

May 19, 1964

A. P. SCHOLTZ
CAN MACHINE AND METHOD

3,133,669

Filed May 8, 1961

2 Sheets-Sheet 1

Fig. 1.

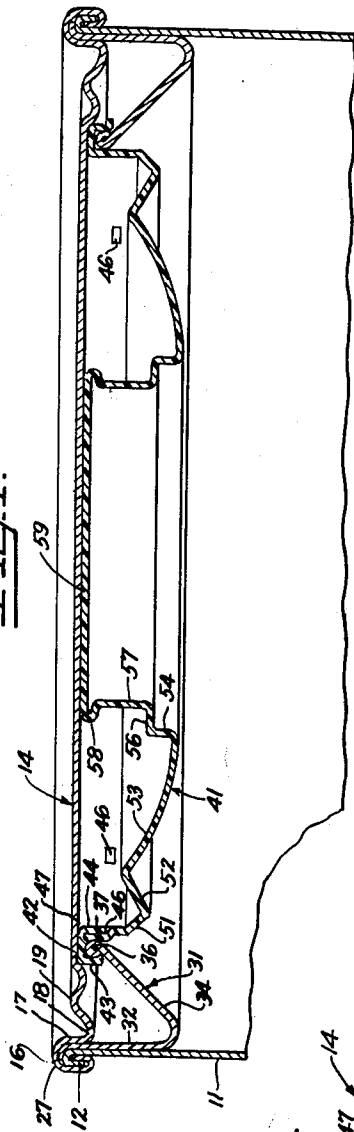


Fig. 3.

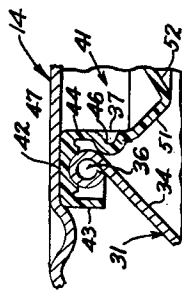
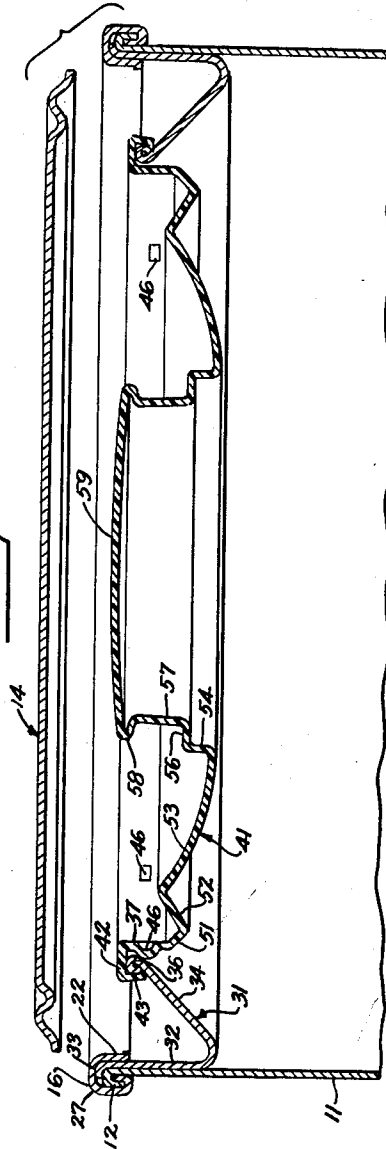


Fig. 2.



INVENTOR.
ARTHUR P. SCHOLTZ
BY *Julian Kaplan*
ATTORNEY.

May 19, 1964

A. P. SCHOLTZ
CAN MACHINE AND METHOD

3,133,669

Filed May 8, 1961

2 Sheets-Sheet 2

Fig. 4.

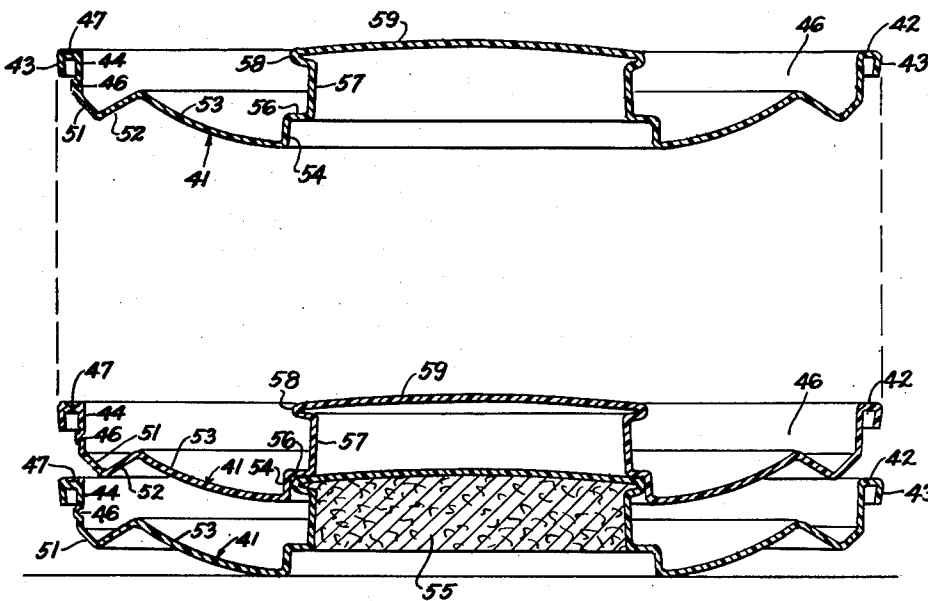


Fig. 5.

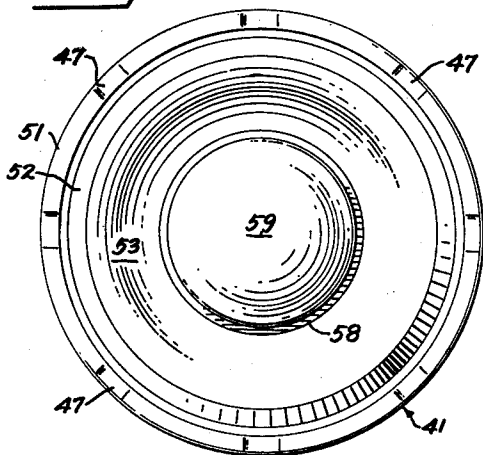


Fig. 6.

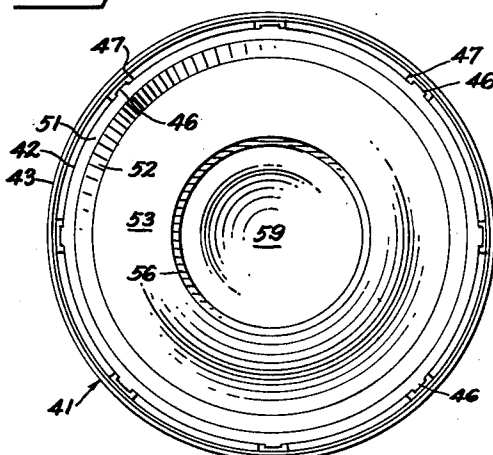
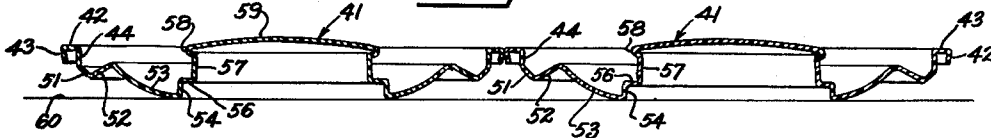


Fig. 7.



1

3,133,669

CAN MACHINE AND METHOD

Arthur P. Scholtz, Chicago, Ill., assignor to National Can Corporation, Chicago, Ill.

Filed May 8, 1961, Ser. No. 198,398

5 Claims. (Cl. 220-97)

This invention relates to a new and improved can with inner replaceable closure. More particularly, the invention relates to a can having a conventional end which is removed in the usual manner to provide access to a replaceable cap-type closure, or the like, which may be removed and replaced at will.

This application is a continuation in part of co-pending applications, Serial No. 43,574, filed July 18, 1960, and Serial No. 84,090 filed January 23, 1961.

In prior applications of which the present invention is an improvement, have been shown cans each having an end seamed in conventional manner but which differ from such conventional can construction in that after the end has been removed a replaceable closure is provided which may be used to reseal the contents as required. Thus, a collar is located inside the upper end of the can body and so constructed that when the top can end is applied and seamed onto the body the collar is secured in place. The collar has an inwardly directed portion which terminates in a neck having a curl, bead or hem. A flexible plastic cap snaps over the curl, bead or hem and thus is removably positioned to protect the contents of the can from the atmosphere.

The present invention comprises an improvement in the construction of such cap as hereinafter set forth. One such improvement is in the formation of an integral lifting knob on the cap. Such knob is used by the consumer to lift the cap for removal or replacement. The knob is preferably hollow and preferably has at its upper edge an outwardly projecting ridge which functions to keep the fingers from sliding relative to the cap when the cap is being pulled off the collar.

Prior to original installation of the cap on the collar, the caps may be stacked on top of each other for convenient storage and further to facilitate feeding the caps onto the collars by machinery. A feature of the present invention is the formation of the lift knob with an outwardly expanded step near the bottom of the wall of the lift knob, which step has an inside diameter to receive the rib of the next lowermost cap. In this manner the caps stack on top of each other in a stable arrangement. Further, the caps are slightly spaced apart at their outer peripheries so that a detent may be interposed in the space between the peripheries of the caps to facilitate feeding the caps from a stack one at a time by the use of automatic machinery.

A still further feature of the invention is the construction of the cap in such manner that it will rest on a horizontal surface in a stable manner. It will be understood that as an alternate to feeding the cap from a stack the caps may be fed along a horizontal table or moving belt. In such method of feeding, the construction of the cap tends to prevent the caps from tilting as edgewise pressure is imparted and thus the construction hereinafter set forth in detail prevents jamming of the machinery for feeding the caps.

A further feature of the invention is the formation of an integral knob on a flexible cap, thereby facilitating removal and replacement of the cap. The knob may project upwardly from a depression in the center of the cap to enhance the natural flexibility of the plastic material of which the cap is constructed so that it snaps onto the collar and may be removed therefrom, but sufficient tension is imparted to the caps so that the contents are sealed by the cap gripping the bead on the collar.

2

Another object of the invention is the provision of a lifting knob on the replaceable inner closure so constructed that it is easily gripped by the fingers of the user and yet is shaped so that the closure may be molded in plastic without requiring the use of a split cavity mold.

A further feature of the invention is the provision of nibs adjacent the outer periphery of the cap on the underside of the cap against which pressure is exerted by the super-imposed can end whereby the undersides of the nibs are deformed to seal against the bead on the neck of the collar.

An alternative feature of the invention is the provision of nibs or other means on the reclosure cap so constructed that communication is maintained between the interior of the can and the headspace between the cap and the upper can end. Thus when the can is evacuated (as in vacuum packed products such as coffee), drawing a vacuum in the can simultaneously creates a vacuum in the headspace.

A still further feature of the invention is the fact that a hermetic seal may be achieved between the headspace and the body of the can. Alternatively, communication may be maintained between the two areas so that the entire can may be vacuumized or gassed; on the other hand, only one of these areas may be so treated.

Pressure of the can end at the annular zone where the cap fits onto the collar tends to maintain a seal between the two areas where such seal is desired and, accordingly, this is another feature of the invention.

Still another object of the invention is to provide a can having reclosure means in which the entire interior of the can in contact with the contents may be enameled to prevent raw metal affecting the taste, odor or appearance of the contents.

Still another feature of the invention is the provision of a space between the reclosure cap and the can end, which space may be used for advertising circulars or premiums, directions for use of the contents of the can, or other purposes. A small package of additive such as a coloring material or flavor may be placed in the space between the cap and the end to be added to the contents of the can by the consumer as desired.

Further, it will be understood that a premium or the like may be inserted in the head space above the reclosure cap and need not be provided with a sanitary wrapping since it is isolated from the contents of the can.

A particular object and advantage of the invention is the fact that the can end may be severed easily and without leaving ragged, dangerous metal edges. The can may be opened with any known can opener. Even the punch-and-cut blade type can opener operates well with this construction. The angle at which the user holds the blade is not so critical for proper cutting because the shape of the end and the collar direct the blade toward the proper angle. Further, the blade does not tend to go too deep because it contacts the collar and this eliminates one of the principal reasons for ragged edges in the use of punch-and-cut can openers.

A still further advantage of the end construction herein described is the improvement in the end seam achieved by this construction.

Heretofore various types of reclosure cans have been developed. In many of such constructions the cylindrical wall, of the can is opened, as by means of a tear strip opened with a key, and cooperating means provided on the can body and the portion of the body originally above the tear strip and/or the can end itself for reclosure. Such constructions have the disadvantages inherent in key opening cans—such as high cost of manufacture and inconvenience to the consumer in opening the can. They have additional disadvantages in that sealing on reclosure is

3

either ineffective or difficult from an operational standpoint.

In other prior constructions the top of the cylindrical body wall is deformed, as by the rolling of deep beads and the can end likewise deformed by stamping or drawing deep depressions which fit inside and seal against the bead. Thus when the end is cut by a can opener reclosure may be accomplished by pressing the end downwardly until the depression seats against the bead. Such constructions raise serious manufacturing obstacles. Further, because of lack of rigidity of the end, repeated reclosure of the end is not feasible. Another disadvantage of such constructions resides in the fact that the inside diameter of the bead must necessarily be almost as great as the can body diameter, which does not leave much room for the user to pry the end out of the bead and hence further contributes to the inconvenience of use. Additionally, the exposure of the raw edge of the severed end is a hazard to the fingers of the user.

Other prior constructions employ snap-on or friction outer ends, which prevent hermetic sealing of the can and make sterilization of the contents after sealing impossible.

A still further prior construction employs a ring held in the double seam between the end and body and having a central perforation or aperture in which fits a friction plug-type reclosure cap. Removal of such caps requires use of a prying instrument of some type and is generally time and effort consuming. Further, if a tight seal is to be accomplished, considerable force is required to push the cap into the aperture which necessitates a rugged construction and increases the cost of materials and manufacture. The effectiveness of making an air-tight reclosure seal is also less in this type construction than in that hereinafter described.

Accordingly, the present invention affords important advantages over prior reclosure can constructions without material increase in the cost of construction thereof.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a fragmentary vertical sectional view through the top of a can constructed in accordance with the present invention.

FIG. 2 is a view similar to FIG. 1, showing the end severed.

FIG. 3 is an enlarged fragmentary view showing the oil tight seal of the reclosure cap and collar bead of FIG. 1.

FIG. 4 is a vertical sectional view of a stack of reclosure caps shown in position to be fed into a machine for applying such caps.

FIG. 5 is a top plan of a cap.

FIG. 6 is a bottom plan thereof.

FIG. 7 is a side elevational view showing a pair of reclosure caps in edge-to-edge relationship while being fed along a belt.

The present invention is adapted for use with a standard can such as a sanitary can, or it may be adapted for use with other can constructions, such as paint cans and other general line cans. A conventional can has a body 11, which is customarily cylindrical in shape and seamed and soldered together in a side seam (not shown). An outwardly directed flange 12 is formed on the top and a similar flange is formed on the bottom of the body. In conventional can construction, the upper end 14 of the can is a disc of sheet metal having a trough 16 formed at the outer periphery and containing sealing compound (not shown). Inwardly of the trough 16 is a vertical seaming chuck wall 17 which in the present instance is of slightly less than conventional diameter to provide space for a collar hereinafter described. The chuck radius 18 at the bottom of wall 17 is somewhat greater than in conven-

4

tional can ends and a raised annular bead 19 is provided inwardly of radius 18. Large radius 18 and bead 19 tend to spring the severed end upward when it is cut by a can opener. Bead 19 further tends to localize the path of the blade of the can opener and prevent inward movement thereof, thereby improving the operation of the can opener. Further, bead 19 tends to reduce wrinkling of the end disc 21 as it is cut and this feature is desirable in that if the end is wrinkled it tends to stick at various points under portion 22 of the can end which remain adhering to the body, which makes removal of the can end difficult at times.

By means forming no part of the present invention and well understood in the can manufacturing art, a closing machine is employed to form a double seam sealing the can end 14 to the body 11, resulting in conventional end bead 27. Such a conventional closing machine is employed to close the can of the present invention and a feature of the present invention is the fact that no alteration of such machine is required other than shaping the closing machine chuck to fit the can end 14.

The present invention employs a collar 31 inside the upper end of the can and secured thereto. In the form shown in the accompanying drawings, collar 31 has a vertical side wall 32 having a diameter to fit inside the can body with a friction fit. The depth of the side wall 32 is sufficient so that the collar is not severed when the upper can end 14 is removed by a conventional can opener. The upper end of the side wall 32 is formed with an outwardly directed flange 33 which is similar in shape but of lesser width than flange 12. Thus flange 33 rests on top of flange 12 and prevents collar 31 from being pushed downwardly into the can body. When end 14 is double-seamed onto body 11, collar 31 is permanently secured to body 11. It will be understood that other means may be employed to secure the collar to the wall, one such means being shown in FIGS. 5 to 7 of co-pending application Serial No. 43,574. Collar 31 has an upwardly-inwardly slanting breast 34, terminating in an outwardly rolled bead 36 which is immediately under end 14. It will be understood that the neck 37 of collar 31 may terminate in a curl, bead or hem and the term "bead" is used herein to include all such constructions. Preferably, bead 36 projects upwardly and outwardly since in such construction there is no possibility of a raw edge of the metal coming in contact with the contents of the can, which might affect the color, odor or taste of the contents deleteriously.

In accordance with the present invention there is provided an improved reclosure cap 41 which snaps onto the bead 36 on neck 37 of collar 31. Such a cap has adjacent its periphery a narrow annular shoulder 42 of a width approximately equal to that of bead 36. Surrounding the outer edge of shoulder 42 is a short downwardly extending skirt 43 which fits around the outside of bead 36. On the inside edge of shoulder 42 is a short vertical wall 44 having an outside diameter slightly less than the inside diameter of bead 36 and having a plurality of outwardly protruding nibs 46 which are equally spaced around the periphery of wall 44 and engage under bead 36 to hold the cap on the neck. Since the cap is made of a deformable plastic material the cap may be snapped on and off of the bead as required, cap 41 and nibs 46 flexing to accomplish this result.

As is best shown in FIG. 3, there are also positioned on the underside of shoulder 42 and resting upon the top of bead 36 a plurality of downwardly projecting nibs 47. When the can end 14 is forced against the cap shoulder 42, as shown in FIG. 1, pressure is exerted on nibs 47 which deform to the position shown in FIG. 3, thereby allowing the underside of shoulder 42 to seal against the top of bead 36 in an oil-tight seal. Deformation of the top nibs 47, by reason of the resilient nature of the plastic material of which the cap is constructed, exerts an upward resilient force on the super-imposed can end 14, tending to lift the same. This resilient force

causes the severed disc 21 of the can end to be raised when end 14 is opened by a can opener, all as hereinafter set forth.

Preferably, the top and side nibs 47, 46 are formed as shallow indentations of the top surface of shoulder 42 and inwardly facing surface of wall 44 or, correspondingly, as shallow downward projections of the underside of the shoulder 42 and outward projections of the outer surface of wall 44. The number of such nibs 46 or 47 is subject to considerable variation, but it has been found that eight each is a satisfactory number for most uses. Removal of the cap is facilitated if the nibs are not diametrically opposite to each other and hence a slightly staggered arrangement rather than equal spacing between the nibs is desirable.

In the accompanying drawings, the top and side nibs 46, 47 are disposed substantially in vertical alignment with respect to each other, but this feature is subject to variation if desired.

Inwardly of the bottom edge of wall 44, cap 41 is formed with a downwardly-inwardly slanted portion 51 which may be disposed at an angle of about 45° with respect to the horizontal. This slanted portion 51 facilitates proper seating of the cap on bead 36 if the user happens to position cap 51 eccentrically with respect to collar 31. Inwardly of slanted surface 51 is an upwardly-inwardly slanted surface 52 rising to an elevation about equal to that of the bottom of wall 44. Inwardly of the upwardly-inwardly slanted surface 52 is an annular depression 53 having in cross-section an arcuate shape which conveniently receives the tips of the fingers of the user. The inner edge of depression 53 terminates in an upward vertical riser 54 which, in turn, merges into an inward horizontal shoulder 56. As hereinafter appears, the riser 54 and shoulder 56 constitute a "stacking step" useful when caps are piled on top of each other in a stack (FIG. 4). Above the inner shoulder 56 is a vertical wall 57 of the lift knob and at the top of the knob is an outward and slightly upwardly slanted rim 58 which terminates in a reverse bend and merges with the substantially horizontal but slightly upwardly bowed top 59 of the knob. The function of the rim 58 is to prevent the fingers of the user from slipping off the side wall of the lift knob.

The rim 58 may be produced in various ways. However, a preferred form avoids the use of a split cavity mold. In the original form as received from the mold, the lift knob has a bulbous projection around its upper end. Such a shape may be stripped from a mold without using a split cavity. After removal from the mold, downward pressure is applied on the top surface 59 by any convenient means and this results in a squeezing of the cap to form ridge 58.

The construction of cap 41 is of particular importance in handling the cap, as in connection with storing and transporting caps in stacks or in feeding the caps during assembly of the containers by automatic machinery. When the caps are thus stacked, as shown particularly in FIG. 4, the horizontal shoulder 56 of one cap rests upon the top 59 of the next lower cap and hence a stable stack is achieved. In this connection, it will be noted that the outside diameter of rim 58 is slightly less than the inside diameter of riser 54. In addition to the stability of the stack it is also apparent from FIG. 4 that there is adequate space between the skirts 43 so that a detent of a feeding means for feeding the caps on the stack during assembly of the containers may enter between successive caps.

Further, where the caps are fed horizontally along a belt 60 or table, as shown in FIG. 7, the shape of the cap also affords stability. Thus when fed along such horizontal surface the skirts 43 are in edge-to-edge relationship at a plane which is about half the height of the cap and the bottom of the cap is resting on a horizontal annular surface at the bottom edge of riser 54, which is of relatively large diameter. Thus the caps tend to remain

in contact with the surface along which they are fed and do not tend to tip or climb over each other. This again provides a stable and effective means for feeding the caps during assembly of the containers.

In the assembled position of the can end, shoulder 42 may be squeezed between bead 36 and end 14, deforming top nibs 47 to the position shown in FIG. 3, and also slightly reforming the top end 14 during the double seaming operation. It will be understood that in the seaming of can end 14 to can body 11, a downward force is applied by the can seaming machine chuck which grips the top of wall 17 and radius 18 but does not grip the other parts of end 14. Accordingly, end 14 from chuck wall radius 18 to the point where the outer shoulder 42 of cap 41 comes in contact with it is slightly reformed in the seaming operation. The reforming of the top end causes a slight amount of metal spring-back when the end is removed from the pressure of the chuck. However, these pressures remain until the top is cut off by the can opener. Upon performance of this operation the top end springs back and the cut-out end 21 is lifted out, accordingly releasing the pressure tending to squeeze the plastic between the end and bead 36. The resiliency of the plastic material lifts the severed end disc 21 out when such pressure is released.

It will be noted that the plastic cap 41 and, specifically, the shoulder 42 and nibs 47 are squeezed between the can end 14 and bead 36 and this results in an oil-proof seal, particularly when the cap is molded of medium density polyethylene. (See especially FIG. 3.)

The nibs 47 rest upon bead 36 with the result that unless sufficient pressure is applied to squeeze them to the form shown in FIG. 3, they maintain the shoulder 42 out of contact with bead 36. This facilitates removal and reclosure of the cap. Further, nibs 47 function as vents so that air passes from the space inside the can to the space above collar 31 and cap 41. Such communication is important, particularly where the can body 11 is evacuated in packing such products as coffee.

The can may be filled at either end, i.e., the cap 41 and end 14 applied either at the factory or cannery. Where the can is to be filled at the top the bottom end is sealed onto the bottom of the can body in conventional manner at the can factory. Collar 31 is slipped onto the upper end of can body 11 and is held in place by friction. At the cannery or other location where the can is to be filled, the contents are filled through neck 37 and cap 41 applied, snapping into place over bead 36. Alternatively, the contents of the can may be filled first and then collar 31 and cap 41 applied. Advertising circulars, premiums, directions, or small packages of additives may be placed on top of collar 31 and closure cap 41. Cap 41 prevents such materials from coming in contact with the contents of the can prior to consumption. Thereafter, the upper end 14 is seamed onto the can body by conventional machinery, the seaming of the upper end locking collar 31 permanently in place.

As an alternate, where the can is to be filled at the bottom, collar 31, cap 41 and end 14 may be applied at the can factory. In such case the can is filled through the open bottom end and bottom end is applied by conventional closing machine at the cannery. If the contents of the can are to be filled under vacuum, the headspace above collar 31 is evacuated at the same time that the main body of the can is evacuated.

At the destination, the consumer cuts off disc 21 of upper end 14 with a can opener in conventional manner. The depth of side wall 32 is such that the blade of the can opener does not sever the collar. Upward pressure is exerted by the compression of shoulder 42 and nibs 47 and this upward pressure tends to lift disc 21. Thus when the end is severed disc 21 is lifted upwardly where it can be conveniently removed without danger of the fingers being cut by the sharp edge. The depressed radius 18 and raised bead 19 tend to locate the blade of the can

opener in proper position, namely, at the bottom of the radius 18, and to prevent the blade from being displaced from such position as it traverses the can. Thus the angle at which the user holds the blade is not critical. Such positioning of the blade is particularly important where the "punch-and-lift" blade-type can opener is used. Further, the collar 31 is located in such position that it is not normally contacted by the can opener blade. However, if it is so contacted, the collar tends to prevent the blade from penetrating downwardly too deeply and puncturing the collar. The shape of the end 14 improves the seam which can be attained.

It will further be seen that there is a trough at the juncture of the wall 32 and slanted stretch 34 of the collar in which particles of metal which may be dislodged when the end is cut collect and which are thereby prevented from falling into the contents of the can.

It will be further understood that in place of the reclosure cap 41, herein illustrated and described, other caps such as those having pouring spouts, dredges, or means for measuring the volume of product dispensed may be substituted. Other devices for proportionately adding various additives such as catalysts, activators for paints and the like, may be attached to add material to the contents being dispensed. Means for mixing, stirring or otherwise mechanically manipulating the product may be incorporated in the cap. A pressed fibre material 55, such as cotton, may be inserted in the hollow of cap 41 inside wall 57 and when such material is saturated with water it tends to keep the contents of the container moist. This form of invention is particularly desirable for products such as tobacco, keeping the tobacco in condition for slow and cool burning. The material 55 is shown positioned in the lowermost cap in the stack of FIG. 4, but is eliminated in all other views to show the optional nature of this feature. A dehumidifying agent may likewise be inserted in the same location as reference numeral 55 to keep powdered products dry and prevent caking, and likewise an oxygen absorbing agent may be inserted to obviate the need for gas or vacuum packing.

Although the foregoing invention has been described in some detail, by way of illustration and example for purposes of clarity of understanding it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. A reclosure cap for a necked container formed of a unitary piece of flexible plastic comprising an annular shoulder shaped to fit on the neck of the container, means depending from said shoulder for engagement with said neck, an annular depression inwardly of said shoulder, and a lift knob rising centrally of said depression, said knob having an enlargement at its base, said enlargement being hollow and open at the underside of the cap, the top of said knob fitting into the hollow at the under-

side of another identical cap when said cap is stacked with other identical caps in a stack, the hollow underside being defined by a riser wall that is of a size to make a telescoping fit over the knob of a subjacent cap to hold the superimposed cap against radial shifting, and the riser wall terminating at its upper end in a portion extending radially inwardly an amount sufficient to seat the superimposed cap on the knob of the subjacent cap, the said riser wall and the radially extending portion maintaining the respective stacked caps in parallelism and with their axes coinciding.

2. A cap according to claim 1, which further comprises a plurality of arcuately-spaced downwardly-protruding nibs on the underside of said shoulder.

3. A cap according to claim 1, which further comprises a plurality of arcuately-spaced downwardly-protruding nibs on the underside of said shoulder, said nibs being deformable under pressure to provide a substantially coplanar, continuous annular sealing surface on the underside of said shoulder.

4. A cap according to claim 1, in which said means comprises a peripheral skirt depending from said shoulder and a short wall depending from the inner edge of said shoulder, said wall being formed with a plurality of outwardly projecting resiliently deformable retaining lugs to fit under the neck of a container on which said cap is positioned.

5. A reclosure cap for a necked container formed of a unitary piece of flexible plastic comprising an annular shoulder shaped to fit the neck of the container, means depending from said shoulder for engagement with said neck, a short wall depending from the inner edge of said shoulder, a downwardly-inwardly slanted stretch inwardly of the bottom of said wall, an upwardly-inwardly slanted stretch inwardly of said last-mentioned stretch, an annular depression inwardly of said upwardly-inwardly slanted stretch, and a lift knob rising centrally of said depression, said knob having at its base an enlargement which is open at the underside of the cap, the opening being of a size and shape to make a telescoping fit over the knob of a subjacent cap when two identical caps are stacked on each other.

References Cited in the file of this patent

UNITED STATES PATENTS

1,667,697	Draper	Apr. 24, 1928
1,695,286	Johnson	Dec. 18, 1928
2,523,285	Erb	Sept. 26, 1950
2,685,383	Kochner	Aug. 3, 1954
2,693,307	Goodwin	Nov. 2, 1954
2,982,436	Hitov	May 2, 1961
2,985,354	Aldington	May 23, 1961

FOREIGN PATENTS

143,716	Austria	Nov. 25, 1935
---------	---------	---------------