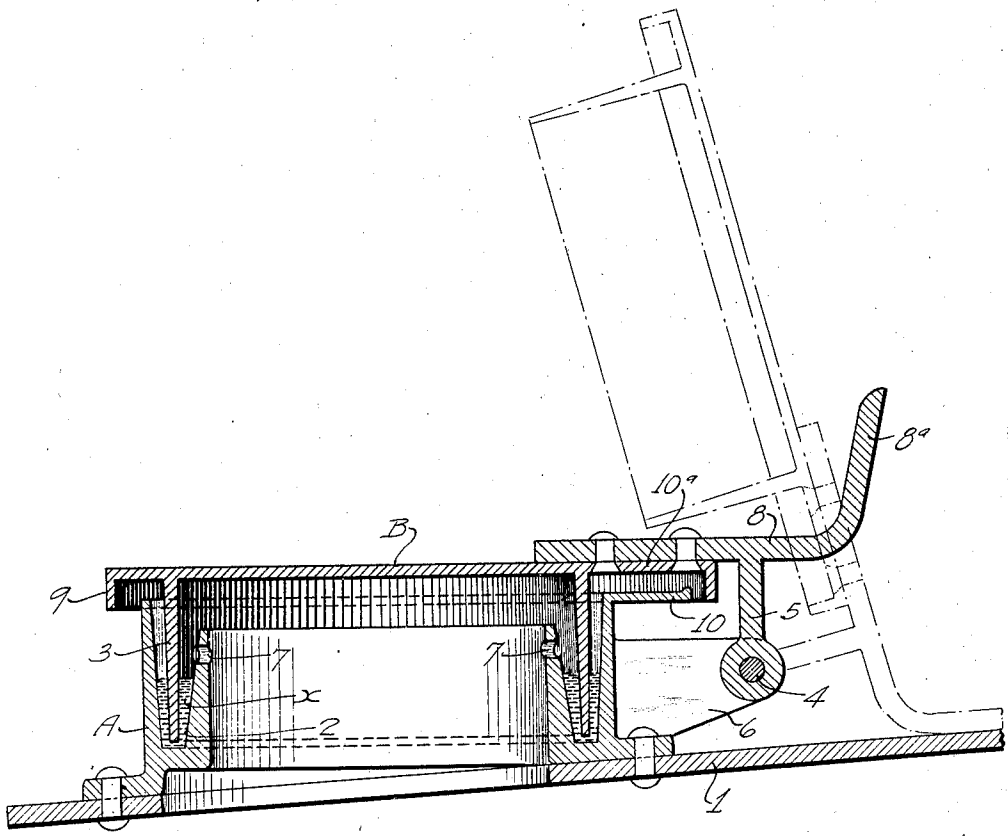
Sept. 22, 1925. 1,554,773

J. H. WIGGINS

THIEF HOLE COVER FOR LIQUID CONTAINERS

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Fig. 1.




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Fig. 2.

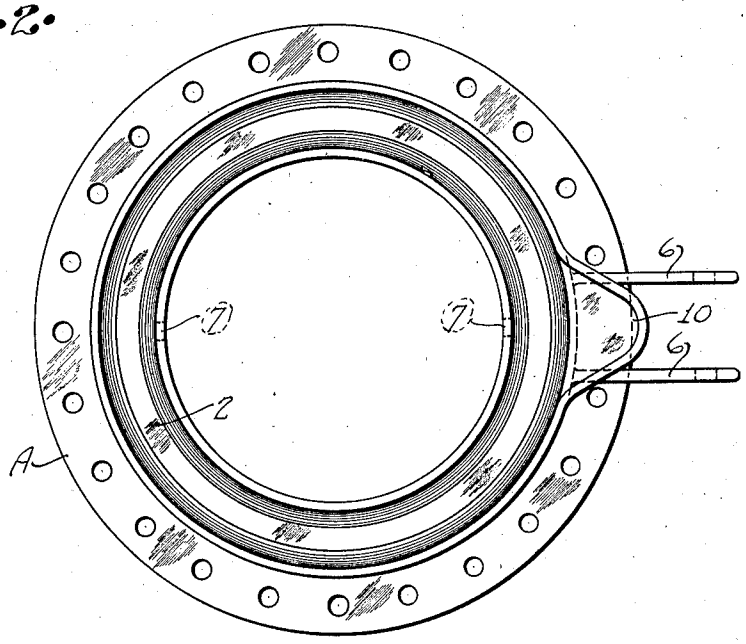
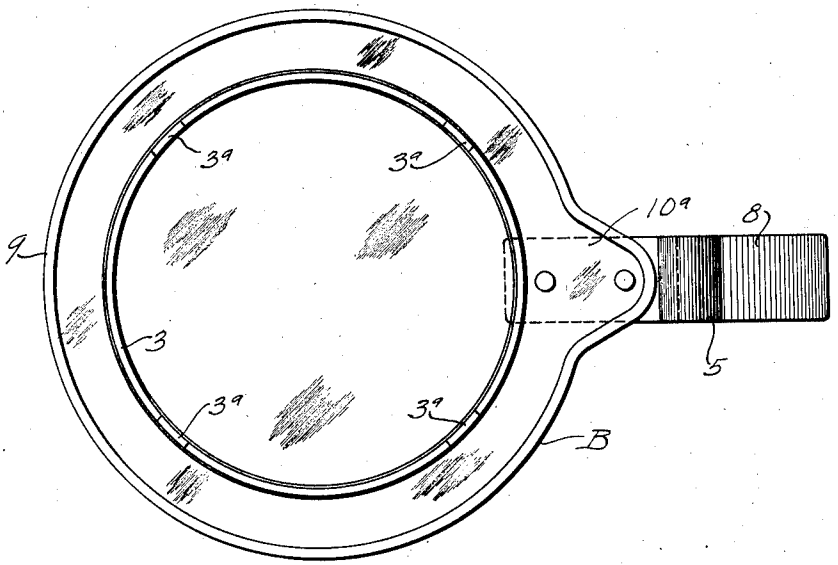



Fig. 3.




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# UNITED STATES PATENT OFFICE.

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## THIEF-HOLE COVER FOR LIQUID CONTAINERS.

Application filed May 21, 1923. Serial No. 640,626.

*To all whom it may concern:*

Be it known that I, JOHN H. WIGGINS, a citizen of the United States, residing at Bartlesville, Oklahoma, have invented a certain new and useful Improvement in Thief-Hole Covers for Liquid Containers, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to devices of the kind that are known commercially as "thief hole covers," namely, closures such as are used on oil storage tanks for covering the gauging hole in the roof or top of the tank through which a gauger inserts a measuring instrument to determine the depth or approximate quantity of the oil in the tank.

One object of my present invention is to provide a thief hole cover, which, in addition to effectively sealing the contents of the tank from the atmosphere, also serves as a differential pressure regulator that will automatically relieve an abnormal internal pressure in the container on which it is used and permit air to enter the container during the operation of withdrawing liquid from same.

Another object is to provide a thief hole cover of the general kind referred to which is so constructed that it can be opened and retained in its open position by pressure applied to same by the gauger's foot, and when said pressure is relieved, will close automatically and remain in such condition that it serves as a differential pressure regulator for the container.

Another object is to provide a combined differential pressure regulator and liquid sealed thief hole cover which is so constructed that gases can escape from the interior of the container, in the event of an abnormal internal pressure, and air can enter the container during the operation of withdrawing liquid therefrom without liability of destroying the liquid seal or rendering the liquid seal inoperative.

And still another object is to provide a liquid sealed thief hole cover which is so constructed that the sealing liquid which drips off the lid or movable element of the cover when it is moved into its open position will be collected and conducted back into the reservoir which holds the sealing liquid. Other objects and desirable features of my invention will be hereinafter pointed out.

Figure 1 of the drawings is a vertical cross-sectional view of a combined thief hole cover and differential pressure regulator constructed in accordance with my invention.

Figure 2 is a top plan view of the stationary member of the device that contains the reservoir for the sealing liquid; and

Figure 3 is a bottom plan view of the lid or movable element of the device.

My improved thief hole cover consists of a stationary member A adapted to be connected to the roof or top 1 of the liquid container at a point in alignment with a hole or opening in said roof 1, and a movable member or lid B that is normally arranged over the member A, as shown in Figure 1. The member A is of circular form in general outline and is provided with an annular reservoir 2 that is adapted to contain a sealing liquid *x* which receives an annular sealing device 3 on the underside of the lid B, thus producing a liquid seal that effectively cuts off the contents of the container from the atmosphere. The lid B is of slightly greater diameter than the member A and is hinged to said member by a pintle pin 4 that passes through a depending hinge member 5 on the lid that is embraced by a pair of laterally-projecting ears 6 on the member A.

In order that the device will perform the dual function of a liquid sealed thief hole cover and differential pressure regulator, I construct the members A and B in such a manner that gases can break through the liquid seal in case an abnormal internal pressure is created in the container, thus automatically relieving the internal pressure, and air can break through said liquid seal and enter the container when liquid is being withdrawn from the container, thereby automatically relieving the vacuum that is created in the container during the operation of withdrawing liquid from same. In the form of my invention herein illustrated this is effected by designing the members A and B in such a way that spaces or passageways are provided between the member B and the upper portion of the member A and between the lower edge of the sealing device 3 and the bottom of the liquid reservoir 2 when the lid or movable member B is in its closed position, as shown in Figure 1. One convenient way of maintaining the members A and B in approximately the relative position

shown in Figure 1, when the member B is closed, is to provide the sealing device 3 on the member B with a plurality of depending lugs $3^a$ on its lower edge, as shown in Figure 3, that bear upon the bottom of the liquid reservoir 2, thereby holding the major portion of the bottom edge of the sealing device 3 spaced away from the bottom of the liquid reservoir 2 in the member A and maintaining the underside of the member B spaced slightly away from the top edge of the member A. Obviously, the same result could be obtained by forming spaced lugs or projections on the bottom of the liquid reservoir on which the sealing device 3 of the lid B rests when said lid is in its closed position, or by providing the upper edge of the member A with spaced lugs or projections on which the underside of the lid B rests when said lid is in its closed position. The liquid reservoir 2 is preferably substantially wedge-shaped in vertical cross section, or is of greater width at its upper end than at its lower end so as to prevent the sealing liquid from being displaced from or carried out of the liquid reservoir 2 by gases escaping from the container or by air which is drawn into the container during the operation of withdrawing liquid from the container. I also prefer to make the outer wall of the liquid reservoir 2 deeper or slightly higher than the inner wall of said reservoir and provide said inner wall with overflow holes 7, as shown in Figure 1. If an abnormal pressure is created in the container, due to an internal explosion or to the accumulation of a large quantity of gases, said pressure will be exerted on the portion of the sealing liquid $x$ lying between the inner wall of the liquid reservoir 2 and the inner side of the sealing device 3, thus causing the sealing liquid to rise in the space between the outer wall of the liquid reservoir 2 and the outer side of the sealing device 3. Owing to the fact that this space increases gradually in width or area from its lower towards its upper end, there is little liability of the sealing liquid being discharged from the reservoir 2 with the escaping gases, because the escaping gases will break through the liquid before the liquid has risen to the upper edge of the outer wall of the liquid reservoir 2. In other words, if the internal pressure in the container is sufficient to displace the liquid between the sealing device 3 and the inner wall of the reservoir 2 one inch, the liquid lying between the sealing device 3 and the outer wall of the liquid reservoir will rise considerably less than one inch, due to the fact that the space between said outer wall and sealing device increases from its lower towards its upper end. When the liquid is being withdrawn from the container the vacuum that is created in the container is exerted on the portion of the sealing liquid lying between the sealing device 3 and the inner wall of the liquid reservoir 2 in such a way that the liquid in this space will rise and the liquid in the space between the sealing device 3 and the outer wall of the liquid reservoir will drop. The liquid in the space between the inner wall of the reservoir 2 and the sealing device 3 rises upwardly until it reaches the overflow holes 7 in said inner wall, whereupon some of the liquid will pass into the container through said overflow holes, the space above said overflow holes then functioning as a separating space for bubbles of air entering the container, and thus preventing too much of the liquid from splashing out of said reservoir into the container. When the operation of withdrawing liquid from the tank ceases, the sealing liquid in the space between the sealing device 3 and the inner wall of the reservoir 2 drops downwardly and the liquid in the space between said sealing device and the outer wall of the reservoir 2 rises, thus causing the sealing device 3 to be submerged in a body of liquid that effectively seals the container. When liquid is being introduced into the container, the sealing liquid in the space between the sealing device 3 and the outer wall of the reservoir 2 rises, but on account of the V-shape, cross-sectional form of said reservoir the sealing liquid will not rise high enough to splash out of said reservoir onto the top 1 of the container. While some of the sealing liquid escapes from the reservoir 2 into the container, as above described, during the operation of withdrawing liquid from the container, this is not objectionable, because the gauger will replenish the sealing liquid in the reservoir 2 whenever he sees that it contains less than the required quantity of sealing liquid by emptying his gauging device into said reservoir, thus insuring that the reservoir 2 will always contain an adequate supply of fresh sealing liquid, usually oil, which is not sticky or gummy enough to prevent it from functioning properly to admit air to the container during the operation of withdrawing liquid from same and to relieve the pressure in the container during the operation of filling the same.

To facilitate the opening and closing of the lid or movable member B of the device I prefer to provide said lid with a foot piece 8 arranged adjacent the hinge between said lid and the member A and equipped with an angularly-disposed, upturned portion $8^a$ on which the gauger can place his foot and exert downward pressure, so as to swing the lid upwardly to withdraw the sealing device 3 from the liquid reservoir 2 and uncover the opening in the roof 1 of the container which the stationary member A of the device surrounds. Preferably, the foot piece 8 is so proportioned and designed that

when the angularly-disposed part 8ª thereon engages the roof 1 of the container, as indicated by broken lines in Figure 1, the lid B will be fully open. When the gauger removes his foot from the angularly-disposed portion 8ª of the foot piece on the lid B, gravity causes said lid to swing downwardly into its closed position, thus causing the contents of the container to be cut off from the atmosphere, but in such a way that air can enter the container to relieve the vacuum when liquid is being withdrawn from the container, and gases can escape from the container, in the event an abnormal pressure is created in the container. The particular style or type of hinge that is used for connecting the lid B to the member A is immaterial, but I prefer to form the hinge member 5 on the foot piece 8 on the lid B, so as to reduce the cost and simplify the construction of the device and enable the lid to be formed from a casting of simple design. I also prefer to provide the lid B with a depending flange 9 at its peripheral edge that projects downwardly slightly below the top edge of the outer wall of the liquid reservoir 2, but which is spaced slightly away from said wall, as shown in Figure 1, when the lid of the device is in its closed position, said flange operating to prevent rain from getting into the sealing reservoir 2.

When the lid B is swung upwardly into its open position some of the sealing liquid $x$ adheres to the sealing device 3 on said lid. In order to collect and recover this adhering liquid I provide the stationary member A of the device with a laterally-projecting portion 10 arranged on the outer wall of the liquid reservoir 2 at a point above the hinge lugs or ears 6 on the member A, so that it will form a cup which receives liquid that drips off the sealing device 3 of the lid when said lid is in its raised position, said lid also being provided with a laterally-projecting portion 10ª, as shown in Figure 3, that extends over said drip cup 10, the liquid that collects in the cup 10 draining out of same back into the liquid reservoir 2.

A thief hole cover of the construction above described effectively seals the contents of the liquid container on which it is used from the atmosphere, and it serves as a differential pressure regulator to automatically relieve a vacuum or an abnormal pressure in the container. Consequently, it overcomes the necessity of equipping an oil storage tank with two separate devices, as has heretofore been the usual practice, namely, with a thief hole cover and an automatic vent device; it is of such design that the lid of same can be swung into its open position and retained in its open position by the foot of the gauger, and when the gauger's foot is removed from the foot piece 8 of the cover, said cover will return automatically to its normal position. In addition to the desirable features above pointed out, such a device is inexpensive to manufacture and it is easy to install, as it is only composed of two parts of simple design, one of which can be easily connected by rivets or other suitable fastening devices to the roof or top of the container on which the device is used.

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

1. A thief hole cover for liquid containers, comprising a stationery member provided with an annular reservoir that is adapted to contain a sealing liquid, a hinged lid provided with an annular sealing device that projects downwardly into said reservoir, and a drip cup projecting laterally from said reservoir at a point above the hinge of said lid for receiving liquid that drips off said lid when the lid is in its raised position.

2. A combined thief hole cover and differential pressure regulator for liquid containers, comprising a stationary member adapted to be connected to the top or roof of a container and provided with an annular reservoir that is adapted to contain a sealing liquid, hinge ears on said member that project laterally from the outer wall of said reservoir, a lid pivotally connected to said hinge ears and provided with an annular sealing device that projects down into said reservoir, spaced lugs on the lower edge of said sealing device that rest on the bottom of said reservoir when said lid is closed, a foot piece on said lid having an upturned portion on which the user exerts pressure with his foot to swing the lid into its open position, and a drip cup on said stationary member projecting laterally from said reservoir at a point above said hinge ears for receiving and collecting liquid that drips off the lid when the lid is raised.

3. A combined thief hole cover and differential pressure regulator for liquid containers, comprising a stationary member adapted to be connected to the top or roof of a container and provided with an annular reservoir that is adapted to contain a sealing liquid, hinge ears on said member that project laterally from the outer wall of said reservoir, a lid pivotally connected to said hinge ears and provided with an annular sealing device that projects down into said reservoir, spaced lugs on the lower edge of said sealing device that rest on the bottom of said reservoir when said lid is closed, a foot piece on said lid having an upturned portion on which the user exerts pressure with his foot to swing the lid into its open position, a drip cup on said stationary member projecting laterally from said reservoir at a point above said hinge ears for receiving and collecting liquid that drips off the lid when the lid is raised, said reservoir

being of substantially wedge shape in vertical cross section and provided with an outer wall of greater height or depth than its inner wall, overflow holes in the inner wall of said reservoir, and a depending flange on said lid that projects downwardly below the top edge of the outer wall of said reservoir.

4. A combined thief hole cover and pressure regulator for liquid containers, comprising a stationary member adapted to be connected to the top or roof of a container and provided with a reservoir that is adapted to hold a sealing liquid, said reservoir being substantially wedge-shaped in cross section and having the top edge of its outer wall terminating at a higher point than the top edge of its inner wall, a movable lid, and a sealing device on said lid projecting downwardly into said reservoir and having spaces or passageways between its lower edge and the bottom of the reservoir, said sealing device being spaced away from the inner and outer walls of said reservoir and the top edge of the inner wall of said reservoir being spaced away from the underside of the lid so as to permit air or gases to enter or escape from the container through the passageway between said sealing device and the inner wall of said reservoir.

5. A combined thief hole cover and pressure regulator for liquid containers, comprising a stationary member adapted to be connected to the top or roof of a container and provided with a reservoir that is adapted to hold a sealing liquid, said reservoir being substantially wedge-shaped in cross section and having the top edge of its outer wall terminating at a higher point than the top edge of its inner wall, overflow holes in said inner wall adjacent the top edge of same, a movable lid, and a sealing device on said lid projecting downwardly into said reservoir and having spaces or passageways between its lower edge and the bottom of the reservoir, said sealing device being spaced away from the inner and outer walls of said reservoir and the top edge of the inner wall of said reservoir being spaced away from the underside of the lid so as to permit air or gases to enter or escape from the container through the passageway between said sealing device and the inner wall of said reservoir.

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