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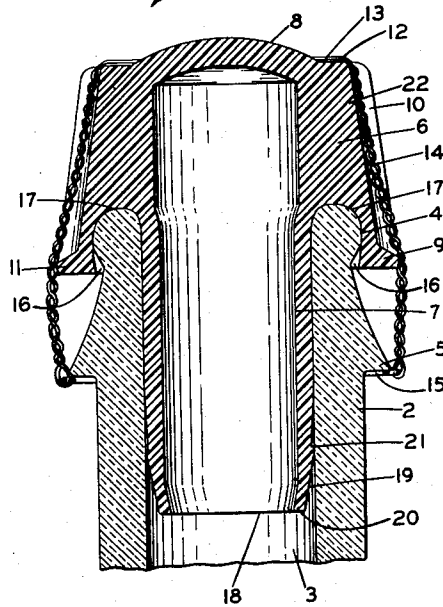
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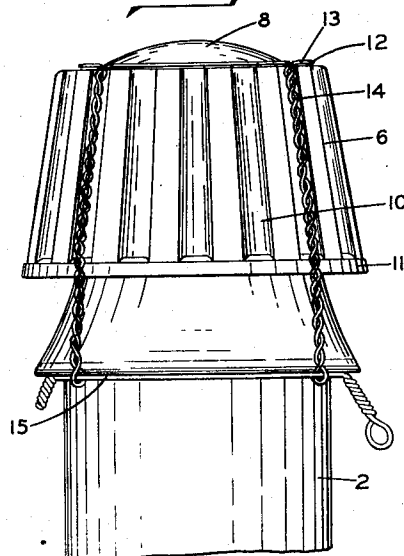
BOTTLE STOPPER

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*Fig. 1*



*Fig. 2*



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## BOTTLE STOPPER

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This invention relates to a bottle closure, and more particularly to a stopper for fluids packaged under pressure in which the stopper is made of an elastomeric plastic material.

In the sealing of containers for materials such as champagne which are packaged under pressure, it has been common practice to use a stopper such as the well-known cork champagne stopper. These stoppers are of a diameter in excess of the internal diameter of the bottle neck in which they are inserted. The stopper is compressed in a direction normal to the longitudinal axis of the stopper immediately prior to its insertion into the neck of the container. When the compression is released, the expansion of the cork holds the stopper firmly in engagement with the interior glass finish of the container neck. To prevent the stopper from being forced out of its engagement with the bottle neck because of the internal pressure, a wire tie-down is placed in engagement with the top of the stopper. This tie-down includes radial extensions which are drawn down along the sides of the stopper into engagement with the under-surface of a flange on the exterior of the bottle finish. In order to open the container, the wire tie-down is first removed and the cork is then extricated by working it back and forth until its frictional contact with the glass container has been diminished to the point where the pressure is sufficient to eject the cork. For economic reasons, it has been found desirable to develop a substitute for the cork champagne stopper.

Several attempts have been made to develop a synthetic plastic stopper as a replacement, but these have not been successful because of the inherent nature of the plastic material which renders it unsuitable for this specific use. The relatively hard plastic materials are not suitable for this purpose because they cannot be deformed for insertion into the bottle opening. Any deformation of the hard plastics results in shattering. Polyethylene has been used with a small degree of success because it can be deformed sufficiently for insertion into the bottle opening; however, the polyethylene has a rather slippery unctuous surface, resulting in poor frictional engagement with the glass container. Upon the removal of the wire tie-down, the polyethylene stopper is readily ejected by the pressure in the container and the likelihood of serious accident is always present.

In order to overcome the disadvantages of the prior art plastic stoppers referred to above, we have developed a polyethylene champagne stopper having a shank which engages the interior of the bottle finish and a cover portion extending down over the crown-tirage finish of the bottle to a point where it can be urged under this crown tirage by the wire tie-down. This engagement with the crown tirage prevents the stopper from being ejected from the container upon the removal of the wire tie-down.

Polyethylene has such physical characteristics that the points on the lower skirt of the cover which are urged under the crown tirage by the wire tie-down take a semi-

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permanent set and remain in engagement with the crown tirage after the wire tie-down has been removed. This enables the person removing the stopper to remove the wire tie-down and thereafter remove the stopper safely.

The object of this invention is to provide a stopper for the containers packaging contents under pressure which properly seals the container and is not ejected from the mouth of the container immediately upon the removal of the wire tie-down.

In order that our invention may be more readily understood, it will be described in connection with the attached drawing, in which:

Figure 1 is a cross sectional view of the stopper of our invention in position on a container; and

Figure 2 is an elevational view showing the stopper in position on the container.

Referring to Figure 1, there is shown a container 2 having an opening 3 through the neck. The container here shown is designed for the packaging of beverages such as champagne in which the contents are first packaged and sealed with a temporary crown type sealing device fitted over the crown tirage of the glass finish 4. After the fermentation period, this temporary crown seal is taken off and the sediment in the neck of the container is removed. A permanent stopper type seal is then inserted into the opening in the bottle neck. This stopper also has a skirt which engages the crown tirage. Immediately below the crown tirage is a radial projection 5 which is engaged by the wire tie-down to hold the permanent seal in place. With the conventional champagne cork, the crown tirage is not used after the initial crown is removed.

The stopper here under consideration, which is designated generally by the numeral 6, utilizes the crown tirage 4 as well as the interior surface of the bottle neck for holding the stopper on the container after the wire tie-down has been removed. The stopper 6 is provided with a hollow shank 7 which extends down into the bottle neck 3 for a substantial distance to insure a large amount of frictional contact between the exterior surface of the tubular shank and the interior surface of the container.

In the manufacture of glass containers such as champagne bottles having formed irregularities on the exterior surface such as the crown tirage 4 and the radial projection 5, the glass in these thicker portions does not cool at the same rate as in the thinner portions. This difference in cooling rate in some instances during subsequent formation causes irregularities on the interior of the neck finish. The shank 7 should be of a length sufficient to bridge all of these irregularities and contact the uniform container wall beyond the irregularities.

The upper end of the tubular shank 7 is closed by a cover portion 8 and the portion of the stopper above the container has a skirt portion 9, extending from the cover portion 8 down over the crown tirage 4 to a point immediately below the crown tirage. The skirt 9 has a plurality of flutes 10 extending from the top substantially down the entire distance of the skirt; however, the skirt terminates in a ring 11 which surrounds the bottom edge of the skirt. The skirt is of length sufficient that the ring 11 is disposed below the crown tirage 4.

The cover portion 8 includes an area 12 which serves as a seat for the circular portion of the wire tie-down 13. In the embodiment here under consideration, the wire tie-down 13 has four radially extending members 14 which fit into certain of the flutes on the skirt. The stopper here under consideration is provided with sixteen flutes 10 so that the radial extensions 14 of the wire tie-down will automatically fall into flutes 10 when the tie-down is laid in position on the top of the stop-

per by the present tie-down applying equipment in the bottling plant. These radial extensions 14 extend below the skirt of the stopper to a point where they are engaged by a wire 15 received beneath the radial projection 5 on the neck of the container. This wire 15 is then tightened under the projection 5 to hold the wire tie-down firmly in position on the container and clamping the stopper in place. The tightening of the wire 15 exerts inward pressure on the extensions 14 at the points where they pass over the ring 11, forcing the ring 11 in an inward direction under the crown tirage 4. The physical characteristics of the elastomeric material from which the stopper is formed are such that the constant pressure of the radial extensions 14 in an inward direction on the lower extremity of the skirt causes this lower extremity to take a semipermanent set under the crown tirage in the area 16. This semipermanent set stabilizes the stopper in position on the container after the wire tie-down has been removed.

The recess 17 formed between the tubular shank portion 7 and the lower extremity of the skirt 9 conforms to the shape of the crown tirage on the bottle finish. This materially increases the frictional sealing area between the stopper and the container. The position of the wire tie-down seating area 12 is on the same longitudinal axis as the crown tirage so that the tie-down urges the stopper firmly into engagement with the crown tirage during the time that the stopper is in position on the container. This long skirt in conjunction with the tight engagement of the recess 17 and the crown tirage prevents the relatively thin shank wall from bulging between the top of the container and the underneath portion of the stopper top.

Inasmuch as the diameter of the tubular shank 7 is slightly in excess of the internal diameter of the glass finish, the lower extremity 18 of the tubular shank is beveled as shown at 19 in order to aid in guiding the stopper into the neck of the container. It will be observed from Figure 1 that not only the exterior of the shank is tapered, but the interior of the shank has a convergent surface extending about one-half the distance of the taper. This provides an inwardly directed lower extremity on the shank in which the outer surface and inner surface are substantially parallel. This prevents the formation of a feather edge on the lower extremity of the shank and instead results in a reinforced edge 20 which will not split when driven into the container.

At the line of juncture between the bevel 19 and the straight portion of the shank, there is provided a thin flexible radial projection 21 which serves as a squeegee, wiping any liquid from the interior of the neck of the container as the stopper is driven into sealing position. This insures a relatively dry surface which materially improves the seal and friction between the stopper and the bottle.

The wall thickness of the tubular shank 7 is such as to render the shank sufficiently stiff and rigid to be forced into engagement with the interior of the bottle throughout its entire surface except for the beveled portion 19. However, due to the nature of the elastomeric material, the shank portion 7 is forced outwardly by the pressure of the contents of the container. The wall thickness should not be so great as to prevent the gaseous pressure from urging the shank into engagement with the glass container.

The distance between the crown tirage and the top of the stopper should be sufficient to enable manual manipulation of the stopper during the removal operation. Also, this top portion is made of sufficient height to accommodate wire ties of conventional length so that the stopper can be used in conjunction with conventional tie-down equipment. In removing the stopper, the wire 15 is first removed and the tie-down is then taken off. This renders the stopper free for removal, but it is held in engagement with the container by reason of the frictional

engagement between the shank and the glass container and by the semipermanent set of the portion 16 which curls under the crown tirage. The stopper is removed by exerting firm pressure in the area 22 in a direction substantially normal to the longitudinal axis of the stopper. The pressure should be applied alternately from side to side to rock the stopper in its path of travel in an upward direction. It has been found that in removing this stopper from a container in which the internal pressure is approximately 60 to 100 pounds per square inch, the stopper will remain in position in the neck opening until the manual manipulation has raised the stopper to a point where the internal pressure overcomes the diminishing frictional engagement. This is considered a desirable function in a stopper of this type, inasmuch as it does not raise of its own accord immediately upon the removal of the wire tie-down.

We claim:

1. The combination of a closure with a container having a crown-tirage finish and an outward radial projection disposed below the crown-tirage finish, said closure being made of a relatively stiff elastomeric plastic composition and comprising a tubular shank portion adapted to fit into the neck opening of the container to a point substantially below the outward radial projection on the container to seal the container, a heavy walled top portion disposed above said shank and being provided with a relatively rigid skirt of sufficient length to extend immediately below the crown-tirage finish of the container, the relationship between the top portion of the shank and the bottom portion of the skirt being such as to form a recess to accommodate the crown-tirage finish to thereby increase the area of seal between the finish and the closure, said skirt terminating in a reinforcing element surrounding the closure, said closure skirt being provided with a plurality of flutes extending from the top thereof substantially throughout the length of the skirt, a ledge around the periphery of the top of the closure to accommodate a tie member, and a tie member placed on said ledge with the downward projections lying in certain of said flutes and being securely tied beneath the outward radial projection on the container.

2. The combination of a closure with a container having a crown-tirage finish and an outward radial projection disposed below the crown-tirage finish, said closure being made of a relatively stiff elastomeric plastic composition and comprising a tubular shank portion adapted to fit into the neck opening of the container to a point substantially below the outward radial projection on the container to seal the container, a heavy walled top portion disposed above said shank and being provided with a relatively rigid skirt of sufficient length to extend immediately below the crown-tirage finish of the container, the relationship between the top portion of the shank and the bottom portion of the skirt being such as to form a recess to accommodate the crown-tirage finish to thereby increase the area of seal between the finish and the closure, said skirt terminating in a reinforcing element surrounding the closure, a ledge around the periphery of the top of the closure to accommodate a tie member, and a tie member placed on said ledge with the downward projections passing along the plane of the skirt and being securely tied beneath the outward radial projections of the container.

3. The combination of a closure with a container having a crown-tirage finish and an outward radial projection disposed below the crown-tirage finish, said closure being made of a relatively stiff elastomeric plastic composition and comprising a tubular shank portion adapted to fit into the neck opening of the container to a point substantially below the outward radial projection on the container to seal the container, a heavy walled top portion disposed above said shank and being provided with a relatively rigid skirt of sufficient length to extend immediately below the crown-tirage finish of the container, the relationship

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between the top portion of the shank and the bottom portion of the skirt being such as to form a recess to accommodate the crown-tirage finish to thereby increase the area of seal between the finish and the closure, said closure skirt being provided with a plurality of flutes extending from the top thereof substantially throughout the length of the skirt, the lower extremity of said skirt terminating in a ring surrounding the entire bottom edge of the skirt, said ring being of an inner diameter slightly greater than the outer diameter of the crown-tirage finish, a ledge around the periphery of the top of the closure to accommodate a tie member, and a tie member placed in said ledge with the downward projections lying in certain of said flutes and being securely tied beneath the outward radial projection on the container.

4. The combination of a closure with a container having a crown-tirage finish and an outward radial projection disposed below the crown-tirage finish, said closure being made of a relatively stiff elastomeric plastic composition and comprising a tubular shank portion adapted to fit into the neck opening of the container to a point substantially below the outward radial projection on the container to seal the container, said tubular portion having a side wall thin enough to be deformed by the gaseous pressure in the container, a heavy walled top portion disposed above said shank and being provided with a relatively rigid skirt of sufficient length to extend immediately below the crown-tirage finish of the container, the relationship between the top portion of the shank and the bottom portion of the skirt being such as to form a recess to accommodate the crown-tirage finish to thereby increase the area of seal between the finish and the closure, said skirt terminating in a reinforcing element surrounding the closure, said closure skirt being provided with a plurality of flutes extending from the top thereof substantially throughout the length of the skirt, a ledge around the periphery of the top of the closure to accommodate a tie member, and a tie member placed in said ledge with the downward projections lying in certain of said flutes and being securely tied beneath the outward radial projection of the container.

5. The combination of a closure with a container having a crown-tirage finish and an outward radial projection disposed below the crown-tirage finish, said closure being made of a relatively stiff elastomeric plastic composition and comprising a tubular shank portion adapted to fit into the neck opening of the container to a point substantially below the outward radial projection on the container to seal the container, a heavy walled top portion disposed above said shank and being provided with a relatively rigid skirt of sufficient length to extend immediately below the crown-tirage finish of the container, said skirt being of a depth sufficient to provide a substantial area for firm digital engagement for removal of the closure, the relationship between the top portion of the shank and the bottom portion of the skirt being such as to form a recess to accommodate the crown-tirage finish to thereby increase the area of seal between the finish and the closure, said skirt terminating in a reinforcing element surrounding the closure, said closure skirt being provided with a plurality of flutes extending from the top thereof substantially throughout the length of the skirt, a ledge around the periphery of the top of the closure to accommodate a tie member, and a tie member placed on said ledge with the downward projections lying

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in certain of said flutes and being securely tied beneath the outward radial projection on the container.

6. The combination of a closure with a container having a crown-tirage finish and an outward radial projection disposed below the crown-tirage finish, said closure being made of a relatively stiff elastomeric plastic composition and comprising a tubular shank portion adapted to fit into the neck opening of the container to a point substantially below the outward radial projection on the container to seal the container, a heavy walled top portion disposed above said shank and being provided with a relatively rigid skirt of sufficient length to extend immediately below the crown-tirage finish on the container, the relationship between the top portion of the shank and the bottom portion of the skirt being such as to form a recess to accommodate the crown-tirage finish to thereby increase the area of seal between the finish and the closure, said skirt terminating in a reinforcing element surrounding the closure, said closure skirt being provided with a plurality of flutes extending from the top thereof substantially throughout the length of the skirt, a ledge around the periphery of the top of the closure to accommodate a tie member, and a tie member placed on said ledge with the downward projections lying in certain of said flutes and being securely tied beneath the outward radial projection on the container to urge the lower extremity of the skirt inwardly under the crown-tirage finish while the stopper is in sealing position thereon.

7. The combination of a closure with a container having a crown-tirage finish and an outward radial projection disposed below the crown-tirage finish, said closure being made of polyethylene comprising a tubular shank portion adapted to fit into the neck opening of the container to a point substantially below the outward radial projection on the container to seal the container, a heavy walled top portion disposed above said shank and being provided with a relatively rigid skirt of sufficient length to extend immediately below the crown-tirage finish of the container, the relationship between the top portion of the shank and the bottom portion of the skirt being such as to form a recess to accommodate the crown-tirage finish to form a seal between the finish and the closure, said skirt terminating in a reinforcing element surrounding the closure, said closure skirt being provided with a plurality of flutes extending from the top thereof substantially throughout the length of the skirt, a ledge around the periphery of the top of the closure to accommodate a tie member, and a tie member placed on said ledge with the downward projections lying in certain of said flutes and being securely tied beneath the outward radial projection on the container.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

53,090	Bousigues	Mar. 6, 1866
402,370	Walch	Apr. 30, 1889
1,946,981	Lower	Feb. 13, 1934
2,169,448	Linch	Aug. 15, 1939

##### FOREIGN PATENTS

525,159	Belgium	Jan. 15, 1954
1,088,929	France	Sept. 22, 1954
1,091,781	France	Nov. 3, 1954
64,542	France	June 22, 1955
738,546	Great Britain	Oct. 12, 1955