A dispensing container end closure is disclosed which includes a one piece cap and a one piece disc rotatably secured to the cap. The disc has various shapes and sizes of openings for dispensing the contents of the container. The cap includes a removable tab which is defined by a reduced thickness tearing web for sealing the container during shipping and storage. A novel fulcrum pin is provided on the cap for preventing the tab from falling into the container during removal of the tab.

2 Claims, 6 Drawing Figures
END CLOSURE WITH INTEGRAL SAFETY FULCRUM PIN

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates generally to end closures for containers, and more specifically to plastic end closures which seal the container for shipping and storage and which include a removable tab for opening the container.

Plastic end closures for containers may include a one-piece stationary cap which closes the end of the container and a one-piece rotatable disc which provides various sizes and shapes of openings for dispensing the contents of the container as shown in U.S. Pat. No. 2,961,132 to Robert W. Ankeny. The one piece cap of such prior art closures includes a removable tab which seals the container during shipping and storage and which is defined by a reduced thickness tearing web. The reduced thickness tearing web is located at the bottom of a V-shaped groove in the cap, and the V-shaped groove is discontinuous at two locations to provide two fulcrum pins about which the tab can be rotated. To remove the tab, one end of the tab is pushed down into the container to begin tearing the web at such one end, and the tab rotates about the fulcrum pins so that the other end of the tab moves upward away from the container. This permits grasping such other end of the tab to remove the tab and prevent the tab from falling into the container for both sanitary and safety reasons.

Such prior art end closures have received widespread commercial acceptance and in general have operated in a satisfactory manner. However, it has been found that a novel type of fulcrum pin, when applied to such end closures, provides a significantly greater resistance to premature breaking both during the tearing of the tearing web and also during rotation of the tab about the fulcrum pin.

The fulcrum pin according to the present invention is an elongated pin molded integrally with the end closure cap on the bottom surface thereof and extending laterally across the bottom of the tearing web. This permits the fulcrum pin to be longer than the prior art fulcrum pins (which could only be as long as the width of the V-shaped groove of the cap), and it is believed that the angular deformation of the fulcrum pin is thereby distributed over a greater length to reduce the twisting stress at any given location on the fulcrum pin and prevent premature breaking thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects of the invention are incorporated in the preferred embodiment of the invention shown in the drawings, wherein:

FIG. 1 is a perspective view of a container and end closure according to the principles of the invention;
FIG. 2 is an enlarged cross-sectional view taken along reference view line 2—2 of FIG. 1;
FIG. 3 is an enlarged side elevational view of the end closure shown in FIG. 1;
FIG. 4 is an enlarged perspective view showing a portion of the top of the stationary cap of the end closure shown in FIG. 1, with the tab partially rotated for removal;
FIG. 5 is an enlarged perspective view showing a portion of the bottom of the stationary cap before rotation of the tab; and
FIG. 6 is an enlarged perspective view of one of the fulcrum pins shown in FIG. 5 with the tab partially rotated for removal.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings in greater detail, FIG. 1 is a perspective view of a dispensing container having an end closure according to the principles of the invention. The dispensing container shown in FIG. 1 is particularly adapted for use with food products and includes a paper fiber tube 11, a bottom end closure 12, and a top end closure 14. The end closures 12 and 14 in the preferred embodiment are secured on the ends of the fiber tube 11 by glue. In actual use, one of the end closures is first secured on the fiber tube 11 to form an open ended can, the can which is so formed is filled with a product which is to be dispensed, and the other end closure is then secured on the open end of the can to form the dispensing container.

FIGS. 2 through 6 show the end closure 14 in greater detail. The end closure 14 includes a one piece stationary cap 15 and a one piece rotatable disc 16. The cap 15 and the disc 16 are each injection molded, and the cap 15 is preferably made of a medium impact polystyrene while the disc 16 is preferably made of a flexible polyethylene. This provides a stationary cap which is relatively rigid and a rotatable disc which is relatively flexible so that the disc can be snapped onto the cap without breakage.

As best seen in FIGS. 1 and 2, the rotatable disc 16 includes a large arcuate shaped opening 17 for pouring or for receiving a spoon and a plurality of smaller openings 18 for dispensing the contents of the container by shaking. The rotatable disc 16 also includes a depending axile portion 19 which is snapped into a suitable opening in the center of the stationary cap 15, and the disc 16 is rotated to bring the openings 17 and 18 into alignment with a suitable opening formed in the stationary cap 15 and described below.

The construction of the stationary cap 15 is best shown in FIGS. 2 through 6. The cap 15 includes a laterally extending end portion 23 and an annular skirt portion 24 extending axially from the end portion 23. The laterally extending end portion 23 includes a removable tab 30 which is defined by a reduced thickness tearing web 31 so that the tab 30 can be removed to permit dispensing the contents of the container through the large opening 17 or through the smaller openings 18 of the disc 16. The tearing web 31 is located at the bottom of a V-shaped groove in the laterally extending end portion 23, and the V-shaped groove extends from the top surface of the end portion 23 and terminates at the tearing web 31.

The laterally extending end portion 23 of the stationary cap 15 also includes two elongated fulcrum pins 32 molded integrally with the cap 15 on the bottom surface thereof. The longitudinal axis of each of the fulcrum pins 32 extends laterally across the tearing web 31, and the fulcrum pins 32 are located on opposite sides of the tearing web 31. In this manner, the tab 30 seals the stationary cap 15 during shipping and storage, and the tab 30 is removed for dispensing the contents of the container.
To remove the tab 30, one end of the tab 30 is manually pushed downwardly into the container in the manner shown in FIG. 4. This begins to break the tearing web 31 at such one end of the tab 30. As the tearing web 31 tears further from such one end of the tab 30, the tearing reaches the location of the fulcrum pins 32. The fulcrum pins 32 do not break, but instead they provide a fulcrum about which the tab 30 rotates so that the other end of the tab 30 moves in a direction away from the container to tear the web 31 at such other end. When the web 31 is torn around the periphery of the tab 30, the one end of the tab 30 is pushed further manually into the container so that the tab 30 rotates about the fulcrum pins 32 and the other end of the tab 30 can be grasped. The tab 30 can then be twisted back and forth until the fulcrum pins 32 break to permit removal of the tab 30.

The operation of the fulcrum pins 32 during rotation of the tab 30 is best illustrated in FIG. 6. As the tab 30 rotates, the angular deformation of each fulcrum pin 32 is believed to be distributed over a length which is greater than the length of the prior art fulcrum pins located in the V-shaped groove of the cap as disclosed in the aforementioned U.S. Pat. No. 2,961,132. It is believed that this reduces the twisting stress at any given location on the fulcrum pins 32, and that this is the principal reason that premature breaking of the fulcrum pins 32 is prevented by this invention.

Test samples of this invention were made by the assignee of this application using polystyrene for the cap 15. It was found that, after breaking of the tearing web 31, the removable tab 30 could be rotated through an arc of at least 90° without breaking the fulcrum pins 32. It was also found that, upon such rotation, the fulcrum pins 32 appeared to deflect in the manner shown in FIG. 6 along a length greater than the width of the V-shaped groove in the cap 15. To compare the fulcrum pins 32 with the fulcrum pins provided in prior art end closures manufactured by the assignee of this application in the manner disclosed in U.S. Pat. No. 2,961,132, the polystyrene test samples of the end closures according to the principles of this invention were compared to substantially identical polystyrene end closures having the prior art type fulcrum pins located in the V-shaped groove of the cap. It was found from such comparison that the end closures according to the principles of the invention provide a significantly greater resistance to premature breaking of the fulcrum pins (and consequent falling of the tab into the container) than the prior art fulcrum pins.

What is claimed is:
1. A container comprising a tube, a bottom end closure, and a top end closure, said top end closure including a one piece plastic cap secured to said tube, said cap including a removable tab defined by a reduced thickness tearing web at the bottom surface of said cap and two fulcrum pins being constructed and arranged to provide a pivotal axis for rotating one end of said tab in a direction into said container and the other end of said tab in a direction out of said container to break said tearing web when a force is exerted on said one end of said tab in a direction into said container, a groove in said cap extending downwardly from the top surface of said cap to said tearing web at said bottom surface of said cap, each of said fulcrum pins including an elongated pin molded integrally with said cap on the bottom surface thereof, the longitudinal axis of each of said elongated pins extending laterally across said tearing web, the length of each of said elongated pins exceeding the width of said groove and each of said elongated pins extending beyond said tearing web on both sides of said tearing web a substantial distance sufficient to prevent breaking of said elongated pins during said breaking of said tearing web whereby said elongated pins prevent said tab from falling into said container, and said elongated pins being frangible in response to a shearing force substantially in excess of the force required to shear said tearing web whereby after said breaking of said tearing web said elongated pins may be broken to permit removal of said tab whereby said tab may be permanently removed to provide a dispensing passage.

2. A container as defined in claim 1 wherein said elongated pins are located on opposite sides of said tearing web and said groove in generally V-shaped.

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