Initially Sealed Closures with Sealing Structures

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Abstract

An initially sealed closure having a top, sealing means for forming a seal against a container neck and means for engaging such a neck so as to hold the sealing means in a sealed relationship with the neck can be formed with an initially sealed dispensing opening, an integral strap capable of being partially severed from the closure and a subclosure carried by the strap. With this structure the strap can be partially broken away from the remainder of the closure so that the subclosure can be used to close the opening.

5 Claims, 6 Drawing Figures
INITIALLY SEALED CLOSURES WITH SEALING STRUCTURES

CROSS-REFERENCES TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

It is known to form closures with dispensing openings in their tops and to utilize such closures with subclosures or secondary closures which are adapted to be used in sealing such openings. Such subclosures may be supplied as separate articles by a closure manufacturer. On occasion they are formed integrally with such closures so that they can be broken off of closure bodies when they are to be used. They have also been permanently attached by extending straps formed so as to be capable of being manipulated to place these subclosures in operative positions.

None of these subclosure structures is considered to be completely desirable. Separate subclosures may be easily lost or misplaced. When this happens obviously they cannot be used. Subclosures which are intended to be broken off of a closure body prior to use may also be lost or misplaced after they have been severed from a closure structure. Further, such initially attached subclosures may be broken off of the closures to which they are attached during normal assembly and handling operations.

It is considered that closure of this category utilizing subclosures which are adapted to be broken off of closure bodies cannot be adequately handled in modern conventional automatic capping equipment because of the danger of these subclosures being broken. It is also considered that known closures utilizing subclosures carried upon an integrally formed extending strap are disadvantageous for the same reason. Such a strap inherently is of such a nature as to make closures of this type difficult to handle during conventional capping equipment.

In spite of these and related defects of known closures having dispensing openings to be used with a secondary closure, closures of this general type are frequently desired for certain applications. Closures of this general type are used because they can be inexpensively manufactured and because of the fact that customers can readily determine how to use them. Other factors of course enter into the commercial adoption of any dispensing closure. It is considered that commercial markets for closures of the type described having dispensing openings and sub or secondary closures can be significantly expended by providing closures of this type which overcome various limitations and disadvantages of prior structures as indicated.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide new and improved closures having dispensing openings and sub or secondary closures which overcome various disadvantages and limitations of prior closures utilizing such openings and subclosures. More specific objectives of the invention are to provide closures of the type described: which can be conveniently and easily manufactured at a comparatively nominal cost; which are integral units so that there is no danger of parts of such closures becoming lost or misplaced; which may be easily handled with automatic capping equipment with only minimal difficulty; which perform satisfactorily in use; and which may easily be used by an ultimate user.

In accordance with this invention, these objectives are achieved by providing in a closure for use on a container neck, the closure having a top adapted to be located over the end of the neck, sealing means carried by the top for forming a seal with respect to it and means for engaging the neck so as to hold the sealing means in a sealed relationship with respect to the neck, an improved structure which includes an initially sealed dispensing opening on the top which is capable of being broken open, a strap attached to the closure so as to be capable of being partially severed from the closure and a subclosure carried by the strap. This structure is designed so that the strap may be partially severed from the closure and can be manipulated to place the subclosure in contact with the top so as to seal the opening.

BRIEF DESCRIPTION OF THE DRAWINGS

A brief summary of this category is inherently incapable of indicating all facets of an invention. Further details with respect to the present invention as well as the manner in which the invention achieves the aforesaid objectives will be apparent from a careful consideration of the remainder of this specification and the accompanying drawing in which:

FIG. 1 is an isometric view of a presently preferred embodiment or form of an invention installed on a container neck;

FIG. 2 is a cross-sectional view taken at line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view corresponding to FIG. 2 showing the use of the subclosure shown in the preceding figures;

FIG. 4 is an isometric view similar to FIG. 1 of a modified embodiment of a presently preferred closure of this invention installed on a container neck;

FIG. 5 is a cross-sectional view taken at line 5—5 of FIG. 4; and

FIG. 6 is a cross-sectional view corresponding to FIG. 5 showing the use of the subclosure shown in the preceding FIGS. 4 and 5.

On reflection it will be apparent that the closures shown in the drawing are not in and of themselves the invention, but rather are structures embodying the concepts of the invention. From this it will be apparent that these concepts may be embodied within other somewhat differently appearing and/or constructed closures through the use or exercise of routine engineering and design skill.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

In FIG. 1 of the drawings there is shown a closure 10 of the present invention. This closure 10 is formed as an integral article out of a polymer such as a linear or non-linear polyethylene, isotactic polypropylene or the like. It may also be formed out of various other polymers having physical properties similar to those of these polyolefins. As constructed this closure 10 may be manufactured at a comparatively nominal cost with
present day high-speed injection molding techniques. This is considered to be important.

The closure 10 includes a top 12 divided into a center section 14 and a concentric peripheral section 16. This center section 14 preferably includes a small centrally located upstanding boss 18 across the center of which there extends what may be regarded as a diaphragm 20. This diaphragm 20 preferably is divided into a number of pie-shaped sections by lines 22 of lesser thickness than the remainder of the diaphragm 20. These lines 22 are designed to facilitate the diaphragm 20 being broken so that the broken parts of it will tend to bend down as shown in FIG. 3. They are not necessary if the diaphragm 20 itself is sufficiently thin so that it is capable of being easily punctured or broken.

With this structure the space occupied by the diaphragm 20 constitutes a dispensing opening within the boss 18. For convenience of reference this opening is referred to hereinafter as an opening 24 extending around the interior of the boss 18. Technically speaking the opening 24 is only formed when the diaphragm 20 is ruptured.

Between the sections 14 and 16 of the top 12 there is located an integrally formed sealing structure 26 having inner and outer walls 28 and 30 respectively. The outer wall 30 has substantially the shape of a frustum of a cone directed downwardly. These walls 28 and 30 are joined together so that the entire sealing structure 26 at any point around the top 12 has essentially a "Vee" shaped cross-sectional configuration. If desired, the outer wall 30 need not have a precise linear configuration, but can be shaped so as to act in the most desirable manner as a plug within the interior 32 of a container neck 34. Other known sealing structures or means may be employed instead of the structure 26.

The entire closure 10 is adapted to be used so that the top 12 overlies the end of this neck 34 and so that a peripheral skirt 38 attached to the peripheral section 16 so as to depend from it closely fits around the exterior 31 of the neck 34. Preferably this skirt 38 includes an internal bead 42 which is adapted to mate against a corresponding bead 44 on the exterior 40 so as to hold the closure 10 in place with respect to the neck 34.

This structure is designed so that the closure 10 may be located in place upon the neck 34 by being located over the end 36 and pushed down upon it. With this structure when this is done as the result of temporary material deformation the two beads 42 and 44 will be "popped" past one another or snapped over one another so as to latch the closure 10 in place in a position in which the outer wall 30 forms a seal with the interior 32 of the neck 34.

It will be realized that other equivalent means for engaging a neck known to the closure industry may be used instead of the bead 42 in order to secure the closure 10 to a particular neck such as the neck 34. It will also be realized that with the closure 10 the sealing structure 26 serves, because of the friction between it and the interior 32 and the resiliency of the walls 28 and 30, as an additional means for engaging the neck 34 so to hold the closure 10 in place. Because of this action of the sealing structure 26 it can be used without the bead 42 or its equivalent being employed, although this is not normally preferred. If desired the precise sealing structure 26 may be replaced with other sealing structures which will form a seal with respect to the neck 34. A number of such structures are well-known and commonly used.

With the closure 10 a portion of the skirt 38 is formed as a strap 46. This strap 46 has a base 48, side edges 50 and 52 and a terminal end 54. Of these side edges 50 and 52, the side edge 50 is uppermost and is located at the periphery of the top 12. This side edge 50 is connected to the top 12 by a line 56 corresponding to the lines 22. This line 56 is capable of being easily severed or broken during the use of the closure 10 as hereinafter described. If desired, it may be provided with perforations 58, although this is not normally considered necessary or desirable. When used such perforations 58 tend to make it easier to fray the strap 46 along the line 56 than if such perforations 58 were not used.

It will be noted that the base 48 is integrally formed with what may be termed as a fixed or non-moving portion 60 of the skirt 38. If desired a small holding tab 62 may be formed on this portion 60 so as to extend from it for use in facilitating the use of the closure 10. Preferably the side of the portion 60 remote from the base 48 is separated from the terminal end 54 by a slit 64 extending axially from the bottom of the skirt 38 to the line 56. The terminal end 54 of the strap 46 preferably carries another small tab 66 which in turn carries a subclosure 68. This subclosure 68 appears much like a dome on a Russian Orthodox church so as to include a pointed top 70 separated from the tab 66 by a groove 72. If desired the interior 74 of the subclosure 68 may be made hallow so as to increase the resiliency of the subclosure 68.

This structure is designed so that when the closure 10 is supplied by the manufacturer it may be installed on a neck 34 as shown in FIG. 1. An ultimate user of the closure 10 may pull on the subclosure 68 and/or tab 66 so as to partially break away the strap 46 along the easily broken line 56. As indicated by the extent of the perforations 58 as illustrated in FIG. 1, the strap 46 will be severed more than half-way around the periphery or outside of the closure 10 when this is done. The bead 42 will of course be pulled away from the bead 44 along the entire length of this strap 46 as the strap 46 is severed in this manner. When this is done the top 70 of the subclosure 68 may be applied to the diaphragm 20 so as to break this diaphragm 20 open. During such opening the portions of the diaphragm 20 between the lines 22 will normally tend to fold back within the interior of the closure 10 so as to thereafter not significantly interfere with the operation of this opening 24.

As pressure is applied to the subclosure 68 it will "pop" through the opening 24 as a result of temporary material deformation so that the groove 72 fits against the interior of the opening 24 as this opening has been formed by breaking the diaphragm 20. Preferably the parts are shaped as shown and are dimensioned so that a seal is formed between the subclosure 68 and the wall dividing the opening 24.

After the subclosure has been applied or secured in this manner to the top 12 of the closure 10 this subclosure 68 may be removed from the closure 10 so as to expose the opening 24. This may be accomplished by pulling upwardly on the subclosure 68 and/or the tab.
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66. Normally the holding action of the sealing structure 26 against the container neck 34 will hold the closure 10 upon the container neck 34 as the subclosure 68 is removed in this manner. However, if desired or if the sealing structure 26 does not fit tightly within the container neck 34 downward pressure may be applied to the top 12 as the subclosure 68 is removed from the top 12 so as to hold the closure 10 in engagement with the container neck 34.

If it is desired to completely open the container neck 34 by removal of the closure 10 this may be easily accomplished by lifting the tab 62 upwardly using this tab 62 much like a handle. By manipulation of the closure 10 using the tab 62 the sealing structure 26 may be disengaged from the container neck 34. Thereafter the closure 10 may be reinserted within the container neck 34 by pushing it downwardly into a position as indicated in FIG. 3 of the drawing.

In FIGS. 5-7 there is shown a modified closure 100 of the present invention which is closely related to the closure 10. In the interest of brevity and for convenience various parts of the closure 100 which are the same or substantially the same as various parts of the closure 10 are not separately described herein, and are designated herein and in the drawings by the numbers previously used to designate such parts preceded by the number 1.

In the closure 100 the diaphragm 20 is not used. In this closure 100 the boss 118 appears as a spout-like truncated cone projecting upwardly from the top 112 significantly further than the boss 18 previously described. Preferably an annular groove 180 is located around the periphery or outer surface of the boss 118 in a plane perpendicular to the axis of the boss 118.

When the closure 100 is initially supplied the top end of the boss 118 is closed off by means of a tip 182 appearing as a cylindrical box. This tip 182 is separated at its base from the upper end of the boss 118 by a line 184 corresponding to the line 56 previously described. Preferably, this line 184 is not perforate so that the top 112 is sealed as the closure 100 is applied to a user.

This line 184 is designed so that the tip 182 may be easily broken off of and removed from the boss 118 by merely pushing upon it or twisting it. If desired the line 184 may be sufficiently thick so as to require the application of a knife to it to sever the tip 182. This is not normally preferred because it increases the difficulty of customer use. In order to facilitate removal of the tip 182 it may be provided with wings 186 such as the wings used on a common wing nut so that a twisting force may be easily applied to the tip 182 in order to facilitate severing of it along the line 184.

In the closure 100 the subclosure 168 incorporates as one of its parts the tab 166. This subclosure 168 also includes a downwardly extending skirt 188 which is adapted to fit tightly against the exterior of the boss 118. Preferably this skirt 188 includes in its interior an internal annular bead 190 which is adapted to fit within and engage the groove 180. The subclosure 168 also preferably includes an internal stopper-like flange 192 having a tapered external surface 194 located within the skirt 188 on the tab 166. It will be noted that the skirt 188 and the flange 192 extend downward on the tab 166 as the closure 100 is initially formed. This is to prevent the accumulation of dust.

When the closure 100 is installed on a container as indicated in FIG. 4 it may thereafter be used by removing the tip 182 from the boss 118 as previously indicated and by separating the strap 146 carrying the subclosure 168 as previously described. When the strap 146 is free to move relative to the remainder of the closure 100 the subclosure 168 may be positioned over the boss 118 and pushed down upon this boss 118. As this occurs the bead 190 will snap into the groove 180 as a result of material deformation, and the surface 194 of the flange 192 will fit closely within the interior of the top of the boss 118 so as to form a seal therewith. For this purpose of forming a seal other structures known to the art than the flange 192 may be employed.

After the subclosure 168 has been installed in the manner described it may be removed from the boss 118 in substantially the same manner as the subclosure 68 can be removed from the top 12 in the closure 10. When this occurs the opening 124 extending across the top of the boss 118 is, of course, exposed so that it may be used in dispensing material. The subclosure 168 may of course be reapplied to the boss 118. If desired the closure 100 may be repeatedly removed from and replaced upon the neck 134 without disturbing the subclosure 168 after this subclosure has been installed on the boss 118 in the same manner in which the closure 10 may be removed and reinstalled.

Both the closures 10 and 100 are constructed in such a manner that there is no danger of the subclosures used with them becoming lost or misplaced or being accidentally broken off during normal handling. Both of these closures are constructed in such a manner that the straps 46 and 146 used with them do not extend from them. This facilitates handling and capping. This is considered to be significant with respect to the present invention. The case with which these closures 10 and 100 may be employed is also considered to be important.

From a careful consideration of the preceding it will be realized that the embodiment of the invention shown achieve the objectives of the invention. It will also be realized that any structure employing the concepts within the illustrated structures are quite beneficial from a commercial and utilitarian standpoint.

I claim:

1. In a closure for use on a container neck, said closure having a top adapted to be located over the end of said neck and a cylindrical skirt extending downwardly from the periphery of said top, sealing means for forming a seal with respect to said neck carried by said top and means for engaging said neck so as to hold said sealing means in a sealed relationship with said neck, the improvement which comprises:

   a member in said top, said member being capable of being broken open, so as to define an opening which was sealed prior to said member being broken,

   a strap having a base, side edges and a terminal end, said base and at least part of one of said side edges being formed integrally with said skirt, said one of said side edges being connected to the remainder of said skirt by a line of material which is capable of being easily severed, said strap forming a portion of said skirt,
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7. A sub-closure capable of engaging said top at said opening to form a seal with respect to said opening located on said terminal end, said skirt being capable of being broken along said line without breaking said strap and the connection between the base of said strap and said closure so that said strap may be manipulated to place said sub-closure in contact with said top so that said sub-closure will seal said opening, said sealing means being integrally formed with said top and being capable of fitting within said neck so as to hold said closure with respect to said neck, a holding means for engaging and forming a seal with a container neck located on said skirt along said strap so as to form the interior of said skirt, said strap and said holding means extending more than half-way around said skirt.

2. A closure as claimed in claim 1 wherein:
said member comprises a diaphragm adapted to be broken.

3. A closure as claimed in claim 2 wherein:
said subclosure includes a pointed top for use in severing said diaphragm and a peripheral groove, said subclosure being capable of being popped into said opening so as to form a seal with the wall of said closure around said opening.

4. A closure as claimed in claim 1 wherein:
said member comprises a tip and a breakable line of material surrounding said tip and connecting said tip to the remainder of said top, said tip being capable of being broken away from said top along said breakable line of material so as to open said opening.

5. A closure as claimed in claim 4 wherein:
said subclosure includes a flange to fit within said opening so as to close said opening.

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