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CLOSURE MEANS FOR PRESSURIZED SYRUP TANKS AND THE LIKE

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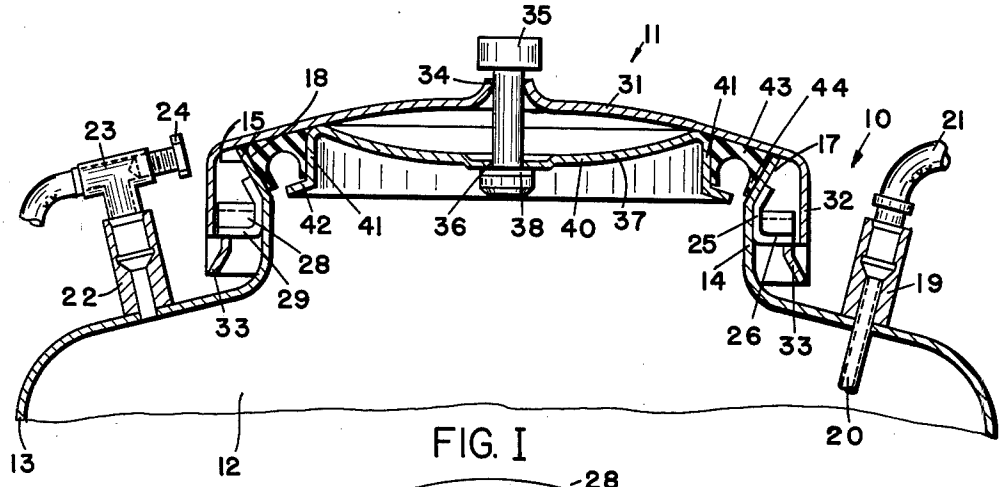


FIG. I

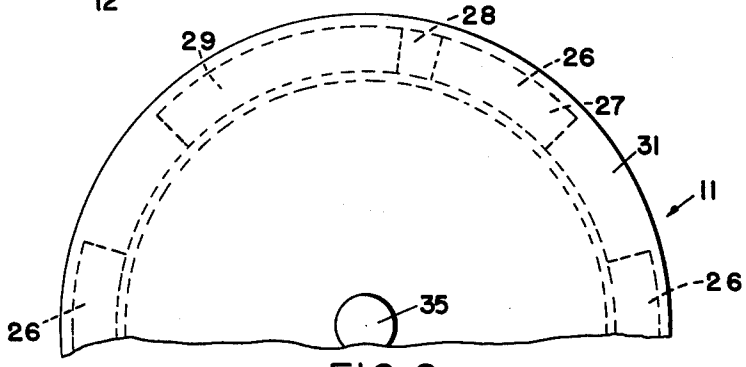


FIG. 2

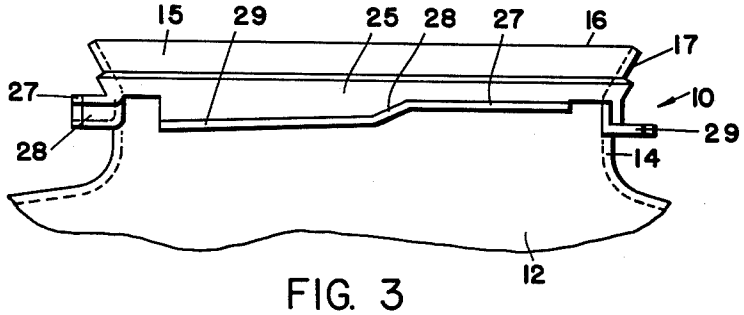


FIG. 3

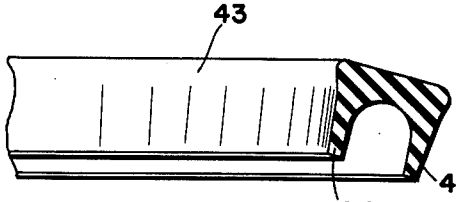


FIG. 4

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The present invention relates generally to the container closure art and to the provision of improved closure means for sealing pressurized containers and the like. The closure means of the present invention is particularly well adapted for sealing the large mouth openings in pressurized beverage containers.

In the beverage dispensing art it is common practice to mix flavoring syrups and carbonated water at the dispensing location by the use of suitable mixing and dispensing apparatus. In this method of dispensing each of the flavoring syrups provided is normally stored in a strong sanitary container, usually fabricated from stainless steel or formed from fiber glass impregnated thermal setting plastic material, and the container is pressurized by an expelling gas under sufficient pressure to convey the syrup to the mixing and dispensing apparatus. It is also common practice to package pre-mixed beverages in such containers and to dispense the same at the point of use by suitable dispensing apparatus. To facilitate easy and complete cleaning of these containers, as well as to facilitate the filling thereof, large mouth structures and caps of the expanding plug type with integral purging means are commonly employed. Such a closure cap is disclosed and claimed in our co-pending United States patent application, Serial No. 663,165, filed April 16, 1957, entitled "Closure Cap for Pressure Containers" and which is assigned to the assignee of the present invention.

In such prior art apparatus the outer surface portion of the large mouth opening is provided with a plurality of short hook-like flanges while the outer annular skirt of the closure cap is punched out along its circumference at predetermined points to define discontinuous locking elements. The closure cap is first placed over the large mouth structure in the container and then depressed and turned so that the locking elements engage the hook-like flanges to simultaneously seat the closure cap on the opening and to effect a fluid tight seal between the closure cap and the interior surface of the large mouth opening. After the closure cap has been engaged to seal the opening the container is pressurized by an expelling gas at sufficiently high pressures to expell the syrup at the dispensing location.

Although such closure caps are widely employed in the beverage dispensing industry, one inherent disadvantage thereof is that the seal between the closure cap and the interior surface of the large mouth opening may be effected prior to the engagement and locking of the locking elements and the hook-like flanges. The natural result of this is that when the expelling gas under pressure is introduced into the interior of the container the pressure builds up on the inner surface of the closure cap and "blows" the same from the large mouth opening of the container with considerable force. If the locking elements and hook-like projections are only partially engaged and are not completely locked the container can be pressurized but the closure cap is liable to be blown from the large mouth opening of the container at any time during the normal handling thereof. This presents

a very serious safety problem since workmen are usually working over and around the containers during filling operations and in moving and transporting the syrup containers to the point of ultimate use. In addition to the above, expelling gas, time and effort are wasted since the closure caps must be replaced and expelling gas under pressure again introduced into the containers.

It is therefore the primary or ultimate object of the present invention to provide closure means for pressurized syrup containers and the like wherein it is impossible to effect the seal between the closure cap and the large mouth opening in the container unless and until the locking means for securing the closure cap to the container is positively engaged and locked. In this manner it is impossible to pressurize the container until the closure cap is firmly secured to the container thereby completely eliminating the serious safety problem discussed above.

Another object of the present invention is to provide a closure cap for pressurized syrup containers which embodies improved sealing means for effecting a seal between the closure cap and the large mouth opening of the container. As will be hereinafter more fully explained, the sealing means comprises an annular resilient member of generally U-shaped cross section which is ideally suited for the use intended .

A further object of the invention is to provide a closure cap for pressurized syrup containers which comprises improved integral purging means for bleeding off the expelling gas under pressure within the container to allow the safe removal of the closure cap from the large mouth opening.

Another object of the invention is to provide apparatus of the character above described embodying improved and greatly simplified construction whereby the same may be easily and cheaply manufactured in large quantities but yet produces the desired results. The main body portion of the closure cap comprises only two main parts which are well adapted to be formed from sheet metal by conventional stamping methods.

These, as well as other objects and advantages of the invention, will become more fully apparent upon consideration of the following specification and accompanying drawing wherein there is disclosed an illustrated embodiment constructed in accordance with the teachings of the present invention.

In the drawings:

FIGURE 1 is a fragmentary side sectional view of a pressurized beverage container embodying closure means constructed in accordance with the teachings of the present invention;

FIGURE 2 is a partial plan view of the apparatus depicted in FIGURE 1;

FIGURE 3 is a fragmentary side view of the beverage container of FIGURE 1 with the closure cap removed showing specifically the construction of the locking flanges mounted on the outer periphery of the large mouth opening in the beverage container; and

FIGURE 4 is a fragmentary enlarged end sectional view of the improved sealing element used in the closure cap of the present invention for sealing pressurized beverage containers and the like.

Referring now to the drawing, and initially to FIGURES 1 and 2 thereof, the closure means of the present invention comprises locking means and a closure cap, generally designated by the reference numerals **10** and

11, respectively, which are shown disposed in fluid sealing relation wtih respect to a beverage container 12. The beverage container 12 has a generally cylindrical principal body portion 13 which terminates at its upper extermity in a circular vertically extending portion 14 and a circular outwardly directed flange 15 which form a large mouth opening 16 for the syrup container. The vertically extending portion 14 and the outwardly directed flange 15 of the large mouth opening define a circular outer peripheral surface 17 upon which the locking means 10 is mounted and a smooth inner surface 18 that is adapted to be engaged by the fluid pressure sealing element of the closure cap 11. It is preferred that the beverage container 12 be fabricated from stainless steel or other like light, corrosive resistant and sanitary material.

Mounted on the upwardly tapering shoulder of the syrup container 12 is an upwardly projecting fitting 19 that is adapted to receive, in fluid sealing relation, a dip tube 20 extending to the bottom of the container through which fluid may be discharged outwardly via a flexible conduit 21 to mixing and dispensing apparatus, not shown. Another fitting 22 is also mounted on the upwardly tapering shoulder of the beverage container 12 to receive a terminal and valve fixture 23 which is adapted to communicate with a source of expelling gas under pressure, not shown. The terminal and valve fixture 23 includes a threaded valve operator 24 which, upon proper manipulation thereof, controls the flow of the expelling gas under pressure into the syrup container 12.

The locking means 10 comprises an annular ring-like member 25, see FIGURE 3, which is mounted by welding or other convenient attachment means to the circular outer peripheral surface 17 of the large mouth opening 16 in the syrup container 12. The ring-like member 25 is formed with a plurality of radially projecting circumferentially extending spaced segmental flanges 26 which are adapted to cooperate with discontinuous locking elements on the closure cap 10 in a manner to be hereinafter described for locking the closure cap to the syrup container. It will be noted that three of the circumferentially spaced flanges 26 are provided and that each of these members extends for approximately one quarter of the circumference of the large mouth opening 16 in the syrup container. As specifically shown in FIGURE 3 of the drawing, each of the flanges 26 comprises a generally horizontally extending portion 27, a steeply and downwardly inclined portion 28 of relatively short circumferential length and an elongated downwardly sloping offset portion 29 which is disposed in a plane substantially below the plane of the horizontally extending portion 27. These various portions of the flanges 26 form, in effect, cam means for the closure cap and insure that the beverage container cannot be pressurized unless and until the closure cap is secured to the container as will be hereinafter more fully explained.

The closure cap 11 comprises a cup-like outer cover disc 31 having an integral circular skirt 32 depending from the outer periphery thereof. The skirt 32 is punched out along its circumference at three equally spaced points to define discontinuous locking elements 33 which are adapted to cooperate with the flanges 26 in securing the closure cap to the container. Each of the discontinuous locking elements is of a length dimension less than the spacing between the circumferentially spaced flanges 26 and is so vertically disposed that the same is adapted to ride under the flange associated therewith.

The cup-shaped outer cover disc 31 has a slight convex curvature and is centrally apertured at 34 to receive the shank portion of a vertically extending double headed stud 35 whose upper head is disposed above the outer cover disc 31. The shank portion of the double headed stud 35 is also received in a centrally disposed aperture 36 in an inner cup-shaped clamping disc 37 with the lower headed end of the stud serving as an abutment means for retaining the cup-shaped clamping disc 37 and the cup-shaped cover disc in assembled relation at all times. The double headed stud is loosely received within the apertures 34 and 36 for sliding movement with respect to the cover disc and the clamping disc. Disposed between the lower surface of the cup-shaped clamping disc 37 and the lower headed end of the stud and mounted on the shank portion of this last mentioned member is an annular resilient and deformable washer 38 for sealing the clamping disc from below and which is preferably made from nylon or one of the various plastic materials.

The cup-shaped clamping disc 37 has a circular center portion 40 having a slight concave curvature and an integral downwardly directed vertically extending circular skirt or wall portion 41 disposed about the outer periphery of the center portion thereof. The lower extremity of the vertically extending wall or skirt portion 41 terminates in an integral and outwardly projecting annular mounting flange 42 which, with the skirt or wall portion 41, forms an annular ledge for mounting a ring-like sealing element 43. The ring-like sealing element 43 is depicted in FIGURE 4 of the drawing and is generally U-shaped with downwardly and inwardly directed leg portions 44. The sealing element 43 provides the required fluid tight seal between the closure cap and the container while the clamping disc initially forces this sealing element into sealing relation with the container and presents an impervious lower surface to the expelling gas to prevent the escape thereof. The stud 35 and the centrally disposed apertures provide a means for purging the container of any and all gas remaining therein whereby the closure cap can be removed. The specific functioning of these various parts will perhaps best be understood when described in connection with the operation of the closure means of the present invention.

When it is desired to seal the beverage container the closure cap is first fitted over the large mouth opening in the container so that the discontinuous locking elements 33 are positioned in the spaces between the three flanges 26 extending from the ring-like member 25. The closure cap in this position is not locked in any manner and is adapted for vertical movement as is readily apparent. The closure cap is then turned in a clockwise direction—the only direction which the closure cap can be turned due to the interfering relation between the locking elements 33 and the ends of the downwardly sloping portions of the flanges 26 adjacent thereto—so that the locking elements ride under the horizontally extending portion 27 of the flanges 26. At this time vertical movement of the closure cap is prohibited whereby the same is firmly secured to the syrup container. However, the vertical disposition of the locking elements and the horizontally extending portion of the flanges is such that no seal is effected between the resilient ring-like sealing element 43 and the inner surface 18 of the large mouth opening 16 so that it is impossible to pressurize the container when the closure cap is in this position although vertical removal of the closure cap is prohibited.

Continued rotation of the closure cap in the clockwise direction causes the locking elements to engage and ride down the lower surfaces of the steeply and downwardly inclined portions 28 and under the downwardly sloping offset portions 29 thereby drawing the cup-shaped outer cover disc downwardly into firm pressure contact with the upper surface areas of the U-shaped ring-like sealing element 43. This pressure contact between the outer cup-shaped cover disc and the upper surface of the ring-like sealing element forces the leg portions 44 into initial sealing relation with the inner surface of the large mouth opening and the skirt or wall portion 41 of the cup-shaped clamping disc 37. In this manner continuous fluid tight circular seals are formed between the sealing elements 43 and the inner surface 18 and the skirt or wall portions 41 to positively seal the large mouth opening in the container. Of course, the closure cap is rotated until the same is tight and it will be observed that the movement

of the locking elements from the downwardly inclined portions **28** upon continued rotation of the closure cap is prevented due to the eventual engagement of the cup-shaped outer cover disc and the upper edge of outwardly directed flange **15** of the large mouth opening for the container.

After the closure cap has been positioned as above described, the valve operator **21** is manipulated to admit expelling gas under pressure to the interior of the beverage container. The double headed stud **35** is drawn upwardly and as the pressure builds up in the container the resilient and deformable washer **38** is forcibly impinged between the lower headed end of the stud and the clamping disc **37**. This causes deformation of the washer **38** to seal the opening between the shank portion of the stud and the aperture **34** in the clamping disc **37** and the stud is maintained in its upper position by the pressure exerted on the lower headed end thereof by the pressurized expellant. As the pressure builds up, the leg portions **44** of the sealing ring **43** are forced into tighter engagement with the contiguous metal surfaces **18** and **41**.

When it is desired to open the container for cleaning and/or refilling the valve operator **24** is manipulated to shut off the supply of gas pressure to the container. To purge the remaining expelling gas in the container it is only necessary to strike the projecting upper head of the stud **35** to force this member downwardly to break the fluid seal provided by the resilient and deformable washer **38** so that the residual gas can escape through the apertures **34** and **36** in the cup-shaped outer cover disc **31** and clamping disc **37**, respectively. As soon as the pressure is relieved from the interior of the container the closure cap can be rotated in a counterclockwise direction to disengage the locking elements **33** from the flanges **26** whereby the closure may be removed.

It should thus be apparent that we have accomplished the objects initially set forth by providing improved closure means for pressurized beverage containers and the like. Of particular importance is the provision of closure means wherein it is impossible for the closure cap to be blown off since the cap is always secured to the container prior to the time that the fluid tight seals are effected which allow the container to be pressurized. Also of importance is the specific sealing element employed, the integral purging means utilized and the highly simplified construction and operation of the closure means.

Although we have shown and described an illustrated embodiment of the invention, it should be understood that many changes may be made therein without departing from the teachings of the present invention. Accordingly, reference should be had to the following appended claims in determining the true scope and intent of the invention.

We claim:

1. Self-sealing closure means for a pressurized container comprising a container, said container having a circular and vertically extending large mouth opening, a circular outwardly directed flange at the outer end of said opening, said flange having a smooth inner periphery defining a first sealing surface, locking means, said locking means comprising a plurality of radially projecting circumferentially extending spaced segmental flanges secured to the outer periphery of said container adjacent said circular vertically extending large mouth opening, each of said flanges having a generally horizontally extending portion, an intermediate portion and an offset portion disposed in a plane substantially below the plane of said generally horizontally extending portion, a removable closure cap comprising a circular cover disc having a skirt depending from the outer periphery thereof, said cover disc overlying said large mouth opening, a plurality of circumferentially spaced locking elements carried by said skirt and engaging said flanges to lock said closure cap to said container, a clamping disc on the inner side of said cover disc, means mounting said clamping disc from said cover disc, said clamping disc having a vertically extending outer peripheral surface defining a second sealing surface, said first and said second sealing surfaces being disposed in spaced concentric relation, a resilient annular sealing element mounted on said clamping disc and having sealing contact with said first and said second sealing surfaces, and said resilient annular sealing element being deformed into sealing relation with respect to said first and said second sealing surfaces only when said locking elements engage said intermediate portions and said offset portions of said flanges.

2. Apparatus according to claim 1 further characterized in that said sealing element comprises an annular resilient ring-like member, said sealing elements having a generally U-shaped cross section defining a pair of thin flexible legs, and said legs being pressed into further sealing relation with respect to said first and said second sealing surfaces by the pressure existant in said container.

3. Apparatus according to claim 1 further characterized in that said means mounting said clamping disc from said cover disc comprises a double headed stud loosely received and extending through central apertures in said clamping disc and said cover disc, a resilient and deformable washer interposed between said clamping disc and the lower headed end of said stud, said annular sealing element, said clamping disc, said resilient and deformable washer and said lower headed end of said stud forming a fluid impervious surface when said stud is raised, and said apertures defining relief passageways for exhausting any residual pressure in said container when said stud is lowered.

4. Self-sealing closure means for a pressurized container comprising a container, said container having a large opening thereinto, a generally circular upwardly and outwardly extending flange at the outer end of said opening, said flange having a smooth inner periphery defining a first sealing surface, locking means, said locking means comprising a plurality of radially projecting circumferentially extending spaced segmental flanges secured to the outer periphery of said container adjacent said opening, each of said flanges having a generally horizontally extending portion, an intermediate portion and an offset portion disposed in a plane substantially below the plane of said horizontally extending portion, a removable cover cap assembly, said cover cap assembly comprising a generally circular cover disc, a skirt depending from the outer periphery of said cover disc, said cover cap assembly overlying said opening, a plurality of circumferentially spaced locking elements carried by said skirt and engaging said flanges to lock said cover cap assembly to said container, said cover cap assembly having a depending cylindrical flange defining a generally annular surface radially inward of but adjacent said first sealing surface, said annular surface defining a second sealing surface disposed in spaced generally concentric relation to said first sealing surface, a resilient annular sealing element, said sealing element having a pair of generally circular thin flexible leg portions, said pair of leg portions having sealing contact with said first and said second sealing surfaces, said leg portions of said sealing element being deformed into positive initial sealing relation with respect to said first and said second sealing surfaces only when said locking elements engage said intermediate portions and said offset portions of said flanges, and said leg portions being pressed into further sealing relation with respect to said first and said second sealing surfaces by the pressure existent in said container.

5. Apparatus according to claim 4 further characterized in that said cover cap assembly includes a clamping disc, said clamping disc being disposed on the inner side of said cover disc in generally axially aligned relation with respect thereto and mounting said depending cylindrical flange defining said second sealing surface, means mechanically connecting said clamping disc and said cover

disc, and said means connecting providing a passage to purge any residual pressure from said container.

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