

April 18, 1939.

F. G. THWAITS

2,154,545

CLOSURE

Filed Nov. 16, 1936.

2 Sheets-Sheet 1

Fig. 1.

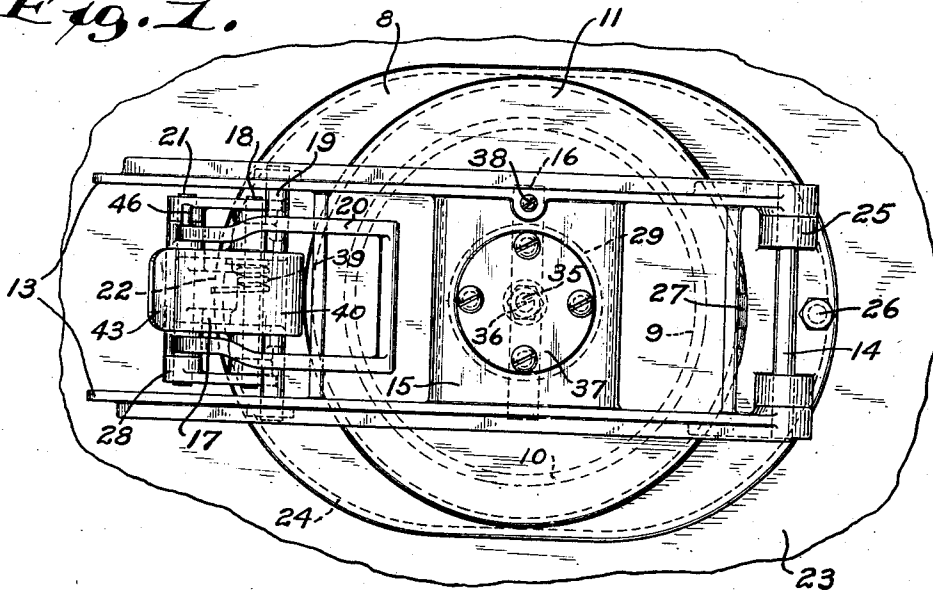
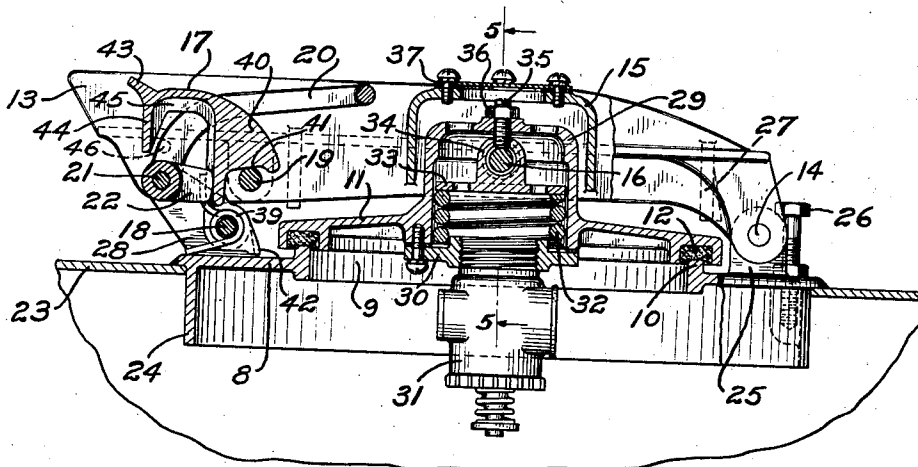


Fig. 2.

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Fig. 3.

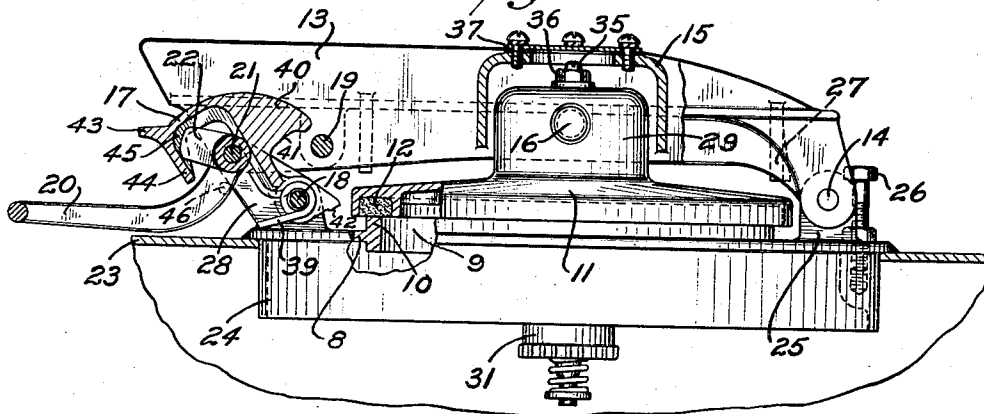


Fig. 5.

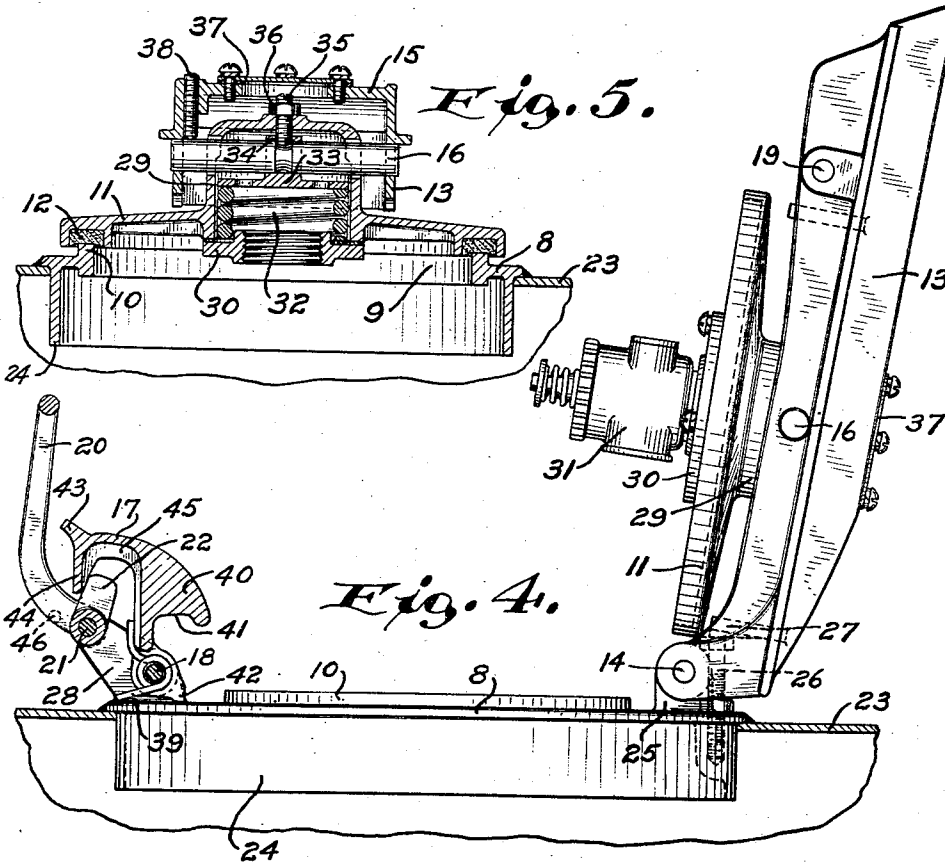


Fig. 4.

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UNITED STATES PATENT OFFICE

2,154,545

CLOSURE

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4 Claims. (Cl. 220—57)

My present invention relates in general to improvements in the construction and operation of closures, and relates more particularly to improvements in manhole covers for tanks and to improved mechanism for manipulating and for sealing such covers.

An object of the present invention is to provide simple and efficient closure mechanism which may be readily and safely manipulated.

Another more specific object of my invention is to provide a durable closure assemblage which may be conveniently adjusted to effect tight sealing at all times when the closure cover is in closed position.

A further specific object of the invention is to provide a new and useful closure especially adapted for cooperation with the manhole of a vehicular tank wherein streamlined appearance is desirable.

Still another specific object of my invention is the provision of improved latching and release mechanism for closure covers, which is freely accessible for manipulation and adjustment of parts, and which is normally protected against damage.

An additional specific object of the invention is the provision of improved closure mechanism wherein the closure cover is automatically latched in sealed condition when it is swung or dropped into closed position.

Another specific object of this invention is the provision of improved manipulating mechanism which enables quick release and opening of a manhole closure or the like.

A further specific object of the present invention is the provision of an improved manhole and closure assemblage which may be applied to a container as a complete unit, and which can be manufactured at moderate cost.

These and other objects and advantages of the present invention will be apparent from the following detailed description.

A clear conception of embodiments of the improved features, and of the construction and operation of a manhole closure and actuating mechanism which is built in accordance with this invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a top view of one of the improved closure assemblages, showing the same applied to a fragment of a tank and with the cover latched in closed position;

Fig. 2 is a central vertical section through the assemblage of Fig. 1, showing the hinge portion thereof in elevation and also showing the cover latched in closed position;

Fig. 3 is a part sectional elevation of the closure assembly, showing the latch released and the cover elevated to avoid compression of the sealing ring but still in closed position;

Fig. 4 is an elevation of the major portion of the assemblage but a section through the latch, showing the cover in fully opened position; and

Fig. 5 is a transverse vertical section through the assemblage with the cover sealed, the section having been taken along the line 5—5 of Fig. 2.

Although the invention has been shown and described herein as being specifically embodied in a manhole closure assembly for streamlined vehicular liquid transporting tanks, it is not the intent to thereby unnecessarily restrict the scope, since some of the novel features may be susceptible of more general application or use.

Referring to the drawings, the improved closure assemblage shown therein comprises in general a rigid frame or support 8 having a central circular opening 9 surrounded by an upwardly projecting continuous annular seating 10; a cover 11 having a lower recess provided with a continuous annular compressible or resilient sealing ring 12 adapted to snugly engage the seating 10; a double main lever 13 swingably mounted upon the support 8 by means of a front pivot pin 14 and having a medial housing 15 within which the cover 11 is swingably suspended by means of an adjustable pivot pin 16; and latching mechanism consisting of a spring pressed retaining latch 17 swingably supported upon the support 8 by a pivot pin 18 and cooperable with a transverse latching rod 19 carried by the swinging end of the lever 13, and a releasing lever 20 also swingably mounted upon the support 8 by a pivot pin 21 and coacting with the latch 17 through a cam 22.

The frame or support 8 may be welded or otherwise permanently attached to a tank shell 23, and has a continuous apron 24 depending into the liquid confining compartment of the tank. The front end of the support 8 is provided with integral upwardly extending ears 25 which support the front pivot pin 14, and is also provided with a vertically adjustable central stop screw 26 which is adapted to engage a transverse web 27 on the lever 13 so as to limit the opening movement of the cover 11 as shown in Fig. 4. The rear portion of the support 8 is likewise provided with integral upstanding ears 28 which

carry the pivot pins 18, 21 as shown in Figs. 1 and 2, the ears 28 being disposed within the streamlined side bars of the lever 13 when the cover 11 is in sealed position.

5 The closure cover 11 which carries the compressible sealing ring 12, and which is adjustably associated with its suspension pin 16, has an integral inverted cup-shaped medial portion 29 which projects upwardly into the lever housing 10 15 as clearly illustrated in Figs. 2 and 5. The lower end of the cover portion 29 is normally sealed by a removable plate 30 from which a vent valve assemblage 31 is suspended, this assemblage preferably being of the type shown and described in co-pending application Serial No. 15 70,983, filed March 26, 1936, by H. A. Strelow. A relatively powerful compression spring 32 directly engages the bottom plate 30, at its lower end, and reacts at its upper end against a top 20 plate 33 having a central lug 34 which embraces the grooved mid-portion of the pivot pin 16, and the opposite ends of the pin 16 are snugly fitted in openings in the lever 13 but are free from direct contact with the sides of the cover portion 25 29 which are pierced by this pin. The pivot pin 16 is held against axial shifting by a set-screw 35 having screw thread coaction with the upper central part of the cup-shaped portion 29, and also having a lower point engageable with the lug 34 and with the central groove of the pin 16; and this set-screw 35 is manipulable to vary the compression of the spring 32 and may be 30 locked in adjusted position by a nut 36. The set-screw 35 and the nut 36 are accessible for manipulation through an opening in the lever housing 15 which is normally closed by a removable plate 37, and the pivot pin 16 is normally locked to the lever 13 by means of another set-screw 38 shown in Figs. 1 and 5.

40 The lever latching rod 19 is rigidly attached to the swinging end of the lever 13 and spans the space between the side bars thereof, and the retaining latch 17 which is pivotally suspended from the pivot pin 18, is constantly urged to swing in a clockwise direction as viewed in Figs. 2, 3 and 4, by means of a coil spring 39 which embraces the pin 18 and has end portions engaging the support 8 and the latch 17 respectively. The front nose-portion 40 of the latch 17 has an arcuate or 50 inclined upper surface which is adapted to be engaged by the latch rod 19 when the lever 13 is swung into cover closing position, to thereby swing the latch 17 away from the path of travel of the rod 19, and the portion 40 also has a lower retaining surface 41 cooperable with the rod 19 during 55 sealing of the cover 11. The latch 17 also has an integral lower stop 42 which is engageable with the top of the support 8 to positively limit the forward swinging of the latch by the spring 39 when the cover 11 is open; and the rear upper portion of 60 the latch 17 is provided with an integral actuating projection 43 and with a depending wall 44, the latter of which cooperates with the rear surface of the latch to form a socket 45.

65 The latch manipulating and releasing lever 20 which is swingably suspended from the pivot pin 21, is of U-shaped formation as shown in Fig. 1, and one of the side arms of this lever 20 is provided with an outwardly extending pin 46 which is 70 engageable with the rear surface of one of the ears 28 to limit the downward swinging motion of the lever 20 as indicated in Fig. 3. The lever 20 and the cam 22 are rigidly attached to the pivot pin 21 so as to swing in unison, and the cam 22 75 which is disposed within the latch socket 45 is

interchangeably cooperable with the wall 44 and with the rear surface of the latch 17 to either retract this latch as shown in Fig. 3 or to hold the same in latching position as shown in Fig. 2.

When the improved closure unit has been prop- 5 erly assembled, adjusted and applied to a tank shell 23, the cover 11 may be opened or closed at will in the following manner. Assuming the cover 11 to be in closed and sealed condition as shown in Fig. 2, the sealing ring 12 is then pressed 10 into snug engagement with the annular seating 10 by the compression spring 32 which coacts with the cover through the lower plate 30 and reacts against the locked lever 13 through the upper plate 33 and pivot pin 16. In order to release the lever 13 preparatory to opening of the cover 11, it is only necessary to grasp the locking lever 20 and to swing the same to the position shown in Fig. 3 with the stop pin 46 in engagement with the adja- 20 cent ear 28. As the lever 20 is thus swung rearwardly, the cam 22 will rotate with the pivot pin 21 and will engage the rear latch wall 44, thereby swinging the latch 17 in a counter-clockwise direction and subjecting the coil spring 39 to additional tension. As soon as the latch 17 is thus 25 retracted and frictionally retained, the spring 32 will become effective to elevate the lever 13 slightly and to thereby release the excess pressure acting upon the resilient sealing ring 12, and the ring 12 will then expand and will rest freely upon the 30 seating 10 as indicated in Fig. 3. With the latch 17 thus positioned to clear the rod 19, the lever 13 may subsequently be swung into open position as illustrated in Fig. 4, with the web 27 engaging the stop screw 26, thereby fully opening the cover 11 35 and retaining the same in open position. The interior of the tank 23 will then be freely accessible through the opening 9, and future closing of the cover 11 may be effected by merely swinging the lever 13 so that the center of gravity of the 40 cover and main lever assembly is disposed rearwardly of the pivot 14. The cover 11 and lever 13 will thereafter drop by gravity toward closed position; and if the latch 17 and lever 20 have been pre-set as shown in Fig. 4, the descending rod 45 19 upon striking the inclined nose portion 40 of the latch 17, will automatically swing this latch rearwardly and will snap into position beneath the latch surface 41. The momentarily excessively stressed coil spring 39 will thereafter become 50 quickly effective to automatically return the latch 17 and the locking lever 20 to the position illustrated in Fig. 2. In case the latch 17 and the lever 20 have not been pre-set to the position shown in Fig. 4, but are still in the position indi- 55 cated in Fig. 3, then final latching and locking of the initially closed cover 11 may be quickly manually effected by merely swinging the lever 20 forwardly into final locking and retaining position whereupon the spring 39 will simultaneously func- 60 tion to swing the latch 17 over the rod 19.

The stop screw 26 may obviously be readily adjusted to properly position the lever 13 and the cover 11 in open position, and proper seating coaction between the ring 12 and seating 10 may be 65 conveniently effected by merely removing the plate 37, releasing the lock nut 36, and by manipulating the adjusting screw 35. If the set-screw 35 is turned to increase the compression of the spring 32 between the plates 30, 33, the sealing 70 contact between the ring 12 and the seating 10 will be increased as the lever 13 is forced into latching position, and vice versa, so that any desired sealing pressure may be obtained. The cover 11 may also be readily removed from the 75

lever 13, by merely withdrawing the set-screw 35 from the central groove in the suspension pin 16, and by subsequently releasing the retaining screw 38 and withdrawing the pin 16 longitudinally from its bearings. The stop 42 obviously limits the forward swinging motion of the latch 17, and this latch may also be manipulated independently of the lever 20 with the aid of the projection 43. If so desired, the lever 20 and the cam 22 may be completely removed, and the pin 46 normally functions to limit the rearward and downward swinging motion of the lever 20.

From the foregoing detailed description, it will be apparent that my present invention provides an exceedingly simple assemblage for automatically closing and for locking a cover in closed position. When the lever 20 is swung forwardly, the latch 17 is positively locked in closed position, and the sealing ring 12 is caused to snugly engage the seating 10 by the resilient connection between the cover 11 and the lever 13 afforded by the spring 32. The tension of this spring 32 may obviously be readily adjusted to vary the sealing pressure, and the cover 11 may be either automatically sealed or manually manipulated to effect sealing. The universal motion permitting connection interposed between the cover 11 and its supporting lever 13 is also of considerable importance since it permits the seal 12 to uniformly snugly engage all portions of the seating 10 thereby insuring tight sealing. The assemblage is obviously extremely compact and durable in construction, and all parts thereof are conveniently accessible for inspection. The particular assemblage illustrated in the drawings is especially suited for use in conjunction with streamlined vehicular tanks, and the latching mechanism is effectively protected against damage, being concealed between the side bars of the main actuating lever 13. The assemblage may also be utilized either with or without the final locking lever 20, but the use of this lever is not essential. The assemblage may moreover be built and installed as a compact unit, and may be readily applied to tanks or other containers wherein tight sealing during normal use is a prerequisite.

It should be understood that it is not desired to limit the present invention to the exact details of construction and to the precise mode of operation herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:

1. In combination, a support having an open-

ing, a lever pivotally suspended to swing across said opening, a closure cover pivotally suspended from said lever and being cooperable with said support to seal said opening, and resilient means interposed between said cover and its suspension pivot, said means being adjustable to vary the sealing pressure and the axes of the lever and cover suspension pivots being approximately parallel to each other.

2. In combination, a support having an opening surrounded by an annular seating, a lever pivotally mounted at one side of said opening for swinging movement across the opening, a closure cover pivotally suspended from a medial portion of said lever and being cooperable with said seating to seal said opening, and a spring interposed between said cover and its suspension pivot, said spring being adjustable to vary the sealing pressure and the axes of the cover and lever suspension pivots being approximately parallel to each other.

3. In combination, a support having an opening, a cover for closing said opening, a lever for swinging said cover toward said opening, a latch pivotally suspended from said support and having a retaining surface engageable with a swinging end portion of said lever to hold said cover in closed position, a spring coacting with said latch to constantly urge the same toward lever engaging position, and a locking lever pivotally suspended independently of said latch and having a locking portion engageable with said latch remote from its suspension pivot, said latch and locking lever being movable about their suspension pivots into lever engaging and retaining position by said spring when said lever and cover are swung into closed position.

4. In combination, a support having an opening, a cover for closing said opening, a lever pivotally suspended to swing said cover toward said opening, a latch pivotally suspended to swing toward said lever and having a retaining surface engageable with a swinging end portion of said lever to hold said cover in closed position, a spring coacting with said latch to constantly urge the same about its supporting pivot toward lever engaging position, and a locking lever pivotally suspended independently of said latch and having a cam portion engageable with said latch remote from its suspension pivot to positively lock the latch in lever engaging position.

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