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RELIEF VALVE MECHANISM FOR OIL TANKS

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Fig. 1

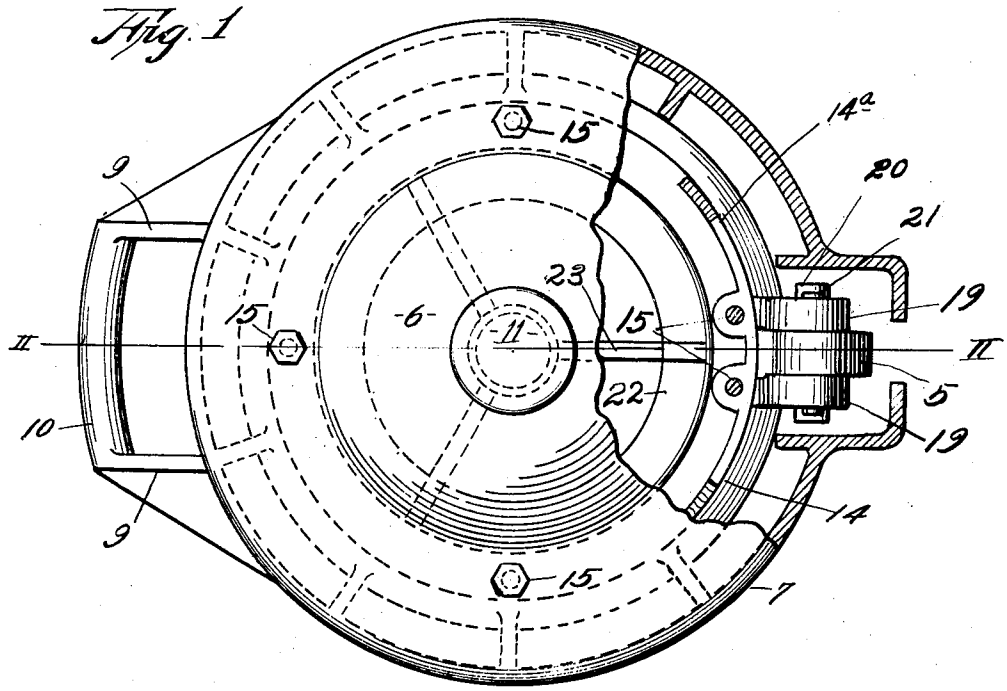
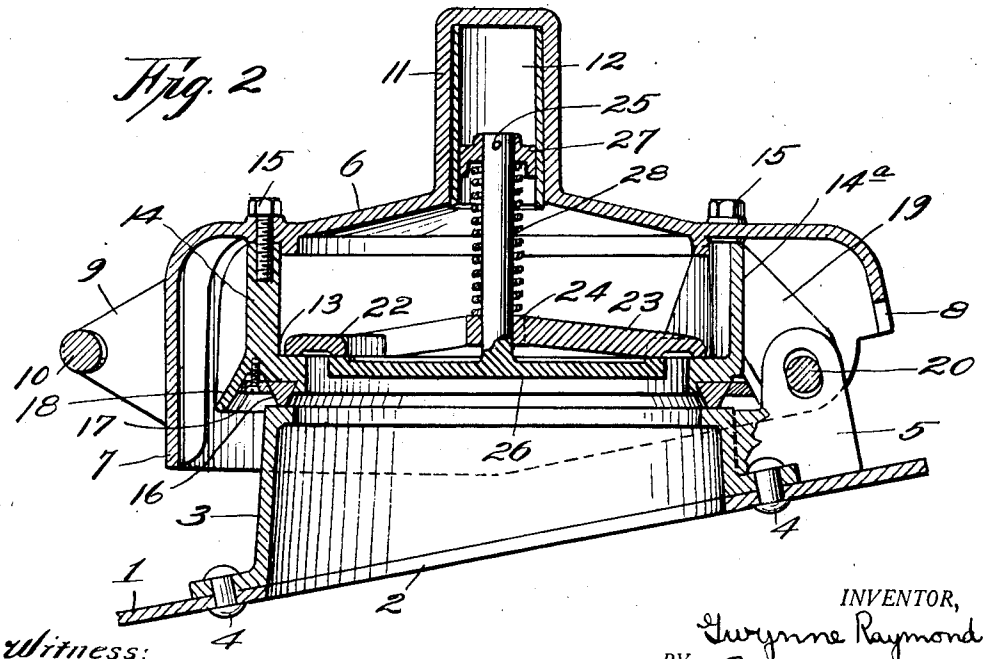


Fig. 2



Witness:

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UNITED STATES PATENT OFFICE.

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RELIEF-VALVE MECHANISM FOR OIL TANKS.

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This invention relates to relief valve mechanism for tanks for holding oils and the like, of that class which will retain pressure within a tank in excess of external pressure to a predetermined degree and open for relief purposes in the event the pressure within the tank rises to a point dangerous to the latter, and which will also open in the event of the pressure within the tank falling below atmospheric or external pressure to a degree threatening injury to the tank through collapsing action, one of my special objects being to produce a valve construction of the character outlined, which will open and close without chattering. Another object of the invention is to provide a valve structure with a compressible gasket and a hinged hood or housing of such weight as to offer a resistance to opening movement in excess of that offered by the valve to unseating action under internal pressure, the weight of the hood and valve mechanism causing the gasket to guard against accidental change in the relative pressures within and without the tank unless occasioned by automatic action of the valve mechanism.

With these general objects in view and others as hereinafter appear, the invention consists in certain novel and useful features of construction and combinations of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawing, in which:

Figure 1 is a top plan view of a releif valve construction embodying the invention, part of the structure being broken away to disclose more clearly certain features otherwise hidden in such view.

Figure 2 is a central vertical section on the line II—II of Figure 1.

Referring the drawing in detail, 1 indicates a portion of the top of a tank for holding oils and the like, and in said portion is provided a large opening 2, encircled by an upstanding wall 3, the wall having a base flange secured with a gas-tight joint to the top of the tank around said opening, as by rivets 4. The wall 3 is provided with an external radially-arranged perforated lug 5 to constitute a hinge member for a hood 6, the hood being of substantially greater diameter than the wall and equipped with a skirt 7 which depends for the greater part of a circle to a plane below that of the top of the wall, the skirt in proximity to the hinge lug 5, being notched or cut-away as at 8, to accomodate hinge movement of the hood, as will hereinafter more clearly appear. Diametrically opposite the cut-away portion 8, the hood is provided with a pair of outwardly-projecting arms 9 connected by a cylindrical portion 10 constituting a handle by which the hood member is hingedly operated.

The hood is provided with an upstanding dome 11, disposed in concentric relation with respect to the opening 2, and said dome is lined with a sleeve 12, preferably of a rust-resisting material. A valve-seat ring 13 is arranged within the hood concentrically with respect to the sleeve 12, and is secured in fixed relation to and as a part of the hood by a series of posts 14 and a segment 14^a extending upward from the outer portion of the ring to the hood and secured thereto by cap screws 15 or the like. The valve-seat ring is channeled at its under side and a compressible gasket 16 is secured in said channel by a clamp ring 17, the gasket being adapted to rest with a gas-tight joint upon the wall 3. The ring is provided at its outer margin with a downwardly flaring skirt 18 tending to protect the gasket and said joint from the access thereto of moisture, it being understood however that the chief instrumentality for accomplishing such protection is the skirt portion of the hood. The segment 14^a above mentioned is provided primarily for the support of a pair of hinge lugs or ears 19, which fit against opposite sides of the perforated hinge lug 5, the hinge connection being completed by a pin 20 extending through said lugs 5 and 19, and for convenience of assemblage the pin is retained in place by cotter pins 21.

A circular or ring valve 22 has a concentric channel in its under face and normally fits externally of said channel with a gas-tight joint upon the valve-seat ring 13. Said ring valve is in the form of a spider, that is, has a number of radial arms 23 running to a hub 24 fitting slidingly on the upwardly-projecting stem 25 of a circular plate valve 26 underlying the ring valve inward of the channel thereof. A piston 27, preferably of aluminum, is mounted on the upper end of the stem 25 for operating within a sleeve 12 with a dash-pot effect, and

an expensive coil spring 28 fits around said stem and applies pressure at its opposite ends against the under side of the piston and the upper side of the hub of the ring valve and therefore holds the plate valve 26 pressed upwardly against the ring valve, the weight of both valves being sustained by the valve seat ring 13.

In the practical operation of the valve mechanism, the parts remain in the position shown as long as there is no excessive pressure or vacuous condition within the tank. Immediately pressure in the tank rises to a degree which might threaten its rupture, the plate valve 26 rises against the resistance of the weight of the parts and that offered by the dash-pot, the opening being accomplished without any chattering of parts tending to impair the valve seat joints or to produce a spark that might ignite gases escaping from the tank and mixing with the outer air. In the event a vacuous condition is created in the tank to a dangerous degree, atmospheric pressure forces the plate valve 26 downward against the resistance of the spring 28, and permits air to enter the tank, the plate valve being immediately reseated as the pressures become equalized or as initially provided for, the dash-pot steadying such action to guard against chattering.

When it is desired to obtain access to the contents of the tank for testing, sampling or other purposes, the handle is grasped and the hood swung to an open position, the valve mechanism of course participating in such movement and therefore uncovering the wall 3 through which access to the tank is obtained.

From the above description, it will be apparent that I have produced a device embodying all the features of advantage pointed out as desirable, and while I have described and claimed the preferred embodiment of the invention, it is to be understood that I reserve the right to make all changes properly falling within the spirit and scope of the appended claims.

I claim:

1. The combination with a tank having an opening and means forming a gas-tight joint with the tank around said opening and including a valve seat ring, of a valve plate within and spaced from the said means and capable of movement axially of said opening in both directions from its normal position, a valve ring bridging the space between the valve seat ring and valve plate and normally engaging both with a gas-tight relation and adapted to be unseated from the former by the valve plate under sufficient pressure applied thereon from within the tank, and a dash-pot providing resistance to movement of the valve plate induced by pressure within the tank.

2. The combination with a tank having an opening and means forming a gas-tight joint with the tank around said opening and including a valve seat ring, of a valve plate within and spaced from the said means and capable of movement axially of said opening in both directions from its normal position, a valve ring bridging the space between the valve seat ring and valve plate and normally engaging both with a gas-tight relation and adapted to be unseated from the former by the valve plate under sufficient pressure applied thereon from within the tank, and a hood fitting over the said gas-tight joint-closing means and connected to and imposing its weight upon the latter; said hood bearing a hinged relation to the tank.

3. The combination with a tank having an opening, a wall surrounding the opening and having a gas-tight connection with the tank, a hood bearing a hinged relation to the tank and enclosing the upper part of said wall and provided with a dome forming a dash-pot chamber, a valve seat ring secured to and within the hood above said wall, an annular gasket between and engaging said ring and wall, a valve plate within and spaced from said ring and provided with a stem extending upward into the dash-pot chamber, a piston on the stem within said chamber, a valve ring bridging the space between the valve seat ring and valve plate and resting on the latter, and a spring exerting pressure in opposite directions for holding the valve plate upward against the valve ring.

4. The combination with a tank having an opening, a valve seat ring adapted to make sealing contact with the periphery of said opening, of a valve plate within and spaced from said valve seat ring and capable of axial movement in both directions from its normal position, a valve ring bridging the space between said valve seat ring and valve plate and adapted to be unseated from said valve seat ring by outward movement of the valve plate; said valve seat ring being hingedly connected to the tank, a hood secured to said valve seat ring and providing guiding means for and yielding resistance against outward movement of said valve ring and valve plate, and yielding means for maintaining tight contact between said valve ring and valve plate.

In witness whereof I hereunto affix my signature.

GWYNNE RAYMOND.