Oct. 1, 1935. R. B. BUKOLT 2,016,224

WEATHERPROOF TANK CLOSURE

Filed Aug. 1, 1934

FIG. 1.

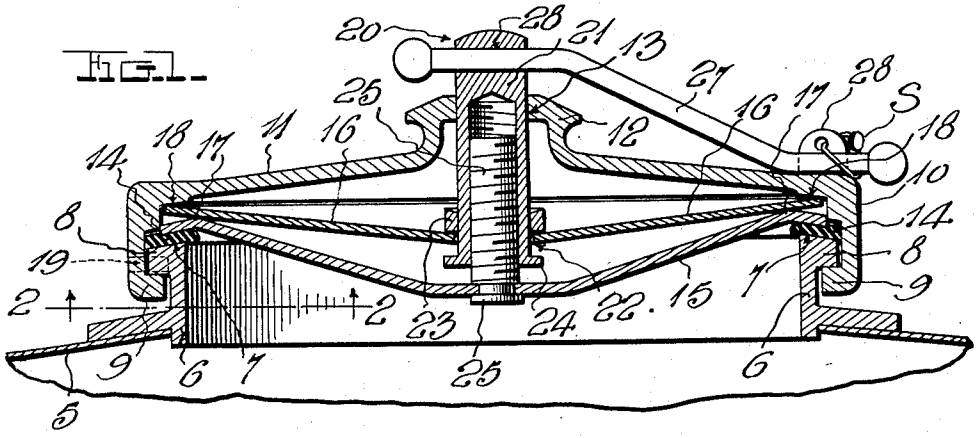


FIG. 3.

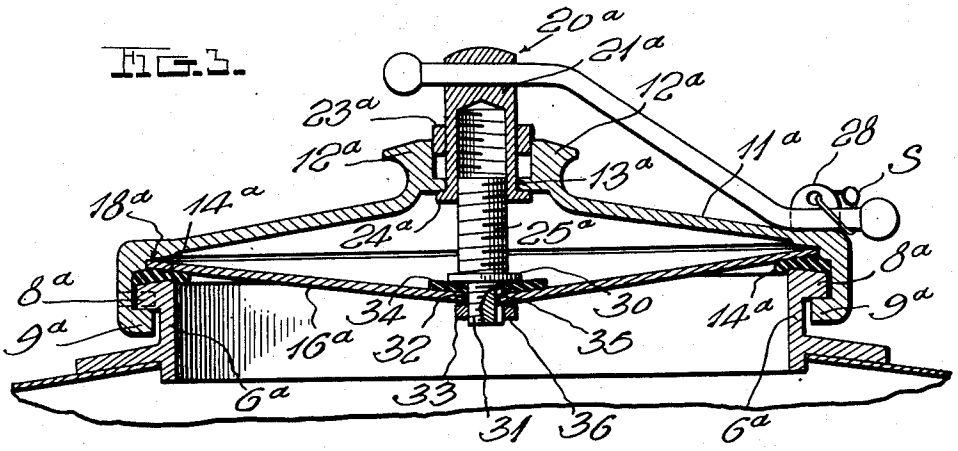
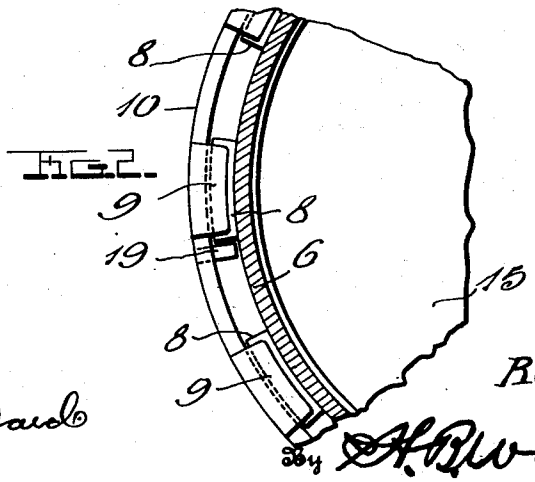


FIG. 2.



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WEATHERPROOF TANK CLOSURE

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7 Claims. (Cl. 220—55)

The invention relates to a novel weather-proof closure for various kinds of containers but particularly adapted as a tank closure for use on tank cars and trucks, storage tanks and the like which are exposed to the elements of weather subjecting them to corrosion.

The closure is of the general type disclosed in my pending U. S. application Serial No. 719,961, filed April 10, 1934, in which a lever-and-toggle-action snap disk is sprung inwardly to hold the closure sealed and is sprung outwardly to release the closure. The principal object of the invention is to provide an improved means for protecting the snap disk and any parts associated with it, said means including a weather excluding cap which provides a fulcrum for the snap disk, the cap being detachably connected with the container but being held against detachment therefrom until the snap disk is released.

A further object is to provide novel operating means for the snap disk having an actuating portion accessible at the exterior of the cap.

Yet another aim is to make novel provision for holding the snap disk actuator against unauthorized release.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawing.

Fig. 1 is a vertical sectional view showing one form of construction, the snap disk being in and positively held in its operative position.

Fig. 2 is a detail sectional view on line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1 but showing a different form of construction.

Preferred structure has been illustrated and will be rather specifically described, with the understanding however that within the scope of the invention as claimed, variations may be made. First, see Figs. 1 and 2.

The container or tank 5 is provided with an outwardly projecting neck 6 welded or otherwise secured thereto, the outer end of said neck constituting a sealing ring seat 7. This neck is provided with circumferentially spaced laterally projecting lugs 8 which interlock with similar lugs 9 on the side wall or flange 10 of a heavy metal cap 11, so that when the cap is sufficiently turned to allow the lugs 9 to pass between the lugs 8, said cap may be removed from the neck. In the present showing, the cap is provided with a central upstanding boss 12 having an opening 13 for a purpose to appear.

Carried within the cap 11, are a sealing ring 14, a metal closure 15 lying upon said sealing ring, and a substantially concavo-convex, lever-and-toggle-action snap disk 16. The closure 15 is somewhat cupped as shown and said closure is provided near its peripheral edge with a pivoting ridge 17 upon which the disk 16 rests. At its peripheral edge, this disk bears against a continuous shoulder 18 in the cap 11, said shoulder constituting a fulcrum for said disk when it is snapped inwardly to the operative position shown in Fig. 1.

When the cap 11 and the parts therein are applied to the neck 6, the disk 16 is in an outwardly snapped position near the top of said cap 11 and is thus rather loosely engaged with the fulcrum shoulder 18, and the rim portion of the closure 15, and the latter bears only lightly against the sealing ring 14. Thus, the cap may be easily applied and turned to interlock its lugs 9 with the lugs 8 of the neck 6. A suitable stop 19 may be provided to limit the extent of turning. After application of the cap and parts therein as described, the snap disk 16 is sprung inwardly to the position shown in Fig. 1. This disk thus rocks against the fulcrum shoulder 18 and presses inwardly on the pivoting ridge 17, exerting a powerful inward force to hold the sealing ring 14 seated upon the seat 7, said sealing ring being also compressed by the inward snapping of the disk to establish a fluid-tight seal.

A novel actuator 20 is provided for snapping the disk 16 inwardly to operative position or outwardly to released position. When disk 16 is in its operative position, it exerts such outward pressure on the cap 11 that the lugs 8 and 9 are held in such tight frictional engagement with each other that the cap cannot be removed until the disk is released. When disk 16 is outwardly snapped to released position, the friction is relieved and the cap may be easily removed.

The actuator 20 includes a sleeve 21 passing rotatably through the opening 13 of the cap boss 12, the inner end of said sleeve being passed also through an opening 22 in the snap disk 16. This sleeve is provided with outer and inner shoulders 23 and 24 respectively, which are disposed at the outer and inner sides of the snap disk 16, said shoulders being spaced apart a distance which is considerably greater than the thickness of said disk, allowing the snap action of the latter without causing it to jerk the entire

actuator 20. A threaded stud 25 is suitably secured at 26 to the center of the closure 16, so that it cannot rotate, and said stud is threaded in the sleeve 21.

A turning bar 27 is suitably connected at 28 with the outer end of the sleeve 21 and is normally connected by a suitable seal S to a lug 29 on the cap 11 so that the actuator 20 cannot be operated undetectedly by unauthorized persons. When the seal is removed or broken and the turning bar 27 is used to rotate the sleeve 21 in the proper direction, this sleeve threads upwardly upon the stud 25, thus moving the disk 16 to and slightly past a dead center position. Then the disk quickly snaps upwardly to released position. By rotating the sleeve 21 in the opposite direction, said sleeve threads downwardly on the stud 25 to move the snap disk 16 to and slightly past dead center so that said disk then quickly snaps to its lowered operative position. When this snap action takes place, the disk 16 of course moves downwardly from the upper thrust shoulder 23 and the closure may be left in this condition if desired, so that there is the possibility of any excessive pressure within the container snapping the disk to released position and thus venting said container. However, if desired, after disk 16 has snapped downwardly to operative position, the sleeve 21 may be further rotated to bring the shoulder 23 into contact with said disk, thereby locking the latter in operative position.

In the construction shown in Fig. 3, preferably used on containers which carry less internal pressure, the cap 11^a is practically identical with the cap 11 and it is connected detachably by lugs 8^a and 9^a with the tank neck 6^a. In this construction, the snap disk 16^a rests directly upon the sealing ring 14^a and engages the fulcrum shoulder 18^a. The disk actuating device 20^a includes a sleeve 21^a passing rotatably through a central opening 13^a in a boss 12^a on the cover 11^a, said sleeve having outer and inner shoulders 23^a and 24^a to limit its endwise movement with respect to said cover. Threaded into the sleeve 21^a is a stud 25^a which is centrally secured to the snap disk 16^a.

In the present showing, the inner end of the stud 25^a is provided with a shoulder 30 and with a reduced threaded portion 31 projecting inwardly beyond said shoulder. This portion 31 passes through a central opening 32 in the disk 16^a and is provided with a convex nut 33 contacting with the lower side of said disk. A resilient gasket 34 is interposed between the upper side of the disk 16^a and the shoulder 30. This resilient gasket and the shape of the nut 33 allow the necessary changes in shape at the center of the disk when it is snapped inwardly or outwardly. A key 35 on disk 16^a, fits into a groove 36 in the reduced stud portion 31 to hold stud 25^a against rotation.

When disk 16^a is in operative position, the container is tightly sealed and the cap 11^a is held against removal. When disk 16^a is snapped to released position, however, what pressure may exist in the container is vented and the cap 11^a may be easily removed with the disk 16^a, sealing ring 14^a and actuating device 20^a.

It will be seen from the foregoing that both forms of construction are simple and inexpensive, yet that they will form effective tank closures which are well protected against weather conditions. While preferred structures have been shown, attention is again invited to the possibility of making variations within the scope of the invention as claimed, and obviously any appropriate materials may be employed.

I claim:—

1. A container having an outwardly facing sealing ring seat, a sealing ring engaging said seat, a snap disk for exerting an inward force to seat said sealing ring, a cap enclosing said sealing ring and said snap disk and providing a fulcrum for the latter, means detachably connecting said cap with the container, and an actuating device for snapping said snap disk to active and released positions, said actuating device being operatively connected with said cap and disk and having an actuating portion accessible at the exterior of said cap.

2. A container having an outwardly projecting neck provided with lateral lugs, a sealing ring engaging the outer end of said neck, a snap disk for exerting an inward force to seat said sealing ring, a cap enclosing said neck, sealing ring and snap disk and providing a fulcrum for the latter, said cap having lugs engaged with those of said neck and disengageable therefrom upon turning said cap, and an actuating device for snapping said snap disk to active and released positions, said actuating device being operatively connected with said cap and disk and having an actuating portion accessible at the exterior of said cap.

3. A container having a neck whose upper end constitutes a sealing ring seat, said neck being provided with outwardly projecting circumferentially spaced lugs, a centrally apertured cap having a top plate and a downwardly projecting continuous side wall, said top plate being upwardly spaced from said sealing ring seat and having a downwardly facing annular fulcrum surface over said seat, said side wall being provided with lugs abutting the lower sides of the lugs of said neck and spaced to pass between these lugs when the cap is sufficiently turned, a sealing ring resting on the aforesaid sealing ring seat, a closure disk resting on said sealing ring and having a continuous pivoting ridge spaced inwardly from its edge, a lever-and-toggle-action snap disk resting on said pivoting ridge and abutting said downwardly facing fulcrum surface on a line spaced outwardly from and concentric with said ridge, whereby downward snapping of said snap disk will exert an upward pressure on said cap to hold said lugs in such contact as to prevent turning of said cover to released position, and will exert a downward pressure on said closure disk and sealing ring to compress the latter against its seat, and an actuator for said snap disk connected with this disk and passing through the central aperture of said cap.

4. A container having a neck whose upper end constitutes a sealing ring seat, said neck being provided with outwardly projecting circumferentially spaced lugs, a centrally apertured cap having a top plate and a downwardly projecting continuous side wall, said top plate being upwardly spaced from said sealing ring seat and having a downwardly facing annular fulcrum surface over said seat, said side wall being provided with lugs abutting the lower sides of the lugs of said neck and spaced to pass between these lugs when the cap is sufficiently turned, a sealing ring resting on the aforesaid sealing ring seat, a lever-and-toggle-action snap disk resting on said sealing ring and bearing against said downwardly facing fulcrum surface, where-

by downward snapping of said snap disk will exert an upward pressure on said cap to hold said lugs in such contact as to prevent turning of said cap to released position, and will exert a downward force on said sealing ring to compress said ring upon its seat, and an actuator for said snap disk connected with this disk and passing through the central aperture of said cap.

5. In a container having closing means including a resilient snap member and a rigid member stationary with respect to said snap member; relatively fixed and rotatable actuating elements for said snap member, said elements being threaded together and being operatively connected with the aforesaid members respectively, said rotatable actuating element being accessible for rotation whereby such rotation may be utilized to move said snap member slightly past a neutral position allowing it to complete its movement by snap action, the operative connection between one of said members and the actuating element connected therewith being constructed to allow relative sliding of said one member and the element connected therewith when the snap action of said snap member occurs.

6. In a container having closing means including a detachable cover having a central opening, a snap disk at the inner side of said cover having a central opening, and a closure at the inner side of the snap disk to be held against the container by means of said snap disk; a rotatable sleeve passing through said openings and having shoulders at opposite sides of said snap disk, said shoulders being spaced apart a distance greater than the thickness of said snap disk, and a stud secured to said closure and threaded into said sleeve, whereby said snap disk may be moved slightly past a neutral position by rotating said sleeve and the spacing of said shoulders then allows the disk to snap beyond the position to which it has been moved without jerking said sleeve.

7. In a container having closing means including a detachable cover having a central opening, and a snap disk at the inner side of said cover; a sleeve passing rotatably through said opening and having shoulders at the inner and outer sides of said cover, said shoulders being so spaced as to allow relative sliding of the cover and sleeve, and a stud secured to said snap disk and threaded into said sleeve, whereby said snap disk may be moved slightly past a neutral position by rotating said sleeve and the spacing of said shoulders then allows said disk to snap past the position to which it has been moved.

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