United States Patent [19]

Bittel

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[45] **Dec. 3, 1974**

[54] **FORCE FIT PLASTIC CLOSURE**

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[52] **U.S. Cl.** **229/5.5**

[51] **Int. Cl.** **B65d 3/16**

[58] **Field of Search** 229/5.5

[56] **References Cited**

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[57] **ABSTRACT**

A dispensing container is disclosed which includes a fiber tube, a bottom end closure, and a top end closure which is self-locking on the fiber tube. The self-locking top end closure includes an annular skirt portion which is received in the tube and a cantilever fin which projects radially outwardly from the skirt portion. The fin is molded in a normal radially outwardly extending position and is rotatable about its fixed end into an adjacent recess in the skirt portion for permitting straight line axial removal of the top end closure from its mold. When the top end closure is assembled on the fiber tube, the fin is rotatable about its fixed end in the other direction from its normal position and is wedged between the skirt portion and the fiber tube to hold the top end closure on the fiber tube. A mold for making the top end closure is also disclosed which permits removal of the top end closure from the mold by straight line axial movement without requiring relative radial movement of portions of the mold.

8 Claims, 7 Drawing Figures

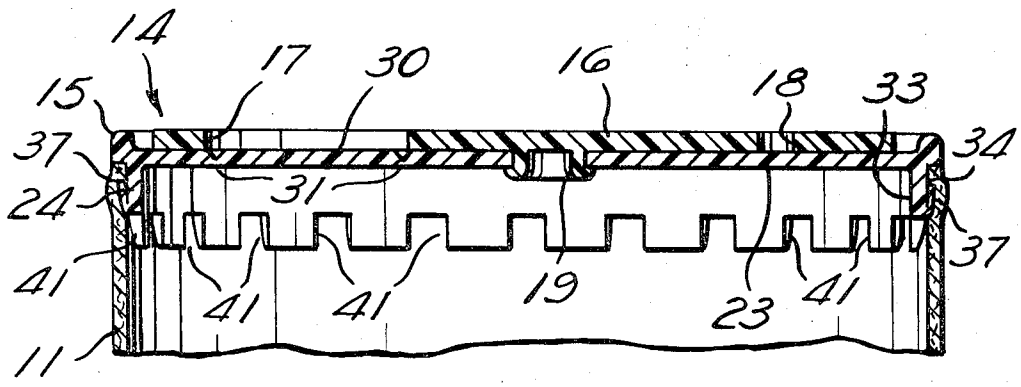


Fig. 1

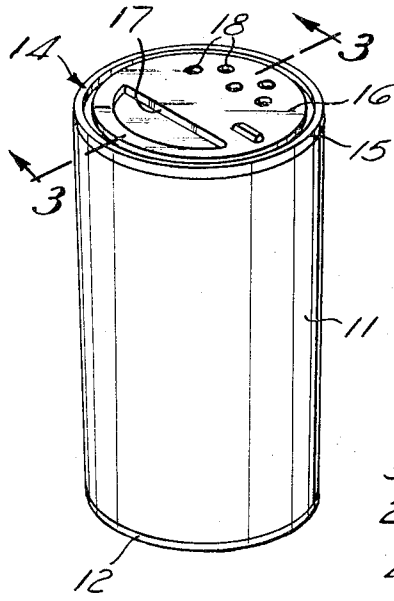


Fig. 2

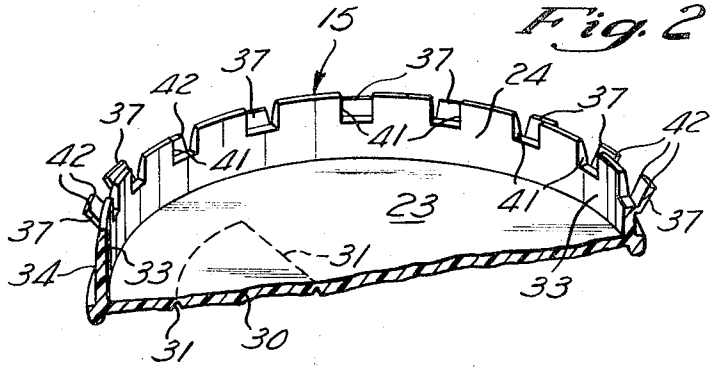


Fig. 3

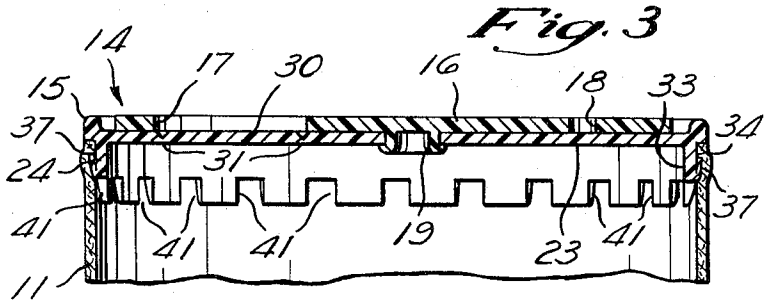
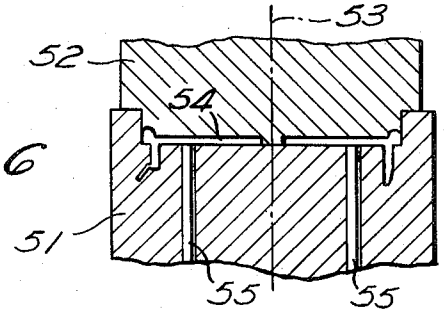


Fig. 6



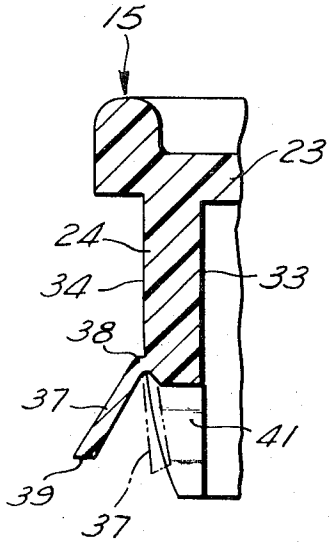


Fig. 4

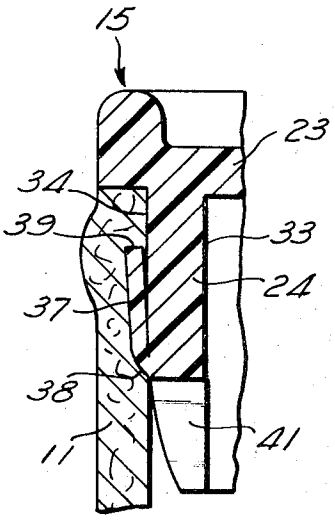


Fig. 5

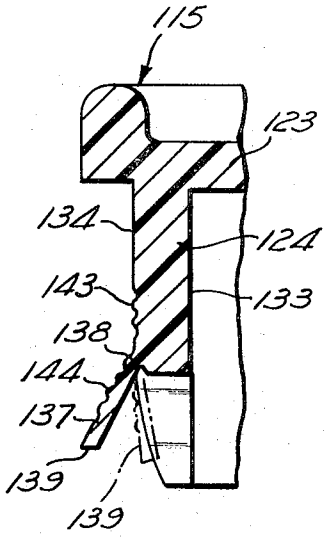


Fig. 7

FORCE FIT PLASTIC CLOSURE

BACKGROUND OF THE INVENTION

This invention relates generally to plastic end closures, and more particularly to a self-locking plastic end closure for use on a fiber tube.

Paper fiber tubes (that is, tubes which include layers of fiber material wound such as in a helix one upon the other and secured together by an adhesive) have become widely used for dispensing containers in the packaging industry. The paper of such tubes may be plain or it may be coated, waxed, resin impregnated, or combined with other foils or films to provide a satisfactory container for various types of products. The tubes are cut to the desired length of the container, and a plastic end closure is placed on each end of the tube to form the container.

Each end closure includes a generally flat round end portion and an annular skirt which extends from the end portion and which is received within the tube. In order to hold the end closure on the tube, an adhesive is applied to the inside of the tube or to the skirt of the end closure prior to assembly. Although such adhesively held end closures have achieved wide commercial acceptance, it is desirable to eliminate the step of applying the adhesive and to provide an end closure which is secured on the tube without the use of an adhesive.

SUMMARY OF THE INVENTION

The present invention provides a self-locking plastic end closure for use with a fiber tube. The end closure includes a generally flat laterally extending end portion and an annular skirt portion extending axially from the end portion, and the skirt portion has a generally cylindrical outer surface for being received within the tube.

A cantilever fin having a fixed end on the outer surface of the skirt portion remote from the end portion is disposed in a normal radially outwardly extending position. When the end closure is ejected from its mold cavity, the cantilever fin rotates in one direction about its fixed end into a recess in the skirt portion so that the end closure can be removed from the mold cavity by straight line axial movement without requiring radially movable mold portions. When the end closure is assembled on the tube, the cantilever fin is rotated in the opposite direction about its fixed end to a locking position between the outer surface of the skirt portion and the tube to prevent removal of the end closure from the tube.

In this manner, the invention provides a self-locking plastic end closure which can be secured on a fiber tube without the need for an adhesive and which can be removed from its mold cavity with straight line axial movement without requiring radially movable portions of the mold.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects and advantages of the invention will become readily apparent to those skilled in the art upon an understanding of the preferred embodiment of the invention shown in the accompanying drawings, wherein:

FIG. 1 is a perspective view of a dispensing container according to the principles of the invention;

FIG. 2 is a perspective view of a portion of the top end closure for the container shown in FIG. 1;

FIG. 3 is a cross-sectional view taken along reference view line 3—3 of FIG. 1;

FIG. 4 is a cross-sectional view of the top end closure for the container shown in FIG. 1 with the fin shown in the normal radially outwardly extending position;

FIG. 5 is a cross-sectional view of the top end closure for the container shown in FIG. 1 with the fin shown in its axially extending locking position;

FIG. 6 is a schematic cross-sectional view of a mold for making the first embodiment of the top end closure shown in detail in FIGS. 2 through 5; and

FIG. 7 is a view similar to FIG. 4 but showing a second embodiment of the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings in greater detail, FIG. 1 is a perspective view of a dispensing container 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. The tube 11 is well-known in the art and includes layers of a heavy kraft paper wound in a helix one upon the other and secured together by an adhesive. The dispensing container shown in FIG. 1 also includes a bottom end closure 12 and a top end closure 14 which are secured on the ends of the fiber tube 11 to close the ends. 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 the product which is to be dispensed, and the other end closure is then placed on the open end of the can to form the dispensing container.

FIGS. 2 through 5 show a first embodiment of the top end closure 14 in greater detail. The end closure 14 includes a stationary cap 15 and a rotatable disc 16, each of which are of a suitable plastic material and are injection molded. The cap may be made of any suitable material having sufficient resiliency to permit the fins to be rotatably displaced without breaking and to permit the fins to spring back to their normal radially outwardly extending position after ejection from the mold cavity in a manner described below. In the first embodiment shown in FIGS. 2 through 5, both the cap 15 and the disc 16 are made of polyethylene.

As best seen in FIG. 1, 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 axle 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 or 18 into alignment with a suitable opening formed in the stationary cap 15 as described below.

The end closure cap 15 includes a laterally extending end portion 23 and an annular skirt portion 24 extending axially from the end portion 23. The end portion 23 includes a removable tab 30 which is defined by a reduced thickness outline portion 31 so that the tab 30 can be removed in the manner disclosed in U.S. Pat. No. 2,961,132, which is incorporated herein by reference as though fully reprinted, to permit dispensing the contents of the container through the large opening 17 or the smaller openings 18.

The skirt portion 24 is generally cylindrical and extends axially from the end portion 23 for being received within the fiber tube 11. The skirt portion 24 includes an inner surface 33 and a generally smooth cylindrical outer surface 34, and the free end of the outer surface 34 is slightly tapered to provide an entrant surface to assist in the assembly of the end closure 14 onto the fiber tube 11. The diameter of the outer surface 34 is approximately three inches in the first embodiment of the invention shown in FIGS. 2 through 5.

The top end closure cap 15 also includes a plurality of cantilever fins 37 extending radially outwardly from the outer surface 34 of the skirt portion 24. The cantilever fins 37 each include a fixed end 38 formed integral with the skirt portion 24 at a location on the outer surface 34 remote from the laterally extending end portion 23, and each fin extends radially outwardly from its fixed end to a free end 39. The skirt portion 24 also includes a radially inwardly recessed portion 41 at a location adjacent each of the fins 37. In the first embodiment shown in FIGS. 2 through 5, each recess 41 extends completely through the skirt portion 24, but each radially inwardly extending recess 41 could alternatively be of lesser depth so that it does not extend completely from the outer surface 34 to the inner surface 33 of the skirt portion 24.

Turning now to FIG. 6, a mold for making the first embodiment of the end closure cap 15 is shown schematically. The mold includes a fixed or stationary mold section 51 and a movable mold section 52 which is movable axially along an axis 53 toward and away from the stationary mold 51. When the mold sections 51 and 52 are in the closed position shown in FIG. 6, they define a mold cavity 54 for making the cap 15. The mold cavity 54 is filled with plastic material through a suitable sprue (not shown) and the mold sections 51 and 52 remain closed until the plastic hardens.

After the plastic hardens, the movable mold section 52 moves axially upwardly as viewed in FIG. 6 to open the mold cavity 54. Ejector pins 55 then push the completed cap axially out of the stationary mold section 51. As the cap 15 is pushed axially out of its mold cavity by the ejector pins 55, each of the radially outwardly extending fins 37 rotates about its fixed end 38 to a mold ejecting position (extending axially away from the end portion 23) in which each fin 37 is received within its adjacent recess 41. The axially extending mold ejecting position of the fins 37 is shown in phantom in FIG. 4.

In this manner, the top end closure cap 15 is removed from its mold cavity 54 by straight line axial movement without requiring radially movable portions of the mold sections 51 or 52 to permit ejection of the cap 15.

Because the cap 15 is molded from a plastic material, the elastic memory or resilience of the fins 37 causes each fin to snap back to its normal radially outwardly extending position illustrated in FIGS. 2 and 4 after it has been removed from the mold so that it can be assembled on the fiber tube 11.

To assemble the cap 15 on the fiber tube 11, the tapered entrant portion of the free end of the skirt portion 24 is first pushed axially into the tube 11. When the radially outwardly extending fins 37 reach the end of the tube 11, further movement of the cap 15 into the tube 11 rotates each fin 37 about its fixed end 38 to a locking position extending axially toward the end portion 23 as shown in FIGS. 3 and 5. The fins 37 are dimensioned so that they do not extend all the way to the top of the fiber tube 11 when the cap 15 is assembled thereon. The resilence of the fiber tube 11 permits the fiber tube 11 to spring back to its normal smaller diameter after it has been stretched as it passes over the fins 37 so that the inner surface of the fiber tube 11 engages the outer surface of the skirt portion 24 after passing over the fins 37. This permits the free end 39 of each fin 37 to bite into the inner surface of the tube 11 to permit removal of the cap 15 from the tube 11.

In the first embodiment shown in FIGS. 2 through 5, each fin 37 extends circumferentially through an arc of about 5 degrees, and the portions of the skirt 24 between adjacent fins 37 and between the recessed portions 41 each extends circumferentially through an arc of about 10°. This provides a relatively high number of fins with the attendant advantage that the two sharp corners 42 of the free end 39 of each of the many fins 37 tend to bite into the inner surface of the tube 11. Alternatively, the fins 37 could be of greater circumferential extent (and could even be a single fin extending 360° about the entire circumference of the skirt 24 if the material of the cap 15 is of sufficient elasticity), but the attendant advantage of the corners 42 tending to bite into the inner surface of the tube 11 is thereby diminished.

FIG. 7 illustrates a second embodiment of an end closure according to the principles of the invention. The second embodiment provides an end closure cap 115 which is identical to the cap 15 in structure and mode of operation except as specifically noted herein. The cap 115 includes an axially extending skirt portion 124 which has an inner surface 133 and a smoother generally cylindrical outer surface 134. A plurality of fins 137, only one of which may be seen in FIG. 7, extend radially outwardly from the outer surface 134 of the skirt portion 124 and extend circumferentially through an arc of about 5 degrees. The fins 137 are molded integrally with the skirt portion 124 and extend from a fixed end 138 to a free end 139. The fins 137 are each rotatable about their fixed ends 138 in one direction to a mold ejection position extending axially away from the end portion 123 as shown in phantom in FIG. 7 and are rotatable about the fixed end 138 in the other direction to a locking position extending axially toward the end portion 123.

The second embodiment shown in FIG. 7, unlike the first embodiment shown in FIGS. 2 through 5, is provided with serrations 143 on the outer surface 134 and is provided with serrations 144 on the fin 137. In this manner, when the fin 137 is rotated to its locking position extending axially toward the end portion 123 upon assembly of the cap 115 onto the fiber tube 11, the serrated portions 143 and 144 engage to prevent relative axial movement between the fin 137 and the outer surface 134. This prevents the fin 137 from rolling over on itself such as would occur if the free end 139 remains stationary against the tube 11 in its locking position while the skirt portion 124 and fixed end 139 are pushed axially out of the tube 11. The second embodiment illustrated in FIG. 7 can be made in a mold similar to that shown schematically in FIG. 6, but the plastic material must be of sufficient elasticity and compressability that the serrated portions 143 and 144 deform sufficiently to permit straight line axial removal of the cap 115 from its mold cavity.

Although two embodiments of this invention have been illustrated and described in detail, various modifications and rearrangements of parts may be resorted to without departing from the scope of the invention disclosed and claimed herein.

What is claimed is:

1. A single piece integral plastic end closure for a tube comprising a laterally extending end portion, an annular skirt portion extending axially from said end portion, said skirt portion having a generally cylindrical outer surface for being received within said tube, and a cantilever fin having a fixed end on said outer surface of said skirt portion remote from said end portion and a free end, said fin being rotatable about said fixed end in one direction from a normal radially outwardly extending position to a mold ejecting position extending axially away from said end portion, and said fin being rotatable about said fixed end in another direction opposite said first direction from said normal radially outwardly extending position to a locking position extending axially toward said end portion.

2. An end closure as defined in claim 1 wherein said outer surface of said skirt portion is recessed radially inwardly at a location adjacent said fin when said fin is in said mold ejecting position, and said fin is received within said recess when said fin is in said mold ejecting position.

3. An end closure as defined in claim 2 including a plurality of fins substantially identical to said first mentioned fin and a plurality of recesses substantially identical to said first mentioned recess, and said fins are circumferentially spaced about said outer surface of said skirt portion.

4. An end closure as defined in claim 2 wherein each of said fins extend circumferentially through an arc of about 5°.

5. An end closure as defined in claim 4 wherein said fins are circumferentially spaced apart by about 10°.

6. An end closure as defined in claim 2 wherein each of said fins is serrated and said outer surface of said skirt portion is serrated, and said fin and outer surface serrations engage to prevent axial movement of said fin relative to said outer surface when said fin is in said locking position.

7. In combination, an end closure and a fiber tube, said fiber tube including a generally cylindrical inner surface, and said end closure being plastic and including a laterally extending end portion, an annular skirt portion extending axially from said end portion, said skirt portion having a generally cylindrical outer surface received within said tube inner surface, and a cantilever fin having a fixed end on said outer surface of said skirt portion remote from said end portion and a free end, said fin being integral with said skirt portion and being folded from a normal radially outwardly extending position to a folded axially extending position between said outer surface of said skirt portion and said inner surface of said tube whereby said fin secures said end closure on said tube.

8. The combination defined in claim 7 wherein said outer surface of said skirt portion is recessed radially inwardly at a location adjacent said normal position of said fin whereby said fin is folded radially inwardly into said recess when said end closure is removed from its mold cavity.

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