United States Patent [19]

Rigaud

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[54] **CONTAINER FOR PACKAGING AN OBJECT**

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[51] **Int. Cl.**.. **B65d 51/12;** B65d 85/70; B65d 85/58

[58] **Field of Search** ..... 220/24 R, 42 C, 42 B, 72, 220/86 R, 44 C, 44 E; 229/62.5; 206/63.5; 150/9; 141/68, 67, 311, 392, 390; 137/525.1; 206/.82, 96, 123, 270, 318, 379, 437, 443, 384, 63.3

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[57] **ABSTRACT**

For packaging an object, a container having a tube with at least one open end and a removable end cap. The end cap includes a depressed top wall which is cup-shaped and divided into a plurality of resilient segments by slits which intersect at the bottom center of the cup. The resilient segments deflect inwardly of the tube to allow insertion of an object and resiliently return to their original position after the object has passed therethrough to prevent removal of the object.

4 Claims, 4 Drawing Figures

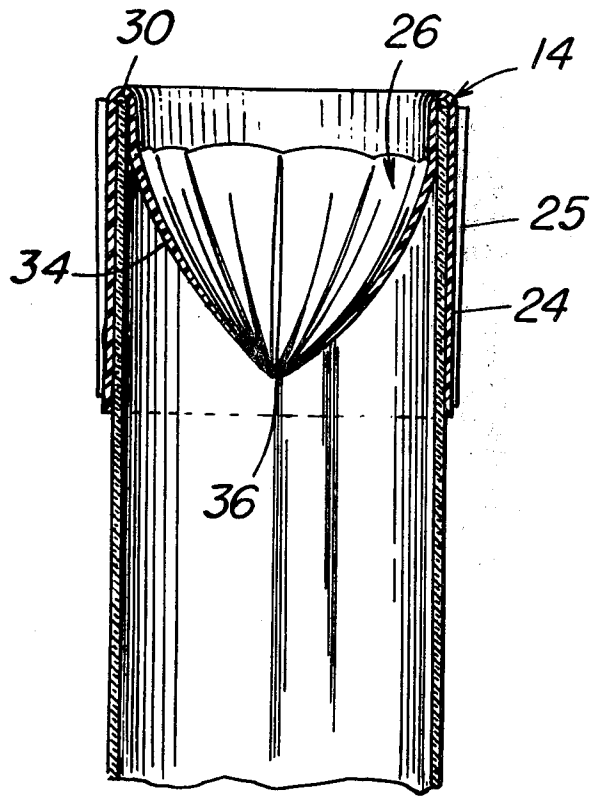
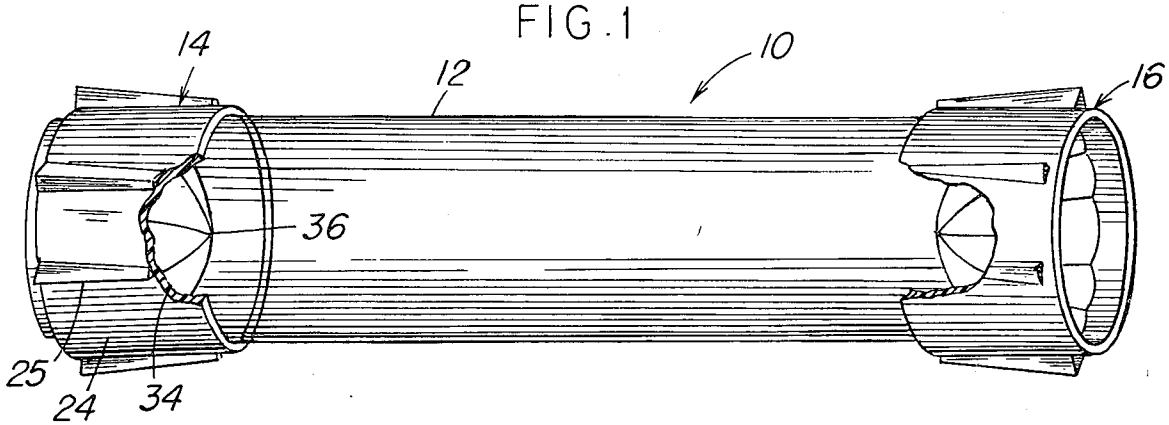


FIG. 1



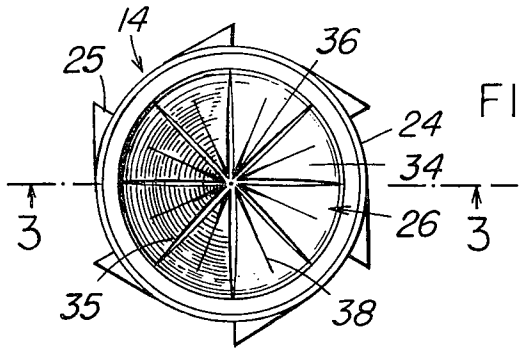


FIG. 2

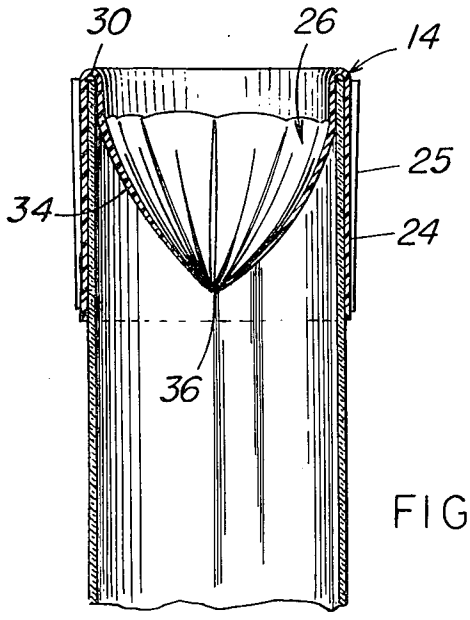
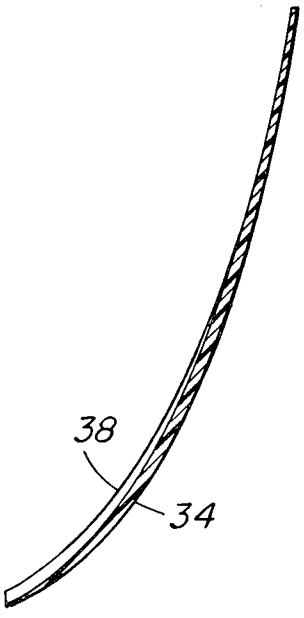


FIG. 3

FIG. 4



CONTAINER FOR PACKAGING AN OBJECT

The present invention relates to containers, and more specifically to a tubular container having an end cap with deflectable segments for insertion of an object into the container.

Various tubular containers have been used to package objects such as drills, reamers, router-bits, ball bearings, and the like. Such containers have generally proven unsatisfactory for mass production packaging of such objects because the end caps must be fitted on the container after it is filled. Since the packager may not have automated equipment for this purpose, the assembly of the end caps on the container requires additional manual labor which increases the cost to the consumer as well as increasing the assembly time.

It is an object of the present invention to provide a container for packaging objects which overcomes the deficiencies of the prior art containers.

It is a further object of the present invention to provide a container capable of use for mass production packaging of objects.

It is a further object of the present invention to provide a closed container having an end cap which allows insertion of an object, but prevents removal of the object until the end cap is removed.

It is a further object of the present invention to provide a container having an end cap which allows air to continuously enter the container.

Other objects, aspects and advantages of the present invention will be apparent when the detailed description is considered with the drawing.

Briefly, the container of the present invention includes a tube having at least one open end with a removable end cap mounted on the open end. The end cap has a depressed top wall which is generally cup shaped and divided into a plurality of deflectable segments by slits which intersect at the center of the bottom of the cup. The segments deflect inwardly of the tube to allow insertion of an object and resiliently return to their original position after the object has passed therethrough to prevent removal of the object. Advantageously, the segments taper in thickness toward the center of the cap and each includes a central radial rib which increases in its amount of protrusion or height in proportion to the reduction in thickness of the segments to maintain a constant thickness of material along the center of the segments.

The present invention is illustrated in the following drawing in which:

FIG. 1 is a perspective view of one embodiment of the container of the present invention with parts broken away for clarity;

FIG. 2 is an end view of the container of FIG. 1, showing the end cap;

FIG. 3 is a sectional view of the container and end cap taken along line 3—3 in FIG. 2; and

FIG. 4 is a sectional view of a segment of the end cap showing the longitudinal rib.

Referring to FIG. 1, the container 10 includes a tube 12 with end caps 14 and 16 mounted on the open ends of the tube 12. The tube 12 has a diameter greater than the diameter of the object to be inserted and is preferably made of a transparent plastic to reveal the inserted object, e.g., a drill (not shown). The container 10 of the present invention is particularly applicable to the packaging and storing of elongate objects, such as drills, router-bits, reamers, and the like. However, other objects, such as ball bearings, nuts, screws or other small items may be advantageously packaged and stored within the container 10.

Referring also to FIGS. 2 and 3, only one end cap 14 will be discussed in detail since the structure and assembly of the other end cap 16 is identical. The end cap 14 is preferably formed in one piece from molded plastic and includes a sidewall skirt 24 shaped to slip over the end of the tube 12. The sidewall skirt 24 may be slightly flared to facilitate receipt of the open end of the tube 12 and is retained on the tube 12 by friction. Advantageously, the sidewall skirt 24 includes ribs 25 to aid in the application of rotational torque to the end cap 14 for removal or remounting of the end cap 14.

The end cap 14 has an inwardly depressed end wall 26 integrally formed with the sidewall 24. The depressed end wall 26 is formed in the general shape of a cup or cone, the bottom or apex 36 of which extends inwardly of the tube 12. The end wall 26 and the sidewall 24 are spaced apart to provide an annular groove 30 into which the end of the tube 12 is frictionally received when the end cap 14 is mounted on the tube 12. The end cap is frictionally retained on the tube 12, but may be provided with screw threads or snap beads, as desired.

The end wall 26 is divided into a plurality of deflectable triangular segments 34 by radial slits 35 which intersect at the central apex 36 of the cone. Each segment 34 tapers in thickness toward the apex 36 and includes a central rib 38 on its outer surface which increases in height from the surface of the segment 34 in direct proportion to the reduction in thickness of the segment 34 to maintain a constant thickness along the center of the segment 34. These central ribs 38 serve as feeders to aid in distributing the plastic which forms the segments 34 during molding. Further, since the ribs 38 increase in thickness toward the apex 36, they aid in forming the segments 34 into a closed cup shape as the molded end cap 14 cools because the thicker ribs 38 shrink more than the thinner segments 34. The shrinking of the plastic in the ribs 38 tends to pull the segments 34 toward each other into the desired cup shape. Further, the ribs 38 aid in biasing the segments toward closure after an object has been inserted into the container 10. This construction of the end cap 14 advantageously provides slits between segments 34 and allows air to flow readily through the container 10. Free air flow helps prevent moisture accumulation during storage of the packaged object. Air flow can further be encouraged by terminating the segments 34 short of the center of the depressed end wall 26 to leave a central aperture.

In assembling the container 10, the end caps 14 and 16 are mounted on the open ends of the tube 12. Since end caps 10 and 16 and tube 12 are assembled by the container manufacturer rather than by the packager of the goods sold in the container, automated assembly machinery can be economically employed. The object to be packaged within the assembled container 10 is inserted by the packager through one of the end caps 14 or 16 by pushing the object through the deflectable segments 34 of one of the end caps 14 or 16 and into the tube 12. Once the object is inserted past the segments 34, they resiliently return to their original position and prevent the object from escaping from the container 10. Thus, the packager need not remove or replace an

end cap to package the object. To remove the object, the ultimate consumer simply removes one of the end caps **14** or **16.**

The container **10** of the present invention provides for rapid automatic or gravity packaging of objects by simply inserting the object through the end caps **14** or **16** of the closed container **10.** There is no requirement to subsequently cap the container as with prior art structures. There is little tendency for the packaged object to escape because of the cup or conical shape of the end wall **26** formed by the segments **34** which causes the segments **34** to wedge together when the packaged object strikes the interior of the end caps **14** or **16.** In effect, the cup or conical shape of the end caps **14** and **16** causes them to function as a one-way valve.

It should be understood that the container of the present invention may include only a single end cap, allowing the other end of the container to be closed in any conventional manner as by a solid wall cap, integral end wall, plug, or heat sealed seam.

What is claimed is:

1. A container for packaging an object, comprising:

a tube having at least one open end;

an end cap mounted on the open end of said tube, said end cap having an end wall in the shape of a cup extending inwardly of said tube and a sidewall skirt depending from said end wall, said skirt being shaped to slip over the tube, an annular groove located between said skirt and said end wall for frictionally receiving the end of said tube, said end wall being divided into a plurality of resilient triangular segments separated by radial slits which meet in the center of said end wall, said triangular segments tapering in thickness toward the center of the end wall and being deflectable inwardly of the container to allow an object to be inserted through the end wall into the container, said triangular segments being biased to resiliently return to their original position after an object has passed into the container through said cap to prevent escape of the object from the container said triangular segments including a central radial rib which increases in height from the surface of the tapered segments in direct proportion to the reduction in thickness of the segments to maintain a constant thickness of material along the radial center portion of said segments.

2. The container as recited in claim **1** wherein:

said deflectable triangular segments terminate short of the center of said cup to form a central aperture.

3. The container as recited in claim **1** wherein:

said end cap is formed as a single piece from molded plastic.

4. A container for packaging an object, comprising:

a tube having at least one open end;

an end cap mounted on the open end of said tube, said end cap being formed as a single piece from molded plastic and having an end wall in the shape of a cup, extending inwardly of said tube, said end wall being divided into a plurality of deflectable resilient triangular segments by radial slits, said triangular segments tapering in thickness toward the bottom of the cup and each of said triangular segments including a central radial rib which increases in height from the surface of said triangular segment in direct proportion to the reduction in thickness of said triangular segments to maintain a constant thickness of material along the center of said triangular segments, said triangular segments being deflectable inwardly of the container to allow an object to be inserted through the end wall into the container, said deflectable triangular segments being biased to resiliently return to their original cup-shape after an object has passed inwardly through said end cap to prevent escape of the object from the container, said end cap including a sidewall skirt depending from said end wall, said sidewall skirt being shaped to slip over the open end of said tube, said cup-shaped end wall and said sidewall skirt being spaced to form an annular groove for frictionally receiving the open end of said tube.

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