March 19, 1929. W. K. AUCHINCLOSS 1,706,051

LOCKING DEVICE FOR TANK DOME COVERS

Filed July 12, 1927

Fig. 1.

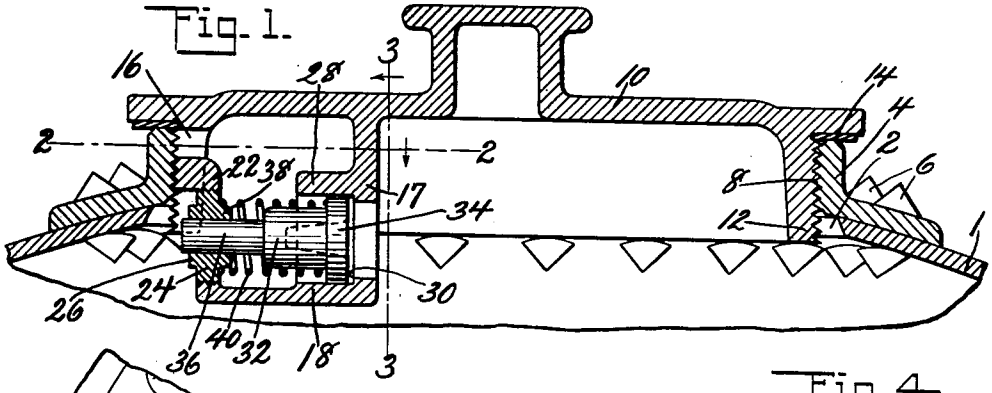


Fig. 2.

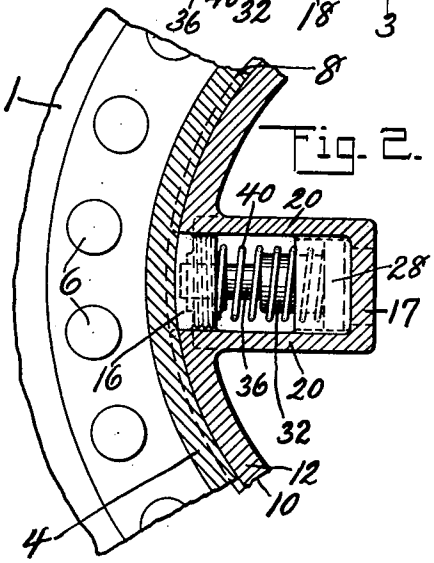


Fig. 3.

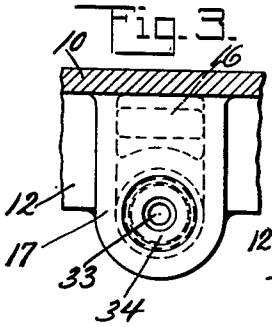


Fig. 4.

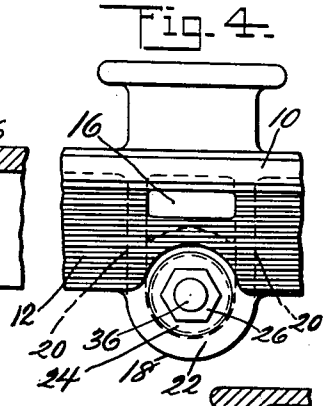


Fig. 5.

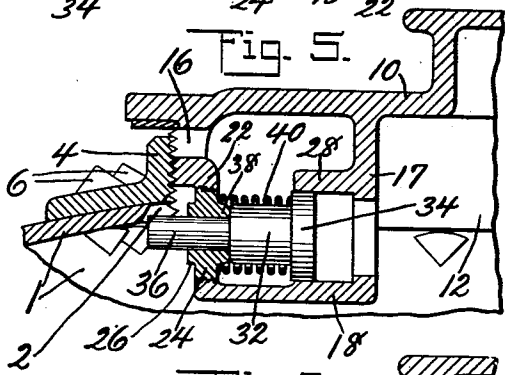


Fig. 7.

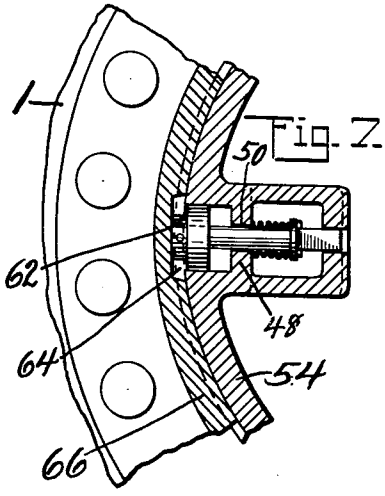
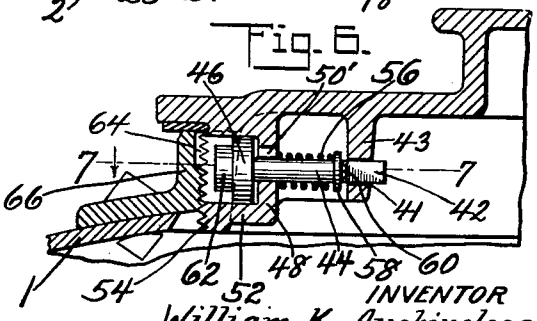


Fig. 6.



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UNITED STATES PATENT OFFICE.

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LOCKING DEVICE FOR TANK-DOME COVERS.

Application filed July 12, 1927. Serial No. 205,205.

Reference is had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof within the scope of the claims will occur to persons skilled in the art.

In said drawings:

Fig. 1 is a sectional view of the upper portion of a tank dome showing the invention applied thereto;

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

Fig. 3 is a sectional view on the line 3—3 of Fig. 1;

Fig. 4 is an view of a portion of a tank dome cover showing the invention;

Fig. 5 is a sectional view through the upper portion of a tank dome, showing the piston in locking position;

Fig. 6 is a sectional view through a portion of the upper part of a tank dome showing a modified form of the invention; and

Fig. 7 is a sectional view on the line 7—7 of Fig. 6.

This invention relates to tank dome closures and refers more particularly to a safety device therefor.

The primary object of the invention is the provision of a locking device for tank dome closures which is operative due to pressure within the tank and which prevents the removal of the tank dome cover until the pressure within the tank has been reduced to a degree of safety.

A further object of the invention is the provision of a locking means for the cover of a tank dome which, while the cover is seated in closing or sealing position, is inactive due to a substantially balanced pressure on opposite sides of the locking means, but which becomes active upon release of pressure on one side of the locking means as the result of partial rotation of the cover.

Another object of the invention is the provision of a locking device for tank dome covers which is operative with the standard type of tank dome and its associated dome ring.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which 1 designates a tank dome head having the usual manhole opening 2 therein surrounded by the flanged dome ring 4 which is secured to the head 1 by rivets 6 or the like; the flange of the dome ring being internally threaded as shown at 8 to secure a dome cover 10 at its externally threaded flange 12. The cover 10 is substantially of usual construction having a packing ring 14 which engages the upper edge of the dome ring 4, and the flange of said cover is provided with a vent opening 16, see Figs. 1 and 4.

The locking device of the present invention includes a piston chamber preferably formed integral with the cover, and having a rear wall 17, a base 18 and side walls 20. The front wall 22 of the piston chamber is formed with the flange of the dome cover, being preferably cast integral therewith, and the vent 16 is formed in the flange, as clearly shown in Fig. 1. The front wall 22 receives a supporting bushing 24, the latter having a nut surface 26 for receiving a suitable tool by which said bushing may be positioned.

The wall of the piston chamber is provided with an inwardly extending boss 28 having a seat 30 for limiting the rearward movement of a piston 32 provided with a head 34 which has a close but sliding fit in said bushing and is adapted to normally rest against the seat 30. The piston 32 is provided with a stem 36 which is positioned within the bushing 24 and said bushing 24 has a mounting portion 38 which supports a spring 40 arranged between the head 34 and the bushing 24 and normally urges the piston to seated position. As shown clearly in Fig. 3, the piston is provided with an inwardly extending recess 33 which lightens the piston as well as provides a recess for receiving gas generated or formed within the tank. As shown clearly in Figs. 3 and 4, the before-mentioned vent 16 is formed in the front wall of the piston chamber.

Figs. 6 and 7 disclose a modified form of the invention in which the piston chamber is shown as comprising a downwardly extending rear wall 43 provided with an opening 41 therein for receiving the squared end 42 of a piston stem 44. The piston includes also a head 46 which works within a chamber formed by a downwardly extending wall 48 having an opening 50 therein through which the stem 44 works, and a base 52 formed integral with said wall 48 and with

the flange 54 of the dome cover. The piston is normally retained in the position shown in Fig. 6 by means of a coil spring 56 which is positioned between the wall 46 and a collar 58 which is keyed to the stem 44, as shown at 60. The head 46 of the piston is provided with a reduced end 62 which is adapted to engage within a recess 64 formed in the flange 66 of the dome ring, as clearly shown in Fig. 7. A port or opening 50′ is provided, in the wall 48, to allow the gas formed within the tank to enter and engage the piston head 46 for the purpose of operating the said piston, as clearly shown in Fig. 6.

In use, referring now to Figs. 1 to 5 inclusive, with the cover in the position shown in Fig. 1, if excess gas pressure should develop within the tank, the gas tank will leak past the piston head 34 into the piston chamber where the pressure on each side of the head will be substantially balanced and the piston remain in the position shown in Fig. 1. When it is desired to remove the dome cover, an operator will rotate the cover 10 which will permit the gas within the piston chamber to escape from the piston chamber through the vent 16 to the atmosphere, as clearly shown in Fig. 5, and if the gas pressure within the tank is so great as to be dangerous, upon the escape of gas from the piston chamber to the atmosphere, the gas within the tank will force the piston to the position shown in Fig. 5, and it will be obvious that continuous rotation of the cover to release the same from its engagement with the dome ring will be impossible, due to the fact that the stem 36 will be wedged against or will bind against the underface of the dome ring. The cover will thus be held against removal until the operator releases the gas from within the tank through a suitable valve (not shown) or the gas escapes from the tank around the piston head, into the chamber and out of the tank through the vent 16. When the gas pressure within the tank has reached the degree of safety, the piston will be forced by the tension of the spring 40 to the position shown in Fig. 1, whereupon the cover may be rotated and removed from the dome head.

Referring to Figs. 6 and 7, should there be excess or dangerous gas pressure within the tank, the piston will be moved to the position shown in Fig. 7, where the reduced portion 62 will be positioned within the recess 64 and rotation of the cover thus prevented. Upon a reduction of pressure within the tank, which may be due to permitting the escape of gas through a suitable relief valve, or due to cooling of the contents of the tank, the piston will be withdrawn by means of the spring 56, to the position shown in Fig. 6, the reduced portion 62 thus being disengaged from its locking engagement with the dome ring, and the cover may be removed by continued rotation thereof on the dome ring.

What is claimed is:

1. In a tank dome, a cover therefor, and a piston mounted in said cover and movable in response to gas pressure after partial venting of the gas within said dome to engage the dome and prevent removal of the cover until reduction in gas pressure.

2. In a tank dome, a dome ring, a cover rotatable on said ring, a spring pressed piston carried by the cover and adapted to be moved by gas pressure within the tank dome to engage said dome ring after partial rotation of the dome cover whereby to prevent removal of the cover.

3. In a tank dome, a cover, a piston chamber formed with the cover, and a spring pressed piston in said chamber movable to engage the tank dome after partial venting of gas within the dome to prevent removal of the cover until after reduction in gas pressure in the dome.

4. In a tank dome, a cover, and means for preventing the removal of the cover comprising a piston chamber formed with the cover and having a vent, and a piston in said chamber provided with a locking stem, said piston being operative to locking position only upon partial rotation of the cover to open said vent.

5. In a tank dome, a dome cover having a depending attaching flange, a piston chamber formed with the cover and flange and provided with a vent, spring means for normally retaining the piston in retracted position, and a stem formed with the piston adapted to engage the tank dome upon venting of the gas within the chamber.

6. A tank dome cover locking means comprising a piston chamber, a piston therein having a stem adapted to engage the tank dome upon movement of the piston, and venting means brought into operation upon partial rotation of the cover to relieve the pressure within the chamber whereby pressure in the tank dome operates the piston stem to locking position.

7. In a car tank having a dome, a removable cover for said dome, a locking piston mounted in the cover and normally retained in inactive position, and means for venting gas from said tank upon partial rotation of the cover to permit the piston to move to locking position.

8. In a car tank having a dome, a dome cover therefor, a piston carried by said cover and having a locking stem, spring means normally retaining the piston in retracted position, a gas receiving piston chamber in which the piston is mounted, and means for venting gas from the chamber upon partial rotation of the cover to relieve the pressure against one side of the piston whereby gas

pressure in the tank will force the piston stem into locking engagement with the dome.

9. In a car tank having a dome, a rotatable cover for the dome, a piston chamber formed integral with the dome and having an inwardly extending tubular bushing formed with rear wall, said bushing having a seat, a removable bushing in the front wall of the chamber, a piston movable in said chamber and having a head mounted in the bushing in said rear wall and a stem slidable in the removable bushing, and spring means urging the piston head to its seat.

10. In a car tank having a dome, a removable cover for the dome, a locking piston mounted in the cover and normally retained in inactive position, said piston being operative by gas pressure exerted thereagainst, means for venting gas from adjacent the piston upon partial rotation of the cover whereby to permit the piston to move to locking position in response to pressure of the gas within the tank.

11. In a tank dome, a cover therefor having a piston chamber formed therewith, a piston in said chamber, and means for normally retaining the piston in retracted position, said piston being movable from retracted position after partial venting of the gas from the dome and in response to gas pressure within the dome to engage the latter and prevent removal of the cover until reduction of gas pressure within the dome.

12. In a tank dome, a cover therefor having a piston chamber formed therewith, a piston in said chamber, a spring normally retaining the piston in retracted position, said piston being movable by gas under pressure to engage the dome after relief of gas pressure on one side thereof whereby to prevent removal of the cover until reduction of gas pressure in the dome.

13. In a tank dome, a cover therefor having a piston chamber formed therewith, a spring pressed piston in said chamber, said chamber being adapted to receive gas formed within said dome whereby to counterbalance the piston and permit the spring to retain the same in retracted position, said piston being movable to engage the dome after venting of the gas from the piston chamber whereby to prevent removal of the cover until reduction of gas pressure in the dome.

14. In a tank dome, a cover therefor having a piston chamber formed therewith and having a vent, a spring pressed piston in said chamber counterbalanced by gas within the piston chamber and in the dome to remain in retracted position, said piston being movable upon relief of gas from the piston chamber through the vent to engage the dome and prevent removal of the cover until reduction of gas pressure within the dome.

In witness whereof I have hereunto set my hand.

WILLIAM K. AUCHINCLOSS.