

- [54] **PRESSURE VESSEL SEAL AND LOCK**
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[51] Int. Cl.² **B65D 45/28**

[58] Field of Search 220/314, 94, 243, 244, 220/247; 292/256, 256.5, 259, 257

[56] **References Cited**

UNITED STATES PATENTS

2,400,614 5/1946 Vivian..... 220/314

2,823,825 2/1958 Coffman 220/314
 3,045,861 7/1962 Dieter 292/257
 3,268,254 8/1966 Vantroba 220/314
 3,760,743 9/1973 Walk..... 220/314

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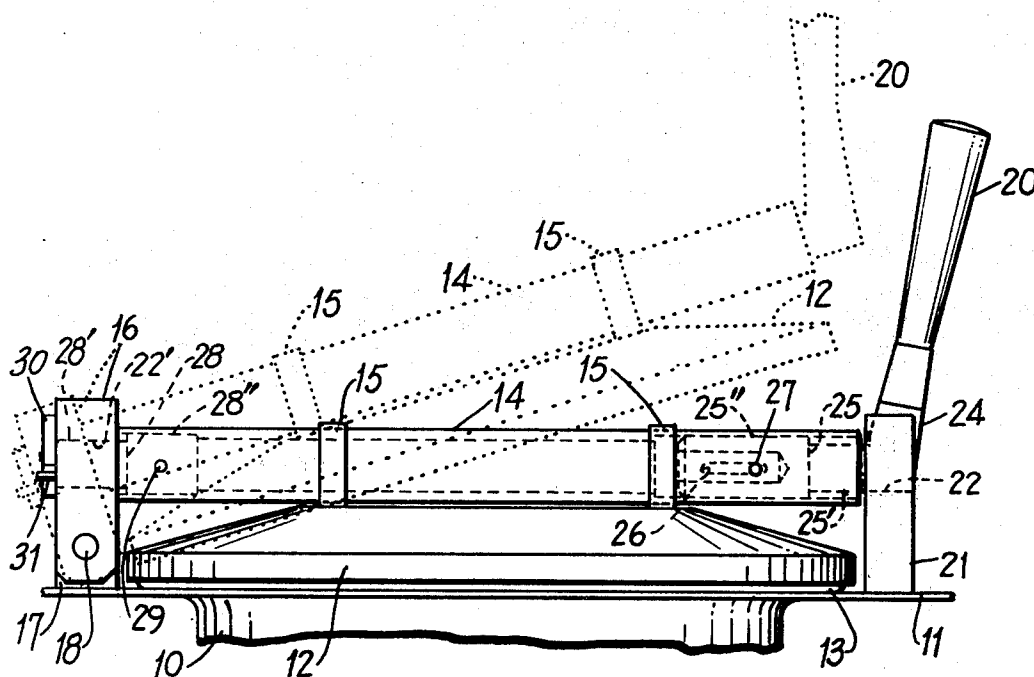
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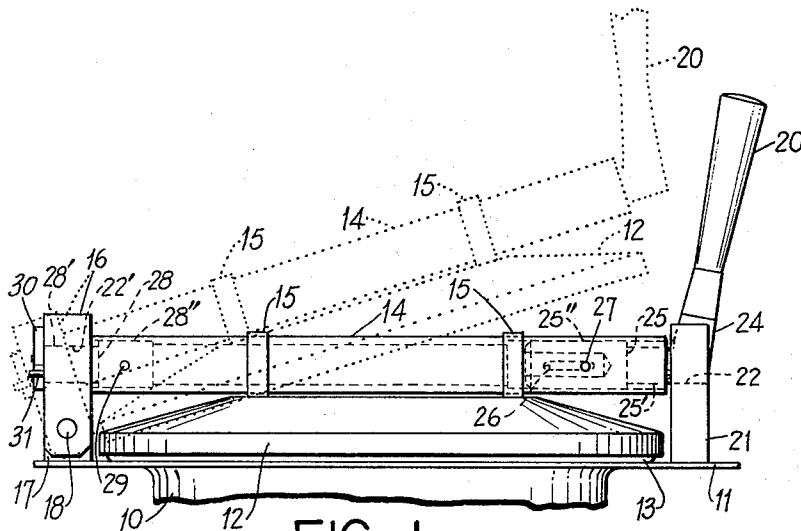
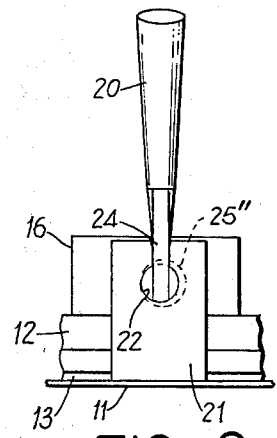
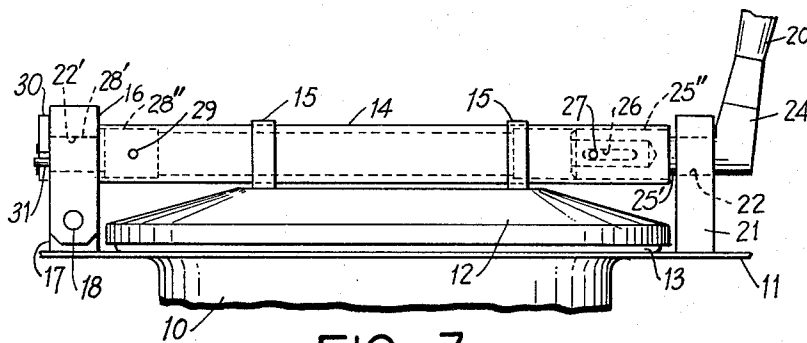
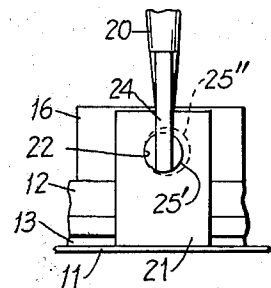
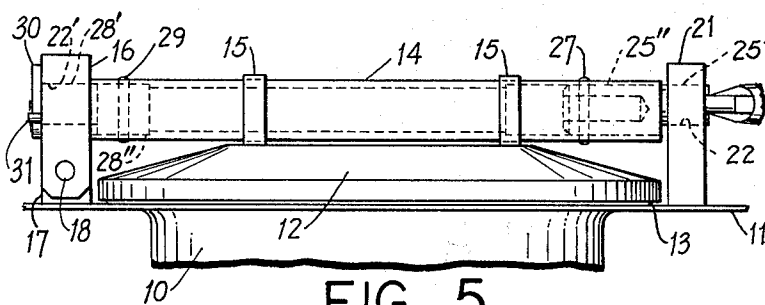
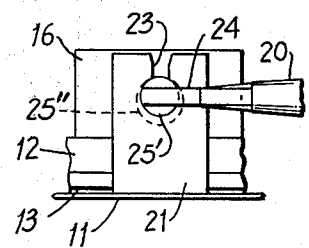
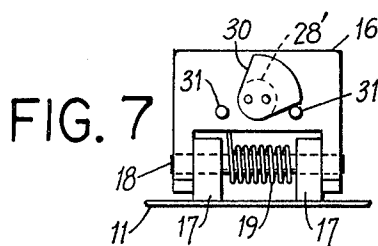
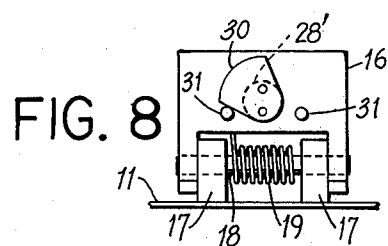
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ABSTRACT

The lid of a pressure vessel is sealed and locked closed by a handle which requires two distinct movements, one to break the seal, and the other to open the lid.

3 Claims, 8 Drawing Figures





PRESSURE VESSEL SEAL AND LOCK

This invention relates to sealed closures for pressure vessels, and more particularly, to a safety handle mechanism which requires two distinct movements, one to break the seal and the other to open the closure.

A preferred form of the invention is illustrated in the attached sheet of drawing in which:

FIG. 1 is a side view of the device showing the parts in position to permit opening the cover;

FIG. 2 is a FIG. 1 right-hand end view;

FIG. 3 is another side view showing the cover locked closed, but not yet seal closed;

FIG. 4 is a FIG. 3 right-hand end view;

FIG. 5 is still another side view showing the cover locked and seal closed;

FIG. 6 is a FIG. 5 right-hand end view;

FIG. 7 is a left-hand end view corresponding to FIGS. 1 and 3; and

FIG. 8 is a left-hand end view corresponding to FIG. 5.

In the drawings the upper open end of a pressure vessel 10 is illustrated as being surrounded by a rim or flange 11. A lid or cover 12 having a compressible ring seal 13 is adapted to be safety lock seal closed on to the rim or flange 11.

The lid 12 is suspended off a tube 14 which extends through a pair of rings or collars 15 fixed to the top of the lid. Tube 14 is free to turn in the collars 15.

At its left-hand end, tube 14 is mounted to a hinge block 16. Hinge block 16 is pivoted on a pair of spaced lugs 17 fixed to flange 11. The block 16 and lugs 17 are hinged together by a pin 18. A spring 19 (see FIG. 7) surrounds the pin 18 and is for purposes of putting an opening bias on the block 16 in order to counteract some of the weight of the cover.

At its right-hand end the tube 14 is provided with a handle 20. Handle 20 cooperates with another block 21 fixed to the flange 11 diametrically opposite to the hinge block 16.

Block 21 has a circular hole 22 which is intersected by a top slot 23, see also FIG. 6. The inner or lower end of the handle has a flat 24 which fits in the slot 23.

Connected to the lower end of handle 20 in front of the flat 24 is a stepped cylindrical member 25. Member 25 extends into the tube 14, but at times also operates in the hole 22 in block 21.

Briefly, member 25 comprises a right-hand end portion 25' and a larger left-hand end portion 25''. A close ended slot 26 extends diametrically through part 25'' and a pin 27 extends through tube 14 into slot 26. This connects member 25 and tube 14 together so that they turn together, but member 25 is free to slide lengthwise with respect to the tube 14 for the length of slot 26.

The part 25' has a snug fit in the hole 22 when the member 25 is pulled to the right by handle 20. Both the hole 22 and part 25' are circular in outline and concentric with respect to each other. Part 25'' is also circular in outline, but it is eccentric with respect to the hole 22 and part 25'. Therefore, when part 25' is in the hole 22 and the handle 20 is rotated to turn the part 25' within the hole 22, the tube 14 will be lowered or raised slightly to make or break the seal. This is due to the eccentricity of the part 25''.

The left-hand end of tube 14 is mounted to the block 16 by a similar stepped cylindrical member 28, but without the toggle 26, 27 as with the handle stepped

member 25. That is to say, the stepped member 28 has two parts 28' and 28''. The part 28' is concentric in a hole 22' in block 16, whereas the larger part 28'' is eccentric. Part 28'' is inside the tube 14 and keyed thereto by a pin 29 so as to turn therewith.

Thus, the two parts 25' and 28' and the two holes 22 and 22' in blocks 21 and 16, respectively, are all circular in outline and on the same axis of rotation. However, since the parts 25'' and 28'' are offset or eccentric with respect to that axis of rotation, the cover is raised and lowered slightly to break and make the seal when the parts 25, 14, 28 are rotated by the handle 20.

Actually, the handle 20 is permitted only 90 degrees of rotation. This is accomplished by a cam 30 on the part 28' which operates against two stops 31 on the block 16, see FIGS. 7 and 8. When the handle is rotated down 90°, the device is in seal locked closed position. When it is rotated up 90°, the seal is broken, and then if the handle is then also pushed in, the cover is unlocked so that it can be hinged to open position as shown in dotted lines in FIG. 1.

A sequence of operations will now be described. In FIG. FIGS. 2, 7 the parts are shown so that the seal is broken, the cover is unlocked, and only the flat 24 of the handle is in the hole 22 so that the cover can be hinged open by raising the handle 20. Now in order to lock the cover closed, the parts are placed in the FIGS. 3, 4, 7 position. FIG. 7 has not changed, but FIGS. 3 and 4 have from FIGS. 1 and 2. Briefly, the handle 20 has been pulled out to pull the part 25, which is like a rotatable lock bolt or cam, into the hole 22. Now to make the seal, that is to say, to compress the gasket 13, one must go to the FIGS. 5, 6, 8 position. Thus, the handle is rotated from its up position in FIGS. 3 and 4 clockwise to its down position in FIGS. 5 and 6. It was heretofore stated that parts 22, 25', 28' and 22' are all concentric on the same axis of rotation, whereas the parts 25'', 14, and 28'' are eccentric. The eccentricity is such that when the handle is up the cover is raised, and when it is down, it is lowered. Thus, the parts 25' and 28' in a sense are aligned bearings for the eccentrics 25'' and 28'' when the handle 20 is turned.

To break the seal and open the device, the reverse procedure is followed. First the handle is raised. This breaks the seal. However, in order to open the cover, another distinct movement is required, and that is to push the handle in so that the cam lock 25' is out of the hole 22. It is only at that time that the handle can be raised.

Besides being relatively uncomplicated and low in cost, the device provides a distinct safety feature. For example, in pressure cooking vessels at the end of the cooking cycle, it is common to have a valve open to relieve the internal pressure. However, sometimes there is residual pressure, and when the cover is opened, it flies open in a dangerous manner. With the invention this cannot happen because the residual pressure has to be first relieved by breaking the seal (FIGS. 5 to 3) before the cover can be opened (FIGS. 3 to 1). It should be noted that in the invention, it is very difficult, if not impossible, to open the cover without the main pressure having been first relieved. This is because in the FIG. 5 position of the device tremendous bearing pressures are placed on the part 25' during the cooking cycle, so that it is almost physically impossible to turn part 25' within hole 22 until after the main pressure has been relieved. Additionally, the parts are arranged so that an operator is compelled to follow the proper pro-

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cedure. In FIG. 1 the handle cannot be turned until it is first pulled out to place part 25' in the hole 22. Thereafter, because of the cam stop and stops 30, 31, the handle can be turned only in the one correct direction. The same applies for the opening sequence. The handle cannot be moved except first in the correct up position to first break the seal to relieve the residual pressure. Only after this has been done can the lid be opened, but this requires the distinctly different movement of pushing the handle in. Neither movement can be bypassed. For example, the handle cannot be pushed in to open the cover without first breaking the seal, because before the handle can be pushed in, it must be first rotated to line up the flat 24 with the slot 23. Similarly, the cover cannot be sealed closed without also locking it shut, because before the handle can be turned down, it must first be pulled out to remove the flat 24 from the slot 23 which, of course, puts the cam 25' in the hole 22 to lock the cover shut.

I claim:

1. A mechanism for sealing and locking a cover to an opening, said mechanism comprising a block on opposite sides of said opening, a cylindrical hole in each of said blocks, said holes being aligned on a common axis, a cylindrical tube extending between said blocks, a cylindrical bearing in each of said holes, cylindrical eccentrics on each of said bearings extending into opposite ends of said tube, means connecting said eccentrics to said tube whereby said bearings, eccentrics and tube rotate in unison, means rotatable with respect to said tube for suspending said cover off said tube, one of said blocks having pivotal mounting for hinged movement

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away from said opening, the bearing in the other of said blocks being adapted for sliding movement into and out of the same, and handle means connected to said last mentioned bearing to either rotate the same in its block or to move it in and out of its block.

2. In a mechanism, as in claim 1, said handle means being connected to said last mentioned bearing at the end thereof opposite its eccentric by a flat portion, a slot in the block of said last mentioned bearing intersecting its hole, and said flat handle portion being adapted to exit and enter said slot as said last mentioned bearing moves in and out of its block respectively.

3. In a mechanism, as in claim 2, a compressible seal located between said cover and opening, wherein said handle means can be operated to rotate said last mentioned bearing to turn said eccentrics to lower said cover on said opening to make said seal only after said handle flat portion is first pulled through said slot to position said last mentioned bearing in its block to lock said cover closed with respect to said opening, whereby said handle means must first be rotated to align said flat portion with said slot before said last mentioned bearing can be moved out of its block to unlock said cover wherein said seal is always first broken and then said cover unlocked by two distinctly different movements, first a rotary one, and then a linear one, whereby said last mentioned bearing, handle flat portion, and block with slot operate as a sequential safety lock for said mechanism.

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