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RECEPTACLE CLOSURE

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Fig. 1.

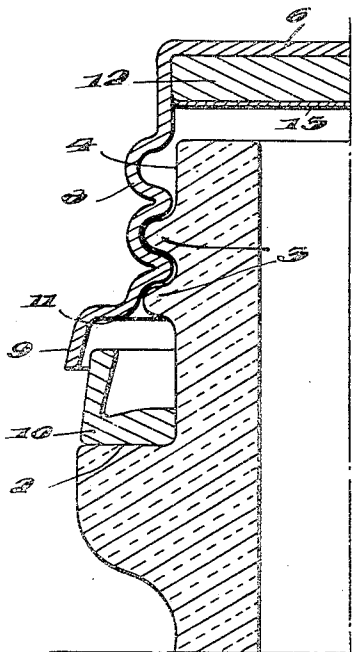
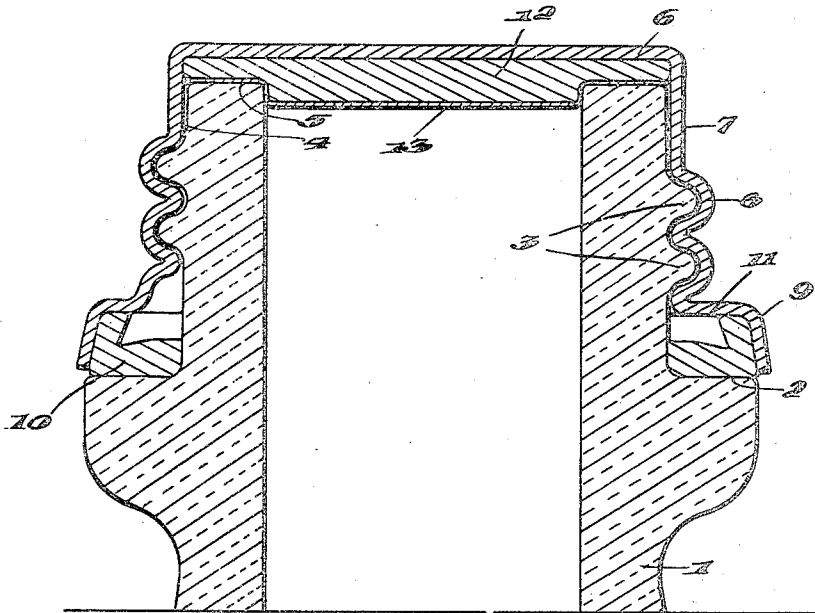


Fig. 2.

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UNITED STATES PATENT OFFICE

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RECEPTACLE CLOSURE

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8 Claims. (Cl. 215-40)

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This invention relates to an improvement in receptacle closures of the character designed particularly for carbonated beverages ordinarily dispensed in bottles, cans or other receptacles, that may be provided with a pouring neck or mouth used to discharge the beverage therefrom.

Carbonated beverages are confined in containers under pressures which are often as high as 60 to 75 pounds per square inch. It has been the practice heretofore to seal the mouth of the container for such beverages by means of a crown cap secured to the crowning ring at the open end of the neck. Such crown caps have been required because it has not been possible to obtain a sufficient sealing action by a screw cap to hold the pressure of the carbonated beverage. This was true even though a gasket be interposed between the cap and the neck of the container. It has been found that such a screw closure, when screwed on or removable by hand, would not hold a pressure greater than 20 pounds per square inch, which is considerably less than that customarily used in carbonated beverages. Furthermore, it is desirable with large containers to re-seal the pressure after a partial emptying of the contents, which is not possible with a crown cap.

In my prior application on Closures, Ser. No. 371,541, filed December 24, 1940, now Patent No. 2,372,227, granted March 27, 1945, I have disclosed a screw cap that may be put on by hand or manually removed and in which the pressure of the carbonated beverage itself, acting on the gasket, is utilized to increase the sealing action of the gasket, thereby holding against leakage the maximum internal pressure that the container itself can withstand, either when initially sealed or when resealed by hand.

It has been the practice in stores and other places where carbonated beverages are sold, to keep these cool by immersing the bottles or other containers in ice water in a dispensing cabinet, the bottles being manually removed as they are sold. Frequently the persons who remove the bottles plunge their hands into the ice water to lift them out. The result is that the ice water surrounding the bottles becomes polluted due to the unsanitary handling of the bottles, and yet this polluted water comes into contact with substantially the entire outer portion of the bottle neck, and even has access to the seal itself, located between the horizontal top surface of the container neck and the superimposed cap. Moreover, since these sealing gaskets are somewhat porous, this pollution may extend over the top surface of the container neck to some extent. Then when the beverage is removed from the container, either by drinking directly from the neck or even when pouring it out of the neck of the container, the beverage will be polluted and unsanitary when consumed. Even if the bottle

is not immersed in ice water before the beverage is consumed, the drinking neck and top gasket may become polluted by handling or by external causes.

The removable caps used heretofore for sealing carbonated beverage containers have closed only the extreme end of the neck, leaving the sides of the neck exposed to the extreme end thereof, and these are sealed at the end only by a single sealing gasket which is clamped between the cap and the end of the neck. When such bottles are immersed in ice water or handled in the ordinary way, there is nothing to prevent the contamination of the neck nor from preventing the ice water from passing up under the edge of the cap until it reaches the sealing gasket. Thus, such containers have had no provision for protecting the drinking portion of the bottle neck and the pouring lip thereof from pollution.

An object of this invention is to protect and conceal the drinking surface or the pouring lip to prevent it from being contaminated by outside pollution while the cap is in place on the container and until the cap is removed for drinking purposes, but in a container in which the cap may be sealed sufficiently to hold carbonated beverages under substantial pressure such as has been used heretofore, preventing the escape of any of the pressure from within the container to whatever extent it may build up less than that which will burst the container itself.

This is accomplished by locating the sealing gasket down on the neck of the container sufficiently far so that it will seal off the drinking or pouring portion of the neck against the entrance thereto of outside contamination from ice water or other causes whenever the cap is in place on the container. This may be combined either with a screw cap for manual release and application, or with a crown-type of cap. There may be provided two gaskets one over the end of the neck between the latter and the cap and the other inside the skirt of the cap at a point spaced downwardly from the end thereof, either above or below the detachable connection of the cap with the container. Either of these gaskets may be used to seal off the beverage pressure against leakage, but the skirt gasket would seal off the space inside the cap against leakage of ice water or other matters of contamination to the region of the neck from which the beverage may be removed either by drinking or pouring.

A further object of the invention is to improve the construction of the container for carbonated beverages, to facilitate the use thereof for drinking or pouring the contents from the container, by keeping the periphery of the mouth of the container dry and free of liquid between the sealing gasket that is spaced downwardly an appre-

ciable distance from the mouth, and the pouring lip itself.

Still another object of the invention is to improve the construction of the closure by the use of a very inexpensive gasket between the cap and the top surface of the bottle neck, covering the entire exposed inner surface of the cap. This is not required to be as expensive material as cork because it does not seal off the gas pressure, and much less expensive materials, such as cardboard, would be effective for the purpose. Nevertheless, it would prevent contact of the liquid in the container with the metal or other material forming the cap, thereby permitting the use of tin or other cheap materials for the construction of the cap. This makes the closure less expensive than the ordinary cap of the crown type used heretofore.

One embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is an enlarged vertical section through a bottle neck having a screw cap thereon representing one form of this invention; and

Fig. 2 is a similar partial sectional view there-through with the cap in the position before sealing occurs.

This closure cap is adapted for use on various types of containers for carbonated beverages, such as for a neck portion through which the contents may be discharged, although it is shown as applied to a glass bottle of the character usually employed for this purpose. The bottle has the usual neck 1 of elongated form and terminating in an open mouth through which the beverage may be discharged either by pouring or drinking directly from the mouth of the container. The size of the container is considerably exaggerated in the drawings for purpose of illustration, but the container would be of the size usually employed for this purpose. The open end of the mouth of the neck is shown as formed in a plane substantially at right angles to the axis of the bottle, but should be rounded off somewhat to facilitate sealing and discharge of the contents.

The periphery of the neck 1 is formed with an outwardly extending shoulder 2 spaced an appreciable distance downward from the mouth of the neck, as shown in Figs. 1 and 2. Above the shoulder 2, the periphery of the neck 1 is externally screw-threaded at 3 to receive a screw cap thereon, the screw-threads being shown as a preferable form of rotational wedging means, other forms of which may be substituted therefor, if desired. The screw-threads should extend preferably through one or more convolutions about the neck of the container, sufficient to provide a leverage for adjustably securing the cap on the container, but the upper end of the thread preferably terminates at a point spaced downwardly from the mouth of the neck, usually a distance of at least one-eighth inch, to provide a smooth peripheral surface 4 on the upper end of the neck below the mouth edge thereof, which is indicated at 5. This provides a smooth drinking and pouring edge, uninterrupted by threads.

The closure cap is designated 6 and is shown as of drawn or rolled metal, although it may be constructed of any other suitable material, such as plastics or other molded or formed products. The cap 6 has a cylindrical side wall 7 adapted to extend downward over the neck 1 and is internally threaded at 8 for adjustable connection with the threads 3 on the neck 1. The lower edge of the side wall 7 of the cap terminates in an out-

wardly and downwardly extending skirt 9 spaced from the periphery of the neck 1 at a point above the shoulder 2, leaving an open crack between the skirt and the shoulder.

A gasket 10 is seated upon the shoulder 2 inwardly of the skirt 9, and the inner edge of the gasket 10 is preferably of smaller diameter than the external diameter of the screw thread 3, so as to be retained on the neck of the container against accidental slipping off. This gasket 10 is shown as substantially V-shaped in cross section, being slit with diverging sides, with one side thereof seated upon the shoulder 2 while the other side is in position to engage and bear against the skirt 9. This skirt 9 has an internal shoulder 11 in the portion thereof joining the periphery of the side wall 7, so as to pinch the up-standing side of the gasket 10 between the shoulder 11 and the shoulder 2 as the cap is secured on the container.

The screw-threaded connection at 3, 8, is sufficiently loose so as to allow fluid pressure from within the container to leak past this connection into pressure relation with the sides of the gasket 10 and expand these, respectively, against the skirt 9 and shoulder 2, thereby sealing the crack therebetween. This fluid pressure always acts in a direction perpendicular to the exposed surface areas.

The gasket 10 is preferably constructed of flexible material which should be somewhat resilient, such as soft rubber, cardboard, or other material which will allow the gasket to flex and expand in response to internal pressure acting against the sides thereof. Where the container is to be washed in a caustic soda solution which is normally used to clean and sterilize the bottles when returned for re-use, the main sealing gasket should be made of a material that would not be affected by this solution. Some of the synthetic rubbers or plastic compositions would be particularly desirable for this purpose, such as "neoprene" or "Koroseal."

If desired or needed, an additional gasket 12 may be used beneath the body portion of the cap, extending over the entire inner surface thereof. This gasket 12 may be formed of soft cardboard, cork or other suitable material since it is not required to seal the gas pressure of the carbonated beverage in the container, but merely keeps the liquid away from contact with the inner surface of the cap. Where the gasket is formed of a relatively cheap material like cardboard, it should be coated preferably with wax, paraffin, or "Vinylite," as shown at 13, where exposed to contact with the liquid in the container or throughout the inner surface of the gasket 12.

The gasket 12 is secured permanently to the cap 6, while the gasket 10 is retained on the bottle. Then in applying the cap to the bottle, as shown in Fig. 2, the cap slips over the neck of the bottle and is screwed down with the shoulder 11 bearing upon the up-standing side of the gasket 10, which side is braced against the skirt 9, and with the peripheral portion of the gasket 12 bearing upon the mouth 5 of the bottle. This will continue until these gaskets are compressed, substantially as shown in Fig. 1.

The gasket 12 serves not only to protect the inner surface of the metal cap from the carbonated beverage in the container but it also prevents the liquid from wetting the exterior surface of the container neck even when the bottle is turned upside down. This is accomplished because the gasket 12 will be squeezed between the

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cap 6 and the mouth 5 of the bottle neck even when the screw cap is applied by hand, the pinching at the periphery of the gasket 12 being sufficient to prevent the escape of liquid when the gas pressures are approximately balanced on both sides of it. This also keeps the liquid in the container away from contact with the main sealing gasket 10 spaced downwardly on the outside of the bottle neck, which makes it possible for the sealing gasket 10 to be formed of rubber or other yieldable material because there is no danger of the flavor of the beverage being changed by contact with this main sealing gasket.

Nevertheless, any gas pressure from within the container which leaks past the gasket 12 and also past the screw threads 3, 8, will act to expand the sides of the gasket 10 effectively against the skirt 9 and shoulder 2, and thereby cause an effective sealing of the crack therebetween sufficiently to hold any pressure against leakage that the container itself will hold. This sealing action in response to the expansion by the fluid would be caused as soon as the gasket 10 is pinched between the shoulder 11 and the shoulder 2, which pinching prevents the leakage of pressure around the sides of the gasket and starts the sealing action in response to the pressure itself to seal off the pressure. Thus, any gas or liquid that reaches the gasket 10 will not get past this gasket after the first pinching pressure has been exerted, because the pressure, in addition to the pinching pressure, seals the gasket.

It is preferred that the gasket 10 be formed of soft rubber, or some suitable resilient material which will last through many uses, and withstand the cleaning processes without damage or requiring removal. This should be sufficiently yieldable to be expanded over the threads 3, and will also yield in response to fluid pressure to seal the crack. It is also preferred that the gasket 12 be formed of relatively inexpensive cardboard which is adequate for the purpose. The gasket 10 will then serve not only to prevent the leakage of pressure from within the bottle, but it is spaced downward sufficiently far from the mouth of the bottle that it will seal the lower edge of the cap against the leakage of water or other contaminating substances to the region of the neck at the mouth.

It has been found that if the sealing gasket is made of soft yieldable material, such as rubber, and yet has a relatively thin section, that rotation of the cap against the gasket where the pinching pressure originates, has the effect of tending to distort the gasket and perhaps wrinkle it in a way that will allow high pressure fluid to leak through the crack. It has been found also that when the bottle is under high pressure and the screw cap is to be removed, that an adhesive gasket bearing against the vertical wall of the cap will make it necessary to use more pressure to unscrew the cap. I have discovered that both of these troubles can be overcome by using a gasket which has either a very low coefficient of friction with the material of the cap or which has been treated with materials that reduce the friction between the gasket and the cap, such as paraffin, lard, graphite or "Vaseline," which act to lubricate the gasket and prevent its becoming distorted in applying the cap thereto. Such a coating is not objectionable for the gasket 10 because the contained liquid does not come into contact with it and could not receive an unpleasant taste or odor from such a coating.

The location of the gasket 10 closely surround-

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ing the neck of the container at a point beneath the thread 3 with its inner edge spaced inwardly from the periphery of the thread, will confine the gasket on the neck so that it will not be removed even in the removal of the cap, but will always remain in place on the bottle. Thus when the bottled beverage is sold, the gasket will come back when the container is returned for refilling and thereby may be used over and over again. Since a bottle of this character is returned for refilling from twenty to forty times, the cost of the main gasket for each use will be about 2½% to 5% of the initial cost. Thus even if a relatively expensive main gasket is used, the cost per use would be considerably less than that of a cheap gasket used only one time.

By the use of a screw threaded connection between the cap and the bottle neck, or other suitable form of adjustable connection, as shown in Figs. 1 and 2, the cap can be applied and removed by hand, being opened without a special bottle opener, and it is also possible for the user to re-seal the contents of the container for later use without the loss of carbonation. It is sufficient to apply and secure the cap by hand, the sealing of the maximum pressure being established when the cap is screwed down on the container. The cap is readily removable under any ordinary carbonated beverage pressures usually encountered, even as high as 100 pounds per square inch, although the pressures more often used are from 60 to 75 pounds per square inch, the lowest limit usually being 25 pounds per square inch.

Moreover the removal and replacement of the screw cap of Figs. 1 and 2 does not involve any danger of chipping the sealing surfaces where the gaskets are in contact with the container structure. When the usual crown cap is used in the conventional way to seal the bottle neck, there has been quite a loss of bottles due to the chipping of the edge of the bottle neck. This chipping occurs both during the capping process and when the crown cap is removed with the usual hand-lever opener. Some chipping occurs also in the handling of the bottles. It is estimated that about 1% of the bottles become chipped in one way or another and cannot be reused. Such chipping cannot occur with screw caps of the type shown in Figs. 1 and 2 that are both applied and removed by hand, and thereby greatly prolongs the life of the bottles.

In the form of the invention described above, the gasket at the open side of the cap is spaced downwardly from the mouth of the bottle sufficiently to seal the space between the cap and the neck of the bottle at a point remote from the region of the mouth. This will prevent the entrance of contaminating substances onto the neck at the mouth. At the same time, the gasket in the cap will confine the liquid inside the container, even if the latter should be turned upside down. This will insure that the drinking and pouring surface of the bottle is entirely clean and sanitary when the cap is in place.

I claim:

1. In a container for fluids under pressure, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, means on said cap and neck for adjustably interlocking the cap on the neck and permitting leakage of fluid pressure between the cap and the neck when the cap is in place thereon, an abutment surrounding the neck ex-

ternally thereof with a surface facing toward the end of the neck, said flange of the cap having a portion thereof provided with an internal surface arranged at an angle to the aforesaid abutment surface when the cap is in locked position on the neck and with a crack therebetween, and a sealing ring overlapping said crack in unbroken contact with said abutment surface and said internal surface of the cap when the cap is in locked position on the neck in position for sealing the crack against the leakage of fluid pressure therethrough, said sealing ring having an inner surface on the opposite side of the ring from the crack spaced from the adjacent portions of the cap and neck in position for action thereon of the fluid pressure to set up a direct sealing action of the sealing ring on the aforesaid surfaces of the cap and abutment.

2. In a container for dispensing fluids under pressure, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, means on said flange and neck for adjustably interlocking the cap on the neck and permitting leakage of fluid pressure between the cap and the neck when the cap is in place thereon, an abutment fixed to the neck and surrounding said neck externally thereof with a relatively smooth surface facing toward the end of the neck, said flange of the cap having a portion providing a relatively smooth internal surface arranged at an angle to the aforesaid abutment surface when the cap is in locked position on the neck with a crack therebetween forming an outlet for internal fluid pressure when the cap is in locked position on the neck, and a sealing ring of resilient material overlapping said crack in abutting relation with said abutment surface and said internal surface of the cap when the cap is in locked position on the neck and sealing the crack against the leakage of fluid pressure therethrough, said sealing ring having an inner surface on the opposite side of the ring from the crack spaced from the adjacent portions of the cap and neck in position for action thereon of the fluid pressure to cause a direct sealing action of the sealing ring on the aforesaid cap and abutment surface.

3. In a container for fluids under pressure, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, means on said flange and neck for adjustably interlocking the cap on the neck and permitting leakage of fluid pressure of the cap and the neck when the cap is in place thereon, an abutment fixed to the neck and surrounding said neck externally thereof with a surface facing toward the end of the neck and spaced from said end, said flange of the cap having a portion providing an internal surface arranged at an angle to the aforesaid abutment surface and between the abutment surface and the end of the neck when the cap is in locked position on the neck with a crack between the aforesaid abutment surface and the internal surface of the cap and forming an outlet for internal fluid pressure when the cap is in locked position on the neck, and a yieldable sealing ring overlapping said crack in unbroken contact with said abutment surface and said internal surface of the cap when the cap is in locked position on the neck and sealing the crack against the leak-

age of fluid pressure therethrough, said sealing ring having an inner surface on the opposite side of the ring from the crack spaced from the adjacent portions of the cap and neck in position for action thereon of the fluid pressure to set up a direct sealing action of the sealing ring on the aforesaid abutment surface and the internal surface of the cap which will cause the container to be sealed against the leakage through the crack of the internal fluid under pressure.

4. In a container for dispensing carbonated liquids and fluids that are subjected to a gas pressure higher than twenty pounds per square inch, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, means on said flange and neck for adjustably interlocking the cap on the neck capable of being hand removed and then re-locked manually and permitting leakage of fluid pressure between the cap and the neck when the cap is in place thereon, an abutment fixed to the neck and surrounding said neck externally thereof with a relatively smooth surface facing toward the end of the neck and spaced from said end, said flange of the cap having a portion providing a relatively smooth internal surface arranged at an angle to the aforesaid abutment surface when the cap is in locked position on the neck with a crack therebetween and forming the only outlet for internal fluid pressure when the cap is in locked position on the neck, and a sealing ring overlapping said crack in unbroken contact with said abutment surface and said internal surface of the cap when the cap is in locked position on the neck and sealing the crack against leakage of fluid pressure therethrough, said sealing ring having an inner surface on the opposite side of the ring from the crack spaced from the adjacent portions of the cap and neck in position for action thereon of the fluid pressure to set up a direct sealing action of the sealing ring on the aforesaid abutment surface and the internal surface of the cap which will cause the container to be sealed against leakage through the crack of the internal fluid under pressure.

5. In a container for dispensing carbonated liquids and fluids that are subjected to a gas pressure higher than twenty pounds per square inch, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, means on said flange and neck for adjustably interlocking the cap on the neck capable of being hand removed and then re-locked manually and permitting leakage of fluid pressure between the cap and the neck when the cap is in place thereon, an abutment fixed to the neck and surrounding said neck externally thereof with a relatively smooth surface facing toward the end of the neck and spaced from said end, said flange of the cap having a portion providing a relatively smooth internal surface arranged at an angle to the aforesaid abutment surface when the cap is in locked position on the neck with a crack therebetween and forming the only outlet for internal fluid pressure when the cap is in locked position on the neck, and a substantially cup-shaped resilient sealing ring seated upon the surface of the abutment and having an offset flange extending in unbroken contact with the aforesaid surface of

the flange on the cap when the cap is in locked position on the neck, said sealing ring overlapping the crack and sealing the crack against leakage of fluid pressure therethrough with an inner surface on the opposite side of the ring from the crack spaced from the adjacent portions of the cap and neck in position for action thereon of the fluid pressure to set up a direct sealing action of the sealing ring on the aforesaid abutment surface and the internal surface of the cap which will cause the container to be sealed against leakage through the crack of the internal fluid under pressure.

6. In a container for dispensing fluids under pressure, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, a gasket within the cap overlapping the discharge end to prevent the escape of liquid from within the container when the cap is in locked position thereon, means on said flange and neck for adjustably interlocking the cap on the neck and permitting the leakage of fluid pressure between the cap and the neck when the cap is in place thereon, means fixed to the neck and having a relatively smooth surface facing toward the end of the neck surrounding the neck, said flange of the cap having a portion providing a relatively smooth internal surface arranged substantially at an angle to the aforesaid neck surface when the cap is in locked position on the neck with a crack therebetween forming an outlet for internal fluid pressure, and a sealing ring overlapping said crack in contact with said abutment surface and said internal surface of the cap when the cap is in locked position on the neck and sealing the crack against leakage of fluid pressure therethrough, said sealing ring having an inner surface on the opposite side of the ring from the crack exposed to the leakage of fluid between the cap and neck in position for action thereon of the fluid pressure to set up a direct sealing action of the sealing ring on the aforesaid internal surface of the cap and neck surface.

7. In a container for dispensing fluids under pressure, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, a gasket within the cap overlapping the discharge end to prevent the escape of liquid from within the container when the cap is in locked position thereon, means on said flange and neck for adjustably interlocking the cap on the neck and permitting the leakage of fluid pressure between the cap and the neck when the cap is in place thereon, means fixed to the neck and having a relatively smooth surface facing toward the end of the neck surrounding the neck, said flange of the cap having a portion providing a relatively smooth internal surface arranged substantially at an angle to the aforesaid neck surface when the cap is in locked position on the neck with a crack therebetween forming an outlet for internal fluid pressure, and a substantially cup-shaped resilient sealing ring overlapping said crack in contact relation with said neck surface and said internal surface of the cap when the cap is in locked position on the neck and sealing the crack against leakage of fluid pressure therethrough, said sealing ring having

an inner surface on the opposite side of the ring from the crack spaced from the adjacent portions of the cap and neck in position for action thereon of the fluid pressure to set up a direct sealing connection of the sealing ring on the aforesaid neck surface and the internal surface of the cap.

8. In a container for dispensing fluids under pressure, said container having a pouring neck with a discharge end thereon, a cap fitting over said discharge end of the neck and having a flange surrounding the outside portion of the neck adjacent said discharge end, a gasket within the cap overlapping the discharge end to prevent the escape of liquid from within the container when the cap is in locked position thereon, means on said flange and neck for adjustably interlocking the cap on the neck and permitting the leakage of fluid pressure between the cap and the neck when the cap is in place thereon, means fixed to the neck and having a relatively smooth surface facing toward the end of the neck surrounding the neck, said flange of the cap having a portion providing a relatively smooth internal surface arranged substantially at an angle to the aforesaid neck surface when the cap is in locked position on the neck with a crack therebetween forming an outlet for internal fluid pressure, and a substantially cup-shaped resilient sealing ring overlapping said crack in contact relation with said neck surface and said internal surface of the cap when the cap is in locked position on the neck and sealing the crack against leakage of fluid pressure therethrough, said sealing ring having an inner surface on the opposite side of the ring from the crack spaced from the adjacent portions of the cap and neck in position for action thereon of the fluid pressure to set up a direct sealing action of the sealing ring on the aforesaid neck surface and the internal surface of the cap, said cup-shaped sealing ring having a flange extending upward along the surface of the cap flange in position for buckling action to break the adhesion thereof with the cap flange upon turning movement of the cap relative to the neck.

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