Dec. 12, 1939. R. P. REXROTH 2,182,855

CAP RETAINER

Filed Aug. 5, 1939

Fig. 2

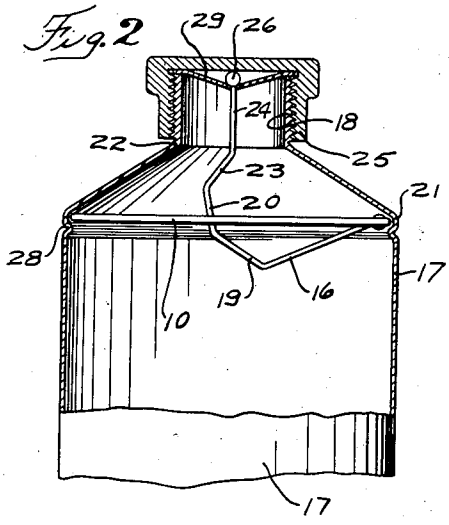


Fig. 3

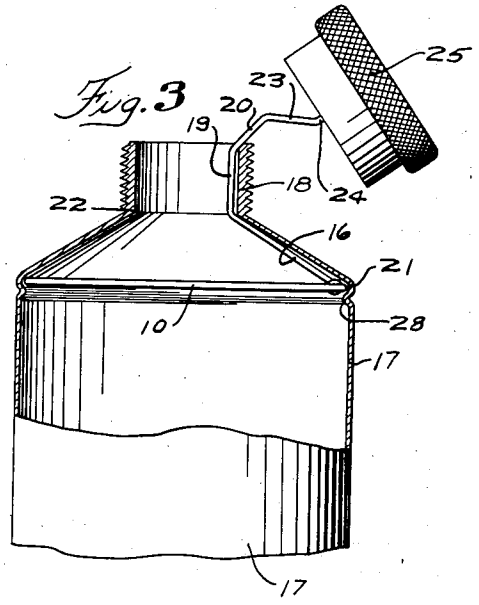


Fig. 4

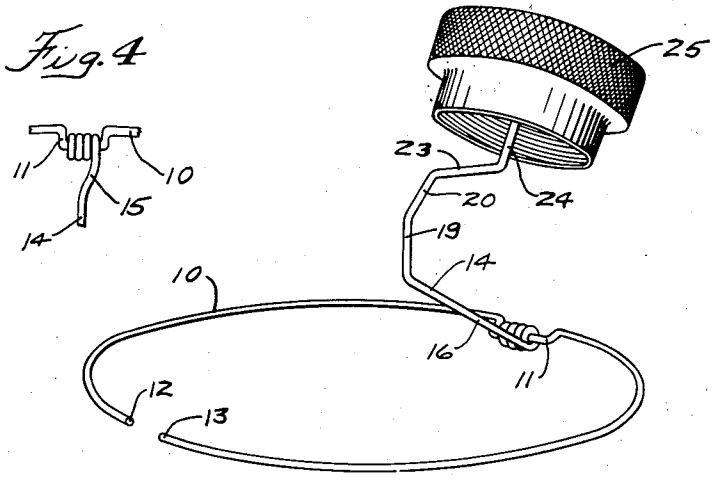


Fig. 1

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CAP RETAINER

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6 Claims. (Cl. 221—60)

This invention relates to means for retaining a cap in relation to a collapsible container in order to prevent dropping or loss of the cap and to have the cap immediately available for reattachment to the container.

An important object of my invention is to provide an exceedingly simple and cheaply produced device that may be applied to the collapsible tubes immediately preceding their filling without having to alter the tube in any respect whatsoever and at the same time will be extremely effective in operation.

Further objects and advantages of the invention will be better understood by those versed in the art from the following description of the invention as illustrated in the accompanying drawing, in which

Fig. 1 is a view in side perspective of a structure embodying the invention;

Fig. 2, a view in central vertical section through a container showing the invention applied thereto;

Fig. 3, a side elevation of a container in partial section showing the cap in removed and retained position; and

Fig. 4, a detail in front elevation of the cap wire connection with the retainer wire.

Like characters of reference indicate like parts in the several views in the drawing.

A length of spring wire 10 is formed to be substantially circular and to have an inwardly offset short length 11 preferably diametrically opposite the open or free ends 12 and 13. A cap connecting wire 14 has one end hinged to the wire 10 by any suitable means. In the present form, this hinge connection is obtained by winding a length of the wire 14 around the offset length 11 so as to form a bearing along the part 11. In order to center the wire 14 in reference to the wire length 11, the wire 14 is preferably offset by the short bend 15 to carry the axis of the wire 14 over substantially centrally of the length of its loops about the wire length 11, Fig. 4.

From the bend 15, the wire 14 extends in a straight line for a distance approaching an axis passing normally and centrally through the plane of the wire 10. In any event the length of this portion 16 must be sufficient to extend along the under side of the upper end of the container 17 to reach the opening through the discharge nipple 18, Fig. 3. From the outer end of this length 16, the wire 14 is bent upwardly into a length 19 to that position that will cause this length 19 to lie along in close proximity with the inside wall of the nipple 18 when the wire 16 is positioned as indicated in Fig. 3. Also this length 19 should equal at least the inside length of the nipple 18. From the outer end of the length 19, the wire 14 is again bent backwardly toward the hinge end of the wire and in the same plane as are the lengths 16 and 19 to form the length 20. The outer end of this length 20 must terminate at a distance not exceeding the distance from the inside of the shoulder 21 of the container 17 to the inner opposite lower end 22 of the nipple 18. Normally in most instances, with the usual size of container 17, the length of the section 20 will be substantially equal to or slightly less than the length 19.

From the outer end of the length 20 of the wire 14, the wire is bent backwardly again and still in the same plane to form the length 23. The wire is bent upwardly, still within the same plane, from the outer end of the length 23 to form the length 24. The outer end of this length 24 is provided with some suitable means for connection with the container cap 25, this connecting means being herein shown as a ball 26 formed on the end of the wire 14.

The structure above indicated is applied to the container 17 by springing the ends 12 and 13 of the wire 10 one toward the other to permit insertion of the wire 10 into the tube from its open end. The wire 10 is pushed into the container until it seats around against the shoulder 21 formed at the junction of the cylindrical wall of the container with its conical end. Normally the elasticity of the wire 10 will be sufficient to spring it outwardly into frictional engagement with the wall of the container 17 to retain the wire 10 in position. However, if desired, the wall of the container 17 may thereafter be provided with an inwardly pressed rib 28 formed in any suitable manner, such as by rolling.

The wire 14, when the nipple end of the container 17 is held downwardly, will drop through the nipple to present the ball end 26 therebeyond so that it may be grasped and a flexible washer 29 having a central aperture therethrough smaller in diameter than that of the ball 26 pushed thereover to have the ball 26 pass through that aperture and bear against the outer side thereof. The diameter of this washer 29 is substantially the same as that of the diameter of the outside of the nipple 18. Therefore, the container 17 may be reversed to its position carrying the nipple 18 upwardly, whereupon the washer 29 will drop down across the outer end of the nipple 18 and bear thereon. The cap 25 is then screw-threadedly engaged over the outside of the nipple 18 in the

usual manner and carried down until the washer 29 is compressed by the inner face of the cap against the end of the nipple 18. This action tends to spread the washer 29 outwardly to have its peripheral edge forced against the internal wall of the cap above the threads. Preferably the washer 29 is initially conically shaped so that the outer peripheral edge is initially turned upwardly and is flattened out by the pressure exerted when the cap 25 is pulled downwardly thereover. This change from the conical to the flat conditions tends to expand the washer 29 laterally to achieve the seating effect in the cap 25.

The container may then be inserted, filled and sealed across its lower end. After the washer 29 has thus been seatedly engaged in the cap 25, the cap 25 may be removed from the nipple 18 and the washer 29 will be carried along therewith so as to lift the wire 14 and swing it about its hinged connection with the wire 10. The cap 25 may then be lifted to one side as indicated in Fig. 3, out of the path of contents discharging from the container 17. The connection of the wire 14 with the cap 25, as above indicated, permits swiveling of the cap on the end of the wire 14 without tending to turn or twist the wire. The cap 25 may be pushed over and down onto the nipple 18 for closing the container, and the cap revolved into screw-threaded engagement with the container 17 to effect the closing of the container without interference in any respect from the wire 14.

Since the wire 14 is of relatively small diameter, it may be lifted and lowered through the nipple 18 without in any material way affecting the contents or tending to pull out the contents upon shifting of the cap 25 to one side. In reference to the various bends of the wire 14 and the lengths between those bends, the relations must be preserved to permit the cap 25 to be supported at one side of the container 17 in the open position, as indicated in Fig. 3, and to permit the cap 25 being carried to the closed position without the wire 14 striking or interfering with the walls inside of the container. By making the bends and lengths as indicated, the wire 14 is free to hinge about the wire 10 to have the length 16 lie in close proximity to the wall of the conical end of the container 17, Fig. 3; the length 19 to extend substantially parallel and in close proximity with the wall of the nipple 18; the length 20 bend over the outer end of the nipple 18; the length 23 extend substantially at right angles to the axis of the tube; and the length 24 extend upwardly therefrom into swivel connection with the cap 25 so that the cap will be positioned in offset relation to the tube 17. By limiting the lengths 16 and 19 in relation to the tube conical wall length and the length of the nipple 18, the lengths 20 and 23 are so positioned that they may drop down through the nipple 18 without interference.

While the foregoing description has indicated the swivel connection between the wire 14 and cap 25 as having been made through the washer 29, it is to be understood that the washer 29 is employed principally when the container 17 is desired to be sealed in an airtight manner. Otherwise the end of the wire 14 could be swivelly attached directly to the cap 25 without the intervening washer 29.

While I have herein shown and described my invention in the one best form as now known to me, it is obvious that structural variations may be employed without departing from the spirit of the invention and I, therefore, do not desire to be limited to that precise form beyond the limitations as may be imposed by the following claims.

I claim:

1. For a container having a tubular body terminating in an end wall carrying a discharge nipple, a cap adapted to engage said nipple, a wire formed to fit around the inside of the container body to abut said end wall, a second wire-like member hinged to the first wire and radially extending therefrom and around upwardly by a length sufficient to permit it to swing through said nipple, and means swivelly connecting the wire to said cap, whereby the cap may be detached from the nipple, carried to one side thereof, and there be retained by said second wire.

2. A cap retainer comprising an elastically contractable and expandable wire ring, and a wire hinged to one side of the ring, said wire being free to swing in a plane diametrical of and normal to the plane of the wire and bent around in its plane approximately in diverging U-shape to have a lower leg of the U extend from its hinged connection with said ring substantially a radial distance of the ring.

3. A cap retainer comprising an elastically contractable and expandable wire ring, and a wire hinged to one side of the ring, said wire being free to swing in a plane diametrical of and normal to the plane of the wire and bent around in its plane approximately in diverging U-shape to have a lower leg of the U extend from its hinged connection with said ring substantially a radial distance of the ring, and cap engaging means on the upper leg of said wire comprising a cap engaging washer rockably receiving said upper leg therethrough, and a ball end on the outer end of said upper leg outside of the washer.

4. A cap retainer comprising an open spring-wire ring, a wire having one end hinged to the ring to swing in substantially a diametrical plane normal to the plane of the ring, said wire extending from its hinged end by a continuous length outwardly toward the ring center and then upwardly and outwardly to terminate in a cap connecting end.

5. For a container having a tubular body terminating in an end wall carrying a discharge nipple, a cap adapted to engage said nipple, a wire formed to fit around the inside of the container body to abut said end wall, a second wire-like member hinged to the first wire and radially extending therefrom and around upwardly by a length sufficient to permit it to swing through said nipple, and means swivelly connecting the wire to said cap, whereby the cap may be detached from the nipple, carried to one side thereof, and there be retained by said second wire, said first wire being of spring nature and consisting of an open ring whereby the ring is contracted and compressibly engages with said body wall as a means for preventing shifting from said end wall.

6. For a container having a tubular body wall and an end wall carrying a discharge nipple, a wire formed to an approximate diverging U-shape, means for rockably securing one end of the wire within the container to one side of said nipple, said wire being shaped and sufficiently long to permit its swinging from said means through said nipple to position the other wire end outside of and to one side of said nipple, and cap engaging means on said other wire end.

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