

March 19, 1968

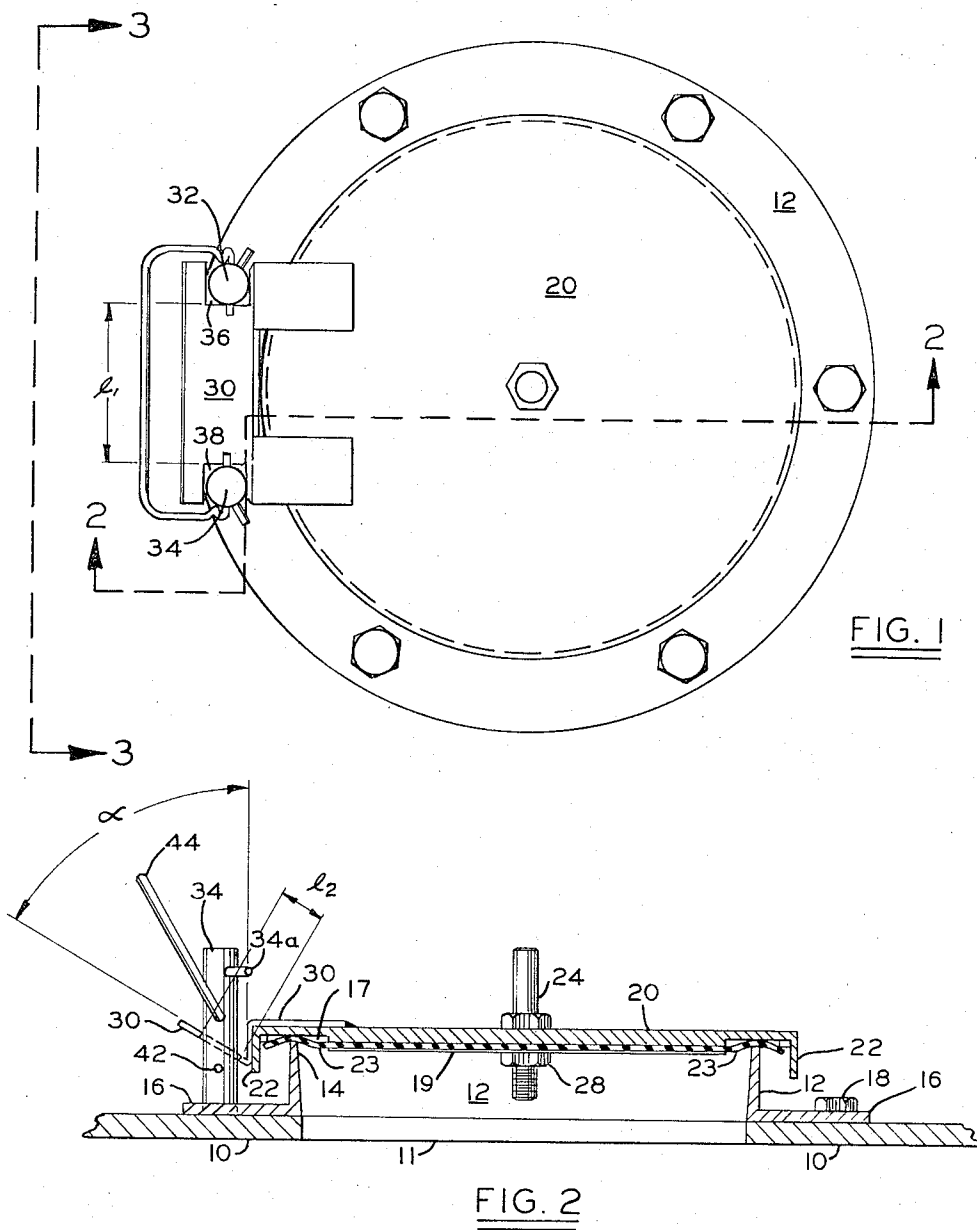
E. DUNKELIS

3,373,893

FLOATING HINGED COVER

Filed March 2, 1966

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

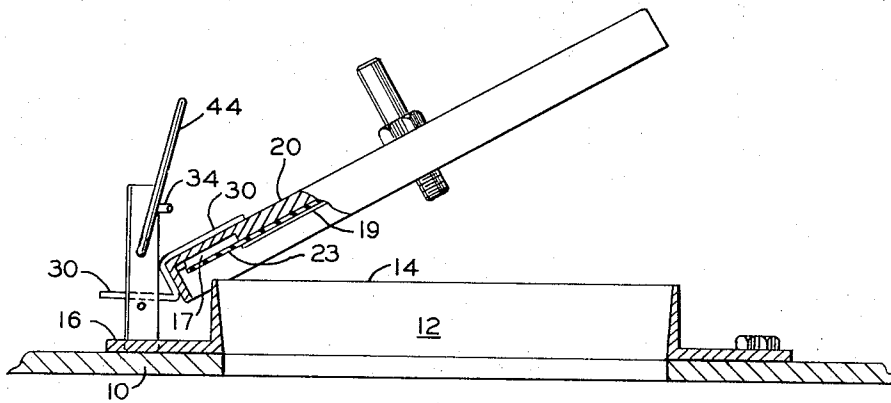


FIG. 2a

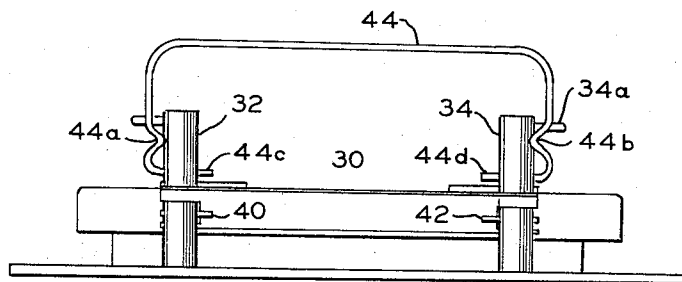


FIG. 3

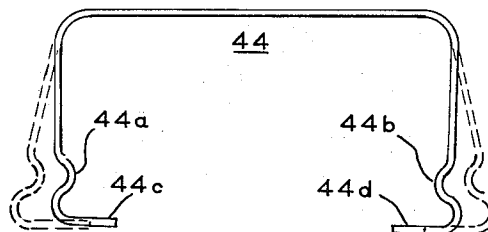


FIG. 3a

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## FLOATING HINGED COVER

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8 Claims. (Cl. 220—38)

This invention relates to a closure construction, and more particularly to a hinge arrangement for a floating cover, such as the valve hole covers used on liquid storage tanks. Such covers are frequently provided with seals to close the tank from atmosphere until and unless the tank pressure (or vacuum) exceeds a desired magnitude. Examples of such valve-type covers are shown in Patents 2,732,856 and 3,074,590. The pressure or vacuum at which such a cover permits exhaust or aspiration is usually determined by the weight of the cover or by selection of weights placed on the cover.

In order that such covers seat evenly all around their rather extensive peripheries, it is necessary that any hinge attached to the cover not apply forces to the cover which interfere with proper sealing. Such valve-type covers and seals move straight up and down vertically in moving between slightly open and fully closed positions, and it has been difficult to provide an economical cover hinge which does not interfere with valve action. Thus it is a primary object of the present invention to provide an improved hinge mounting for a valve or seal-type cover which will allow necessary vertical cover motion without interference from the hinge mounting.

In order that the seals carried by such covers may be inspected (and replaced if necessary), and in order that the seat for such seals on the tank may be cleaned, it is highly desirable that such covers be removable. It has been even more difficult to provide a hinged cover with such a mounting that it may be easily removed and replaced. Thus it is another object of the invention to provide a cover hinge arrangement which allows a cover to be easily removable. Attendant objects of the invention are to provide hinge arrangements of the type described which are simple and economical and permits easy installation and removal of the floating cover in the field without any tools and loose parts.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a top view of an exemplary embodiment of the invention;

FIG. 2 is a cross-section view taken at lines 2—2 in FIG. 1;

FIG. 2a is a detail view of a portion of FIG. 2, showing the cover moved to a wide open position; and

FIG. 3 is an elevation view taken along lines 3—3 in FIG. 1.

FIG. 3a shows a spring handle portion of the invention in relaxed and sprung conditions.

Referring now to the figures, a cover similar to that disclosed in Pat. 3,074,590 is shown installed on the wall 10 of valve covering tank opening 11. The assembly includes, as best seen in FIG. 2, a metal or non-metal annular ring or seat 12 having a seating edge 14, and a base portion 16 by means of which it is attached to the valve wall 10, by means of bolts or rods spaced around

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its periphery, one bolt being shown at 18. Cover (or pallet) 20 is shown as comprising a generally circular plate having a depending flange portion 22 and on its underside a circular groove 17. A centrally-positioned stud 24 protrudes above pallet cover 24 to accommodate weights if needed (not shown) to determine opening pressure, and the lower portion of stud 24 is threaded. Clamped between stud 24 and shoulder nut 28 on stud 24 are pallet 20, and a circular seal-retaining disk 19. Disk 19 holds a circular synthetic seal diaphragm 23. Diaphragm 23 is tight at the center, however, the remainder of seal diaphragm 23 is retained loosely because of the flexibility of the retainer disk 19. The operation of a seal provided by rubber seal diaphragm 23 on edge 14 is well known and described in Pat. 3,074,590 and need not be repeated here. Also, the hinged cover of the invention is useful with other known types of seals.

To hingedly yet removably mount the pallet cover 20 assembly, the invention includes hinge member 30 which is spot-welded to pallet cover 20 and which is slidably and hingedly carried on hinge posts 32 and 34, with notches or recesses 36 and 38 (see FIG. 1) in the sides of member 30 surrounding posts 32 and 34, respectively. As best seen in FIG. 3, pins 40 and 42 extend inwardly from hinge posts 32 and 34 and will be seen to limit downward travel of hinge member 30 and the cover. The ends 44c, 44d of spring handle or bail 44 are also shown extending inwardly through holes in posts 32 and 34, and when these ends of handle 44 protrude through the posts they will be seen to limit upward travel of cover 20 during opening and floating. It will be seen that vertical movement of the pallet cover over a limited distance is in no way restricted by the hinge assembly. However, when handle 44 is raised to a substantially vertical position, so that indented or re-entrant portions 44a and 44b engage posts 32 and 34, the ends 44c, 44d of handle 44 will be seen to be urged outwardly (to the condition shown in dotted lines in FIG. 3a), and to be withdrawn into the holes through hinge posts 32, 34, so that upward movement of the cover assembly is no longer limited and the cover may be removed. The sizes of the indentations 44a, 44b in handle 44 are arranged to provide limited withdrawal of ends 44c, 44d, so that the ends withdraw to the edges of the posts or slightly inside the holes within the posts, but no further, in order to insure that lifting handle 44 will not completely withdraw either end 44c or 44d from its respective hinge post. By provision of small pins (such as 34a in FIG. 2) or flats in or on posts 32 and 34 into or on which portions 44a and 44b may seat, handle 44 will be held fixed at the vertical "removal" position at which ends 44c and 44d are retracted, and then it is unnecessary that handle 44 be continued to be held while the cover assembly is removed or replaced.

By making the distance  $l_1$  in FIG. 1 very nearly equal to the distance between the inner edges of posts 32 and 34, it will be seen that translation of the cover in the direction in which  $l_1$  is measured is prevented, and will be seen that the cover assembly is automatically positioned properly in that direction when the cover assembly is installed or replaced. By provision of proper widths (distance  $l_2$  in FIG. 2) for the slots 36 and 38 in member 30 in relation to the angle ( $\alpha$  in FIG. 2), it will be seen that the edges of slots 36 and 38 may be made to closely fit posts 32 and 34 when the pallet cover is horizontal, or closed, so that the translational position of the cover assembly in a direction toward or away from the hinge posts (i.e., to the left or right in FIG. 2), is automatically controlled, and similarly, the rotation of the cover assembly about any vertical axis is prevented. By controlling the mentioned translational positions and the rotation, proper seating of the cover assembly in the proper

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location on seating ring 14 is automatically insured. Though the edges of slots 36 and 38 fit closely around hinge posts 32 and 34 when the cover is closed, it will be seen in FIG. 2a that upon raising the cover assembly and tilting hinge member 30, the planes of slots 36 and 38 become more nearly normal to posts 32 and 34, providing ample clearance space for easy removal of the cover assembly when spring handle 44 is lifted to withdraw its ends out of the way of hinge member 30. Because the position of the cover assembly relative to the seating ring is governed by the dimensions  $l_1$ ,  $l_2$ , the angle  $\alpha$ , the diameter of posts 32 and 34, and the position of posts 32 and 34 relative to the seating ring, all of which factors are easily adjusted and insured at the factory, installation of the cover assembly in the field is particularly simple and fool-proof and requires no field modifications nor any precision welding or drilling in the field.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a removable hinged closure assembly adapted to permit access through an opening in a wall and having a seat surrounding said opening and a cover movable between open and closed positions, said cover being adapted to engage said seat in said closed position, the combination of:

a post member assembly affixed to said wall and extending in a first direction;  
and a hinge member attached to said cover, a clearance portion between two edges of said hinge member at least partially surrounding said post member, the line between said two edges being arranged at an angle to said first direction when said cover is in a closed position, whereby said edges fit more closely about said post member assembly when said cover is in a closed position than when said cover is tilted toward an open position.

2. Apparatus in accordance with claim 1 having further

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means adapted to extend through said post member assembly for limiting movement of said hinge member in said first direction.

3. Apparatus according to claim 1 in which said post member assembly comprises a pair of posts spaced apart a first distance.

4. Apparatus according to claim 1 in which said seat comprises a circular seating ring and said cover includes a flexible substantially planar seal ring and a circular retaining disc having a diameter less than the diameter of said seating ring, in which said post member assembly comprises a pair of posts spaced apart, said apparatus also including a spring wire handle deformable between two conditions for limiting movement of said hinge member in only one of said two conditions.

5. Apparatus according to claim 1 in which said cover may be removed by moving it along said post member assembly in said first direction, said apparatus having means for limiting movement of said hinge member in said first direction.

6. Apparatus according to claim 2 which said further means is movable between first and second stable conditions, said further means extending through said post member assembly and limiting movement of said hinge member in said first stable condition and being retracted to de-limit movement in said second stable condition.

7. Apparatus according to claim 3 in which said hinge member is provided with two of said clearance portions in the form of slots, two edges of each of said slots at least partially surrounding a respective one of said posts of said pair.

8. Apparatus according to claim 3 in which said hinge member includes third and fourth edges extending in a direction perpendicular to said two edges, and partially surrounding said post member assembly, and limiting movement of said member in a direction parallel to a line between said posts of said pair.

#### References Cited

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