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3,360,155

RAPID SEAL CLOSURE FOR CONTAINERS

Filed Jan. 4, 1966

Fig. 2.

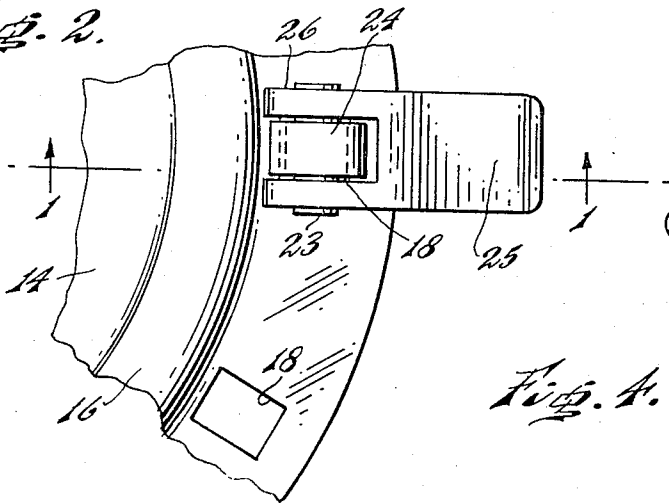


Fig. 4.

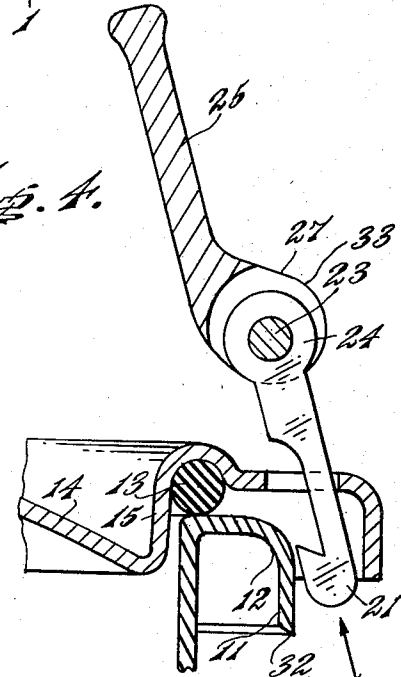


Fig. 1.

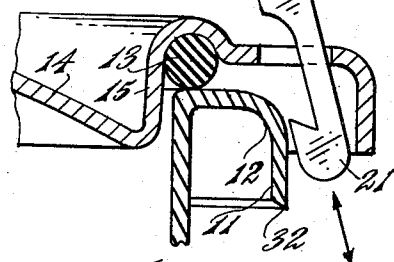
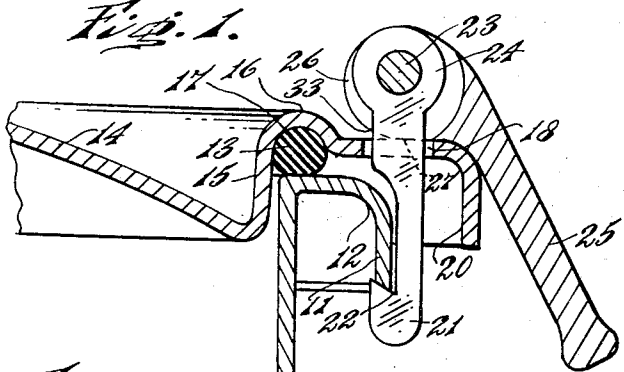


Fig. 3.

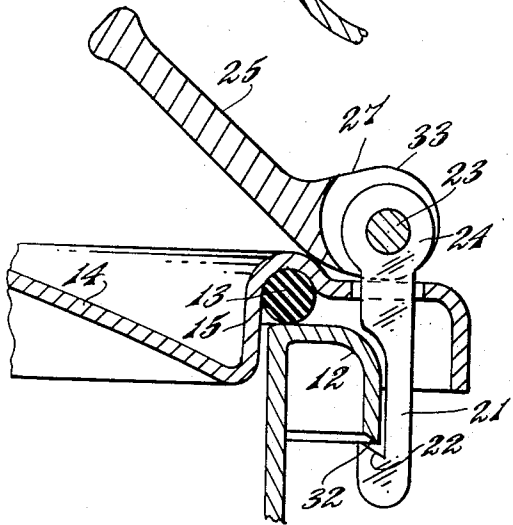
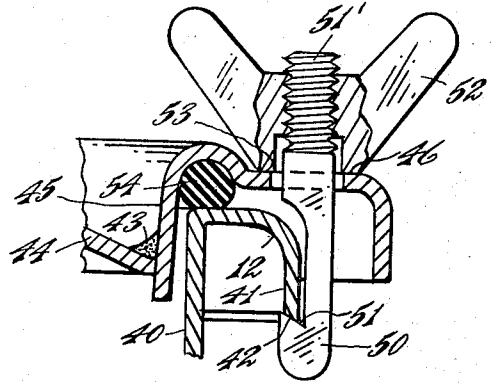


Fig. 5.



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**RAPID SEAL CLOSURE FOR CONTAINERS**  
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### ABSTRACT OF THE DISCLOSURE

In the rapid seal closure of the invention, container and lid have respective flanges extending outwardly and downwardly with the lid flange extending outwardly beyond the container flange whereby an annular space is formed between the downwardly extending portions of the respective flanges. A number of quick acting clamps, each in the form of a shaft and having a notch at the lower end and tightening means at the upper end, extend through holes on the lid flange and hook onto the container flange. The clamping force between the flanges is along the longitudinal axis of the shaft.

This invention relates to closure members for container lids and more particularly to a quick-acting and rapidly sealing clamping means for resiliently locking a closure lid with respect to a container.

A purpose of this invention is to provide a means for quickly clamping and sealing a closure lid to a container.

A further purpose of this invention is to provide a quick clamping means that can be quickly disengaged for removal of the closure lid.

A further purpose of this invention is to provide a positive quick-acting clamp that locks in place.

A further purpose of this invention is to provide a quick-acting locking clamp that can be completely separated from the closure lid and the container permitting effective treatment such as sterilization of the lid and the container free of the clamping means.

A further purpose of this invention is to provide a flanged container neck and an apertured container lid for co-operation with the quick-acting clamping lock.

A further purpose of this invention is to provide a notched element in the quick-acting clamp adapted to grip under the flange neck of the container.

A further purpose of this invention is to provide a lever actuated cam surface on the clamping lock that pulls the notched element under the flanged neck of the container and forces the closure lid down against a resilient sealing member.

A further purpose of this invention is to provide a flat surface adjacent the cam surface on the clamp to lock the closure lid in a sealed position.

A further purpose of this invention is to provide a threaded wing nut that pulls the notched element up under the flanged neck of the container forcing the closure lid down against the container in a sealed and locked position.

A further purpose is to provide a quick-acting closure clamp which can be used on any capacity container ranging from a few gallons up to several hundred gallons.

A further purpose is to provide a quick-acting closure means for a container wherein the opening of the container can range from a few inches in size to at least an opening five feet in diameter or its equivalent area of opening of any other shape.

Further objects and purposes will be apparent in the following description of the drawings wherein like numbers designate like parts.

FIGURE 1 is a fragmentary sectional view taken along the line 1-1 of FIGURE 2 of a closure lid sealed with

respect to a container by the quick-acting clamp shown here in locked position.

FIGURE 2 is a fragmentary top plan view of the clamp of FIGURE 1.

FIGURE 3 shows the clamp disengaged from the container in position for clamping and locking upon the application of leverage to the cam lever.

FIGURE 4 shows the clamp in position for removal or separation from the closure lid and the container, the position also being the same for insertion of the clamp through the lid.

FIGURE 5 is a fragmentary sectional view of an alternative form for the quick-acting clamp, especially suited to large containers.

In the chemical processing industries extensive use is made of containers of various shapes and sizes made of various materials for processing chemical compounds and other substances. These containers may be stationary or capable of being rocked or agitated in a suitable system. They may extend vertically or horizontally, and may have a cylindrical, square, rectangular or polygonal cross section and may be constructed of any suitable metal such as for example stainless steel, copper, low carbon steel or coated metals and even non-metals such as plastics. These containers all have an opening which is normally of a substantial dimension so that one can readily acquire access to the interior of the container. Typical openings in the containers will range from a few inches up to several feet and beyond, depending on the size and function of the containers, the lids varying anywhere up to five feet in diameter. The closure lids may be of any desired shape also, such as for example cylindrical, square, oval, triangular, etc.

The containers may be pressure vessels capable of being subjected to increased pressures or vacuums and hence need to be securely sealed against leakage either from within or from without. Because the containers are used in chemical process industries they should be constructed in such a manner which allows them to be easily and readily cleaned, including any necessary sterilization treatments.

In the prior art many types of opening arrangements of various configurations have been used. These range from simple nut and bolt to step threaded arrangements such as used in the chambers of artillery weapons. A common closure member is composed of a bolt permanently welded to the container pivoting on a hinge and extending through a slot on the container into matching slots in the flange of the lid, a nut threaded on the bolt thereby locking the lid in place.

According to the present invention, applicant provides a quick-sealing pressure container by providing a flanged neck on the container having a lid preferably flanged and sealed thereto by a plurality of individual and separable clamping units. These units protrude through apertures in the lid and grip under the flange of the container. A tightening means on the clamp rapidly forces and locks the lid against the container in a sealed manner by either the quick and simple application of leverage to a lever rotating a cam toward increasing radii, or by the application of torque to a wing nut.

The clamping element shown in FIGURES 1 to 4 is preferably used on relatively small necked containers which can have an opening ranging up to approximately two feet in diameter or the equivalent area of any other shape. With respect to these figures the bottle or container 10 has an outwardly and downwardly extending flange 11 integral therewith maintaining the same thickness throughout. The downwardly extending portion of the flange is preferably vertical, with a large radius of curvature 12 between the outwardly and downwardly

extending portions. The closure lid 14 comprises an upwardly extending flange 15 and an outwardly extending flange 16, the meeting of these flanges being rolled to create a seat 17 for a resilient annular gasket 13. The gasket may be made of rubber, synthetic rubber or any suitable resilient material. The gasket is preferably stretched about the flange 15 to hold it within seat 17 when the lid is removed and may be permanently attached thereto. Around the periphery of the lid and on the flange 16 are a plurality of rectangular shaped apertures 18 adapted to receive the quick-clamping bolts, the apertures being disposed directly above the flange 11 on the container when the lid is properly in place.

The flange additionally includes a downwardly extending portion 20, preferably perpendicular thereto, in order to extend the edge of the lid below the level of the gasket.

The clamp comprises a straight square shaft 21 adapted to fit loosely within the aperture 18 having a notch 22 therein on one side and at one end adapted to grip the under side of the flange of the container or bottle. Pivotaly mounted at 23 to the cylindrical head 24 of the shaft 21 remote from the notched end is a cam lever 25 having integral therewith cam surface 26 and a flat surface 27. The cam lever is preferably bifurcated at 28 and pivoted about both sides of the head 24, thus providing a dual cam surface as best seen in FIGURE 2. The head 24 of the shaft is preferably larger than the shaft in order to provide adequate support for the pivot 23, the flat surfaces 30 of the head riding between the bifurcated portions of the cam lever.

In the operation of the clamping means with the lid properly centered on a container, the shaft 21 of the clamping bolt is extended through the apertures 18 in the lid at an angle to the vertical as shown in FIGURE 4. The apertures 18 must be large enough in one direction to accommodate the shaft of the clamp in a slanted position so that it can slide by the flange 11 of the container, but should be narrow enough in the other direction to permit the cam surfaces of the lever to ride against the top of the lid. The shaft is then straightened so that the notch 22 is placed beneath the flange 11. The bottom surface 31 of the notch is preferably slanted at the same angle as the bottom edge 32 of the flange 11 so that the parts mate together as shown in FIGURE 1. With the cam lever now in the position as shown in FIGURE 3, the minimum radius of the cam surface now being engaged with the closure lid, leverage is applied to the lever in a clockwise direction. This moves the cam toward increasing radius against the flange 16 of the closure lid thus drawing the notch up into tight engagement with the flange 11. Further rotation of the cam lever forces the lid down against the resilient element 13 and into a sealed position with respect to the container. Rotation of the lever beyond the highest point or point of maximum radius 33 will bring the flat surface 27 into engagement with the lid, the flat tending to keep the lid in a sealed and locked position.

As can be readily seen from the drawings, counterclockwise movement of the cam lever will release the lock from its engagement with the flange and on being slanted outwardly can be removed through the apertures in the lid.

It should be noted that the locking action is applied in a vertical direction along the edge of the flange 11 rather than against a flat surface, thus further tending to maintain the lid in a positively sealed and locked position. The bottom of the notch 31 is preferably disposed along the center line of the shaft 21 so that when the clamp is engaged, a direct axial force is applied against the flange without any component forces being dissipated in other directions due to a tilting or offset of the shaft. Preferably, the lid includes a vertical flange 20 which may also have a slight flare outwardly or no flange at all. However, if a flange is provided it should avoid inter-

ference with the quick clamping bolt during its insertion and removal.

The aperture is preferably rectangular and the shaft square since the locking effect does not depend on the rotation of the clamp, but they may be of any other desired shape such as cylindrical, triangular, oval, etc. so long as the shaft fits loosely within the aperture. It can be seen that this is a self-tightening clamp, as the lid will be forced up against the clamp under the influence of any pressure within the vessel and also due to the resiliency of the gasket.

In FIGURE 5 is shown an alternative form of the invention for larger size containers 40 having relatively large necks also comprising an outwardly and downwardly extending flange 41 similar to flange 11 of container 10 with a gripping surface 42. The lid 44 includes an upwardly extending flange 45 which may be part of the lid but preferably would be a separate piece welded thereto at 43 and including an outwardly extending flange 46, having apertures 47 therein disposed around the periphery above the rim of the container with a downwardly extending flange 48.

The clamping lock comprises shaft 50 with notch 51 therein adapted to grip under the rim 41 and a threaded portion 51' for engagement with the wing nut 52, the nut having lands 53 for engagement with the flange surface 46. After insertion of the shaft through the aperture 47 which is also rectangular in shape to permit insertion of the clamp and the proper positioning of the notch with respect to the rim, application of torque to the wing nut draws the notch into engagement with the rim and forces the lid down against a resilient sealing element 54 thus locking the lid with respect to the container. The resilient element 54 is disposed between the container and the lid in the same manner as described above with respect to the cam operated clamping bolt, the seat 55 preventing the element from being squeezed out by the application of pressure to the lid. The shafts 50 are preferably square but they may be cylindrical or of any other shape desired with suitable shaped apertures in the lid or cover 44.

In both of these embodiments it can be seen that a wedged or tapered notch is used to clamp and lock the lid which is an anti-slip type of arrangement wherein any pressure in the container has a tendency to further engage the clamp and hence the possibility of failure of the quick-acting and rapidly sealing clamp is very remote.

In view of my invention and disclosure, variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art to obtain all or part of the benefits of my invention without copying the structure shown and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A closure member for containers having an outwardly and downwardly extending flange, in combination with a closure lid for the container having a plurality of rectangular shaped apertures therein spaced about the periphery of the lid, with resilient sealing means disposed between the lid and the container, the closure member comprising a square shaped shaft adapted for loose engagement through the aperture in the direction of the long side of the rectangular apertures, the shaft having a notch on one side adapted to engage the flange of the container, the notch extending upwardly beyond the flange thereby permitting the shaft to slide past the flange at an angle to the closure lid, a bifurcated cam lever rotatably mounted about the shaft above the lid having a cam surface and a flat surface adjacent the point of maximum radius of the cam surface, whereby rotation of the cam lever toward maximum radius pulls the notch up into engagement with the flange of the container and forces the lid down against the resilient sealing means, the

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flat surface subsequently locking the lid with respect to the container.

2. A rapid seal closure comprising in combination:

(a) a first flange on a container including outwardly and vertically downwardly extending portions integral with the container,

(b) a second flange on a closure lid including outwardly and downwardly extending portions, the outwardly extending portion of the second flange extending radially outwardly of the outwardly extending portion of the first flange, and the downwardly extending portion of the second flange extending circumferentially around the downwardly extending portion of the first flange, thus forming an annular space between said downwardly extending portions,

(c) a resilient seal extending annularly between the outwardly extending portions of the first and second flanges respectively,

(d) apertures circumferentially spaced in the outwardly extending portion of the second flange,

(e) and a plurality of locking clamps individually passing through the apertures and adapted to engage the bottom of the downwardly extending portion of the first flange, said clamp comprising a shaft, a notch in the shaft at one end thereof, and tightening mounted onto the shaft at the end re-

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mote from the notch and above the outwardly extending portion of the first flange,

wherein the clamping force to hold the lid to the container extends from the outwardly extending portion of the second flange to the bottom of downwardly extending portion of the first flange along the longitudinal axis of the clamp shaft.

3. A closure of claim 2, wherein the tightening means comprises a cam lever rotatably mounted to the shaft having a cam surface and a flat surface thereon adapted to respectively force and lock the lid against the container as the cam lever rotates with respect to the shaft.

4. A closure of claim 2, wherein the tightening means comprises a nut threaded thereto whereby the application of torque to the nut forces and locks the lid to the container.

References Cited

UNITED STATES PATENTS

20 1,480,544 1/1924 Cox ----- 220—55

FOREIGN PATENTS

1,070,380 2/1954 France.

6,005 9/1903 Denmark.

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