating female die member for location on opposite sides of the container wall, the members being so formed that when they are brought into mating relationship the wall of the container is pierced. Advantageously, if the container is used for storing sterile liquids the two members are so formed that the portion of the container wall surrounding the perforation is brought into sealing relationship with the two members as they are interlocked.

OBJECTS OF THE INVENTION

One object of the present invention is to provide a method and apparatus for aseptically opening containers such as plastic bags or the like.

Another object is to provide means for opening containers containing a sterile liquid wherein the means, after opening the container, functions as the pouring spout.

A further object is to provide a method and apparatus for opening a container having sterile contents to permit aseptic dispensing of such contents.

Yet another object is to provide a method and apparatus for aseptically opening containers wherein one portion of the tool for opening the container is located inside the container.

These and other objects, advantages and characterizing features of the present invention will become more apparent upon consideration of the following detailed description thereon, when taken in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal section of a two-part bag piercing member prior to assembly;

FIG. 2 is a plan view of die used with piercing member;

FIG. 3 is a diagrammatic illustration showing the assembled piercing member within a sealed container;

FIGS. 4 through 7 are diagrammatic illustrations on different scales showing various stages of the bag opening process; and

FIG. 8 is a diagrammatic illustration showing the final step in a bag opening process in which a modified piercing member is employed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, there is shown a two-part container piercing member or punch generally indicated at 10, comprising a hollow spout member 12 having a tapered shank portion 14 and a flange 16, and a cap member 18 having correspondingly tapered walls 20. For reasons which will be apparent later, the maximum outside diameter of the cap is made less than or equal to the maximum diameter of the tapered shank portion 14. Members 12 and 18 may be made from plastic or metal or any other suitable substantially rigid material capable of withstanding the appropriate sterilizing temperatures.

FIG. 2 shows a connector plate or die 22 formed with a central aperture 24, the diameter of which corresponds approximately to the maximum diameter of the tapered shank portion 14. The die may be of metal or rigid plastic material and may conveniently be kept on a key ring or attached to a table where container opening takes place.

The spout and cap members 12 and 18 respectively are jointed together by pushing the cap over the tapered shank portion 14 of the spout. The two-part punch 10, thus formed, is then placed in any suitable container 26 (FIG. 3), such as a bag of plastic material, which contains a sterile liquid 28. The punch may be placed in the bag prior to, or after the liquid to be sterilized is poured into the bag. The die 22 may be kept as described above or it more conveniently may be attached to the outside of the bag as shown in FIG. 3, in which case it could also be used as a label to indicate the bag contents.

After the punch 10 and the liquid have been deposited into the bag the latter is completely sealed. The sealed bag 26, the liquid 28, the two-part punch 10 and, if desired, the die plate 22 are then sterilized in the usual manner by steam under pressure. During sterilization the punch in the container will be sterilized by means of contact with either the liquid in the bag and/or vapor produced by the liquid. After cooling to a suitable temperature, for example 60°C, the bag is removed from the sterilizer and is then ready for use or may be stored and subsequently re-heated to 50° or 60°C.

To open the bag, whilst maintaining aseptic conditions, the two-part punch 10 is manoeuvred to a part of the bag where it can be manually gripped from outside so that the liquid level is below the punch (FIG. 4). At the same time, the die plate 22, if not already attached to the bag, is positioned outside the bag so that the aperture 24 is in alignment with the shank portion 14 of spout member 12 and cap 18. This can be done manually by holding the plate with two fingers as shown in FIG. 5. With punch 10 and die 22 aligned in this manner, moderate pressure is applied against the bag with the thumb on flange 16 (FIG. 4) and two fingers on die 22 to force the punch through the wall of the bag and into the die aperture 24. Pressure is applied until plate

22 becomes firmly fixed on the shank portion 14 of spout 12.

As the bag is pierced in this manner, a portion 30 of the bag material is "extruded" through aperture 24 and eventually forms a seal between the shank and die 22 as shown in FIG. 6. Cap 18 is now removed from spout member 12, either by hand, or by first inverting the bag and releasing the thumb pressure on the punch momentarily to fill the spout with liquid and then reapplying pressure to pump a small quantity of liquid through the spout which automatically ejects the cap (FIG. 7). The sterile liquid 28 can then be poured out through spout member 12, the flow being regulated by movement of the thumb relative to flange 16 to open or close the back of the spout member. It will be evident that the part of the spout shank portion 14 which is covered by cap 18 never comes into contact with any part of the bag or hand during the opening process and consequently sterile egress of liquid is ensured.

The above described bag opening process is entirely satisfactory for topical applications or where sterile intraveneous solutions are required but in the latter case the construction of spout member 12 has to be slightly modified. As will be seen from FIG. 8, the end of spout member 12'is closed, for example, by a membrane 32 of plastic material. In this case, when the cap is removed after piercing the bag, a needle 34 attached to an intraveneous tube 36 is pushed through membrane 32 to cause sterile egress of the liquid.

The material used in the construction of the bag 26 described above is preferably of cast polypropylene of 200 gauge. However, it will be understood that other materials may be used provided they can withstand the temperature and pressures applied during sterilization and are reasonably light and flexible.

It will be evident from the above description that a simple container such as a deformable bag of plastic material or a rigid container having a deformable portion can be used to store the sterile liquid. This has many advantages over the conventional bottle storing method. In particular, the bag of plastic material is simple to manufacture; it is relatively lightweight; it is not prone to damage; it may be thrown away after use which eliminates the return of bottles for washing operations and therefore excludes the danger of a contaminated bottle being refilled; and it is relatively cheap to manufacture.

Having thus described the invention in detail, what is claimed as new is:

1. A method for aseptically opening a flexible container and removing the sterile fluid contents thereof comprising the steps of:

a. placing a punch into said container prior to sealing and sterilizing the contents thereof so that said punch and the fluid contents of said container are sterile prior to opening, said punch having two portions, a spout and a cap member removably disposed over and about said spout;

b. placing a die against the outside of said container;

c. manually manipulating said container to align said punch with said die and thereafter applying a manual force through said container wall to thrust the spout and cap member portions of said punch through said die to perforate the wall of said container, said cap protecting and maintaining the outlet of said spout and the surfaces of said spout adjacent the outlet in a sterile condition as said cap and spout pass through the wall of said container and said die;

d. removing said cap member from over and about said spout to expose the sterile spout opening; and

e. dispensing the contents of said container through said perforation and the sterile outlet of said spout.

2. A method as set forth in claim 1 wherein said spout member is sealed and dispensing the contents is accomplished by aseptically rupturing said seal after said punch is thrust through the wall of said container and cap is removed.

3. Apparatus for aseptically opening a sealed, flexible container and dispensing the sterile fluid contents thereof, said apparatus comprising;

a. a sterile punch in said container, said punch having two portions, a spout with an opening and a cap member removable disposed over and about the outlet opening of said spout;

b. a die positionable against the outside wall of said container;

c. said container being manually manipulated to force the cap and spout of said punch through said die to perforate said container wall and locate said cap and spout portions of said punch on the outside of said container; and

d. said cap being manually removed from over and about said spout to expose the sterile outlet opening and permit dispensing of the contents of said container through said spout.

4. Apparatus as set forth in claim 3 wherein the outside diameter of said spout is tapered and said die has an opening therein which is smaller than the maximum outside diameter of said spout.

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