Jan. 21, 1930. G. A. HULL 1,744,119

HANDHOLE CLOSURE

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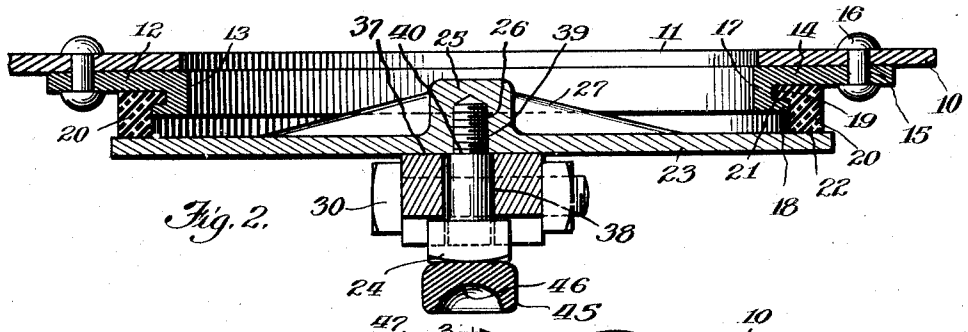


Fig. 2.

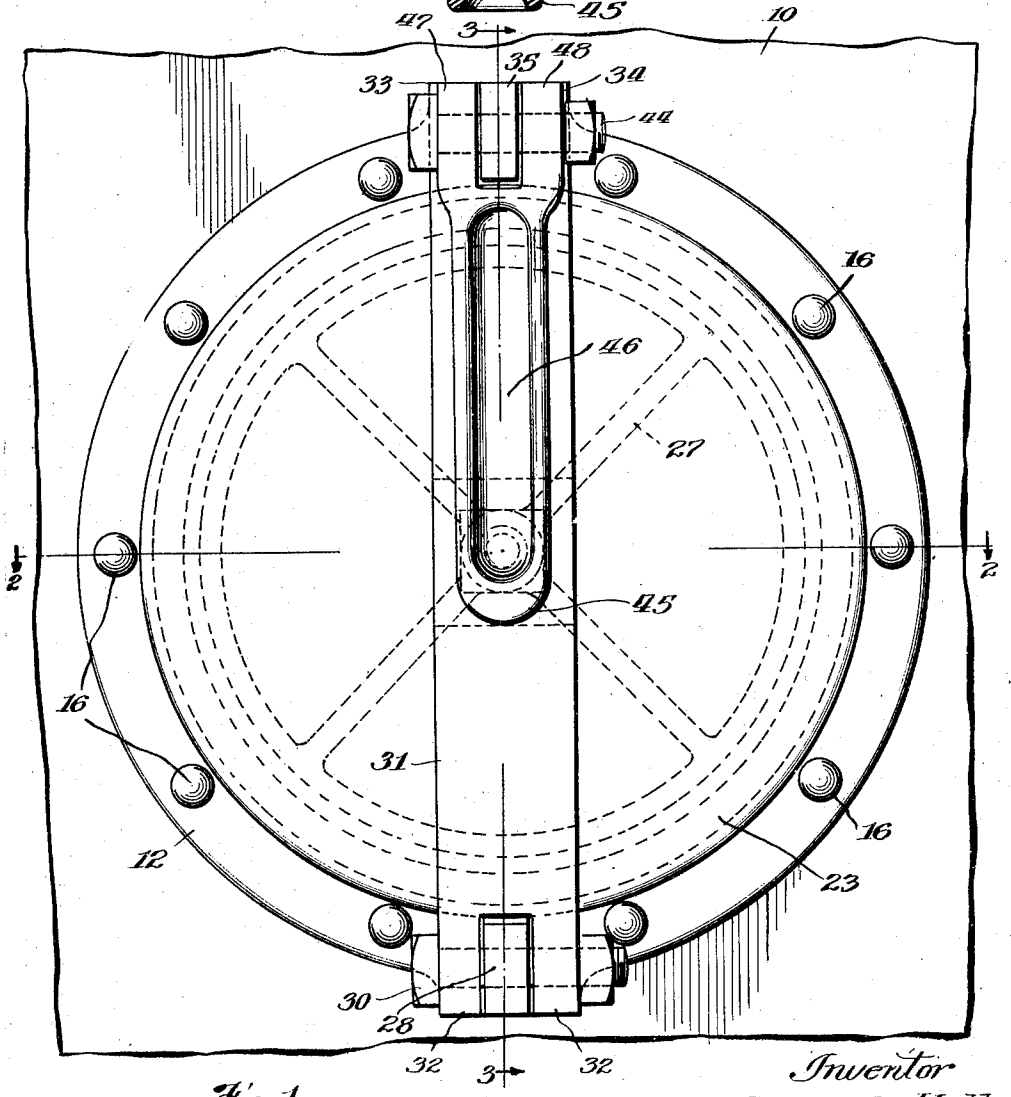


Fig. 1.

Inventor
George A. Hull
By Williams, Bradbury, McCaleb & Hinkle
Attys.

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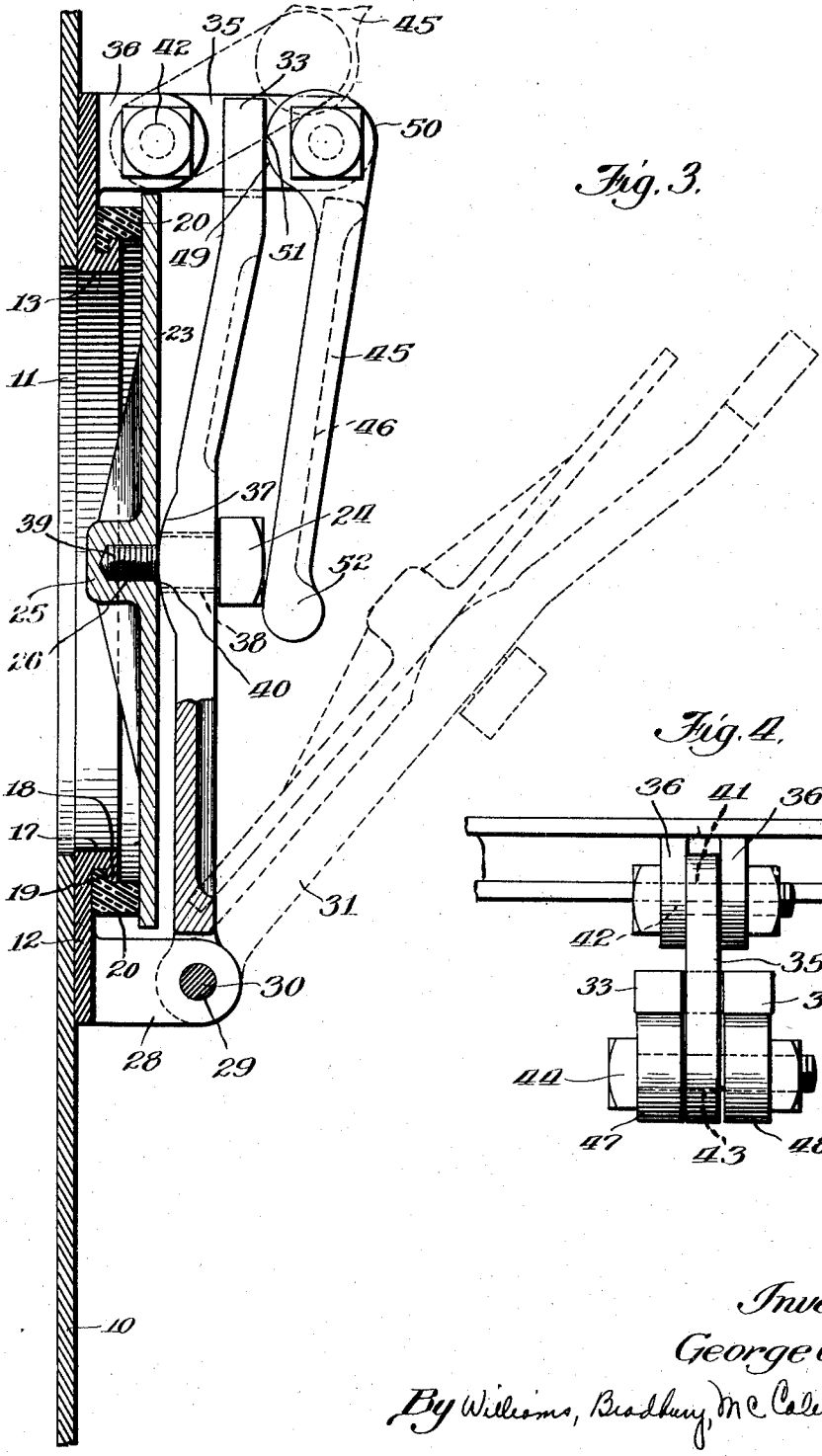


Fig. 3.

Fig. 4.

Inventor
George A. Hull
By Williams, Bradbury, McCaleb & Hinkle
Attys.

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UNITED STATES PATENT OFFICE

GEORGE A. HULL, OF CHICAGO, ILLINOIS, ASSIGNOR TO EQUIPMENT SPECIALTIES CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

HANDHOLE CLOSURE

Application filed February 2, 1928. Serial No. 251,269.

The present invention relates to hand hole closures and is particularly concerned with hand hole closures for brine tanks used upon refrigerator cars and the like.

In the construction of brine tanks for refrigerator cars, it is necessary to provide relatively small hand holes at various parts of the tank for inspection of the interior, for cleaning, etc.

One of the objects of the present invention is the provision of a simplified hand hole closure structure comprising a minimum of operating elements which consist of a balanced cover support and positive closing means for insuring the seating of the cover upon the hand hole.

Another object of my invention is the provision of a novel hand hole structure comprising a centrally supported cover, a lever for carrying said cover and having a limited pivotal joint with the same, and unitary force multiplying and securing means for moving said cover into sealing position and securing the same.

Another object of my invention is the provision of a hand hole closure which is durable, economical and easy to manufacture and assemble, as distinguished from the complicated closures of the prior art.

Other objects and advantages of my invention will appear more fully from the following description and from the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings:

Fig. 1 is a front elevational view of a hand hole closure installed in the side of a brine tank;

Fig. 2 is a plan cross-sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is an elevational cross-sectional view taken on the line 3—3 of Fig. 1; and

Fig. 4 is a plan view of the top of the closing mechanism.

Referring to Figs. 1 and 2, 10 indicates the wall, bottom or top of a tank such as a brine tank upon a refrigerator car, which may be constructed of sheet metal or any other material. In order to provide means for access to the interior of the tank, the side wall 10 may be provided with an aperture 11 which is conveniently made circular in form but which could be made of any desired shape.

In order to provide a seat and support for the closure and its operating mechanism, the wall 10 carries a supporting member 12 preferably formed of cast metal and having a central opening 13 conforming to the boundary of the opening 11. The supporting member 12 may be bounded by an outwardly extending flange 14 having a plurality of apertures 15 adapted to receive rivets 16 securing the member 12 upon the tank wall 10. The member 12 is also provided with a relatively thick inner edge 17 and an outwardly extending annular flange 18 forming an annular groove 19 adapted to retain a resilient member 20.

The sealing member 20 may consist of a soft rubber ring of substantially rectangular cross-section, but having an inwardly projecting flange 21 which is complementary to the groove 19. The sealing member 20 is thereby adapted to fit closely about the supporting ring 12 with the rubber flange 21 in the groove 19 and the sealing member presenting a substantially flat upper surface 22 for engagement with a cover 23.

The sealing member 20 is retained in position by means of the flange 18 and the flat surfaces upon the rubber sealing member engage the supporting ring 12 and provide a water-tight contact therewith. When the sealing member 20 is engaged by the cover 23 being compressed by said cover and slightly deformed thereby, the pressure between the rubber and adjacent metal surfaces is greatly increased and the ring expands into the groove 19 substantially increasing the sealing effect of the rubber member.

The cover 23 comprises a cast metal member which may be of substantially circular form to cover the aperture inside of the wall and extend over the sealing member 20. In order to provide for a support for the cover 23 by means of a bolt 24, the cover may be formed with an inwardly projecting boss 25 centrally located on the inside of the cover and providing material for forming a threaded bore 26. The cover may be reinforced by a

plurality of radially extending ribs 27 beginning at the boss 25, tapering toward their outer edges and terminating within the rubber ring 20. The ribs 27 greatly increase the strength of the cast metal cover which is preferably made of the lightest construction possible which is consistent with engineering practice in order to save material.

The supporting ring 12 also carries at one side an upwardly extending lug 28 provided with an aperture 29 adapted to receive a bolt or rivet 30 for pivotally supporting a lever 31.

The lever 31 comprises a cast metal member which is bifurcated at one end 32 to provide a lug on each side of the lug 28, the lugs having an aperture to receive the bolt 30. The opposite end of the lever 31 may likewise be provided with two lugs 33 and 34 adapted to straddle a link 35 carried by lugs 36 on the ring 12 diametrically opposite from the lug 28. At an intermediate point on the lever 31 adjacent the threaded bore 26 the lever is formed with a curved portion 37 adapted to engage the cover 23 and provide a limited pivotal movement between the cover and lever. The cover may be retained upon the lever 31 by the bolt 24 passing through an enlarged aperture 38 in the lever 31 and engaging in the threaded bore 26. In order that the bolt 24 may not bind the cover 23 upon the lever, I prefer to provide the bolt 24 with a reduced threaded portion 39 forming a shoulder 40 upon the bolt for definitely limiting its inward threading movement.

The link 35 comprises a flat metal member adapted to fit between the lugs 36 and having an aperture 41 for receiving the bolt or rivet 42 passing through said lugs and said link. The opposite end of the link 35 is provided with a similar aperture 43 for receiving a bolt or rivet 44 pivotally supporting a cam lever 45. The cam lever 45 comprises a cast metal member which may be hollowed out as at 46 to remove surplus material and which is provided with a pair of legs 47 and 48 adapted to straddle the link 35. The cam lever 45 is pivotally supported on the link 35 by the bolt 44 and the lower surfaces of the legs 47 and 48 are formed like a cam 49 adapted to engage the ends 33 and 34 of the lever 31.

The cams 49 are of such shape that the radius of the cam gradually increases from the top 50 of the legs 47 and 48, around to a point 51 on the bottom of the legs 47 and 48, and the relation of the parts should be such that when the cam lever is in the position shown in the full lines in Fig. 3, the point of contact 51 of the cam and the lever 31 is above the line of centers of the bolts 42 and 44. The length of the link 35 is such that the link and cam lever may be pivoted about the bolt 42 to the dotted line position shown in Fig. 3 out of engagement with the lever 31 so that the lever 31 may be pivoted on the bolt 30 to the dotted line position of the same figure.

The operation of the foregoing parts is as follows: When the cover 23 is moved into engagement with the rubber ring 20 the legs 33 and 34 of the lever 31 move into position shown in Fig. 3 (full lines) after which the link 35 may be pivoted down so that the cams 49 will be in front of the legs 33 and 34. The cam lever 45 may then be rotated clockwise in Fig. 3 from the dotted line position, the cams 49 engaging the legs 33 and 34 and forcing the lever 31 and cover 23 against the rubber ring 20.

During this movement, the rounded portion 37 on the lever 31 permits a limited pivotal movement of the cover 23 on the lever 31 so as to insure uniform pressure upon the rubber ring 20 at all points, and when the cam lever 45 has reached the position shown in full lines in Fig. 3, the mechanism will remain in such position due to the fact that the point of contact 51 of the cam is above the line of centers of the bolts 42 and 44. The pressure of the rubber ring 20 reacts against the lever 31 which engages the cam 49 above the line of centers and tends to move the cam lever in a clockwise direction, which movement is, however, resisted by engagement of the end 52 with the head of the bolt 24. The bolt 24 may be adjusted, if necessary, to determine the final position of the cam lever 45.

It will thus be observed that I have provided a relatively simple hand hole construction including a cast metal closure which is adapted to engage a resilient ring which reacts against the closing mechanism to retain the same in closed position. My closure mechanism is adapted to insure the sealing contact of the edge of the closure at every point by reason of the limited pivotal connection and the central application of the closing force.

While I have illustrated and described a specific embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claim.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States, is:

An article of manufacture, comprising a unitary hand hole closure structure, having an annular supporting member adapted to be applied to a tank or the like, and having a central aperture and an annular groove, a resilient sealing member carried by said groove, a flat disk for engaging said resilient sealing member and closing said aperture, a lever pivotally mounted on said annular member, a limited universal joint connection between said lever and said flat disk to facilitate the seating of said disk on said sealing member, and comprising a threaded member

carried by said disk and passing through an enlarged aperture in said lever, a head on said threaded member and a curved protuberance on said lever for engaging said disk adjacent said threaded member, and latching means for securing said closure in closed position.

In witness whereof, I hereunto subscribe my name this 30th day of January, 1928.

GEORGE A. HULL.