June 13, 1944. H. W. SANFORD 2,351,150

CONTAINER

Filed Feb. 3, 1941 4 Sheets-Sheet 1

Fig. 1

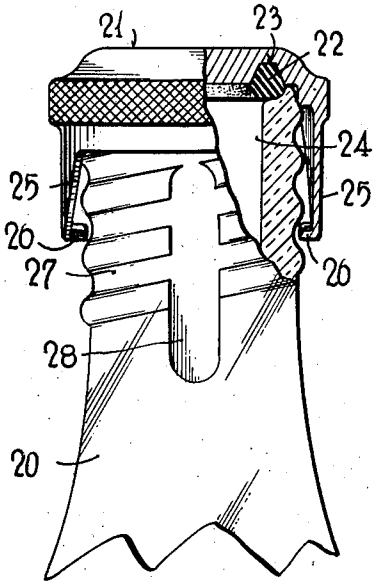


Fig. 2

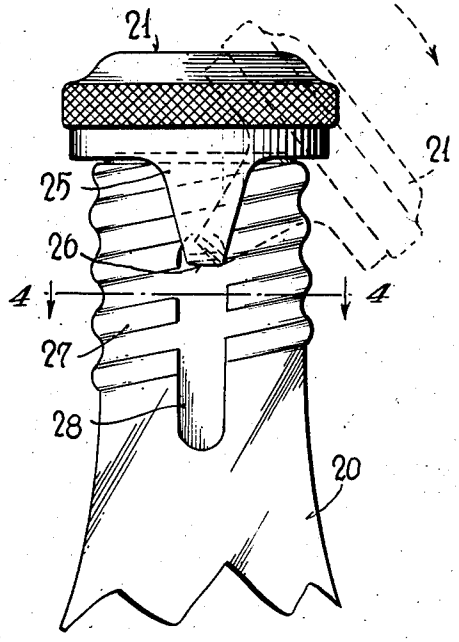


Fig. 3

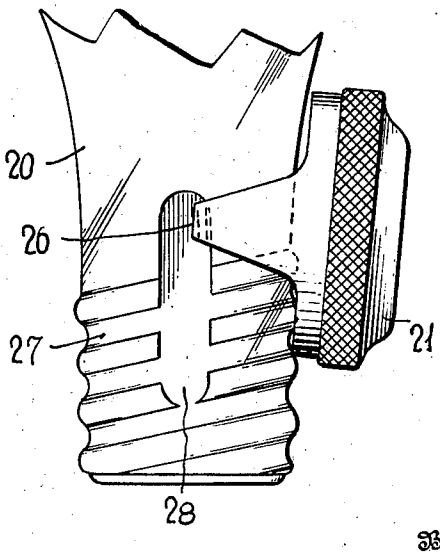
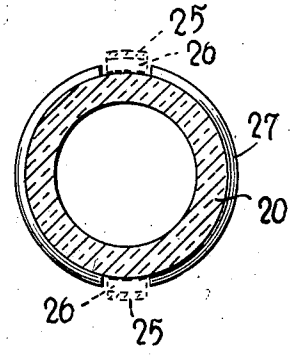


Fig. 4



Inventor

Hugh W. Sanford

By Dyer & Kirchner

Attorneys

June 13, 1944. H. W. SANFORD 2,351,150

CONTAINER

Filed Feb. 3, 1941 4 Sheets-Sheet 2

Fig. 5

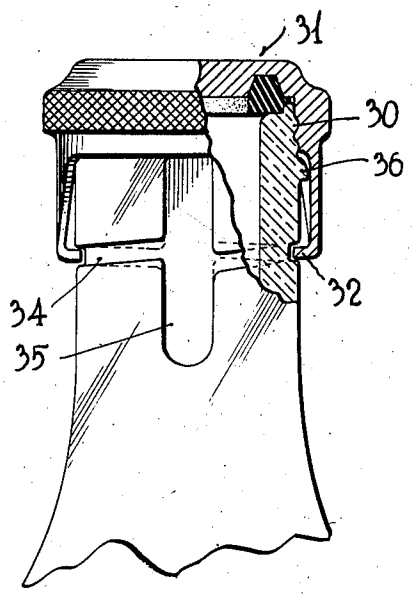


Fig. 8

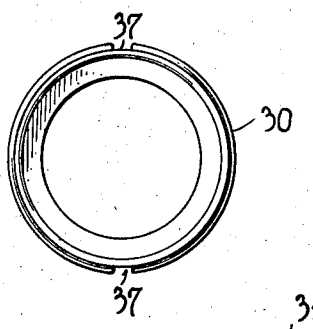


Fig. 7

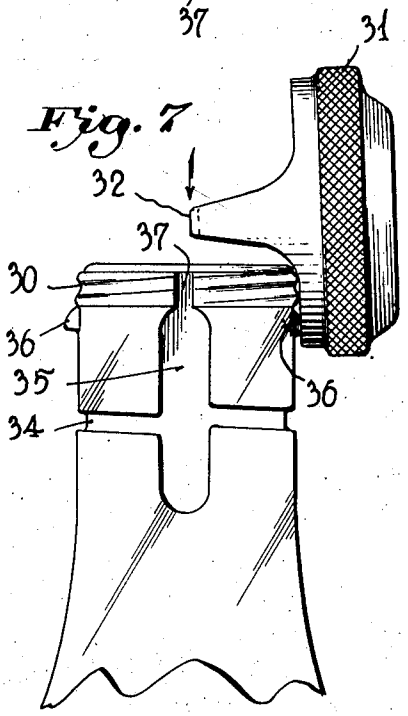
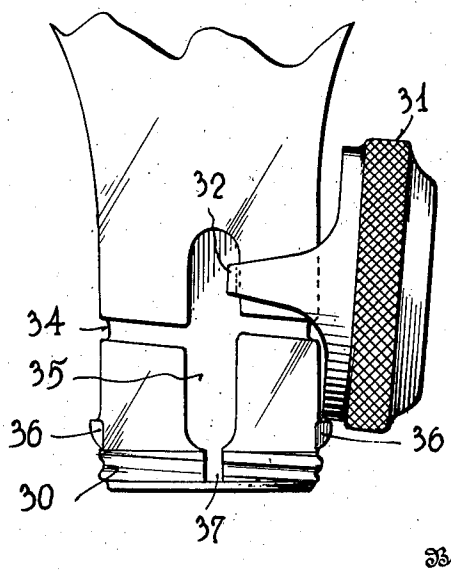


Fig. 6



Inventor

Hugh W. Sanford

By Dyer & Kirchner

Attorneys

June 13, 1944. H. W. SANFORD 2,351,150

CONTAINER

Filed Feb. 3, 1941 4 Sheets-Sheet 3

Fig. 10

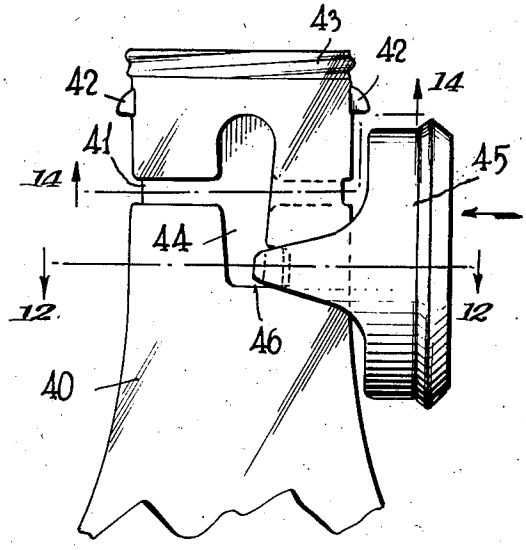


Fig. 9

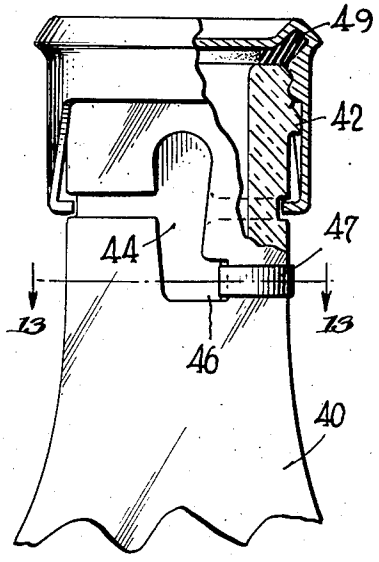


Fig. 12

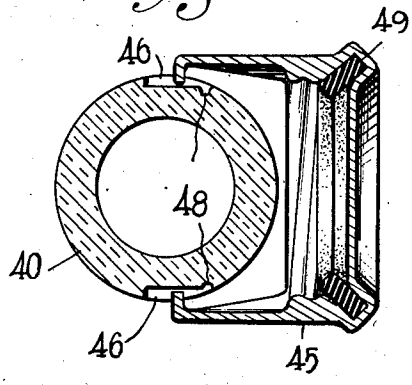


Fig. 11

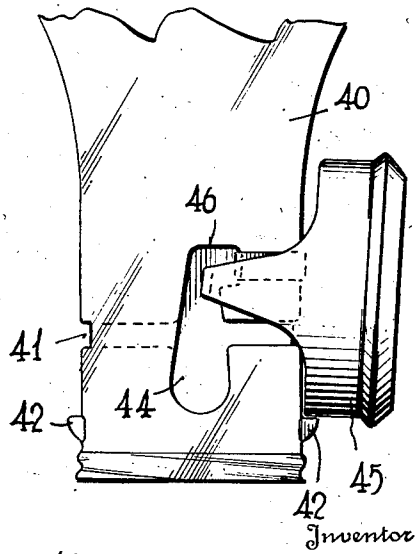
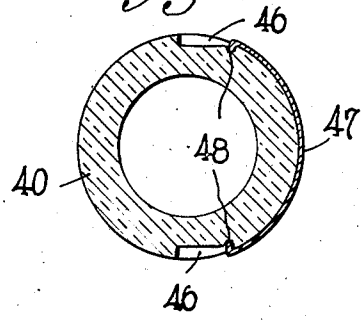


Fig. 13



Inventor

Hugh W. Sanford

By Dyer & Kirchner

Attorneys

June 13, 1944. H. W. SANFORD 2,351,150

CONTAINER

Filed Feb. 3, 1941 4 Sheets-Sheet 4

Fig. 14

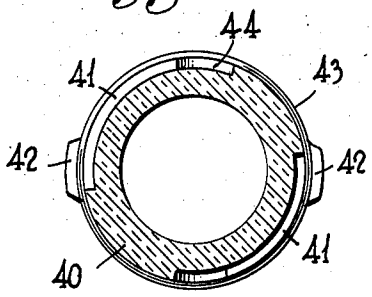


Fig. 16

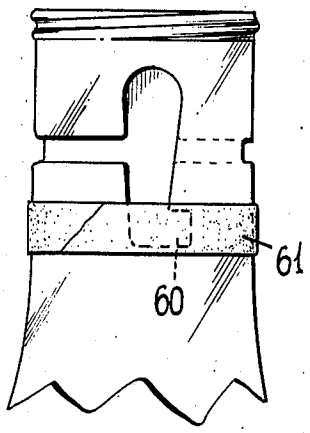


Fig. 17

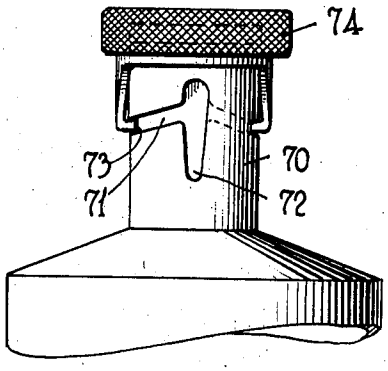


Fig. 18

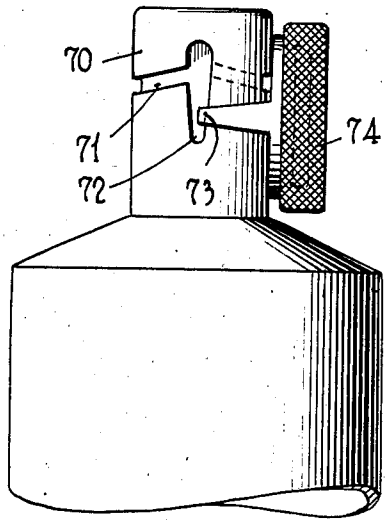
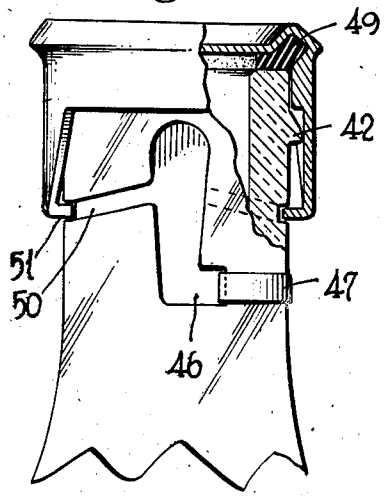


Fig. 15



Inventor

Hugh W. Sanford

By Dyer + Kirchner

Attorneys

Patented June 13, 1944 2,351,150

UNITED STATES PATENT OFFICE

2,351,150

CONTAINER

Hugh W. Sanford, Knoxville, Tenn.

Application February 3, 1941, Serial No. 377,265

20 Claims. (Cl. 215—70)

This invention relates generally to containers of small, portable character, typified by bottles, jars, cans, collapsible tubes and the like, and to sealing closures therefor.

A primary object is to provide a container of such class with a practical and satisfactory closure means in the form of a cap which will adequately seal the container orifice, which can be readily moved to unseal the orifice by simple and easy manipulation without the aid of any tool or mechanical instrument, which can just as readily and by equally simple manipulation be restored to sealing relation with the orifice, and which will remain connected with the container in its unsealed as well as in its sealing position so that the container and the attached cap can, if desired, be returned to a bottling plant or the like for reuse.

An ancillary object of the invention is to effect certain economies in the merchandising of liquids such as beverages by providing a container and captive cap combination which, although initially costing somewhat more than the conventional bottle and crown cap, will be capable of an indefinitely large number of reuses so that the cap cost per use will be less than that of the ordinary crown cap which can be used but a single time.

A related object is to provide a practical and foolproof bottle cap which can be manipulated back into sealing position by the consumer after a portion only of the bottle contents has been used. This advantage of the invention renders the device particularly useful in the packaging of carbonated beverages which at the present time are marketed mainly in bottles of small size because it is not possible for the consumer to restore the conventional crown cap to pressure-holding sealing relation on a partially emptied bottle. Despite the obvious economy of large size bottle merchandising, most consumers now prefer to buy the relatively more expensive small size bottles as being cheaper than wasting that part of the beverage which is not consumed at the time the bottle is first opened. It is true that special substitute or auxiliary stoppers of various kinds have been proposed, but few if any of these are entirely satisfactory, and many purchasers of carbonated beverages prefer not to bother with such special stoppers.

Certain of the advantages of the invention are also realized when it is used in the packaging of such semi-liquid commodities as dentifrices, shaving creams, medicaments, etc., in the familiar collapsible tubes. While such tubes are not returned to the manufacturer of their contents for reuse, the consumer frequently is annoyed by loss of the cap. Applied to such containers, the present invention provides a captive cap which cannot be lost, which can be restored to sealing position with a minimum effort and which automatically maintains itself in unsealed position whenever it is moved to such position.

The invention is of broad application to containers of divers types for a very wide range of different kinds of contents. Thus, in addition to the liquids and semi-liquids of which some examples have hereinabove been suggested, it will be found that various fluent materials like powders and granular substances may be advantageously packaged in appropriate embodiments of the invention. It is a fact also that some solids, particularly such as are now put up in the form of discrete particles of appreciable size and are marketed in bottles, jars, etc., can be advantageously packaged in appropriately designed embodiments of the invention. No attempt will here be made to delimit the field of utility which characterizes the invention. It is thought that the multiplicity of its possible uses will be sufficiently evident to those skilled in the container art from the present description of the structures in certain preferred forms of embodiment.

Broadly speaking, the cap comprises a closure member having leg means working in a groove formation provided on the container so that the cap can be swung down the side of the container with the leg means remaining engaged in the groove formation. I am aware that some previous efforts to attain the objects of this invention have taken this general form but all prior art devices of which I am aware have possessed certain inherent disadvantages so that none of them has met with any very considerable commercial success. The more specific objects of this invention are concerned with eliminating these disadvantages, to the end that the device will be entirely practical and commercial from the standpoint of the consumer, the manufacturer and the bottle or packager. The nature and significance of some of these specific improvements will be explained as the invention is described more in detail hereinafter.

The following explanation of the invention comprises a description of certain preferred forms in which I have embodied it, and the disclosure is made without any intention to limit the scope of the invention to the specific forms selected for illustration. This disclosure is offered in conformity with Section 4888 of the Revised Stat-

utes and with the clear understanding that numerous details of the illustrated structures may be modified or eliminated within the broad spirit of the invention which is sought to be protected and within the scope of the broader of the appended claims.

In the annexed drawings which form part of this application for Letters Patent:

Figure 1 depicts one embodiment of the invention and comprises a side elevational view of the neck of a bottle showing a cap, partly in section, mounted in sealing relation thereon;

Fig. 2 is a similar view illustrating in full and broken lines respectively two stages of the operation of unsealing the bottle;

Fig. 3 is a side elevational view of the unsealed bottle in inverted position, illustrating the manner in which the cap is automatically maintained in retracted position;

Fig. 4 is a cross sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a view like Fig. 1 but illustrating a modified form of the invention;

Fig. 6 illustrates the Fig. 5 embodiment in a position like that shown in Fig. 3;

Fig. 7 is a side elevational view illustrating the manner in which the cap of Fig. 5 is applied to and removed from the bottle;

Fig. 8 is a plan view of the bottle shown in Fig. 6;

Fig. 9 is a side elevational view, with the cap shown partly in section, illustrating a further modification of the invention, the cap being shown in sealing position on the neck of the bottle;

Fig. 10 is a side elevational view showing the cap of Fig. 9 in retracted position with the bottle upright;

Fig. 11 is a side elevational view showing the bottle of Fig. 10 inverted, with the cap retained in retracted position;

Fig. 12 is a cross sectional view taken on the line 12—12 of Fig. 10;

Fig. 13 is a cross sectional view taken on the line 13—13 of Fig. 9;

Fig. 14 is a cross sectional view taken on the line 14—14 of Fig. 10;

Fig. 15 is a side elevational view, with the cap partly in section, of a further modified form of the device, the cap being shown in sealing position;

Fig. 16 is a side elevational view of a bottle adapted to receive a cap like that shown in Fig. 9, but depicting a slot-obstructing element different from that shown in Fig. 9;

Fig. 17 is a side elevational view, with the cap shown in sealing position, of a modification particularly intended for use with collapsible tubes; and

Fig. 18 is a side elevational view of the device shown in Fig. 17 with the cap in retracted position.

Referring to the drawings, in which the same reference numeral designates similar parts in the several views, **20** indicates the neck portion of a glass bottle of the familiar type widely used to contain carbonated beverages, and a cap for the bottle is shown at **21**. The cap is preferably made of metal which is inherently non-corrosive or is coated or plated to make it so, and has some suitable gasket means, like that shown at **22** in an annular counterbore **23**, which is adapted to be disposed in sealing relation with the orifice **24** of the bottle. The cap may be made of resilient metal, in which case it may be sprung on to and off of the container, as will be better understood as the description proceeds. It can also be made of some plastic, such as Bakelite and its equivalents, which, being in most cases too rigid and brittle to permit of springing, will require the groove or channel application and disconnection arrangement which will be hereinafter explained. The upper or head portion of the cap may have a generally circular external contour, milled if desired, and from this upper portion leg means **25** depends. In all of the illustrated embodiments of the invention the legs are shown in pairs depending from diametrically opposite points on the cap peripheries, and this is the preferred and most practical number, but it will be recognized that the invention, broadly considered, does not require the use of any specific number of legs. For this reason in certain of the appended claims reference to the leg element in the singular is to be regarded as including the plural also, in accordance with well established claim practice.

Each leg terminates in an inturned foot **26**, and this foot works in a peripheral groove **27** formed in the bottle neck in the zone thereof adjacent to the orifice **24**. In Fig. 1 this groove is helical, so that it constitutes a screwthread, and it extends to the extreme top of the neck, in the plane of the orifice. The threaded groove is best made in relatively high pitch and defined by quite coarse outstanding beading to impart strength to the groove formation and minimize the possibility of chipping. It will sometimes be found desirable, in this embodiment of the invention, to form the foot **26** with a slight twist or pitch so that it will make line or plane contact with the groove rather than point contact.

The groove is broken by a channel **28**, one for each foot **26**. Necessarily the embodiment shown in Fig. 1 wherein the cap is provided with two legs, has two channels, both of which appear in Fig. 4. Each of the channels terminates upwardly below the plane of the orifice **24** and extends below the lowest portion of the groove **27** which the foot **26** occupies when the cap is in sealing position on the bottle, as in Fig. 1. Moreover, each channel is wide enough, at least in its upper portion, to permit the foot to be pivotally turned therein, in the manner shown by the successively positioned full and broken line views in Fig. 2. The channels are defined in certain of the claims as being longitudinal to distinguish them from the groove which is called circumferential. By this of course is meant that the channels are formed in the outer wall of the container neck, where they extend in a direction parallel to the neck axis.

The structure is used as follows:

Since the groove **27** extends to and including the plane of the container orifice and constitutes a screw thread, and since the feet **26** are formed with a complemental pitch, the cap is applied to the bottle by a simple meshing of the two screws and relative rotation of the two members. During this rotation the feet will enter the channels, but rotation is continued with the feet in the channels so that the feet "jump" the channels and rotation continues until the gasket is well seated on the margin of the orifice. In this condition of the parts the container is effectively sealed.

At this point it may be stated that the particular gasket shapes and cooperative relationships with the cap and container surfaces are original with me and are the subject matter of a separate patent application. They have been

found in actual practice to provide highly effective seals for pressure liquids when turned down with light finger force. The effectiveness of the seal depends on a sort of "check valve" action whereby the resistance of the gasket to unsealing displacement is a function of differential internal and external pressure and increases directly with the internal pressure, so that a container thus sealed will hold pressures up to limits imposed only by the mechanical strength of the glass and metal or other material of the container and cap parts. Moreover, the seal is effective through an appreciable range of relative axial movement of the cap and container neck so that perfect sealing is not dependent on tight compression of the gasket between the opposed surfaces of the cap and container. These specific features of the gasket per se and its relationship to the cap and container surfaces form no part of the broad invention claimed in this application, for the purposes of which any suitable gasket or other sealing element may be considered substitutable for the preferred types which are illustrated.

To open the container the cap is reversely rotated from its Fig. 1 position until the feet **26** enter the channels **28**. At this point the cap is moved axially to its full line position of Fig. 2 to seat each foot in or near the upper end of its channel, whereupon the cap is swung about the feet as pivots through the broken line position of Fig. 2 until the cap clears the upper end of the container. Then the cap is dropped down the side of the container, with feet riding edgewise down the channels until they reach or almost reach the lower ends of the channels. At this final position of the parts the cap tips to engage a segment of its periphery in a part of the groove, where it is held well below the plane of the orifice **24** even when the container is inverted, all as fully shown in Fig. 3.

Thus the cap in its unsealed position presents no obstacle to pouring the contents from the container, and it will be observed that those who prefer to drink directly from the bottle will not be inconvenienced by the presence of the retracted cap. In these connections the preferred forms of gasket are of special advantage because they remain seated in the caps, so that the bottle contents are not poured over them and the gaskets do not come into contact with the mouth of the consumer.

Resealing is accomplished by the obvious expedient of reversing the unsealing procedure just described.

It will be evident that the cap may at any time be disconnected from the container by taking care to cause the feet **26** to "jump" their channels and reenter the groove **27**, followed by continued reverse rotation of the cap. Some special degree of care is required to effect this jump. Because the ordinary, casual rotation has a component of axial tension even without the aid of pressure inside the container, the feet will normally axially upwardly in the channels as soon as they enter them, so that the consumer will not accidentally disconnect the cap from the bottle. It is contemplated that such disconnection will normally be practiced only by the bottler to salvage caps from broken bottles, to sterilize the assembly, replace a worn out gasket, or for any other purpose. Of course, the reverse of the disconnecting operation is practiced in the initial application of the caps to the bottles, which operation proceeds without distorting the legs or tending to chip the glass.

At this point it is appropriate to state that certain proportions of the several parts of the neck and cap are necessary or desirable to facilitate or insure operation in the intended manner. Thus, the walls defining the groove and channels ought to be high enough to retain the feet and prevent their falling out or being accidentally sprung out. The transverse width of each foot (the vertical dimension of the foot appearing in Fig. 3) ought to be longer than the width of the groove **27** at least in the portion thereof which intersects the channel **28**, and the thickness of each foot ought to be just slightly less than the width of the groove so that the fit is a fairly snug one. The channel is sufficiently wider than the transverse width of the foot to pass the foot sidewise along the length of the channel. With the parts thus proportioned the feet, when turned even slightly in the channels **28**, cannot enter the groove on the far side of the channels. The feet must be carefully kept from turning in the channels to reenter the groove and permit the cap to be further rotated to disconnection.

The desirability of employing similar relative proportions for the modified constructions which will hereinafter be described will, it is thought, be sufficiently evident as those modifications are explained.

In the Fig. 1 embodiment the cap legs take the tension stress incident to sealing position of the cap. In Fig. 5 the neck of a bottle generally like that of Fig. 1 is shown screwthreaded in a narrow marginal end zone **30** to mesh with complemental threads formed inside the cap **31**, which is otherwise generally like the cap **21**. In this case the feet **32** of the legs work in a circumferential groove **34** which necessarily has a certain amount of pitch to accommodate the lead of the threaded parts when they are relatively rotated, but the feet do not have to engage the sides of the groove and the legs are not strained. It will be evident that a similar arrangement could be incorporated in the Fig. 1 device.

The Fig. 5 neck contains a longitudinal channel **35** for each foot, into which channels the feet enter in the operation of unsealing and in which they are lifted, pivotally turned and then lowered, all in a manner analogous to that already explained. The groove **34** is much shorter than the groove **27**, amounting to but a single turn or less. Consequently the margins which define this groove cannot serve as a stop for the rim or periphery of the retracted cap in the manner illustrated in Fig. 3, so I provide bosses **36** for this purpose. As will be observed from Fig. 6, these bosses function like the beading or groove margins of Fig. 3, so that these groove margins or beading and these bosses both comprise projections forming part of the neck above the level of the lower end portion of the channel constituting stops holding the cap in orifice-uncovering position, and they are so designated in certain of the claims.

The cap of Fig. 5 is applied to and disconnected from the bottle in the manner best depicted by Fig. 7. As there shown, a longitudinal slot **37** extends from the upper end of each channel **35** to the orifice end of the neck and is adapted to be traversed by the adjacent foot when the cap is swung through substantially ninety degrees from its sealing position and moved

longitudinally of the neck into connection with the container or into separation therefrom.

In the use of this embodiment also it is contemplated that the consumer will not normally disconnect the cap from the bottle. To do so requires a comparatively careful movement of each foot edgewise through the slot **37**, as the foot is purposely made too wide to pass this slot when the cap is moved axially of the bottle with the plane of the gasket parallel to that of the orifice.

Fig. 9 illustrates a further modification. In this form of the device the bottle neck **40** has grooves **41**, bosses **42**, marginal end zone threads **43** and longitudinal channels **44** generally like the corresponding parts of the bottle neck of Fig. 5, and the cap **45** is made generally like the cap **31** of Fig. 5. However, the channel **44** is not provided with any longitudinal slot like the slot **37**. Instead, each channel **44** has a short circumferential slot **46** communicating with it at a level which is different from (lower in the illustrated embodiment) than that of the groove **41**, and this slot is adapted to be traversed by the foot during movement of the cap into connection with the container and into separation therefrom, as is best shown in Fig. 12. It will be noted that the foot enters the circumferential slot **46** when the cap is fully retracted, which is of course a normal position for the cap in ordinary use by the consumer. To prevent accidental and undesired disconnection of the cap from the container neck I prefer to obstruct the slots **46** to prevent admission of the feet. In the Fig. 9 embodiment of the invention the obstruction consists of an arcuate clip element **47** which may be made of spring metal or the like and which is formed to snap into small recesses **48** in or adjacent to the slots **46**. In this way the element **47** provides stopping shoulders preventing movement of the feet of the cap through the slots **46**, so that the cap cannot be disconnected from the container as long as the element **47** is in place.

In this embodiment also it is contemplated that the consumer will not detach the cap from the container. Disconnection is easily effected at the bottling plant or the like by prying the element **47** out of its recesses and of course after the cap is mounted the element is restored to obstructing position by snapping it back into place.

In the embodiment illustrated in Figs. 9–14 the gasket **49** is specifically somewhat different in design from that suggested for the previously described forms of the invention but it functions on the same general principles and is regarded as the full equivalent. Indeed, as I have stated hereinabove, any appropriate kind of gasket may be used in any of the several embodiments.

The Fig. 15 structure is much like that of Figs. 9–14, except that the marginal end zone of the neck is not threaded as at **43** in Fig. 10 and the upper part of the cap is likewise devoid of threading. Instead, the circumferential groove **50** is given a pronounced pitch, so that it constitutes a screwthread and cooperates with the feet **51** to lead the cap down into sealing relation on the orifice when the parts are relatively rotated. It will be observed that in this form of the device, like that which is illustrated in Fig. 1, the legs of the cap take the strain incident to the maintenance of sealing.

The device suggested by Fig. 16 is much like that of Figs. 9–14. The cap of those figures will be used on the neck illustrated by Fig. 16. The difference between these two embodiments resides in the means by which accidental and undesired detachment of the cap from the container is prevented. In Fig. 16 the short circumferential slots **60** are obstructed, after the cap feet have been entered to mount the cap, by a band **61** of sheet material, like heavy paper, Celluloid, plastic, metal foil or the like, which encircles the neck in the zone of the slots **60** to cover the same. The cap can be disconnected from the neck by removing or destroying this band, and it is contemplated that this will be done normally only by the bottler or the like when a cap is for any reason to be removed from one bottle and mounted on another.

Figs. 17 and 18 depict an embodiment of the invention which is useful on bottles and is specially applicable to collapsible tubes. As there shown, the metallic neck **70** of such a tube has a circumferential groove **71** having screwthread pitch broken by a longitudinal channel **72**, one for each foot **73** of the cap **74**. Of course the cap may, if desired, be provided with any suitable kind of gasket. The principal point of difference between this collapsible tube embodiment and the others which have been described hereinabove is that the tube cap, being smaller than those for most other kinds of containers, and the tube not being subject to reuse, can be made of a material which will permit its legs to be expanded and sprung into position with its feet in the groove or channel. Consequently no entrance and separation slot is required. A cap thus made will remain captive on the tube neck during all ordinary opening and closing operations. As indicated in Fig. 18, the dimensions of the cap, legs and neck may be so related to the shape of the channel **72** that in its retracted position the cap will be jammed against the neck and thus remain clear of the orifice plane even when the container is inverted. For this reason it is unnecessary to provide the tube neck with any stop like the thread margins of the groove **27** of Fig. 1 or the bosses **36** of Fig. 5.

It is to be understood that the Figs. 17 and 18 embodiment is an alternative form of the structures shown in the remaining figures and is susceptible of the same modifications. For example, the container neck might be threaded to mesh with threads formed in the cap, so that the legs will not take the strain of sealing, and the container may be a bottle rather than the collapsible tube shown in Figs. 17 and 18. Actually, in the case of tube embodiments the cap will frequently be made of comparatively rigid plastic, which will make it convenient to use a screwthread like that shown at **43** in Fig. 10.

I claim:

1. The combination of a container having a neck of substantially circular cross section provided with an axial orifice and having at each side a circumferential groove portion and a longitudinal channel communicating with the groove portion and extending above and below the same, and a cap rotatable on the neck into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and then to be lifted and pivotally turned in a channel to swing the cap to uncover the orifice and then to be lowered in the channel, below the groove portion, to seat the cap against the neck entirely below the plane of the orifice.

2. The combination of a container having a

neck of substantially circular cross section provided with an axial orifice and having at each side a circumferential groove portion and a longitudinal channel communicating with the groove portion and extending from a point above the groove portion to a substantially closed end below the groove portion, and a cap rotatable on the neck into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and then to be lifted and pivotally turned in a channel to swing the cap to uncover the orifice and then to be lowered in the channel, below the groove portion, to seat the cap against the neck entirely below the plane of the orifice.

3. The combination of a container having a neck of substantially circular cross section provided with an axial orifice and having at each side a circumferential groove portion and a longitudinal channel communicating with the groove portion and extending above and below the same, and a cap rotatable on the neck and movable into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and into the upper end portion of the channel and to be pivotally turned therein to swing the cap to uncover the orifice and thereafter to be lowered in the channel, below the groove portion, to lower the cap below the plane of the orifice, said cap and neck being cooperatively formed to cause the cap to seat against the neck in the last named position of the parts and the neck having a stop for retaining the cap against relative longitudinal movement when the container is inverted with the parts in said last named position.

4. The combination of a container having a neck of substantially circular cross section provided with an axial orifice and having at each side a circumferential groove portion and a longitudinal channel communicating with the groove portion and extending above and below the same, a cap rotatable on the neck and movable into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and into the upper end portion of the channel and to be pivotally turned therein to swing the cap to uncover the orifice, and said container having a projection carried by the neck above the level of the lower end portion of each channel constituting a stop for holding the cap in orifice-uncovering position when the container is inverted with the cap in said position.

5. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having at each side a circumferential groove portion and a longitudinal channel communicating with the groove portion and extending above and below the same, a cap rotatable on the neck into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and into the upper end portion of the channel and to be pivotally turned therein to swing the cap to uncover the orifice and seat against the neck below the orifice, and a slot communicating with a groove portion and channel adapted to be traversed by the foot during movement of the cap into connection with the container and into separation therefrom.

6. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having at each side a circumferential groove portion communicating with a longitudinal channel in the neck which extends above and below the groove portion, a cap rotatable on the neck into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and into the upper end portion of the channel and to be pivotally turned therein to swing the cap to uncover the orifice and seat the cap against the neck below the orifice, a circumferential slot communicating with the channel adapted to be traversed by the foot during movement of the cap into connection with the container and into separation therefrom, and removable means normally obstructing the slot to prevent admission of the foot and separation of the cap from the container.

7. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having at each side a circumferential groove portion communicating with a longitudinal channel in the neck which extends above and below the groove portion, a cap rotatable on the neck and movable into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and into the upper end portion of the channel and to be pivotally turned therein to swing the cap to uncover the orifice and seat the cap against the neck below the orifice, a circumferential slot communicating with the channel at a level different from that of the groove portion adapted to be traversed by the foot during movement of the cap into connection with the container and into separation therefrom, and removable means normally obstructing the slot to prevent admission of the foot and separation of the cap from the container.

8. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having at each side a circumferential groove portion communicating with a longitudinal channel in the neck which extends above and below the groove portion, a cap rotatable on the neck into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and into the upper end portion of the channel and to be pivotally turned therein to swing the cap to uncover the orifice and seat the cap against the neck below the orifice, a circumferential slot communicating with the channel at a level different from that of the groove portion adapted to be traversed by the foot during movement of the cap into connection with the container and into separation therefrom, and a resilient element normally disposed within the slot to prevent admission of the foot and removable therefrom to admit the foot for separation of the cap from the container.

9. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and

having at each side a circumferential groove portion communicating with a longitudinal channel in the neck which extends above and below the groove portion, a cap rotatable on the neck into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and into the upper end portion of the channel and to be pivotally turned therein to swing the cap to uncover the orifice and seat the cap against the neck below the orifice, a circumferential slot communicating with the channel at a level different from that of the groove portion adapted to be traversed by the foot during movement of the cap into connection with the container and into separation therefrom, and a band of sheet material normally encircling the neck in the zone of the slot to cover the same and prevent admission of the foot and removable therefrom to admit the foot for separation of the cap from the container.

10. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having a circumferential groove of screwthread form extending to said upper end of the neck and broken at each side of the neck by a longitudinal channel below said upper end, a cap having at each side a leg provided with an inturned foot threadedly engaged in the groove and rotatable to bring the cap into sealing relation with the orifice, each foot being adapted, during rotation of the cap on the neck, alternatively to enter a channel and be lifted above the intersection of the groove and channel and pivotally turned and lowered in the channel with the cap dropped down the side of the neck or to traverse the channel and continue in engagement with the groove until the cap becomes disconnected from the container, the parts being so proportioned that said lifting of the foot in the channel is necessary to permit the cap to move laterally off the orifice.

11. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having a circumferential groove of screwthread form extending to said upper end of the neck and broken at each side of the neck by a longitudinal channel below said upper end, a cap having at each side a leg provided with an inturned foot threadedly engaged in the groove and rotatable to bring the cap into sealing relation with the orifice, each foot being adapted, during rotation of the cap on the neck, alternatively to enter a channel and be lifted above the intersection of the groove and channel and pivotally turned and lowered in the channel with the cap dropped down the side of the neck and the edge of the cap lodged in a portion of said groove or to traverse the channel and continue in engagement with the groove until the cap becomes disconnected from the container, the parts being so proportioned that said lifting of the foot in the channel is necessary to permit the cap to move laterally off the orifice.

12. The combination of a container having a neck of substantially circular cross section provided with an axial orifice and having at each side a circumferential groove portion and a longitudinal channel communicating with the groove and extending below the same, and a cap rotatable on the neck into sealing relation with the orifice having at each side a leg provided with an inturned foot working in a groove portion during such rotation and adapted to move out of the groove portion and to be pivotally turned in the channel to swing the cap into retracted position uncovering the orifice and then to be lowered in the channel, below the groove portion, to lower the cap below the plane of the orifice with a portion of the cap engaged with a portion of the container for positively holding the cap in such retracted position when the container is inverted with the cap in such position.

13. The combination, with a container having a neck of substantially circular cross section, the upper end of which is provided with an orifice, and a cap device having a head portion normally connected to the neck and movable thereon to sealing position over the orifice and to retracted position down a side of the neck wholly below said end thereof, of means for normally retaining the cap device connected to the neck in both of said positions comprising a pair of legs depending from diametrically opposite points on the head portion and each terminating in an inturned foot of appreciable width and thickness, a generally circumferential groove formed in the neck and wide enough to contain the feet when the head portion of the cap device is in sealing position, and a pair of longitudinal channels formed in the neck intersecting the groove so as to extend above and below the same and wider than the groove at their zones of intersection therewith so that upon rotation of the cap device the feet will leave the groove and enter the channels in which they may be moved first sidewise upwardly along the length of the channels and be pivotally turned therein to swing the head portion from the upper end of the neck to a side of the neck after which the feet may be moved edgewise downwardly below the groove to move the head portion to said retracted position, the relationship of the widths of the feet and of the groove being such that the feet cannot enter the groove from the channels after pivotal turning of the feet has begun.

14. The combination claimed in claim 13, in which the groove is a screwthread extending to the upper end of the neck so that rotation of the cap device with the feet in the groove until said end is reached will result in disconnection of the cap device from the container, the parts being so proportioned that said sidewise upward movement of the feet in the channel is necessary to permit the cap to move laterally off the orifice.

15. The combination claimed in claim 13, in which the groove is a screwthread and rotation of the cap device with the feet in said groove forces the head portion down into sealing position on the orifice, the parts being so proportioned that said sidewise upward movement of the feet in the channel is necessary to permit the cap to move laterally off the orifice.

16. The combination claimed in claim 13, in which the feet work idly in the groove when the cap device is rotated and in which the upper end zone of the neck and the adjacent zone of the head portion of the cap device are complementally threaded to force the head portion down to seal the orifice upon such rotation.

17. The combination of a container having a terminally ported neck provided with exterior longitudinal grooves and with a transverse groove communicating with said longitudinal grooves between the upper and lower ends thereof, the longitudinal grooves having portions wider than the transverse groove, and all of said grooves

having relatively high retaining walls, and cap means for sealing the port having a head portion adapted to bear down against the neck to seal said port and having two oppositely disposed legs depending from said head portion normal to the plane thereof and down the neck when said head portion is in sealing position, a foot provided on the lower end of each leg adapted to extend into said grooves and so constructed that said head portion may be raised from its sealing position to clear the port and be rotated to uncover the same and drop wholly therebelow while said cap means remains secured to said neck by the engagement of said feet with the walls of said longitudinal grooves below said transverse groove, said feet also serving as the axis of said rotation of the head portion away from the port and being wider in a direction transverse to their legs than the portions of said transverse groove at its intersection with said longitudinal grooves so that neither of the feet can enter appreciably into the adjacent transverse groove when the cap means has been rotated about the feet as pivots, whereby the cap means is prevented from becoming disconnected from the neck in such position, and said combination including wedging means operative when the head portion is over said port and is revolved about the longitudinal axis thereof for forcing and securing said head portion against the port to seal the same, the walls of certain of said grooves being sufficiently low at points beyond the path of the feet in the described movements to admit the feet to the grooves at said points, whereby the cap means may be applied to and disconnected from the container.

18. The combination of a container having a terminally ported neck, two longitudinally extending grooves on the outside of said neck beginning adjacent to the upper end of the neck, a transverse groove extending at least partly around said neck and communicating with said longitudinal grooves between the upper and lower ends of each, said transverse groove being narrower at its intersection with the longitudinal grooves than the width of adjacent portions of said longitudinal grooves, a one-piece cap means for sealing the port having two integral and oppositely disposed legs extending longitudinally down the outside of the neck when the top of the cap means is in sealing position, an inwardly extending projection on the end of each of said legs, each projection being wider than the width of the transverse groove at its intersection with the longitudinal grooves and being narrower than the width of the adjacent portions of the longitudinal grooves, each of said projections fitting down into said transverse groove when the top of the cap means is in sealing position and adapted to be moved to fit down into said longitudinal grooves whereby the top may be swung sidewise of the port to clear the same, said projections thus securing the cap means to the neck in all of its possible positions, and cooperating wedging means formed on the neck and cap means whereby rotation of the cap causes the top to be pressed securely against the port to seal the same, said neck having openings to said grooves for admitting the projections on the legs of the cap means into the said grooves.

19. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having at each side a relatively narrow circumferential groove portion and a relatively wide longitudinal channel communicating with and extending above the groove portion, and a cap having a head normally disposed across the orifice and having at each side a leg depending from the head and provided with an inturned foot normally disposed in one of said groove portions, said foot having greater width than thickness, its thickness being small enough to permit it to move edgewise in its groove portion and enter the channel when the cap is turned in one direction and its width being small enough to permit it to move upwardly in the channel and be turned therein through approximately ninety degrees and then lowered edgewise in the channel and being great enough to prevent entry of the foot into the groove portion after such turning, said cap and neck having cooperating means for causing the sealing head to be wedged onto the orifice in sealing relation therewith when the cap is in its normal position and is turned reversely of the first named direction.

20. The combination of a container having a neck of substantially circular cross section provided with an axial orifice at its upper end and having at each side a relatively narrow circumferential groove portion and a relatively wide longitudinal channel communicating with and extending above the groove portion, a cap having a head normally disposed across the orifice and having at each side a leg depending from the head and provided with an inturned foot normally disposed in one of said groove portions, said foot being thin enough to move edgewise out of the the groove portion into the channel and being too wide to enter the groove portion from the channel when turned appreciably and being narrow enough to move upwardly in the channel until the cap head clears the orifice so that the cap can be swung through approximately ninety degrees and the foot lowered edgewise in the channel, and co-operating means formed on the neck and cap for wedging the cap into sealing relation on the orifice when the feet are in the groove portions and the cap is rotated in a direction opposite that in which the cap must be turned to move the feet from the groove portions into the channel.

HUGH W. SANFORD.