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COVER OPERATING MECHANISM

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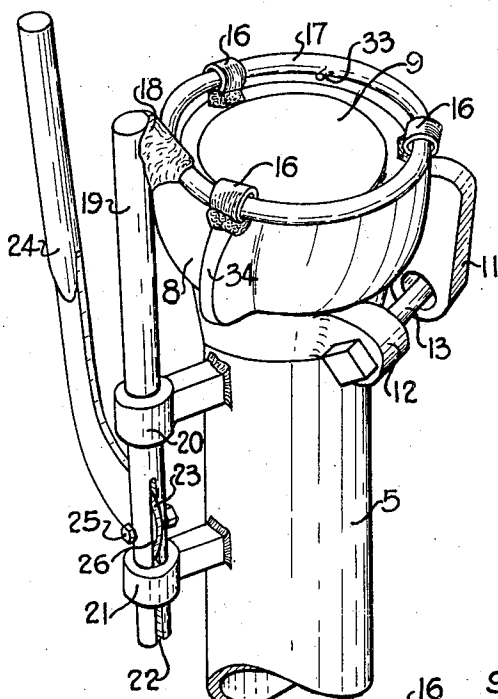


Fig 1

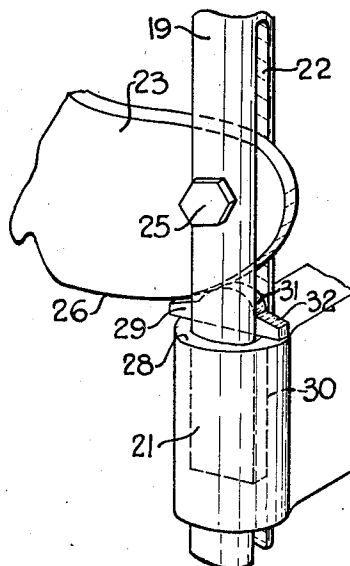


Fig 4

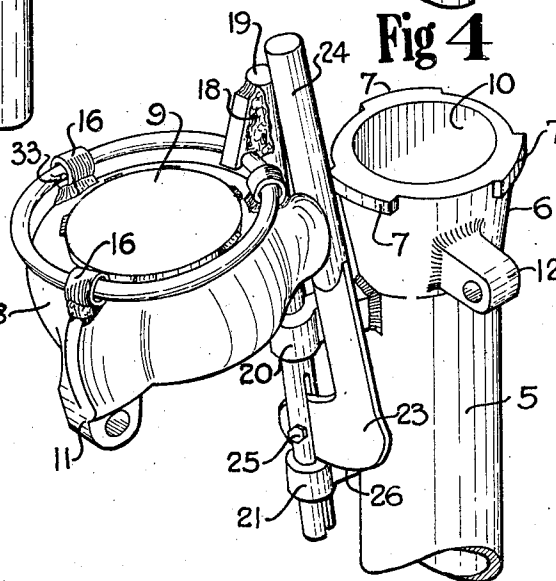


Fig 2

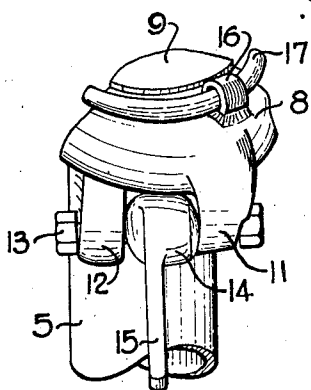


Fig 3

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COVER OPERATING MECHANISM

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7 Claims. (Cl. 220—33)

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This invention relates to mechanism for removing and carrying to one side the cover of a container or pipe, and subsequently reapplying the cover; and more particularly to mechanism of this character applied to the heavy closure of such as pipe, tanks and like containers for gas or liquid under pressure, wherein the cover is rotated in opposite directions for applying and removing the cover from pressure sealing engagement with the container opening.

Among important objects of the invention are to provide compact, simply constructed, and efficient mechanism which can be readily made integral with or be mounted on the container, and by means of which a heavy cover, such as a cap, cover plate, man-hole covering, blanking plug or the like, may be quickly and easily applied or removed by one man for covering and uncovering the access opening of a high pressure gas or liquid container; and to provide in such mechanism simplified and structurally adequate means for connecting the cover to the mechanism whereby the cover is rotatably supported from its periphery rather than from a point at or closer to its axis, whereby the central area of the cover is unencumbered and removal of the cover from the mechanism is made unnecessary for such operations as adjusting or replacing the centered plugs and other fixtures which are associated with certain closures of the class contemplated herein.

Other important objects and advantages of this invention will be apparent from the following detailed description and appended drawings, wherein specific embodiments of the invention selected only for illustration, are shown.

In the drawings—

Figure 1 is a fragmentary perspective view of an embodiment of the invention applied to a relatively large high pressure pipe, and showing the cover in place on the end of the pipe.

Figure 2 is a view similar to Figure 1 but showing the plug cap removed from and carried to one side of the pipe end by a counter-clockwise movement of the mechanism handle.

Figure 3 is a fragmentary perspective view showing a lever cam mounted on the draw bolt for rotating the plug cap in opening direction by camming apart bolt lugs on the pipe and cap, and

Figure 4 is a fragmentary perspective view on an enlarged scale showing a modification of the lifting rod and operating handle cam assembly shown in Figures 1 and 2 consisting of a removable bearing for the cam inserted in the slot of the lifting rod to take the wear of the cam instead of the lower lifting rod bracket.

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Referring in detail to the drawings, the numeral 5 generally designates a pipe, which has the end 6 provided with peripheral inclined lugs 7 which cooperate with similar oppositely inclined surfaces (not shown) within the generally cylindrical or bowl-shaped plug cap 8, whereby in a well known manner rotation of the cap engages and disengages the cap on the pipe depending on the direction of rotation, closing the pipe end 6, with its centralized plug element 9 seated in pressure sealing relation in the pipe opening 10.

The rotation of the cap toward closed position is usually accomplished by striking the radially projecting cap bolt lug 11 with a mallet so as to drive the cap around after which the tightening of the bolt 13, which passes through the apertured depending portion of the cap lug 11 and through the radially projecting pipe lug 12, is utilized to complete and maintain the desired tight closure.

The opening or loosening of the plug cap may be accomplished by loosening and removing the bolt 13 and then striking the cap lug 12 in the cap loosening direction. However, improved means in accordance with the present invention for starting the cap in the opening direction may be employed. This means consists of a starter comprising a rotary double-ended cam 14 turning on the bolt 13 between and acting upon the cap lug 11 and the pipe lug 12 to force them apart when its lever 15 is swung downwardly from a substantially horizontal position to the vertical position shown in Figure 3 of the drawings. The starter is easily removed when the bolt 13 is removed from the lugs preparatory to completing the opening rotation of the cover.

The cover or plug cap 8 has a suitable number of bearing sleeves 16 secured, as by welding, at circumferentially spaced intervals around its periphery preferably at its upper end in a substantially concentric circle, which sleeves slidably receive corresponding circumferential portions of a carrier ring 17, with sufficient looseness to provide for limited lateral and vertical relative movement of the ring and cap facilitating the operation of the mechanism and the seating and unseating of the cover.

The carrier ring is rigidly secured by a bracket 18 to one side of the upper extremity of the vertical lifting or withdrawing shaft 19, whose lower part is slidably and rotatably confined in the upper and lower guides 20 and 21, respectively, which are fastened to the side of the pipe 5 below the end 6.

The lower part of the lifting shaft 19 is slotted as at 22 to accommodate the lifting and lowering

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plate cam 23, forming the laterally projecting lower end of the operating handle 24, the cam being pivoted on a pin or bolt 25 passing through the lifting shaft and across the slot 22. In the arrangement shown in Figures 1 and 2, the lobe 26 of the lifting cam bears on the circular top 28 of the lower guide 21, so when the handle 24 is pulled outwardly and downwardly, from the position shown in Figure 1, the cap 8 is lifted from the pipe end 6. The cam lobe 26 also bears on the top of the guide 21 when the handle is swung counterclockwise in its depressed position to carry the lifted cap 8 from the pipe end to one side of the pipe. The cap is lowered to the out of the way position at one side of the pipe shown in Figure 2 of the drawings, by raising the handle 24.

In order to reduce wear on the cam and on the guide 21, a bearing 29 may be used which has a flat shank 30 inserted in the lifting shaft slot 22 and a crosshead which includes an arcuate surface 31 on which the cam lobe 26 bears, and lateral cams 32 projecting to rest slidably on the circular top 28 of the guide 21.

To restore the cap 8 from the position shown in Figure 2 to a position on the pipe end 6, the handle 24 is depressed so as to lift the cap 8 to its elevated position and is then swung clockwise until the cap 8 is aligned with the pipe end 6, whereupon the handle 24 is again raised so as to drop the cap 8 into position on the pipe end to be rotated into closing and sealing relation to the pipe end in the manner described hereinabove.

A stop pin 33 is provided on the carrier ring 17 between two adjacent sleeves 16, so that rotation of the cap 8 in the opening direction is limited, after the cap has been freed from the pipe end, to an arc slightly greater than the length of the inclined lugs 7. The side of the cap 8 has a radial lug 34 so placed with respect to the stop pin 33 that as the cap is swung clear of the pipe end and lowered alongside of the pipe, as shown in Figure 2, the lug 34 will engage the upper part of the lifting shaft 19, whereby rotation of the cap on the carrier ring 17 in the counter-clockwise or opening direction beyond the point at which the internal lugs (not shown) of the cap will be positioned between the pipe end lugs 7 when the cap is returned to alignment with the pipe end, is prevented. Because of these arrangements, the cap when returned to axial alignment above the pipe end has its lugs in position with respect to the pipe end lugs 7, so that when the cap is lowered, it can be rotated to sealing position without further manipulations.

While I have illustrated and described what I now regard as a practical and efficient construction for the embodiment of the proposed improvements, it is to be understood that the form of construction shown is to be deemed merely illustrative and as susceptible of various changes or modifications within the spirit and scope of my invention.

Having described my invention, I claim:

1. In mechanism for raising and moving a container cover to one side of an opening in the container, the cover being of the type requiring to be axially rotated into and out of engagement with the access opening, a lifting shaft mountable on the container at one side of the opening for longitudinal movement on its axis, a carrier ring secured at one side to said lifting shaft and overlying said cover, and a plurality of sleeves on the periphery of the cover arranged in a circle substantially concentric with the axis of rotation of the cover, said sleeves slidably receiving cir-

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cumferential portions of said carrier ring whereby said cover is rotatably carried by said carrier ring, and operating means comprising means for raising and lowering said lifting shaft.

2. In mechanism for raising and moving a container cover to one side of an opening in the container, the cover being of the type requiring to be axially rotated into and out of engagement with the opening, a lifting shaft mountable on the container at one side of the opening for longitudinal and rotary movement on its axis, a carrier ring secured at one side to said lifting shaft and overlying said cover, and a plurality of sleeves on the periphery of the cover arranged in a circle substantially concentric with the axis of rotation of the cover, said sleeves slidably receiving circumferential portions of said carrier ring whereby said cover is rotatably carried by said carrier ring, and operating means comprising means for raising and lowering said lifting shaft, and means for turning said lifting shaft on its axis while in its elevated position for carrying said cover from a position of alignment with said opening to the aside position and return.

3. In combination, a container provided with an opening, a removable cover for said opening, means operable on rotation of the cover to engage and disengage the cover to the container depending on the direction of rotation, operating mechanism for the freed cover, comprising a lifting shaft, bracket means on the container in which said shaft is mounted for vertical and rotary movement on its axis, a carrier ring fixed to said shaft and overlying said cover, a plurality of sleeves arranged on the cover in a circle concentric therewith and slidably encircling portions of said carrier ring rotatably connecting the cover to the ring, a handle lever having a cam end pivoted on said lifting shaft, the cam positioned to bear upon a portion of said bracket means when the handle is rotated about its pivot vertically to raise and lower the freed cover relative to the opening and so horizontal rotation of the handle rotates the raised lifting shaft on its axis to move the cover laterally relative to the opening.

4. In combination, a container provided with an opening, a cover adapted to be axially rotated into and out of closing relation with the opening, means for lifting said cover away from said opening and replacing the cover therein, said means comprising a lifting shaft, a carrier ring secured to said shaft and overlying said cover, and sleeve means on the cover slidably embracing circumferential portions of said carrier ring so as to connect the cover to the ring and permit the cover to be rotated relative to the ring into and out of closing relation to said opening.

5. In cover lifting mechanism for a container cover or the like, a lifting shaft adapted to be connected to the cover, guide means supporting said shaft for vertical and rotary movement on its axis, a handled lifting cam positioned in a slot formed in said shaft, the cam being pivoted to the shaft on a horizontal axis, and a bearing comprising a shank positioned in said slot beneath said cam, said bearing having a crosshead including arms projecting from opposite sides of the slot and slidably resting upon a portion of said guide means and a cam surface upon which the cam bears when moved on its pivot for raising and lowering said lifting shaft.

6. In combination, a container provided with an opening, a cover adapted to be axially rotated into and out of closing relation to said opening,

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means for lifting said cover away from said opening and replacing the cover therein, said means comprising a lifting shaft, a carrier ring secured to said shaft and overlying said cover, and sleeve means on the cover slidably embracing circumferential portions of said carrier ring so as to connect the cover to the ring and permit the cover to be rotated relative to the ring into and out of closing relation to said opening, said carrier ring being of substantially the same diameter as said cover and arranged coaxially therewith.

7. In combination, a container provided with an opening, a cover adapted to be axially rotated into and out of closing relation to said opening,

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means for lifting said cover away from said opening and replacing the cover therein, said means comprising a lifting shaft, a carrier ring secured to said shaft and overlying said cover, and sleeve means on the cover slidably embracing circumferential portions of said carrier ring so as to connect the cover to the ring and permit the cover to be rotated relative to the ring into and out of closing relations to said opening, said carrier ring being provided with stop means cooperating with said sleeve means to limit the rotation of said cover.

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