LIQUID DISPENSER WITH OVERCAP

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This invention relates to improvements in overcaps for use with dispensing-pump-equipped portable liquid containers for use in protecting the pump structures, as well as for a decorative appearance and/or restricting the pump stroke within desired limits.

Overcaps of the type herein involved are exemplified in my prior copending application #369,986 and #369,987, both filed May 25, 1964, now Patent Nos. 3,216,624 and 3,216,625, respectively.

Such overcaps are normally rotatable with respect to the container cap or closure which supports the pump structure, in order to permit orientation of the laterally directed pump discharge spout, as well as for selectively engaging or disengaging the plunger immobilizing means where such means is provided. Since the overcap normally completely encompasses the container cap so as to render the latter inaccessible, this has made it necessary in all instances to defer assembly of the overcap to the pump structure and container cap, until after these parts have been applied to the container. For the same reason, the rotary relationship between the overcap and the container cap have rendered it difficult, if not impossible, to remove the container cap after the overcap has been applied, without risk of damaging or destroying the overcap or its associated components.

It is accordingly the primary object of the invention to provide an improved type of overcap and a new combination thereof with the container cap by the inclusion of selectively interengageable clutch means normally permitting free relative rotation of the overcap with respect to the container cap, for such purposes as orienting the discharge spout, or engaging or disengaging the plunger immobilizing means, but selectively operable to interconnect the two caps for rotation together whenever desired in order to remove or apply the container cap.

It is a further object of the invention to so associate the overcap with the reciprocating pump structure as to interconnect the removable or reciprocable portion of the pump for rotation with the overcap, to permit and to facilitate rotary orientation of the discharge spout of the reciprocable pump portion with respect to the container and the container cap.

In order to achieve these ends, the overcap is provided with a depending, generally cylindrical skirt, which is rotatably journaled on or otherwise supported for rotation about the container cap. A portion at least of the skirt is radially displaceable relative to the container cap. Preferably the skirt is formed of such a material, and is so proportioned, as to be resiliently radially deformable, and both the inner periphery of the skirt and the outer periphery of the container cap are formed with relatively opposed axially or longitudinally extending splines. These splines are positioned to be normally disengaged, but so that at least one of the splines on the skirt may be pressed radially into meshing interlocking engagement with the splines of the container cap incident to radial inward pressure on the exterior of the skirt, such as might be applied either by the fingers of a person or by a suitable instrument thrusting radially against the skirt.

In accordance with a further aspect of the invention, the container cap and the overcap are provided with relatively axially opposed interengaging stop means or abutments which may be arranged either to prevent relative axial movement of the overcap with respect to the container cap or to permit a predetermined degree of such relative movement. In the former event, the overcap and the movable portion of the pump during its reciprocation, and the length of the reciprocating stroke may be controlled by the degree of relative axial movement permitted between the overcap and the container cap.

In the accompanying drawings, there are shown certain specific embodiments of the invention simply by way of illustration of the invention.

In the accompanying drawings:

FIGURE 1 is an axial vertical section through the upper end portion of a container to which is applied a generally conventional dispensing pump, together with a combined container cap and overcap in accordance with the invention, the container cap being shown partly in elevation and partly in section.

FIGURE 2 is a horizontal section on the line 2—2 of FIGURE 1 showing the clutch structure of the invention in its normally disengaged position.

FIGURE 3 is a sectional view similar to FIGURE 2 showing how the overcap may be manually deformed by applied finger pressure from opposite sides thereof to interengage the clutch structure and thereby to interlock the overcap and the container cap for rotary movement together; and,

FIGURE 4 is a fragmentary view generally similar to FIGURE 1 showing a modified form of the invention.

Referring in detail to the accompanying drawings, and first to the structure shown in FIGURES 1, 2 and 3, there is shown in FIGURE 1 the upper end portion or neck 10 of a conventional liquid container such as a glass bottle provided with external threads 11 for connection with the internal threads 12 provided in the depending generally cylindrical skirt of the container closure cap 13, which may be formed of any usual material, as for instance one of the conventionally employed plastic materials.

The top horizontal wall of the cap 13 is provided with a circular central aperture 14 for reception of a dispensing pump which, in the form here shown, is similar in construction and operation to that disclosed in my U.S. Patent #3,128,018, granted April 7, 1964.

Such a pump comprises a hollow pump cylinder 15, the interior of which communicates with the liquid contents of the container 10 through a depending dip tube 16. The upper end of the pump cylinder is formed with a radially outwardly projecting horizontal flange 17 overlying the upper end of the bottle neck 10. If desired, this flange is provided with concentric annular sealing ribs or rings 18 and 19 for sealing engagement with the bottle neck in the manner described in my aforementioned Patent #3,128,018. The pump cylinder 15 is preferably formed of a suitable plastic material such as polypropylene, polyethylene, vinyl chloride or the like, of a sufficiently resilient nature that sealing ribs 18 and 19 may provide an effective seal.

Projecting axially above the flange 17 is a radially enlarged collar 20 which extends upwardly through the annular aperture 14 in the closure cap. After insertion of the collar upwardly through such aperture to bring the upper surface of flange 17 into engagement with the top of the cap, the upwardly projecting collar is deformed to provide a radially outwardly projecting retainer rib 21 overlying the top wall of the container cap 13 to secure
the cylinder 15 against axial displacement with respect to the cap. The cylinder 15 in this instance thus constitutes the stationary portion of the pump structure.

The movable or reciprocable portion of the pump is exemplified by the hollow plunger, designated 22 in its entirety. The lower end portion of the plunger is reciprocably received and guided in the hollow cylinder 15 and preferably is spring projected upwardly in the manner such as disclosed in the aforesaid Corsette et al. Patent 3,128,018. A laterally directed discharge spout 23 on the plunger, above the upper end of the cylinder 15, and the container cap 13, communicates through the hollow plunger 22 and cylinder 15 with the dip tube 16. It will be understood that the plunger and cylinder are supplied internally with conventional valve means for insuring the upward movement of liquid through the pump and discharge thereof through the spout 23, incident to vertical reciprocation of the plunger 22. Such conventional features, however, constitute no part of the present invention and are accordingly not illustrated, though for a complete showing thereof reference is made to the Corsette et al. Patent 3,128,018.

To facilitate actuation of the plunger, some terminates at its upper end in a disc-like fingerpiece 24 adapted to receive intermittent finger pressure so that by alternate downward finger pressure and upward spring projection, the plunger may be depressed and returned to its starting position respectively as many times, or for as many complete reciprocations, as may be desired.

As a feature, the pump is provided with means for immobilizing the plunger 22 during shipping of filled containers 10 and for effecting a seal between the plunger and the cylinder to prevent loss of liquid by seepage between these parts in the event the container 10 is wholly or partially inverted or roughly handled during shipping. In the present embodiment the immobilizing means is defined by the externally threaded enlargement 25 on the plunger, the threads of which are adapted for interengagement with the internal threads of the cylinder collar 20 when the plunger is fully depressed and in the cylinder 15 about the common cylindrical axis of both parts. The seal effecting means is exemplified by a sealing flange 26 projecting radially from the enlargement 25 above its threads for sealing engagement with the upwardly presented seal end or surface 27 of the collar 20, as the threaded parts 20 and 25 are relatively rotated into tight thread engaged.

In addition to thus providing a shipping seal for preventing escape of fluid externally of the plunger 22, the pump may further incorporate internal seals established incident to thus securing the plunger in its immobilized condition, in order to prevent escape of liquid upwardly through the hollow interiors of the intercommunicating plunger 22, cylinder 15 and dip tube 16. Such seal may be of conventional construction as described in the Corsette et al. Patent 3,128,018.

Also, as in the said patent, it is desirable to facilitate relative rotation of the plunger and cylinder 26 and 15 respectively, to interconnect the threaded portions 20 and 25 and thereby to render operative the shipping seals above described, prior to assembly of the pump structure to a container. Thus, there are provided around the cylinder 15 a series of relatively uniformly spaced downwardly directed teeth or configurations such as 27, to be engaged by an annular tool of mating configuration, and thus secured against rotation while the plunger is depressed and turned or threaded down tightly within the collar 20.

The overlap of the invention, designated in its entirety in FIGURES 28 to 31 inclusive, comprises a generally cylindrical skirt or base portion 30 which normally concentrically surrounds the container cap 13 and is mounted for rotation relative to the cap 13 about an axis coincident with that of the pump cylinder 15 and plunger 22.

The internal diameter of the skirt 30 is such as to provide substantial radial clearance between the opposed inner and outer peripheries of the skirt 30 and the container cap 13. Into the clearance space 31 thus provided, there project inwardly from the skirt 30 a series of uniformly spaced, axially opposed protrusions 32, the tips of which are normally disposed to carry and be freely rotatable past the radially outwardly presented end edges of a similarly uniformly spaced series of axial splines 33, which are preferably formed integrally with and project radially from the outer periphery of the container cap 13. As will be best seen in FIGURES 23 and 24, the splines of both series 32 and 33 are formed with circumferentially inclined or rounded profiles so that in normal usage they will ride freely over and past each other to permit substantially free and unimpeded relative rotation between the cap 13 and overlap 28, even though these parts are not accurately guided or journalred for rotation about a common axis. It will be apparent, however, that when a portion of the skirt 30 is radially displaced or deformed, as by inward compression thereof from opposite directions, by the application of a manual squeezing action as illustrated in FIGURE 3, at least one of the splines 32 of the inner circumferential portion or portions of the skirt 30 will be positively projected between and interlocked with cooperating splines 33 of the cap, thereby positively interconnecting the cap 13 and overlap 28 for rotation together.

It is not necessary that the overlap skirt 30 be subjected to a squeezing action from diametrically opposite directions as in FIGURE 3. Manifestly, the exertion of radial pressure from one side only of the overlap will urge at least some of the splines 32 of the radially inwardly displaced portion of the overlap into interlocking engagement with the splines 33 of the container cap 13.

In the event it is desired to journal the skirt 30 on the container cap 13 in a manner to accurately interconnect them for relative rotation about an approximately common axis, the smooth outer periphery of a bead 34 around the lower edge of cap 13 may be extended radially outwardly somewhat beyond the ends of the splines 33 for rotary engagement with the correspondingly smooth inner peripheral portion 35 of the skirt beneath the splines 33 thereof.

In the embodiment of the invention illustrated in FIGURES 1, 2 and 3, the overlap 28, though normally freely rotatable on the container cap 13, is secured against axial movement thereon by means of inwardly projecting axially opposed flanges or stops 36 and 37 respectively, spaced apart axially a distance corresponding to the axial dimension of the container cap 13, and adapted for axial engagement with cooperating stop means or abutments of the cap 13, as defined by the top of the cap and by the downwardly presented face of the marginal beading or rim 34 at the lower edge of the cap 13.

The stop flange 37 moreover is adapted by means of an inner axially inclined cam surface 37a to be resiliently expanded by engagement with the cap 13 and to provide a snap fit beneath the lower edge or rim 34 of the container cap 13 as the overlap is pressed downwardly over the cap 13. Stop flange 37 thus functions to lock the overlap securely in place with respect to both the container cap 13 and the pump components supported thereby.

In order to permit the desired degree of reciprocation of the pump plunger 22 with respect to the overlap, the overlap of the instant embodiment is provided with a vertical or axially extending slot 38, which not only permits the desired range of reciprocation of the plunger 22 and the spout 23, but which in addition cooperates with the spout 23 to interconnect the plunger 22 and overlap 28 for rotation together relative to the base portion 30. By virtue of this rotary interconnection, rotary adjustment of overlap 28 may be utilized to effect orientation of the discharge spout 23 with respect to the container to which it is applied, as well as to selectively engage or
disengage the threaded plunger immobilizing means 20 and 25. As is usual in such devices, the overcap 28 may have any suitable decorative exterior appearance or configuration, and may have a portion projecting above and in shielding relation to the plunger fingerpiece 24, while extending transversely above and affording a substantial degree of protection for the discharge spout 23.

A suitably shaped and disposed opening 40 in the overcap 28 is for reception of the user's finger to facilitate the application of intermittent operating pressure to the fingerpiece 24.

In the operation of the invention as shown in FIGURES 1, 2 and 3 and as heretofore described, where the plunger immobilizing means 20 and 25 are provided for securing the plunger in its fully depressed sealing position for shipping, it is desirable to defer application of the overcap until after the container cap 13 with the pump structure applied thereto has been threaded on to the container 10. This permits the plunger to be depressed and rotated as necessary to fully interengage the threaded portions 20 and 25 for securing the plunger in fully depressed condition before its application to the container. Then with the pump structure supported on the upper end of the container neck by flange 17, and before the container cap is threaded tight so as to prevent or strongly resist rotation thereon, the entire pump structure and flange 17, the entire pump structure may be rotatably adjusted about the cylindrical axis of the cylinder 15 to properly orient the spout 23 in the desired shipping position on the container. In the event the pump flange 17 and the container are interlocked against rotation by anti-rotation lugs, as exemplified in my prior application Ser. No. 266,896, filed March 21, 1963, now Patent No. 3,179,306, the flange 17 will be seated on the container neck 10, in a position which the spout 23 is properly oriented.

The container cap 13 may then be turned tight to seal the container and to maintain the spout 23 in its desired direction of orientation, whereupon the overcap may be fitted over the spout and plunger and pressed on to the container cap 13 until the snap rim or beading 37 engages and locks beneath the lower edge of the cap 13. As in my earlier copending application 369,986, now Patent No. 3,216,624, above referred to, the overcap 28 is so proportioned relative to the pump structure as to permit application of the overcap to the pump structure and container cap in the manner above described.

In order to place the pump in condition for use, it is necessary only to rotate the pump plunger 22 sufficiently to release the interconnected threaded portions 20 and 25 of the plunger and pump cylinder. This may be achieved simply by rotation of the overcap 28 independently of the container cap 13, which rotation will be transmitted to the plunger 22 through the interconnection formed by the spout 23 and slot 38. Upon release of the plunger it will be spring projected upwardly, following which it may then be rotated to any desired position of orientation merely by rotary adjustment of the overcap 28. The pump then may be actuated in the usual manner by intermittent downward pressure on its upwardly directed fingerpiece 24.

In the event the threaded interconnection afforded by the parts 20 and 25 is dispensed with, it will be readily apparent that the overcap may advantageously be assembled to the pump structure and container cap to form a preassembled unit of these parts before such unit is applied to a container. In this event, inward squeezing or radial displacement of a portion of the overcap skirt 30, either by finger pressure or by an appropriate element of a suitable assembling machine, may be employed to interlock one or more of the splines 32 with the splines of the container cap 13 so that rotation of the overcap may serve to tighten the container cap 13 on the container.

Whether or not the threaded interconnection 20-25 is incorporated in the pump structure, it will be manifest that the container cap 13, together with the entire pump structure and the overcap 28, may be removed as a unit from the container to permit refilling, as well as the dispensing of its liquid contents by pouring, following which the cap 13, together with the pump and overcap, may be reapplied to the container by radially inwardly depressing or deforming a portion of the skirt 30 again to interengage or interlock the splines 32 and 33 so that rotary movement of the overcap may be transmitted to the container cap 13.

In the embodiment of the invention illustrated in FIGURE 4, it is to be understood that the fragmentarily shown pump structure, and also the container cap, are identical with those of the embodiment illustrated in FIGURES 1, 2 and 3. Accordingly the several parts of these elements are designated by the same reference characters employed in FIGURES 1, 2 and 3.

In this embodiment, however, the overcap 28 is affixed to the movable portion or plunger 22 of the pump, both for rotary movement and for reciprocating movement therewith in the manner exemplified in my copending application 369,987, now Patent No. 3,216,625, filed May 25, 1964, as for instance by a socket in the top wall of the overcap defined by a marginal rim 41 receiving and forming a snap fit around the peripheries of the fingerpiece 24. In such arrangement, the pump plunger skirt 30' is disposed for axial movement with respect to the container cap 13 and therefore it stops or stops means 36' and 37' respectively may either be omitted or if retained, as in this embodiment, will be axially spaced apart a distance which exceeds the extent of axial movement of the container cap 13. Accordingly, the axial abutment of the stop 37 with the container cap 13 at the upper extremity of the pump stroke and abutment of the threaded portions 20 and 25 at the lower extremity will each effectively determine the length of the plunger stroke.

Where the pump is provided with threaded plunger immobilizing means 20 and 25, it will of course be necessary that the splines 32' and 33' be axially located for interlocking engagement at least throughout the range of axial movement required for engaging and disengaging the threaded parts 20 and 25.

In this application, I have shown and described only the preferred embodiment of the invention and a single modification thereof, simply by way of illustration of the preferred mode contemplated by me of practicing the invention. However, I recognize that the invention is capable of other and different modifications and that its several details may be modified in various obvious ways, all without departing from the invention. Accordingly, the disclosure herein is to be regarded as merely illustrative and not as restrictive.

Having thus described my invention, I claim:

1. The combination comprising an internally threaded container cap of generally cylindrical configuration for connection to an externally threaded container neck, and a protective overcap of generally tubular configuration having a depending generally cylindrical skirt encircling and normally substantially coaxial with said closure cap, the inner and outer peripheries of said skirt and said cap normally being substantially coaxially related and relatively rotatable, said skirt having a portion disposed for radial movement toward the outer periphery of said cap, and normally disengaged clutch means carried by the inner periphery of said skirt preventing the outer periphery of said container cap for interlocking engagement to interconnect the said cap and overcap for rotary movement together incident to radial movement of said portion.

2. The combination defined in claim 1 in which said clutch means comprises a series of axially extending splines carried by and projecting radially outwardly from the outer periphery of said cap, and at least one radially inwardly projecting spline carried by said skirt portion on the inner peripheral wall thereof.
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3. The combination defined in claim 1, in which said overcap includes relatively axially presented stop means disposed for abutting rotary engagement with the container cap to limit relative axial movement of the overcap on the container cap, one of said stop means comprising a resiliently radially expansible rim projecting radially inwardly from the skirt and having an internal diameter less than the maximum external diameter of the cap, whereby to be snap-fitted beneath the lower edge of the cap to secure the said cap and overcap in assembled relation.

4. The combination comprising a centrally apertured internally threaded container closure cap of generally cylindrical configuration for connection to an externally threaded container neck, a liquid dispensing device including a laterally directed discharge spout carried by the closure cap and disposed through said aperture, with the said spout located above the cap, and supported for rotary orientation about an axis substantially coincident with the cylindrical axis of the said internally threaded container cap, and a protective overcap of generally tubular configuration at least partially housing said dispensing device, said overcap having a depending skirt encircling and normally freely rotatably disposed about the container cap, means interconnecting said overcap and said discharge spout for rotary movement together, a portion of said skirt being radially displaceable toward said container cap, and normally disengaged clutch means carried on the inner periphery of said skirt portion and on the outer periphery of said container cap respectively for interlocking engagement incident to such radial displacement of said skirt portion, to interconnect the overcap and container cap for rotary movement together.

5. The combination defined in claim 4 in which said overcap and said container cap respectively include relatively axially opposed stop means for limiting their relative axial movement.

6. The combination of claim 4 in which the said dispensing device comprises a stationary portion extending through and affixed to the apertured container closure cap, and a relatively movable portion including said discharge spout, said movable portion being reciprocably parallel to the cylindrical axis of said container cap, said clutch means comprising radially projecting and axially extending splines respectively carried on the inner and outer peripheries of said overcap skirt and said container closure cap.

7. The combination of claim 6 in which said overcap is secured against axial movement on the container closure cap and is connected to the container spout for rotary movement therewith and for relative axial movement.

8. The combination of claim 6 in which said overcap is mounted for limited axial movement on said container closure cap, said overcap being connected to said movable portion of the dispensing pump for rotary and axial movement therewith.

9. The combination defined in claim 4 in which the skirt is of resiliently radially deformable material and said clutch means comprises axially disposed splines formed on the inner periphery of said skirt and projecting radially inwardly therefrom, and axially disposed radially outwardly projecting splines formed on the outer periphery of said container closure cap, the inner and outer peripheries of the overcap and container cap respectively being normally radially spaced, and said splines respectively being disposed to freely override each other incident to relative rotary movement of said overcap and said container cap in their normal conditions, and to engage and interlock said container cap and said overcap for rotary movement together incident to radial inward displacement of a portion of said skirt carrying one of the said splines.

10. The combination comprising a centrally apertured container closure internally threaded generally cylindrical depending skirt for connection to an externally threaded container neck, a reciprocating dispensing pump having a stationary portion fixedly carried by the closure cap and disposed through said aperture, and a reciprocating spring projected portion having a laterally directed discharge spout above said closure cap, a protective overcap of generally tubular configuration encircling said reciprocating portion, and formed with a spout receiving opening through which said discharge spout extends, said overcap having a depending skirt encircling and normally freely rotatable about said closure cap said skirt and said closure cap respectively having axially opposed stop means for limiting their relative axial movement, said skirt being of resiliently radially deformable material, and normally disengaged clutch means carried by said skirt and said cap respectively for interlocking engagement incident to radial deformation of the skirt.

11. The combination defined in claim 10 in which said axially opposed stop means interconnect the said overcap and the said container closure cap against relative axial displacement, said spout-receiving opening having a greater axial dimension than the said spout to permit relative axial movement between the said reciprocating pump portion and the overcap, said spout interconnecting the overcap and said reciprocating pump portion for rotary movement together.

12. The combination of claim 10 in which said axially opposed stop means are positioned to permit a predetermined range or axial reciprocation of the overcap on the said container closure cap, said overcap being connected to the said movable pump portion for reciprocating and rotary movement therewith.

13. The combination defined in claim 10 in which said stationary and movable pump portions are relatively rotatable about an axis aligned with their reciprocating movement and respectively include selectively engageable threaded portions concentric to said axis for selective interengagement by relative rotation of said pump portions to immobilize the said movable portion.

14. An overcap for use with a reciprocating liquid dispenser carried by a container cap, comprising a tubular portion adapted for reception of the dispenser, a lateral opening for reception of the dispenser discharge spout, a generally cylindrical resiliently radially deformable skirt integral with said tubular portion, and radially inwardly projecting splines within said skirt.

15. An overcap as defined in claim 14, including means carried by said skirt for snap-fitting onto said container cap, to retain said skirt against subsequent axial withdrawal from the container cap.

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