

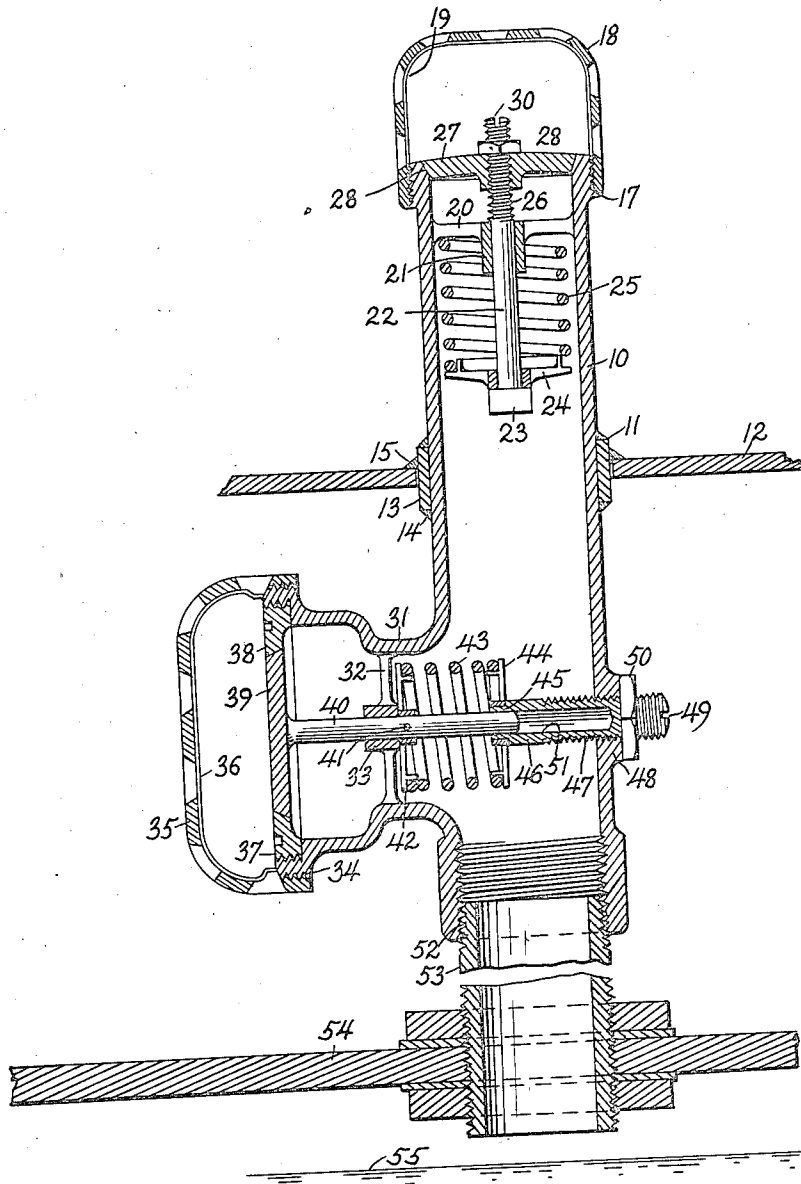
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BREATHER VALVE

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BREATHER VALVE

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This invention relates to a breather valve for permitting the escape of air when filling the tank or container, such as a tank, tank car, tank truck, tank ship, or the like, with a liquid and for the admission of air to the foregoing containers or compartments therein when removing the liquid therefrom by means of a pump or other device, while at the same time excluding the admission of water, rain water, sea water, spray, or other foreign matter to the tank or compartment in question at all times during the operation of either expelling or taking in air.

The particular application of the device in question is for attachment directly or by means of piping to fuel oil tanks or tanks used for the storage of fuel oil and similar fluids or materials loaded into a tank or removed therefrom while in a fluid state aboard ships and sea-going vessels, and to permit the filling or pumping down of such tanks under all conditions of weather with the decks of the vessel awash or flooded from the sea, or in any other manner, without permitting any of the accumulated water to enter the said tanks in which the fuel oil or other liquid subject to contamination is stored.

The further object of this invention is to simplify the construction and reduce the weight of a breather valve, that will fulfill the foregoing requirements, to a minimum.

The further object of this invention is to permit attachments of the breather valve directly to a ship's deck or bulkhead by means of welding or with a very short section of pipe in such manner as will permit it to be installed in obscure corners and without necessitating long lengths of pipe to raise it above the height of a normal sea washing over the deck.

A further object is to regulate the pressure or vacuum, under which the respective valves are to operate, from a position external to the valve and thus without dismantling the valve. The pressure valve or vacuum valve of the breather valve can be regulated independently and separately.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts as will hereinafter be more fully described and as shown in the accompanying drawing, wherein:

The figure is a section view of the valve schematically shown in operative position.

There is shown at 10 a valve body, preferably made of brass, which is secured at 11 in the deck or roof 12 of a ship or tank car, the securing

means 11 being any suitable securing means for making a watertight connection between the body 10 and a suitable aperture through the deck or roof 12, in this case consisting of a ring 13 secured about the valve body 10 by welding or brazing 14 and secured to the roof or deck 12 by welding or brazing 15. The upper end of the valve body 10 projecting above the deck is externally threaded as at 17 so as to receive an apertured protecting portion 18 within which is placed a flame protecting bronze wire gauze 19.

A spider 20 provided within the valve body 10 is formed with an apertured valve guide 21 through which slidably extends a valve stem 22. One end of the valve stem is provided with a head 23 which acts as an abutment for holding a spring seat 24 on the stem 22. A compression spring 25 secured between the spring seat 24 and the lower side of spider 20 acts to draw the valve stem 22 inwardly into the valve body. The other end of the valve stem 22 is threaded as at 26 so as to threadedly receive a valve disk 27 thereon, the valve disk 27 having its upper surface convexly shaped, as shown, and adapted to seat against the valve seat 28 beveled into the upper end of the valve body 10. A locknut 29 is placed on the threaded end 26 of the valve stem 22 after the stem 22 has been manipulated by a screw driver placed in the kerf 30 so as to place the spring 25 under the desired amount of compression. This valve disk 27, as will be apparent, acts as an outlet or pressure relief valve and will allow pressure to escape therethrough whenever the pressure exceeds the adjustment to which the spring 25 has been set.

Below the roof or deck 12 the valve body 10 is provided with an angle 31 within which is secured a spider 32 similar to spider 20 and a valve stem guide 33 similar to the valve stem guide 21. The angle 31 is externally threaded as at 34 so as to receive the apertured protecting cover 35 and the flame resistant gauze 36 thereon. The angle body is also internally threaded as at 37 so as to receive a valve seat 38 secured therein. This valve seat 38 is adapted to have an inlet or vacuum or suction valve 39 operate thereagainst, the inlet valve 39 being provided with a valve stem 40 extending through the valve stem guide 33.

Pinned to the valve stem 40 as at 41 is a spring seat 42 against which rests a compression spring 43. The other end of the compression spring 43 rests on the spring seat 44, this spring seat 44 being mounted on a reduced neck 45 formed on

the end of a sleeve 46 which is threaded as at 47 through a suitable boss 48 formed in the opposite side of the valve body 10. A kerf 49 formed in the external end of the sleeve 46 allows the sleeve to be adjusted in position through the boss so as to adjustably vary the pressure on the spring 43 and in turn the pressure on the inlet valve 39, a locknut 50 being provided to hold the sleeve 46 in the adjusted position.

The sleeve 46 is hollow as at 51 and the end of the valve stem 40 is guided by passing into this hollow 51 of the sleeve 46. The lower end of the valve body 10 is threaded as at 52 so that it may be secured to a suitable breather pipe 53 suitably secured through the tank or compartment wall or top 54.

In operation, the liquid level 55 within the tank or compartment varies as the oil or other liquid within the tank is being used up or is being replaced therein. It also varies with variations in temperature, expanding as the temperature increases and contracting as the temperature decreases. Evaporation taking place from the level thereof within the tank likewise varies with the temperature, increasing and causing a pressure as the temperature rises and decreasing of condensing causing a vacuum as the pressure falls.

If no breather pipe were provided, the normal variation in the liquid level 55 would cause the compartment or tank walls to tend to explode as the pressure increases or to tend to collapse as the pressure decreases, forming a vacuum therein. When explosive materials, such as gasoline or oil, are carried within the tank, it is undesirable to allow the fumes to escape promiscuously as the pressure is being relieved and it is likewise undesirable to allow foreign matter such as sea water, spray, or rain water to enter therein to contaminate the same.

With the valve of this invention connected to the end of the breather pipe, as shown, whenever the pressure within the tank exceeds the predetermined pressure, for which predetermined pressure the spring 25 of outlet valve 27 has been suitably adjusted, the valve 27 will open allowing the fumes to escape therethrough and through the fire-resistant gauze 19 and apertured cover 18. These fumes being dangerous, it is obviously desirable that they be expelled outside the deck of the ship or the roof of the tank car and it is for this reason that the outlet valve 27 is placed above the deck or roof as shown. By having the surface of the outlet valve 27 convex, as shown, any rain water, sea water, or spray that may have collected thereon may drain out through the apertures in the cover 18. As soon as the pressure within the tank drops to that equal to the spring 25, the valve 27 will close and prevent any excessive loss of fumes.

When the temperature drops or the oil level is lowered through using up of the liquid, a vacuum will be created within the tank. As soon as this vacuum exceeds the strength of the spring 43 in its set position, it will cause the inlet valve 39 to open, allowing air to enter the tank through the apertured cover 35 and fire-resistant gauze 36. This inlet valve 39 is located below the deck or roof surface and hence is not exposed to any rain, sea water, or spray, and hence can not draw any moisture into the tank, thereby preventing contamination of the contents of the tank.

It will be especially noted that this form of breather valve permits locating the inlet or suction valve 39 in a protected position to insure that absolutely no spray or water may enter the tank

through the breather pipe. Also, that any pressure inside the breather pipe sufficient to cause the outlet valve 27 to open is bound to be sufficiently in excess of the external pressure at that time to prevent any possibility of water entering at this point.

It is to be noted that fuel or other liquid tanks are generally built to withstand a pressure of at least four pounds per square inch. Thus the spring 25 regulating the outlet valve 27 can be set to cause the outlet valve to function at any pressure up to four pounds per square inch without straining the tank. For sea-going vessels, this would permit installing these valves on the weather deck and the valve would function with seas washing over the deck. Such condition would occur when transferring oil from one tank to another at sea. A sea washing over the weather deck might cover the valve for several feet but the outlet valve 3 would still operate and permit air to escape as the tank is being filled by transfer of fluid from another tank. For ordinary pressure the spring would be set for 1 to 1½ pounds per square inch. With the valve spring set for this pressure the foregoing operation when submerged is still effective as the hydrostatic pressure on the top of the valve will augment the compression on the spring. Under such conditions the valve will not open until the pressure inside the tank, the breather pipe, and the breather valve exceeds the outside hydrostatic pressure plus the compression in the spring and when this occurs water is prevented from entering by the excess of the internal pressure over the external pressure, thereby absolutely excluding water from entering the ship's tank or compartment even though it is discharging under water.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

We claim:

1. A breather valve comprising a valve body adapted to be secured through a wall or deck, an outlet valve in said valve body located without the deck or wall, and an inlet valve in said valve body located within said deck or wall, compression spring means pre-determining the pressure at which said valves will operate, and means accessible outside of said valve body for adjusting said pressure determining means, said pressure determining adjusting means comprising in the case of said outlet valve a valve stem threadedly secured at one end through said outlet valve, a tool cooperating means on said valve stem for adjusting said valve stem relative to said valve, a valve guide secured within said valve body, said valve stem slidably passing through said valve guide, a head formed on the other end of said valve stem, a spring seat on said valve stem resting against said head, said compression spring means being secured between said spring seat and said valve guide.

2. A breather valve comprising a valve body adapted to be secured through a wall or deck, an outlet valve in said valve body located without the deck or wall, and an inlet valve in said valve body located within said deck or wall, compression spring means pre-determining the pressure at which said valves will operate, means accessible outside of said valve body for adjusting said pressure determining means, said pres-

sure determining adjusting means comprising in the case of said inlet valve an inlet valve stem extending from said inlet valve, a valve guide through which said stem extends, a sleeve thread-
5 edly secured through said valve body, the end of said valve stem being slidable within said sleeve, tool cooperating means formed on said sleeve

exteriorly of said valve body, a spring seat secured on said sleeve within said valve body and a second spring seat pinned to said valve stem, said compression spring means resting between said spring seats.

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