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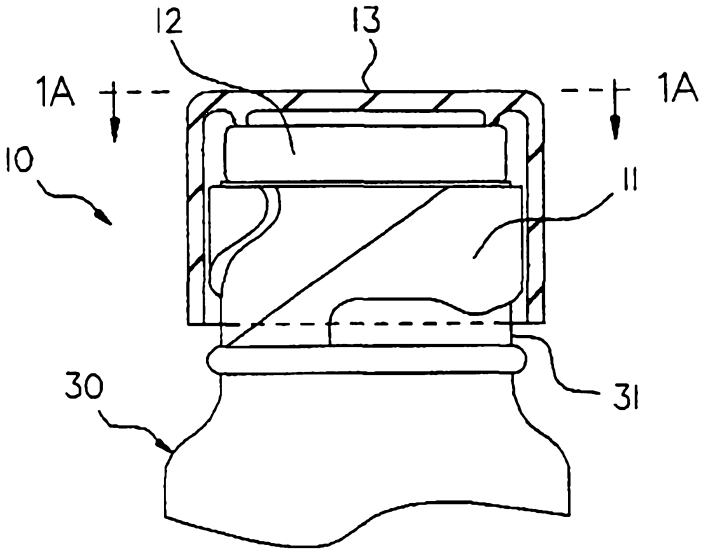
(54) Title: LOCKING HELICAL CLOSURE SYSTEM

(57) **Abstract**

A locking helical closure system (10) for containers consisting of three components. The three components are a closure cap (13), a neck finish (11), and a liner or stopper (12) made of an elastic material. The closure system has engagement lugs (14) that engage helical grooves (15) and pockets on the neck finish preventing the closure cap from unwinding during the sterilization process.



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LOCKING HELICAL CLOSURE SYSTEM

FIELD OF THE INVENTION

This application claims the benefit of U.S. Provisional Application No. 60/133,910 filed May 13, 1999.

BACKGROUND OF THE INVENTION

The present invention relates to improvements in container closure systems which are used for products which require autoclave sterilization processing. In these applications, it is important that the integrity of the sleeve be maintained. It has been found that in conventional systems due to the temperature variations of the process, in some instances thermal creep in the materials during autoclaving, which in prior art closures, caused a loosening effect producing in some instances breach of the seal. Maintaining a tight seal during the autoclaving process is important to maintain the integrity of the product. The present invention provides a closure system characterized by novel features of construction and arrangement ensuring a tight seal during autoclaving processes.

SUMMARY OF THE INVENTION

The present invention provides a closure system particularly characterized by features which make it particularly useful in autoclaving processes. To this end, the closure system comprises a sleeve-like insert which may be press fitted on the neck finish of a container having a spiral configuration terminating in a locking portion and a cap having lugs which engage in the slot and lock a liner in place in a sealed condition on the container.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention and various features and details of the operation and construction thereof are hereinafter more fully set forth with reference to the accompanying drawings, wherein:

Fig. 1 is a side elevational view partly in section of the locking helical closure system of the present invention installed on a container with closure cap cut away;

Fig. 1a is a top plan view of he cap broken away and neck finish sleeve of the locking helical closure system;

Fig. 2 more clearly illustrates the neck finish fitted onto the neck of a container;

Fig. 3 is an isolated, cut away view of the closure cap showing engagement lugs and force focusing means;

Fig. 3a is a bottom plan view of the cap of the closure system;

Fig. 4 is an isolated view of the neck finish showing helical slots, retention bumps, and pocket;

Fig. 4a is a top plan view of the neck finish sleeve;

Fig. 5 is a developed view of both the cap and neck finish sleeve; and

Fig. 6 is a developed view showing the engagement of the cap over the neck finish sleeve.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings and more particularly Figs. 1 and 2 thereof, the locking helical closure system (10) shown installed on a container (30) in Fig. 1 is designed to resist "unscrewing" during the autoclave sterilization process. Due to thermal creep of the materials involved, prior art closures become loosened causing the threaded closure to back off thereby breaching the seal rendering the container contents unusable.

Referring to Fig. 1, the closure system (10) of the present invention is comprised of three components; a cylindrically shaped neck finish sleeve (11), a liner disk or stopper (12) generally made of an elastic material sealing the contents of the container, and a cup shaped closure cap (13) shown cut away in Fig. 1. The neck finish sleeve (11) and the closure cap (13), shown in the engaged position in Fig. 1, interact cooperatively to prevent the closure system (10) from backing off during the sterilization process while closure cap (13) simultaneously applies a downward force to liner disk or stopper (12).

As best shown in the developed view of the insert sleeve (11), there are three helical grooves (15) formed on the exterior surface of the insert

sleeve (11) having an entrance opening (15a) of a size to accommodate the lugs (14) and terminating in a locking slot (16) disposed in a transverse plane (P-P) perpendicular to the axis of the insert sleeve.

The parts of the locking system are assembled in the following manner. First the sleeve (11) is press fitted on the neck of the container until the bottom edge (11a) of the sleeves (11) abuts the circumferentially extending rib (R) separating the bottle finish and the body portion of the container. The liner seal (12) is then positioned over the discharge edge end of the container in the position shown in Fig. 1. The liner (12) is of a diameter smaller than the diameter of the sleeve (11) so that when the cap is positioned over the liner, the lugs (14) can align with and engage in the entrance end of the helical slots (15). Rotation of the cap in a clockwise direction seats the cap and locks the cap in place when the lugs (14) pass over the retention bumps (17) and engage in the locking slots (16).

In Fig. 2, neck finish (11) is shown installed on neck (31) of container (30). Neck finish (11) is force fitted onto neck (31) of container (30) so as to prevent neck finish (11) from rotating during the application of closure cap (13). Closure cap (13) shown in an isolated cut away view in Fig. 3 more clearly illustrate its salient features. Engagement lugs (14) at the open end of closure cap (13) and force focusing means (18) at the

closed end of closure cap (13) act cooperatively to secure liner or stopper (12) on to container (30). Fig. 4 is an isolated view of neck finish (11) showing helical slots 15 that spiral downward, pocket 16 that hold engagement lugs (14) and indicate when closure cap (13) is fully secured on container (30), and retention bumps (17) that prevent closure cap (13) from counter-rotating during the sterilization process.

To secure contents of container (30), neck finish (11) force fitted on neck (31) of container (30). Liner or stopper (12) is placed on top of container (30) or alternatively, is placed within closure cap (13) which is then placed over neck finish (11) such that engagement lugs (14) align with helical slots 15. To secure liner or stopper (12) on container (30), closure cap (13) is rotated pulling it downward along helical slots 15 simultaneously compressing liner or stopper (12) through force focusing means (18). A slightly increased forced rotation of closure cap (13) is required to move engagement lugs (14) over retention bumps (17) and into pocket 16.

To remove liner or stopper (12) and open container (30), sufficient force must be provided to closure cap (13) in a counter-rotating direction for engagement lugs (14) to overcome retention bumps (17). Past the retention bumps (17), engagement lugs (14) unwind along helical slots 15

releasing closure cap (13) and liner or stopper (12) making contents of container (30) available.

Even though particular embodiments of the present invention have been illustrated and described herein, it is not intended to limit the invention and changes and modifications may be made therein within the scope of the following claims.

CLAIMS

What is claimed is:

1. A closure assembly for a container having generally cylindrical neck finish comprising a neck finish sleeve of generally cylindrical shape force fitted press fitted on the neck of the container, means defining a series of circumferentially spaced helical grooves on the exterior surface defined in the exterior surface of the sleeve, each groove terminating adjacent the lower edge of the sleeve in an elongated locking slot, a cap of a cup-shaped form, having a top and a depending skirt, a series of circumferentially spaced radially inwardly directed lugs projecting inwardly from the lower edge of the skirt and circumferentially equi-spaced to align with the helical grooves in the sleeve whereby when the cap is rotated relative to the sleeve, the lugs transverse the grooves and engage in the bottom of the locking slots to hold the cap on the sleeve.

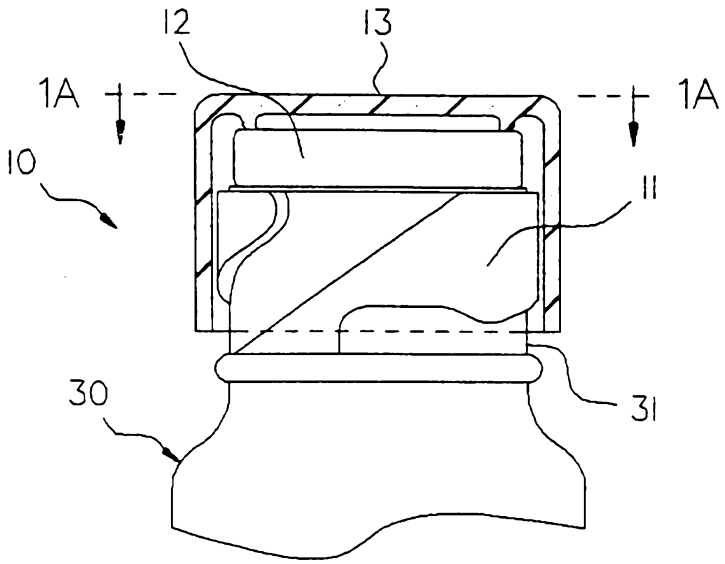

Fig_1

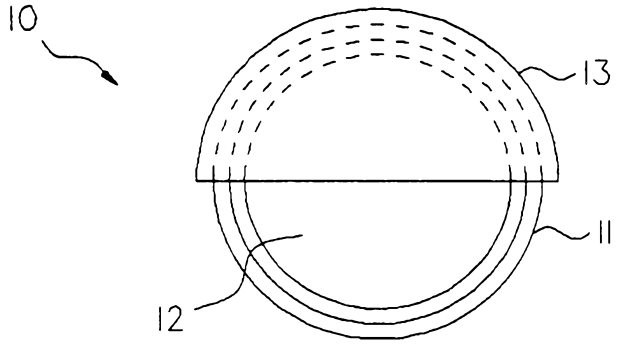

Fig_1A

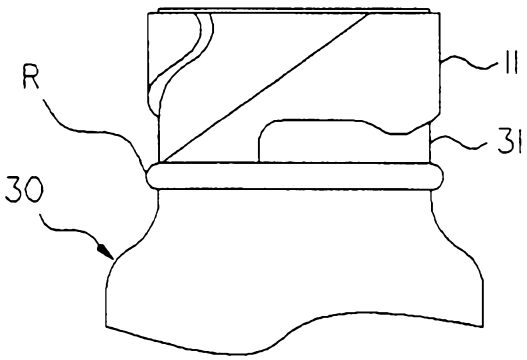

Fig_2

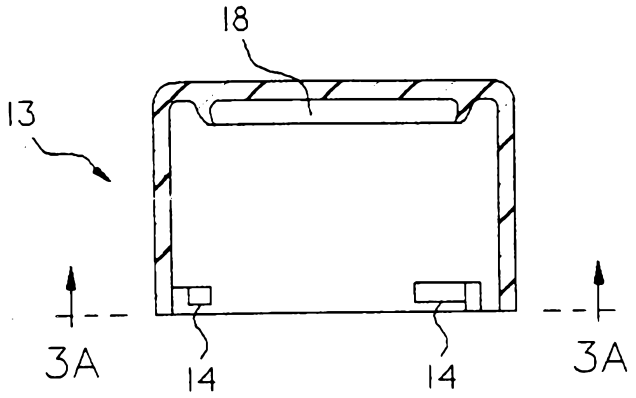

Fig_3

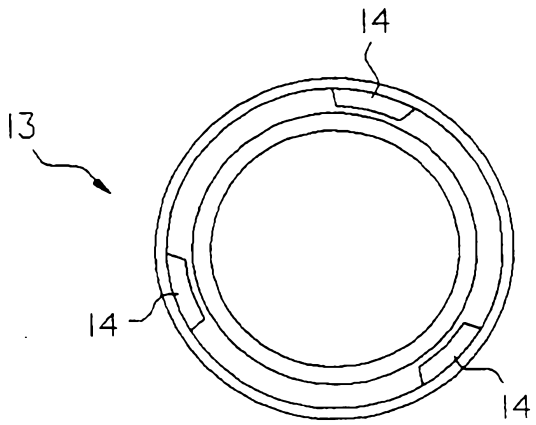

Fig_3A

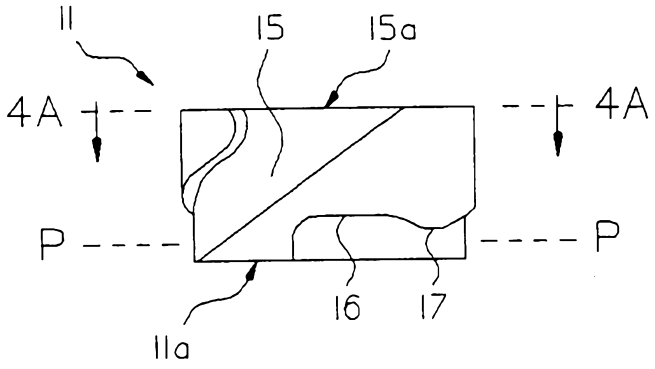

Fig_4

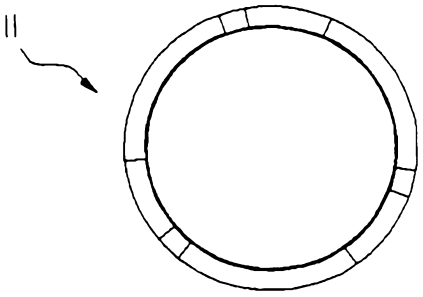

Fig_4A

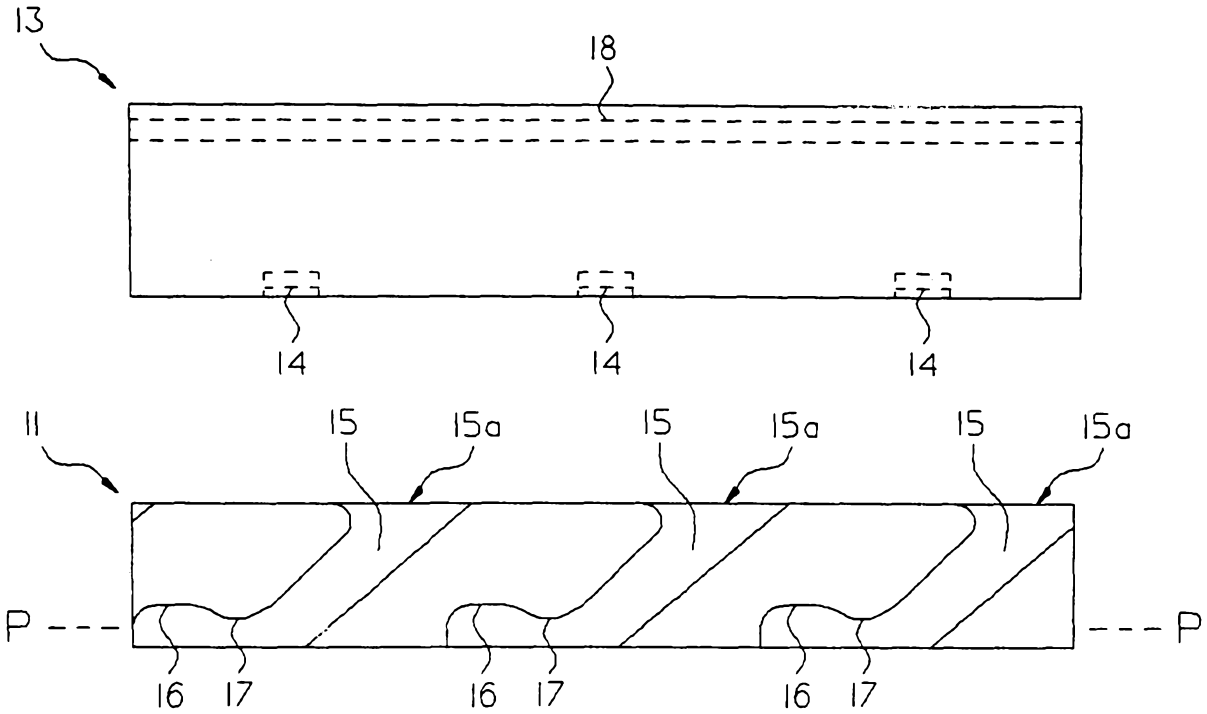

Fig_5

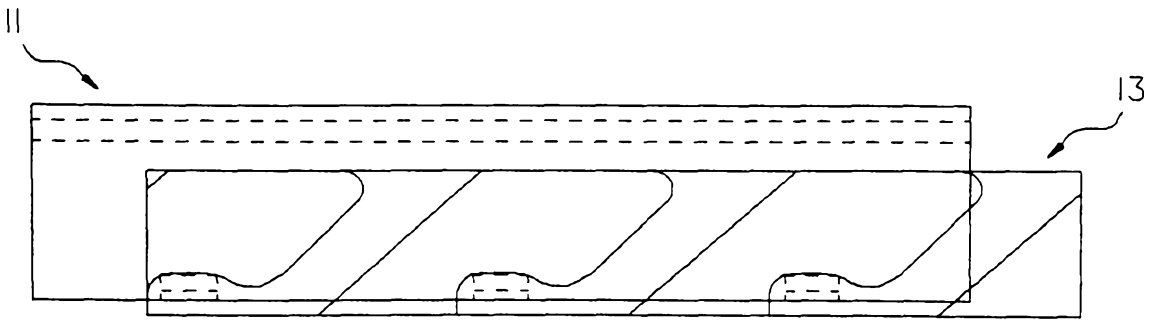

Fig_6