SAFETY GAUGING AND SAMPLING HATCH

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This invention relates to an entry hatch for the top or roof of a storage tank, and more particularly to a safety hatch for access to an enclosed storage tank.

In the production and gathering of crude petroleum, the produced oil is conventionally stored in stock tanks prior to transmission to the refineries. In those areas where the crude produced is "sour," that is, contains hydrogen sulfide, the gauging and sampling of the stock tanks can be hazardous to the operator because of the toxicity of the vapors from the sour crude. Similar problems exist where other liquids emitting noxious vapors are kept in storage tanks, and it is necessary periodically to gauge or sample the tanks.

By the present invention, we provide a safety hatch permitting access to storage tanks containing liquids which evolve toxic or noxious vapors whereby the operator may gauge or sample the tank in safety without exposure to such vapors. In accordance with our invention, we provide a safety hatch for access to an enclosed storage tank, the safety hatch comprising a hollow cylinder mounted in the top or roof of the tank, top and bottom closures for the cylinder, separate opening means for independently opening the top and bottom closures, and locking means permitting only alternate opening of said top and bottom closures, whereby the bottom closure cannot be opened when the top closure is open and the top closure cannot be opened when the bottom closure is open.

Our invention will be further described with reference to the drawings accompanying this specification and forming a part thereof, in which:

Figure 1 is a view in front elevation of the safety hatch of the invention showing the top closure open and the bottom closure closed;

Figure 2 is a view in rear elevation showing the top closure closed and the bottom closure open;

Figure 3 is a view in side elevation; and

Figure 4 is a view along the line IV—IV of Figure 3.

Referring now to the drawings in which like numerals indicate the same element in the various views, the safety hatch is designated generally by the numeral 9, and comprises a hollow cylinder 10 with a top closure 12 and a laterally slidable bottom closure 22. The cylinder 10 of the safety hatch is mounted in that, is, inserted part way through the roof 11 of a storage tank and projects above the same. Projecting from the top closure 12 is a handle member 29 for raising the top by hand. Also projecting from the top closure are upright legs 30 to which there is fixedly attached by a pin 31 an L-shaped hinge member 27. Hinge member 27 is pivotally attached as at 13 by means of projection 32 to the outer wall of the cylinder 10. Fastened to the outside of cylinder 10 are brackets 15 and 17 which carry an elongated rod 16 rotatable about its longitudinal axis, the rod extending from the position directly below hinge member 27 to a point below the bottom of cylinder 10. A packing gland 18 guards against any leakage of gas at the point where rod 16 enters the tank top 11. Rod 16 has a cap 14 at its upper end with a slot 28 therein for receiving and engaging the curved lug portion 27a of hinge member 27. When the top closure 12 is opened, the flat portion 27b of hinge member 27 never engages the slot 28 and thus permits rotation of rod 16 when the top closure 12 is closed. Rod 16 also has a handle 23 adjacent its upper end and extending laterally therefrom whereby rod 16 may be rotated manually for opening and closing bottom closure 22 which is attached thereto. Immediately below bracket 17, a flat bar 19 is fastened to the end of rod 16 and extends at right angles to rod 16 across the bottom of cylinder 10. A pin 20 is fitted in a hole drilled in bar 19 at about midway of its length, the pin 20 extending above bar 19 and bearing bottom closure 22 rigidly attached thereto as by welding or other suitable means, as shown most clearly in Figure 3. Between bottom closure 22 and bar 19, there is provided a washer 33 to allow for a slight swivel action, thereby insuring a more positive shutoff. The free end of bar 19 is capable of engaging a latch member 21, which is fastened to the outside of the lower end of cylinder 10, to limit the degree of rotation of rod 16 and its associated bottom closure 22 to assure that the bottom closure effectively closes the cylinder 10 when desired.

Immediately below top closure 12, as shown in Figure 1, there is attached a drain spout 24 by welding or other suitable means, and within the spout at the bottom thereof is a small drain hole 25 communicating with the interior of cylinder 10. At the upper edge of cylinder 10 there is provided a slot 26 in the lip of the cylinder wall to permit entry of either a gauge line or thief line for gauging the tank or for obtaining a sample while the top closure 12 is closed. A roller wheel 34 for the curvature modulation of such lines is located within the upper end of the cylinder 10 adjacent slot 26. The drain spout serves to catch drippings from a gauge line being withdrawn through the safety hatch after gauging; it may also be employed as a convenient receptacle for oily waste used to wipe off the gauge line.

In the operation of the safety hatch the top closure 12 is opened, the bottom closure being closed, and a thief for abstracting a sample or a gauge for measuring the tank is placed within the cylinder 10 on a line led over roller 34. While the top closure 12 is lifted so that the curved lug portion 27a of hinge member 27 is engaged in slot 28 of cap 14 on the upper end of rod 16, so that it is not possible to rotate rod 16. Bottom closure 22 therefore must remain closed. The operator is therefore not exposed to noxious vapors from the interior of the tank. After a thief or gauge has been placed within the cylinder 10 and the line attached thereto led over roller wheel 34 and out through slot 26, the top closure 12 is closed. Closing top closure 12 disengages the curved lug portion 27a of hinge member 27 from slot 28 and rod 16 is then free to rotate. By moving handle 23 is a clockwise direction (Fig. 4) through approximately 90 degrees of arc, bottom closure 22 is opened thereby effecting communication of the cylinder 10 with the interior of the tank and enabling the thief or gauge previously placed within the cylinder 10 to be lowered to the desired depth in the tank.

It will be noted that, when bottom closure 22 is open, the flat portion 27b of hinge element 27 engages the upper extremity of rod 16, thus providing an escape means for hanging member 27 and any opening, adventitious or otherwise, of the top closure 12. The rod 16 is of sufficient length so that its unslotted upper extremity permits such engagement. No noxious vapors can therefore escape from the interior of the tank to the detriment of the operator, notwithstanding the bottom closure being open.
Removal of the thief or gauge from within the tank is accomplished by reversal of the steps described. Bottom closure 22 is advantageously provided with a bronze gasket ring on its upper surface to engage and form a seal with the lower end of cylinder 10. Top closure 12 is also advantageously provided with a gasket ring on its inner surface effectively to form a seal with the upper end of cylinder 10.

Drain spout 24 will serve to return to the interior of the tank, drippings from gauge line through opening 25. Excess samples may be poured back into cylinder 10 when top closure 12 is open.

Resort may be had to such modifications and variations as fall within the spirit of the invention and the scope of the appended claims.

We claim:

1. A safety hatch for access to an enclosed storage tank comprising a hollow cylinder mounted in the top of said tank, a slideable closure for said cylinder, means for opening said bottom closure comprising an elongated rod capable of rotation about its longitudinal axis and attached to said bottom closure, a slotted head at the upper extremity of said rod, a top closure for said cylinder, a rigid hinge member pivotally attached at one end to the outer wall of said cylinder and fixedly attached at its other end to said top closure, said hinge member engaging said slotted head on said rod and preventing rotation thereof when said top closure is open, and said slotted head preventing opening of said top closure when the slot and hinge member are not in engagement.

2. A safety hatch for access to an enclosed storage tank comprising a hollow cylinder mounted in the top of said tank, a laterally slideable bottom closure for said cylinder, means for opening said bottom closure comprising an elongated rod capable of rotation about its longitudinal axis and attached to said bottom closure, said rod being positioned longitudinally externally of said cylinder and journaled in brackets attached to the outer surface of said cylinder, means for rotating said rod, a slot in the upper extremity of said rod, a top closure for said cylinder, a rigid hinge member for said top closure pivotally attached at one end thereof to the outer wall of said cylinder above the upper extremity of said rod and fixedly attached at the other end to said top closure, a lug portion on said hinge member adjacent the point of pivotal attachment thereof and adapted to engage said slot in the upper extremity of said rod, said rod being of sufficient length that the unslotted upper extremity thereof engages and prevents movement of said rigid hinge member when said lug portion does not engage said slot.

3. A safety hatch for access to an enclosed storage tank comprising a hollow cylinder positioned part way through the roof of said tank, a top closure hinged on said cylinder, the hinge thereof bearing a curved lug portion and a flat portion, a rod positioned longitudinally of said cylinder, having a slotted portion in its upper end for engaging said curved lug portion of said top closure hinge when said top closure is open, the flat portion of said hinge being engaged by and rendered immovable by the unslotted portion of said rod when the top closure is closed, said rod being journaled in brackets attached to the outer surface of said cylinder, a handle extending laterally adjacent the upper end of said rod for manual rotation thereof when the top closure of said cylinder is closed, and a transverse bar attached to the lower end of said longitudinal rod extending laterally therefrom below said cylinder, said bar supporting a bottom closure for said cylinder, said closure being movable by rotation of said handle and said longitudinal rod to uncover the lower end of said cylinder.

4. The safety hatch of claim 3, in which there is provided latching means at the lower end of said cylinder adapted for engaging said transverse bar when the bottom closure is closed.

References Cited in the file of this patent

UNITED STATES PATENTS

1,169,606 Blank et al. Jan. 25, 1916
2,065,019 Pedersen Dec. 22, 1936
2,261,457 Wiggins Nov. 4, 1941
2,483,256 Berg Sept. 27, 1949