J. M. McDONALD.

AIR VALVE FOR OIL TANKS.

APPLICATION FILED JUNE 27, 1910.

980,810.

Patented Jan. 3, 1911.

2 SHEETS—SHEET 1.

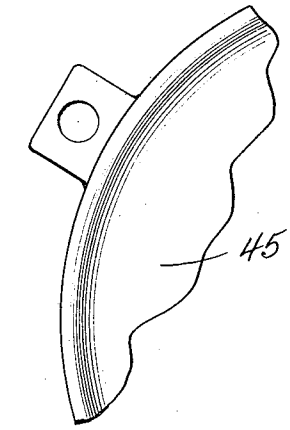
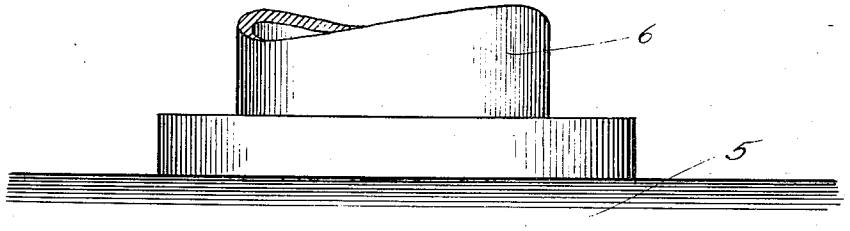


Fig. 4.

Fig. 1.



Witnesses:

Ephraim Banning.

Wm. M. Bond

Inventor:

John M. McDonald.

BY Banning & Banning

Attorneys.

J. M. McDONALD.

AIR VALVE FOR OIL TANKS.

APPLICATION FILED JUNE 27, 1910.

980,810.

Patented Jan. 3, 1911.

2 SHEETS—SHEET 2.

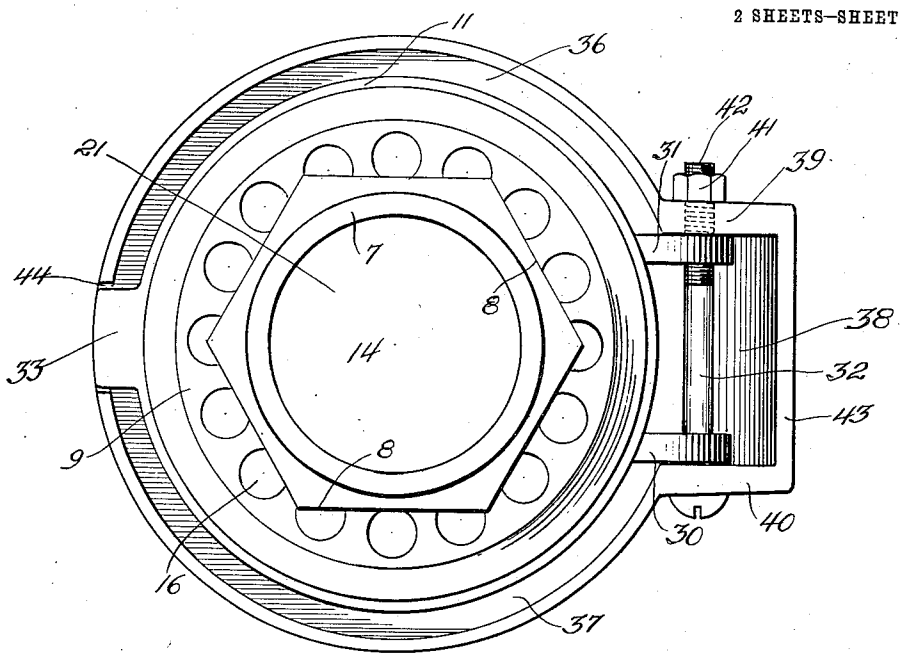


Fig. 2.

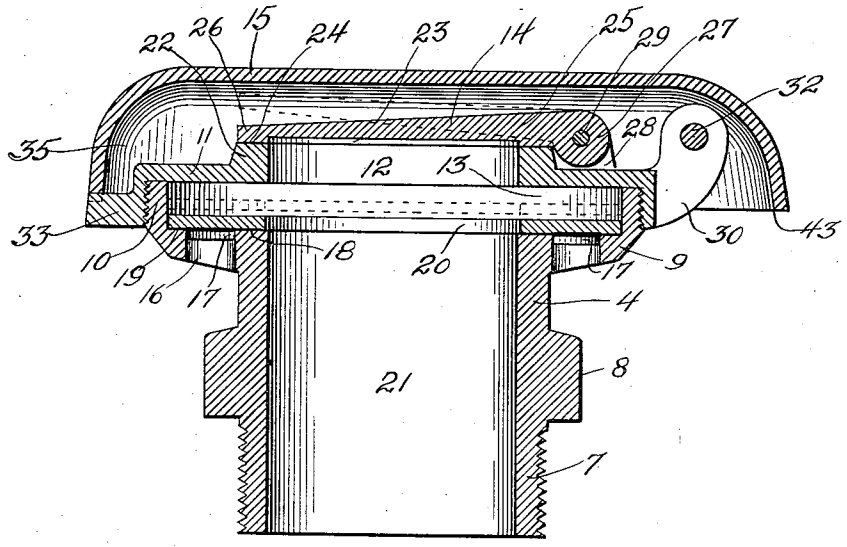


Fig. 3.

Witnesses:

Ephraim Banning.

Wm. P. Bond

Inventor:

John M. McDonald.

BY Banning & Banning

Attorneys.

UNITED STATES PATENT OFFICE.

JOHN M. McDONALD, OF DUBUQUE, IOWA, ASSIGNOR TO THE A. Y. McDONALD MANUFACTURING COMPANY, A COPARTNERSHIP OF IOWA.

AIR-VALVE FOR OIL-TANKS.

980,810. Specification of Letters Patent. Patented Jan. 3, 1911.

Application filed June 27, 1910. Serial No. 569,078.

To all whom it may concern:

Be it known that I, JOHN M. McDONALD, a citizen of the United States, residing at Dubuque, in the county of Dubuque and State of Iowa, have invented certain new and useful Improvements in Air-Valves for Oil-Tanks, of which the following is a specification.

In distributing oil, such as kerosene and gasolene, to the smaller centers of distribution, it is customary at each such center of distribution to locate one or more tanks of considerable capacity for each kind of oil. These tanks are generally in the form of steel cylinders of proper diameter and length, laid horizontally on secure foundations and generally in comparatively open places—that is, not adjacent to many buildings, and without any protection from heat and cold. A railroad siding is run up near to each set of tanks, so that tank cars may be run in over the siding and the oil then discharged from the tank cars into the stationary tanks.

In order to discharge the oil from the tank cars into the tanks, it is customary to use either a hand or engine-driven pump, which sucks the oil from the tank car through suitable connections and discharges the same into the tanks, which generally stand at but small elevation above the ground. Other pipes usually connect with the tanks, so that the oil may be drawn out into distributing wagons or vessels by gravity. Because of the exposed nature of these tanks and their accessories, a suitable air valve must be so designed and constructed as not to be easily injured or deranged by sleet, snow or ice, which might form on the tank or other parts, as such elements might freeze up the parts so that they would cease to operate in cold weather. In like manner, a suitable air valve for this service should be supported above the top of the tank a sufficient distance so that it may not be submerged or covered or its operation interfered with by snow and ice which might form on the top of the tank and then bank up around the valve.

Because of the highly inflammable nature of the liquids and gases in these tanks, they should at all times be completely closed when filled, so that stray sparks or lights could not ignite the gases or liquids. For the same reason, the air valve should be so constructed that a careless or indifferent employee may not go away and leave the valve open after gaging the tank or after opening it for any other purpose.

As before stated, the liquids are, as a rule, of a highly volatile nature—that is, they are continuously giving off gases of different kinds. The rate at which these gases are given off depends in large measure upon the freedom with which they may escape. In case the valve should be left open through inadvertence or carelessness, a considerable amount of the liquid might be evaporated and pass off in the form of a gas, which evaporation would not occur if the valve were closed. Of course, such evaporation entails a complete loss of the liquid thus evaporated, and in some cases tends to deteriorate the quality of the remaining liquid.

Objects of my invention are, to provide a simple valve of cheap construction which will allow the air or gases to pass off from the upper portion of the tank promptly and easily during the filling process, to allow air to flow into the upper portion of the tank immediately when liquid is drawn off from it, so that the rate of flow of the stream drawn off will not be impeded in any way; to provide a valve of such construction that at all times it will remain tightly closed so as to prevent the ingress of sparks or flames to the gases, and so as to impede the normal evaporation which tends to occur when the liquids are exposed to the air, and to relieve pressure and vacuum occasioned by expansion and contraction of the liquid; to provide, however, a construction of valve such that a slight increase of gas pressure within the tank—as, for example, would be occasioned by a hot sun beating down upon the metal—will allow this excess gas pressure to pass off freely as rapidly as the gas is formed, so as to prevent any danger of the tank's being subjected to undue strains; to permit the ingress of air into the tank when the fluids contract by cooling; to provide a form of valve such that a careless or indifferent employee may not leave the valve open at any time; to provide a construction of valve which for gaging purposes will present a clear, unobstructed and direct opening so that the rod may be easily inserted vertically clear to the bottom of the tank; to provide a construction of valve such that all moving parts will be properly inclosed

and sheltered, whereby sleet and rain cannot get to these parts so as to interfere with or prevent their operation; and to provide an arrangement of parts such that snow and ice forming on top of the tank cannot reach up to and freeze over the valve.

Other objects and uses will appear from a detailed description of the invention, which consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings—Figure 1 shows a side elevation of the valve as applied to the top of a cylindrical tank, a portion of the connecting pipe being cut away and the cap being sectioned so as to completely show the clap valve, both the clap valve and cap being in extreme raised position such as they would occupy when gaging the tank; Fig. 2 is a bottom view of the valve, the cap being in closed position; Fig. 3 is a cross section of the valve showing the cap, clap valve and annular valve in closed position, and showing by dotted lines the manner in which the clap valve may open to permit gases to pass out, and also showing in dotted lines the manner in which the annular valve may rise to permit air to pass in; and Fig. 4 shows a modification of a portion of the cap which permits the same to be locked closed.

In the embodiment of my invention, I provide a body portion, clap valve, annular valve and cap, such that when the cap is thrown down it will properly protect the moving parts of the valve, the clap valve being so arranged that it may open to permit gases to pass out of the tank, and the annular valve being so arranged that it may permit gases to pass into the tank, the normal tendency of the annular valve and clap valve, when in working position, being to remain closed, and the cap being so hinged that it will always tend to close by reason of its own weight, and, in case the clap valve is also open for gaging purposes, to close it, so that the tendency of these parts will be to fall into closed position after the gaging operation is complete.

Referring now to the figures, the body portion 4 of the valve is shown as attached to the top portion 5 of the tank by means of a pipe 6 of proper diameter and length and coupling 6^a, as will be hereinafter explained. Preferably the body portion 4 is provided with a threaded neck 7, which may be threaded into the upper end of coupling 6^a, and the body portion 4 is provided with a plurality of faces 8 which may be gripped by the wrench during the process of applying the valve to the pipe. The upper portion of the body is expanded out in the form of a ledge 9, which terminates in an enlarged neck 10. A cap 11 may be threaded onto the neck 10, said cap being provided with an outlet opening 12 in its central portion, the cap 11 and neck 10 being of such form as to provide a space 13 between the upper face of the ledge 9 and the lower face of the cap 11. A clap valve 14 serves to close the opening 12 and a hinged cap 15 serves to cover over the entire upper portion of the valve.

The ledge 9 is provided around its periphery with a plurality of holes or slots 16, which extend from the atmosphere into the space 13 between the ledge and the cap 11. The ledge is provided in its upper face with an annular depression 17, connecting the upper ends of all of the holes or slots 16. The inner and outer edges 18 and 19 of the upper face of the ledge 9 are preferably ground to present accurate, smooth plane surfaces, so that an annular valve 20, likewise provided with a ground lower surface, may accurately seat on the surfaces 18 and 19 so as to provide a tight joint when seated, thus preventing gases from passing up through the hole 21 of the body portion into the space 13 and out through the holes 16.

The cap 11 is provided with an annular ridge 22 surrounding the hole 12, the upper surface of said ridge being also accurately ground. The clap valve 14 is preferably cut away in its central portion 23, and its lower projecting annular edge 24 is ground to seat accurately on the surface of the ridge 22, so that when the clap valve is in closed position there will be a tight connection between it and the ridge 22 into the opening 21 of the body portion. This clap valve is preferably wedge-shaped, being thicker near its rear end 25 than its front end 26, and the rear end terminates in the form of an ear 27. The cap is provided with two lugs 28, spaced apart to receive the ear 27 loosely, and said ear is pivoted to the lugs 28 by means of a set screw 29. The cap 11 is preferably threaded on the neck 10 and is provided on its rear edge with a pair of ears 30 and 31, symmetrically placed with respect to the lugs 28. The cap 15 is then hinged to the ears 30 and 31 by means of a lock bolt 32. The front of the cap 11 is provided with a lug 33 adapted to support the front end of the cap 15 when in closed position.

Considering now the cap 15, this is of peculiar shape. It is preferably in the form of a flat central portion 34 provided around its periphery with an apron 35, which apron may hang down low enough to thoroughly protect the clap valve 14 and ridge 22, but is spaced away from the edge of the cap 11 sufficiently to provide spaces 36 and 37, so that the gases which pass up from the opening 21 and through the partly open clap valve 14 may escape unobstructed through the spaces 36 and 37. The rear portion of the cap 15 is, however, provided with an ex-

tension apron 38, which hangs down low enough to thoroughly inclose the lugs 30 and 31 and bolt 32, so that the elements may not get in at these points and interfere with the free swinging of the cap 15. The sides 39 and 40 of the extension 38 lie parallel to the lugs 30 and 31, and the bolt 32 passes through these sides and the lugs and is locked by means of a nut 41. However, in order to lock the bolt 32 more securely its end 42 may be threaded through the side 39 so that when the nut 41 is applied a true lock-nut connection will be formed. The sides 39 and 40 should be spaced apart sufficiently to allow free play of the cap 15 about the lugs 30 and 31, so that said cap may easily fall closed.

The lower edge 43 of the extension 38 is so formed that when the cap 15 is thrown into its extreme upper position, as shown in Fig. 1, the edge 43 will come into contact with the lugs 30 and 31 in a manner to hold the cap 15 so that it will naturally fall closed into the position of Fig. 3—that is, the cap may never be opened sufficiently to naturally stay open when the valve is set in its normal working position on a tank. The parts should further be so proportioned that the closing tendency of the cap 15 will be sufficient to also close the clap valve 14 from its position of Fig. 1. It is then evident that the valve will automatically close regardless of the negligence or carelessness of an employee. The lower edge of the front part of the apron 35 may be provided with a notch 44, which will register with the lug 33 to properly center the cap 15 as it falls.

By hinging the clap valve 14 loosely to the lugs 28 and the cap 15 loosely to the lugs 30 and 31, it is not necessary to use great care in forming these joints so that the cap 15 will automatically close and carry with it the clap valve in the above described manner. At the same time, the provision of a notch 44, registering loosely with the lug 33, insures that the cap 15 will properly center as it falls, and the provision of considerable bearing surface for the clap valve 14 against the ridge 22 insures that the opening 21 will always be closed at this point in a tight manner. It is possible to proportion the parts in such manner that when the cap 15 is open in the position of Fig. 1, so that it will automatically fall closed, there will still be a clear opening down through the hole 21 and pipe 6 to the bottom of the tank, so that the gaging operation may be easily carried on.

In operation, when the pressure of the gas within the tank falls a slight amount, as it will do when the process of drawing off the oil commences, atmospheric pressure will be exerted upward through the holes or slots 16 against the lower face of the annular valve 20. The latter will then be raised a sufficient amount to allow this air to flow into the opening 21 and thence into the body of the tank, at the same time the clap valve will remain closed. As soon as the operation of drawing off oil ceases, the annular valve 20 will fall back into closed position. When it is desired to fill the tank, the pressure therein will rise a slight amount, and then the clap valve 14 will open sufficiently to allow the gases to pass out and down through the spaces 36 and 37 to atmosphere. It is evident that the surface upon which incoming atmosphere will press to open the diaphragm 20 will be equal to the area of the strip of said annular valve equal in width to the groove 17, and of a length equal to the circumference of said groove. By providing a sufficient surface for the atmosphere to press against, and by making the annular valve 20 sufficiently light, an extremely small reduction of gas pressure within the space 21 will be sufficient to open said valve and allow air to pass in. In like manner, by providing a clap valve of sufficient size so as to present a comparatively large area an extremely small increase of gas pressure within the tank will be sufficient to open the clap valve and allow said gas to pass off. Furthermore, the use of a large clap valve will greatly facilitate the gaging process.

It is evident that the arrangement of parts in this valve is such as to secure the maximum amount of opening both for inlet or egress of fluids within the minimum space. This is true largely because the valve is of circular arrangement, one of the openings being virtually surrounded by the other. Furthermore, the arrangement is one in which the cap 15 may completely and properly protect the vulnerable parts with the greatest ease and thoroughness. The elements cannot get to the working parts by reason of the manner in which they are all inclosed by the apron 35, and by reason of the manner in which the extension 38 covers the hinge at this point.

Although I have shown and described a construction making use of a circular clap valve, and in which the inlet openings are placed circularly around the main opening 21 of the body portion, still I cover in my invention any suitable construction making use of the clap valve for allowing fluids to pass out of the tank and some form of annular or equivalent valve for allowing fluids to pass into the tank.

In the modification shown in Fig. 4, a lug 45 is formed on the cap 15 and adapted to register with a similar lug on the cap 11. These lugs may be perforated so that the cap 15 can be locked closed, as by means of a padlock. These lugs should preferably be formed on one side of the caps so that when the cap 15 is raised during the gaging proc-

ess a clear opening will be presented for the gaging rod.

I claim:

1. A gas valve of the character set forth, comprising a body portion having therein inlet and outlet gas openings, a closure for the inlet openings in the form of an annular valve, a closure for the outlet opening in the form of a clap valve, and a cap covering the upper portion of the gas valve, said cap being hinged to a fixed portion of the valve in a manner whereby when in completely open position it will normally tend to fall closed and the clap valve being so supported with respect to said cap that the cap will throw the clap valve into closed position when the cap falls into closed position, substantially as described.

2. In a gas valve of the type described, a body portion having therein inlet and outlet openings, a closure for the inlet openings in the form of an annular valve, a closure for the outlet openings in the form of a clap valve, and a cap normally covering the upper portion of the device and hinged to a fixed portion thereof in a manner whereby said cap normally tends to fall into the closed position, and the clap valve being hinged to a fixed portion of the device in a manner whereby the cap will throw the clap valve into closed position when the cap is closed, substantially as described.

3. In a device of the class described, a body portion having therein an outlet opening, a clap valve for said opening, and a cap normally covering and inclosing the upper portion of the device, said cap being hinged to a fixed portion of the device in a manner whereby it will normally tend to fall into closed position and the clap valve being hinged in a manner whereby the cap will normally close the clap valve when the cap falls into closed position, substantially as described.

4. In a device of the class described, a body portion having therein inlet and outlet openings and closures for said openings, and a hinged cap normally covering and inclosing the upper portion of the device, and provided with an apron of a formation to extend down around the upper portion of the device and inclose the same when the cap is in the closed position, substantially as described.

5. In a device of the class described, a body portion having therein a plurality of holes extending from the exterior to the interior of the device to form an inlet opening and having in its upper portion a substantially vertically formed hole to form an outlet opening, a closure for the inlet openings and a closure for the outlet opening, and a cap normally covering and inclosing the upper portion of the device, said cap being provided around its periphery with a downwardly extending apron and being hinged to a fixed portion of the device in a manner whereby the cap normally tends to fall into the closed position, the apron being formed on the cap in a manner to extend down below the closure for the outlet opening when the cap is in closed position and being formed in a manner to inclose the hinge whereby it is hinged to the fixed portion, whereby when the cap is in closed position the elements may not gain access to the clap valve or hinge, substantially as described.

6. In a device of the class described, a body portion having therein inlet and outlet openings, a closure for the inlet opening and a closure for the outlet opening, and a cap normally covering and inclosing the upper portion of the device, said cap being hinged to a stationary portion of the device and being provided around its periphery with a downwardly extending apron of a form to normally inclose the upper portion of the device whereby when the cap is in closed position the apron extends down past the closure of the outlet opening, and the hinge, substantially as described.

7. In a device of the class described, a body portion having therein a vertically extending hole in the form of an outlet opening and a plurality of substantially vertically extending holes surrounding the outlet opening and forming an inlet opening, a closure for the inlet openings in the form of an annular valve and a closure for the outlet opening in the form of a clap valve, and a cap for the device normally covering and inclosing the upper portion of the device, the holes comprising the inlet opening being spaced around the outlet opening in a substantially circular manner whereby the holes for said inlet and outlet openings and the closures therefor may be compactly and efficiently placed, substantially as described.

JOHN M. McDONALD.

Witnesses:
EPHRAIM BANNING,
THOMAS A. BANNING, Jr.