Oct. 8, 1935. L. W. G. FLYNT 2,016,773

TANK FILLER CAP

Filed June 15, 1934 2 Sheets-Sheet 1

Fig. 1

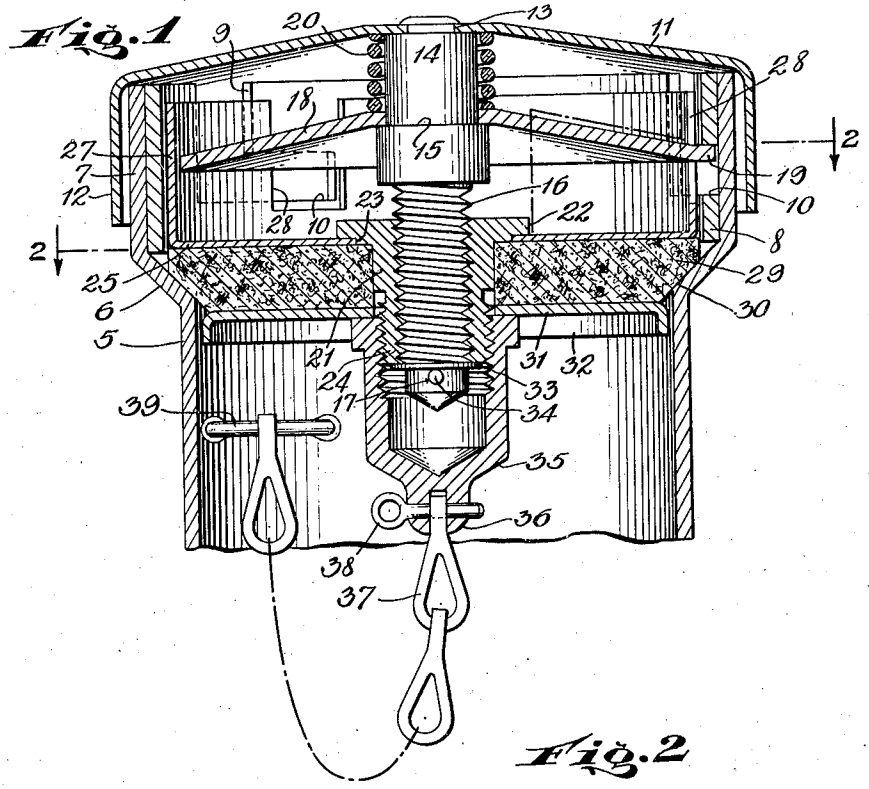
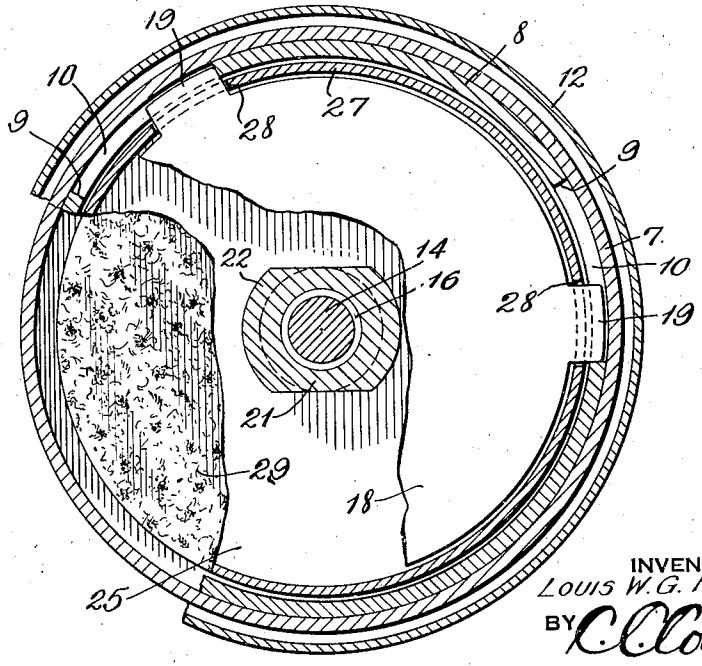


Fig. 2



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Fig. 3

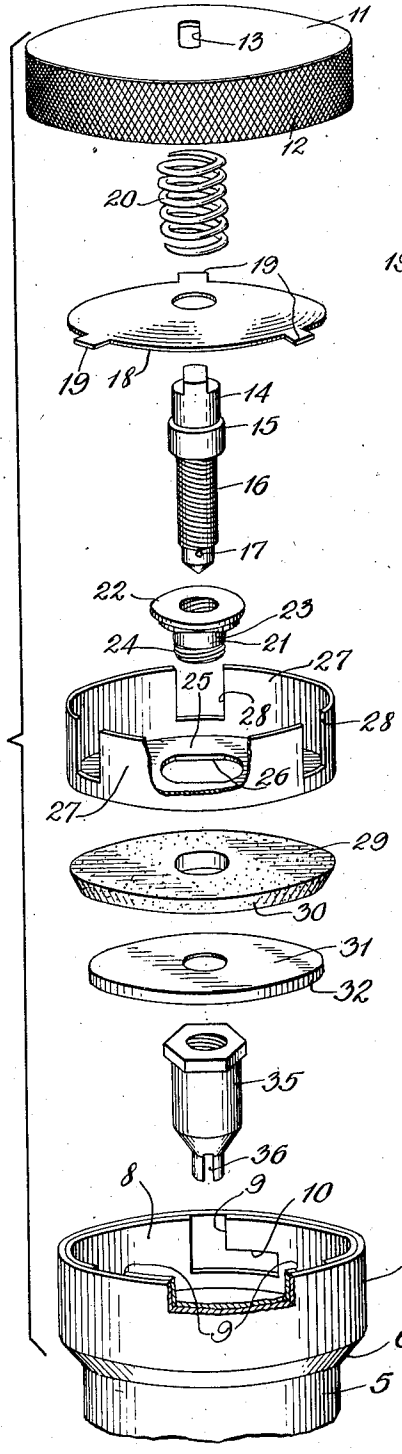
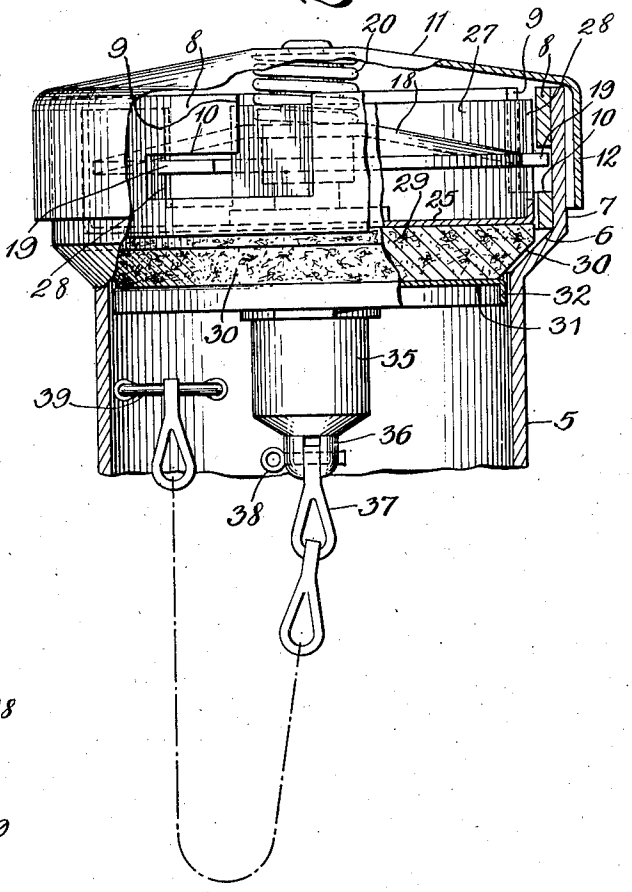


Fig. 4



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2,016,773

TANK FILLER CAP

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13 Claims. (Cl. 220—24)

This invention relates to a tank filler cap.

In tank closures it is common to provide the inlet port of the tank with a projecting, circular neck through which the tank may be filled. A cap is secured on the neck to close the tank.

The invention described herein is particularly suited for use on fuel tanks of mobile units such as aeroplanes where the tank and cap are subjected to vibration, inversion and other stresses. Of course, it will be obvious that the cap may be used as a closure for containers or tanks which are used for other purposes.

Two types of caps are in common use. In one type the cap is threaded and is adapted to be screwed on to the neck of the tank until it seats. The other type is known as a quick-acting cap, in which a plurality of projecting members on the cap are adapted to enter slots on the neck and be held in position by spring pressure obtained by a partial rotation of the cap. Each type has certain advantages which are offset to a large extend by disadvantages. The broad object of this invention is to provide a cap which will combine all of the advantages of the two types referred to but which will obviate their disadvantages.

A specific object of the invention is to provide a quick-acting screw means to force a valve member against a seat.

One objection to ordinary screw caps is that the cap must be rotated many times to seal the inlet neck. Therefore, a further specific object of the invention is to provide a cap adapted to be secured in position by a partial turn of the cap.

In the use of caps which are adapted for removable, threaded engagement with the neck, there is danger of improper engagement of the threads upon application of the cap. Therefore, a further specific object of the invention is to provide a removable cap adapted to be secured by action of a threaded element and having the complementary member which receives the threaded element permanently secured thereto.

The invention consists of the construction, combination and arrangement of parts as herein illustrated, described and claimed.

In the accompanying drawings, forming part hereof, is illustrated one form of embodiment of the invention, in which drawings similar reference characters designate corresponding parts, and in which:

Figure 1 is a vertical section, showing the cap with the valve seated;

Figure 2 is a horizontal section taken approximately on line 2—2 of Figure 1, looking in the direction indicated by the arrows;

Figure 3 is a perspective view showing the essential parts of the cap in separated position; and,

Figure 4 is a vertical section, partly in elevation, showing the cap with the valve unseated.

Referring to the drawings, 5 designates a circular neck or intake opening secured to or formed as an integral part of a tank or other container. The neck 5 is formed with an angular offset 6 so as to provide an inclined face on the inner side thereof. An enlarged portion 7 of the neck 5 extends past the offset 6. Secured to the inner face of the extension 7 is a ring 8 having formed therein a plurality of vertical slots 9 and a plurality of horizontal slots 10 each of which merges with the lower portion of one of the slots 9. The ring 8 may be eliminated and the slots 9 and 10 formed directly in the extension 7, if desired.

Disposed over the extension 7 on the neck 5 is a cover 11 provided with a depending side wall 12. The cover 11 is provided with a central opening 13 to receive the upper end of a supporting stud 14. When the parts are assembled the stud 14 is rigidly secured to the cover 11 and all of the elements hereinafter described are supported on the stud 14. Near its upper end the stud 14 is provided with a seat 15 and the body of the stud 14 is formed with left-hand screw threads 16. Below the threads 16 the stud 14 is formed with an opening 17 to receive a pin as hereinafter described.

A circular plate 18 is provided with a central opening and is seated on the seat 15 of the stud 14. The plate 18 is adapted for free rotation with relation to the stud 14. The plate 18 is of uniform thickness and the upper side thereof is made convex to add strength. The periphery of the plate 18 is formed with a plurality of projecting fingers 19 adapted to operate into the slots 9 and 10 as hereinafter described. Surrounding the upper end of the stud 14 between the upper surface of the plate 18 and the under surface of the cover 11 is a coil spring 20. When the parts are assembled the spring 20 is compressed. When the cover 11 is initially rotated it is desirable that the plate 18 be rotated therewith. The frictional engagement of the spring 20 under compression causes the plate 18 to rotate with the cover 11 as hereinafter described.

Carried by the threaded portion 16 of the stud 14 is a bushing 21 the interior of which is provided with left-hand threads to co-operate with the threads 16. The bushing 21 is provided at its upper end with a projecting flange 22 and a shank 23 provided with plane faces. At its lower end the

bushing 21 is exteriorly provided with ordinary right-hand screw threads 24.

The bushing 21 supports a valve member which comprises two retaining elements and a packing member. The upper retaining member 25 is provided with a central opening 26 having plane portions adapted to engage with the shank 23 on the bushing 21. The member 25 is provided with a circular wall 27 which is interrupted by vertical slots 28, through which project the fingers 19 of the plate 18. Below the retainer 25 is a packing member 29 which may be made of cork, composition, or any material suitable for the purpose. The edge of the packing member 29 is beveled to form a seat 30. Below the packing 29 is disposed a second retainer 31 provided with a circular dependent flange 32. The retainer 31 is of less circumference than the packing 29 or the retainer 25 so as to permit the seat 30 to contact the offset 6, as hereinafter described. The members 29 and 31 are formed with central openings to permit the passage of the bushing 21 therethrough.

When the parts are assembled a retaining washer 33 (Figure 1) is disposed on the lower end of the stud 14 above the opening 17. A pin 34 is disposed through the opening 17 to hold the washer 33 in position. The washer 33 partially covers the lower end of the bushing 21 and thereby limits the extent of movement in one direction of the bushing 21 with relation to the stud 14.

Carried by the lower end of the bushing 21 is a flanged interiorly threaded securing member 35. The packing member 29 and the retainers 25 and 31 are rigidly held between the flange 22 of the bushing 21 and the flange on the member 35. The lower end of the securing member 35 is bifurcated at 36 to receive one end of a chain 37 which is secured in place by a pin 38. The opposite end of the chain 37 is secured to the inner wall of the neck 5 by an anchor 39, the ends of which may be soldered in place. The purpose of the chain 37 is to permit the removal of the cap, but to prevent accidental loss thereof.

When the cap is applied to the inlet 5 the cover 11 is placed over the extension 7. The projections 19 on the plate 18 enter the vertical slots 9 in the ring 8. When the projections 19 reach the bottom of the slots 9 the cover 11 is rotated in a clockwise direction. The friction of the spring 20 is sufficient to carry the plate 18 with the cover 11 so that the projections 19 are carried to the extremities of the horizontal slots 10. The end walls of the slots 10 engage against the projections 19 and prevent further movement of the plate 18. The pressure of the spring 20 is such that the resistance thereof may be easily overcome and the rotation of the cover 11 continued. In the initial rotation of the cover 11 the bushing 21, and all of the parts supported thereby, will rotate with the cover 11. However, when the movement of the plate 18 is stopped as above pointed out, the walls of the vertical slots 28 in the retainer 25 will contact the projections 19 on the plate 18 and the retainer 25 will be prevented from further rotation. Since the central opening 26 in the retainer 25 is of irregular contour and receives the complementary, irregular shank 23 of the bushing 21, the bushing 21 will be prevented from further movement. Therefore, once the rotation of the cover 11 is continued after the projections 19 have reached the extremity of the slots 10, the only member which moves with the cover 11 is the stud 14.

When the cap is applied the projections 19 and the seat 30 are in the position shown in Figure 4. Since the threads 16 on the stud 14 are reversed or left-handed, clockwise rotation of the cover 11 and the stud 14 tends to withdraw the stud 14 from the bushing 21. This movement increases the distance between the plate 18 and the packing 29. As the rotation of the cover 11 continues the projections 19 will bear against the upper wall of the slots 10, and the seat 30 of the member 29 will be seated on the offset 6 of the neck 5. In this way a liquid proof seal is provided and the packing member 29 is held in position under compression.

When it is desired to remove the cap the cover 11 is rotated in a counter-clockwise direction. As soon as the pressure of the projections 19 against the upper wall of the slot 10 is relieved sufficiently to permit the projections 19 to slide with relation to the wall of the slot 10, the plate 18 under the influence of the spring 20 will turn with the cover 11. When the projections 19 reach the vertical slots 8 the cover 11 may be removed. Partial rotation of less than 90° is usually sufficient to remove the cap.

If the spacing between the plate 18 and the packing 29 is not disturbed by rotation of the parts while the cap is off, a partial rotation of less than 90° is usually sufficient to firmly seat the packing when the cap is again applied. In the event that the valve member and its associated parts are rotated with relation to the cover 11 and the stud 14 while the cap is removed, it is possible that the packing 29 will seat directly on the offset 6 before the projections 19 have passed sufficiently far down the vertical slots 9 to enter the slots 10. In this event the cover 11 is simply rotated in a counter-clockwise direction. The plate 18 and the valve member will be prevented from movement since the projections 19 will abut the wall of the slots 9. Therefore, the distance between the plate 18 and the packing 29 will quickly be decreased until the projections 19 are able to enter the horizontal slots 10. The cover 11 is then rotated in a clockwise direction and the valve member is quickly seated.

From the foregoing it will be seen that a liquid proof seal will be achieved and maintained under the pressure of the screw threads on the stud 14. At the same time, the cap may be quickly removed or applied. Furthermore, there is no danger of improper engagement of the threaded members upon application of the cap since the bushing 21 is in engagement with the threads 16 of the stud 14 at all times which precludes the possibility of cross threads.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A closure comprising a cover adapted to be rotatably positioned over an opening in a container, members carried by the cover to engage in recesses in the container, a valve member and means controlled by rotation of the cover to force the valve member against a seat on the container comprising a screw threaded member rotatable with the cover and means engageable with the members carried by the cover to prevent rotation of the valve member.

2. A closure comprising a cover adapted to be rotatably positioned over an opening in a container, members carried by the cover to engage in recesses in the container, a valve member and means controlled by rotation of the cover to force the valve member against a seat on the container comprising a screw threaded member carried by the cover and which supports the valve member

and means engageable with the members carried by the cover to prevent rotation of the valve member.

3. A cap to close the intake opening of a tank comprising a valve adapted to seat on the tank, a threaded shaft on which the valve is carried, a plate mounted on the shaft, projections on the plate adapted to enter slots in the tank, means engageable with the projections on the plate to prevent rotation of the valve and means to rotate the shaft to seat the valve.

4. A cap to close the intake opening of a tank comprising a valve adapted to seat on the tank, a threaded shaft on which the valve is carried, a plate mounted on the shaft, projections on the plate adapted to enter slots in the tank, means engageable with the projections on the plate to prevent rotation of the valve, means to force the projections on the plate against the tank and the valve against the seat by rotation of the shaft and means to rotate the shaft.

5. In combination with a circular intake neck on a tank provided with an inclined seat and a plurality of slots above the seat, a cap to close the neck comprising a valve member adapted to contact the inclined seat on the neck, a threaded stud disposed through the valve member, a plate carried by the stud above the valve, projections on the plate adapted to enter the slots on the neck, means to rotate the stud to force the valve against the seat and the projections of the plate against the upper walls of the slots and means engageable with the projections on the plate to prevent rotation of the valve.

6. In combination with a circular intake neck on a tank provided with an inclined seat and a plurality of slots above the seat, a cap to close the neck comprising a valve member adapted to contact the inclined seat on the neck, a threaded stud disposed through the valve member, a plate carried by the stud above the valve, projections on the plate adapted to enter the slots on the neck, means to rotate the stud to force the valve against the seat and the projections of the plate against the upper walls of the slots and means to prevent rotation of the valve comprising a vertical wall on the valve having openings through which the projections on the plate extend.

7. In combination with a circular intake neck on a tank provided with an inclined seat and a plurality of slots above the seat, a cap to close the neck comprising a cover to overlay the neck, a partially threaded stud carried by the cover and extending into the neck, a plate loosely mounted on the stud and provided with extensions to enter the slots and a valve carried by the threaded portion of the stud adapted to contact the seat on the neck to seal the neck.

8. In combination with a circular intake neck on a tank provided with an inclined seat and a plurality of slots above the seat, a cap to close the neck comprising a cover to overlay the neck, a partially threaded stud carried by the cover and extending into the neck, a plate loosely mounted on the stud and provided with extensions to enter the slots and a valve carried by the threaded portion of the stud adapted to contact the seat on the neck to seal the neck, said cover and stud being adapted to be rotated to seat the valve, the movement of the stud being limited by the projections engaged in the slots.

9. In combination with a circular intake neck on a tank provided with an inclined seat and a plurality of slots above the seat, a cap to close the neck comprising a cover to overlay the neck, a partially threaded stud carried by the cover and extending into the neck, a plate mounted on the stud and provided with extensions to enter the slots, a valve carried by the threaded portion of the stud adapted to contact the seat on the neck to seal the neck, said cover and stud being adapted to be rotated to seat the valve, the movement of the stud being limited by the projections engaged in the slots and means engageable with the projections on the plate to prevent rotation of the valve.

10. In combination with a circular intake neck on a tank provided with an inclined seat and a plurality of slots above the seat, a cap to close the neck comprising a cover to overlay the neck, a partially threaded stud carried by the cover and extending into the neck, a plate mounted on the stud and provided with extensions to enter the slots, a valve carried by the threaded portion of the stud adapted to contact the seat on the neck to seal the neck, said cover and stud being adapted to be rotated to seat the valve, the movement of the stud being limited by the projections engaged in the slots and means to prevent rotation of the valve comprising an interrupted wall on the valve abutting the projections on the plate.

11. In combination with a circular intake neck on a tank provided with a seat and a plurality of slots above the seat, a cap to close the neck comprising a cover to overlay the neck, a partially threaded stud carried by the cover and extending into the neck, a plate loosely mounted on the stud and provided with extensions to enter the slots, a valve carried by the threaded portion of the stud adapted to contact the seat on the neck to seal the neck and friction means between the cover and the plate to cause rotation of the plate upon rotation of the cover.

12. In combination with a circular intake neck on a tank provided with a seat and a plurality of slots above the seat, a cap to close the neck comprising a cover to overlay the neck, a partially threaded stud carried by the cover and extending into the neck, a plate loosely mounted on the stud and provided with extensions to enter the slots, a valve carried by the threaded portion of the stud adapted to contact the seat on the neck to seal the neck and spring means between the cover and the plate to cause rotation of the plate upon rotation of the cover.

13. In combination with a circular intake neck on a tank provided with a seat and a plurality of slots above the seat, a cap to close the neck comprising a cover to overlay the neck, a partially threaded stud carried by the cover and extending into the neck, a plate loosely mounted on the stud and provided with extensions to enter the slots, a valve carried by the threaded portion of the stud adapted to contact the seat on the neck to seal the neck and friction means disposed around the stud and engageable with both the cover and the plate to cause rotation of the plate upon rotation of the cover.

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