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BREATHER VALVE

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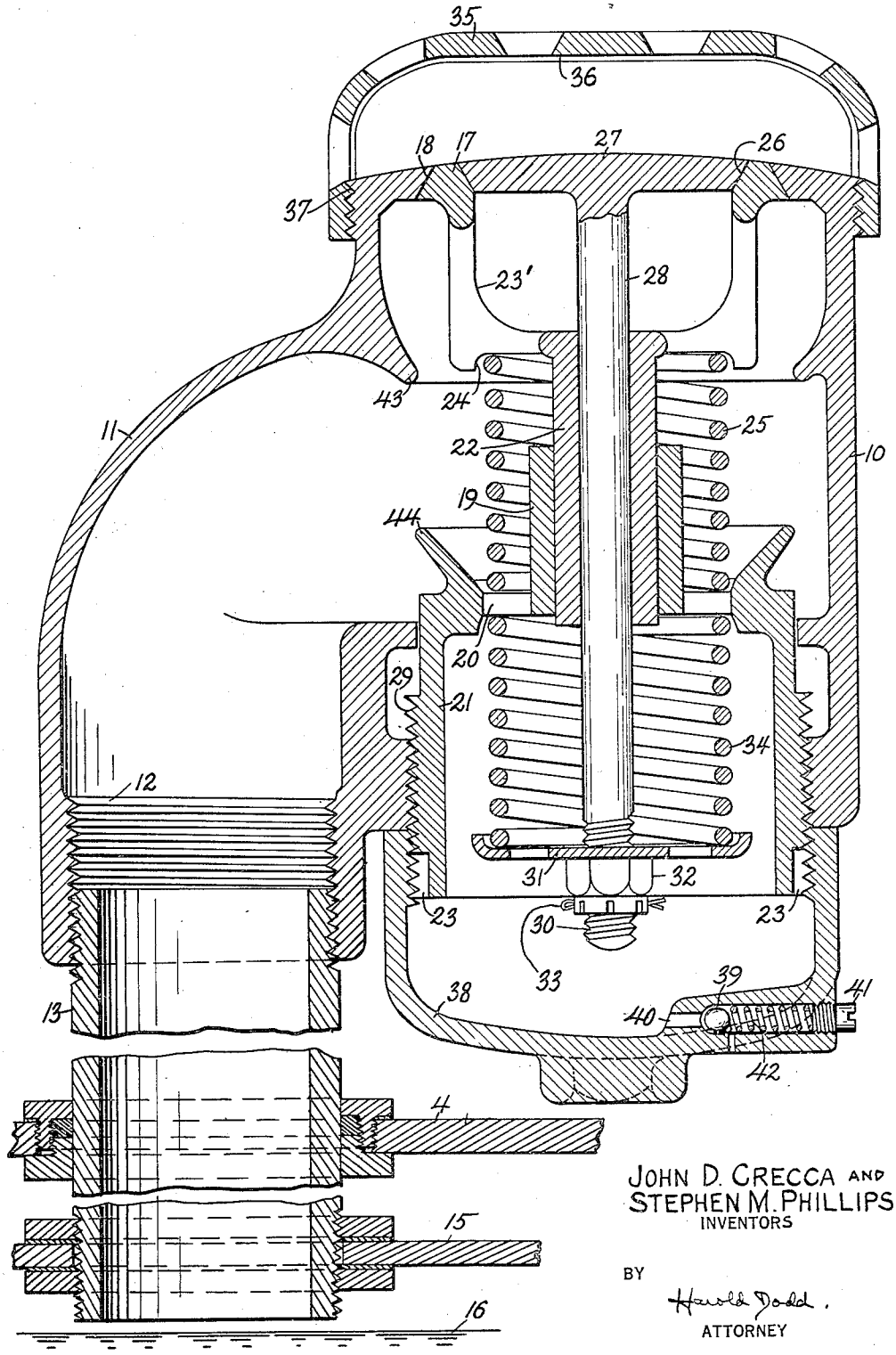

JOHN D. CRECCA AND
STEPHEN M. PHILLIPS.
INVENTORS

BY

Harold Dodd.

ATTORNEY

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BREATHER VALVE

John D. Crecca, United States Navy, and
Stephen M. Phillips, Westbury, N. Y.

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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 arrangements 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 provided with a gooseneck flange 11 threaded as at 12, that may be secured to a vent or breather pipe 13 leading through the roof or deck 14 to a compartment or tank 15. The compartment or tank 15 is intended to receive liquids such as fuel oil, gasoline, or other materials, the level 16 of which may vary as the material is refilled or consumed and as the temperature rises or falls.

Tanks or compartments of this nature are generally made to stand a pressure of at least four pounds per square inch and as the level rises or falls due to temperature variations or to consumption or replacement, it is necessary that the vent pipe 13 allow excessive pressure within the tank to relieve itself as the temperature rises or as the material is being replaced and also allow the vacuum created therein by falling temperature or consumption of material to likewise relieve itself so as to prevent exploding or collapsing of the tank wall. It is also necessary that when the material 16 is inflammable material that the fumes created and discharged as the pressure is relieved should be discharged in a position where they will not be confined so as to cause a fire hazard.

The breather valve 10 attached to the pipe 13 performs these functions and it may be placed, in the case of a vessel, on the lowest weather deck and may operate, in spite of the fact that seas may wash thereover, without allowing any contamination to enter the tank through the valve. By being placed on the lowermost weather deck an excessive length of vent pipe 13 is avoided.

The valve body 10 is provided with an inlet or vacuum relief valve 17 which closes against the seat 18 formed in the valve body 10. This inlet or vacuum relief valve 17 is guided to its seat by the valve stem guide 19 which is secured on the spider 20 to the adjusting trough member 21. The valve stem 22, being in the form of a sleeve, is secured to the valve 17 by means of spider arms 23', which are recessed as at 24 to provide a spring seat for receiving one end of a compression spring 25, the other end seating against the top of the spider 20 of the adjusting trough member 21.

This trough member 21 is threaded as at 29 so that it may be adjusted by means of any ordinary spanner wrench placed in the slots 23. As will be apparent by adjusting the trough member 21 along its threads 29 relative to the valve body 10, the compression on spring 25 may be set as desired so as to predetermine the vacuum which must be exceeded before the inlet or vacuum relief valve 17 may open. The inlet valve 17 in turn is provided with a seat 26 for the outlet or pressure relief valve 27 whose valve stem 28 slidably extends through the hollow of

the sleeve of valve stem 22 and has its lower end threaded as at 30 so as to adjustably receive thereon a spring seat 31. This seat 31 is held in adjusted position by means of a castellated nut 32 held in adjusted position by the cotter pin 33. A compression spring 34 operating between the spring seat 31 and the lower side of the spider 20 serves to hold the outlet or pressure relief valve 27 in closed position until the pressure exceeds that at which the spring 34 has been set by manipulation of the nut 32.

As will be observed, the surface of the assembled inlet valve 17, outlet valve 27 and the upper end of the valve body 10 is in the form of a segment of a sphere so that any water or spray will not accumulate thereon but will tend to flow off, there being absolutely no pockets in which it might collect. A protective perforated cover 35 together with a bronze fire-resistant gauze 36 is threaded as at 37 to the upper end of the valve body 10.

In operation, the inlet vacuum relief valve 17 is first adjusted by manipulation of the adjusting trough member 21 along its threads 29 within the valve body 10 so as to place the spring 25 under the desired amount of compression. Next, the nut 32 is adjusted to place the compression spring 34 under the desired amount of compression, it being observed that compression spring 34 operates the outlet valve 27. After the springs of both valves have been properly adjusted to the desired set amount the bottom cap 38 is placed on the lower end of threads 29 of the trough member 21 to enclose and protect the adjusting ends. A drain valve 39 closing off a drain conduit 40 is adjustably held in position by means of a stud 41 and spring 42.

Below the valve seat 18 the valve body 10 is formed into a funnel-shaped inlet mouth 43, and trough member 21 is provided with a funnel-shaped mouth 44. Whenever air is being drawn into the vent pipe 13 and tank 15 through the gooseneck extension 11, the inlet mouth 43 will cause any moisture or spray entrained therein to deposit and drop down through the trough mouth 44 to the bottom cap 38 where it will collect until either the weight of the collected moisture automatically opens the drain valve 39 to allow the moisture to discharge through the conduit 40 or excessive pressure in the tank causes the entrapped moisture to open this drain valve 39. Obviously, by adjusting the stud 41, the valve 39 may be set so that the drain valve 39 will open before the water level therein can reach the top of the trough mouth 44.

Whenever the pressure in the tank or compartment 15 becomes excessive, either through a rise in temperature or replacement of the liquid 16, the outlet valve 27 will open and allow the fumes to escape therethrough, which at the same time will serve to automatically blow out any moisture accumulated in the bottom 38.

When an excessive vacuum is created within the tank 15, either through a falling temperature or lowering of the level of liquid 16 due to the consumption of liquid, the inlet valve 17 will open allowing the atmosphere to enter through the gooseneck 11 and vent pipe 13 into the tank, any entrained moisture being discharged to the bottom of the valve by the inlet mouth 43 and trough funnel 44.

Due to this provision for drawing in a minimum amount of water and for discharging the same automatically this valve 10 may be located on the lowermost weather deck of a ship or just above the roof of a tank car so that any fumes discharged thereby will not be held in a confined space to create a fire hazard but will be exposed to the wind to be blown away.

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 to a vent pipe extending through a wall or deck, said breather valve comprising a gooseneck extension and a valve body proper, a circular inlet mouth located at the top of said valve proper, a trough formed at the bottom of said valve proper below said inlet mouth, an inlet valve seating within said inlet mouth, said inlet mouth discharging any entrained foreign matter in the air to said trough member, an outlet valve, a valve stem on said inlet valve, a valve stem on said outlet valve, one of said valve stems being in the form of a sleeve adapted to slidably receive and guide the other of said valve stems, an inlet valve seat formed at the top of said valve body, said inlet valve seating against said valve seat, and an outlet valve seat formed in said inlet valve, said outlet valve seating against said seat in said inlet valve.

2. A breather valve comprising a valve body adapted to be secured to a vent pipe extending through a wall or deck, said breather valve comprising a gooseneck extension and a valve body proper, a circular inlet mouth located at the top of said valve proper, a trough formed at the bottom of said valve proper below said inlet mouth, an inlet valve seating within said inlet mouth, said inlet mouth discharging any entrained foreign matter in the air to said trough member, an outlet valve, a valve stem on said inlet valve, a valve stem on said outlet valve, one of said valve stems being in the form of a sleeve adapted to slidably receive and guide the other of said valve stems, an inlet valve seat formed at the top of said valve body, said inlet valve seating against said valve seat, an outlet valve seat formed in said inlet valve, said outlet valve seating against said seat in said inlet valve, said inlet valve stem being in the form of a sleeve, and an outlet valve stem in the form of a cylinder slidably extending through said sleeved inlet valve stem.

3. A breather valve comprising a valve body adapted to be secured to a vent pipe extending through a wall or deck, said breather valve comprising a gooseneck extension and a valve body proper, a circular inlet mouth located at the top of said valve proper, a trough formed at the bottom of said valve proper below said inlet mouth, an inlet valve seating within said inlet mouth, said inlet mouth discharging any entrained foreign matter in the air to said trough member, an outlet valve, a valve stem on said inlet valve, a valve stem on said outlet valve, one of said valve stems being in the form of a sleeve adapted to slidably receive and guide the other of said valve stems, an inlet valve seat formed at the top of said valve body, said inlet valve seating against said valve seat, an outlet valve seat formed in said inlet valve, said outlet valve seating against said seat in said inlet valve, said inlet valve stem being in the form of a sleeve, an outlet valve stem in the form of a cylinder slidably extending through said sleeved inlet valve stem, and a valve guide slidably receiving said inlet valve sleeve stem.

4. A breather valve comprising a valve body adapted to be secured to a vent pipe extending through a wall or deck, said breather valve comprising a gooseneck extension and a valve body proper, a circular inlet mouth located at the top of said valve proper, a trough formed at the bottom of said valve proper below said inlet mouth, an inlet valve seating within said inlet mouth, said inlet mouth discharging any entrained foreign matter in the air to said trough member, an outlet valve, a valve stem on said inlet valve, a valve stem on said outlet valve, one of said valve stems being in the form of a sleeve adapted to slidably receive and guide the other of said valve stems, an inlet valve seat formed at the top of said valve body, said inlet valve seating against said valve seat, an outlet valve seat formed in said inlet valve, said outlet valve seating against said seat in said inlet valve, said inlet valve stem being in the form of a sleeve, an outlet valve stem in the form of a cylinder slidably extending through said sleeved inlet valve stem, a valve guide slidably receiving said inlet valve sleeve stem, an adjustable member, a spider member securing said valve guide to said adjustable member, and means for threadedly adjusting said adjustable member in said valve body.

5. A breather valve comprising a valve body adapted to be secured to a vent pipe extending through a wall or deck, said breather valve comprising a gooseneck extension and a valve body proper, a circular inlet mouth located at the top of said valve proper, a trough formed at the bottom of said valve proper below said inlet mouth, an inlet valve seating within said inlet mouth, said inlet mouth discharging any entrained foreign matter in the air to said trough member, an outlet valve, a valve stem on said inlet valve, a valve stem on said outlet valve, one of said valve stems being in the form of a sleeve adapted to slidably receive and guide the other of said valve stems, an inlet valve seat formed at the top of said valve body, said inlet valve seating against said valve seat, an outlet valve seat formed in said inlet valve, said outlet valve seating against said seat in said inlet valve, said inlet valve stem being in the form of a sleeve, an outlet valve stem in the form of a cylinder slidably extending through said sleeved inlet valve stem, a valve guide slidably receiving said inlet valve sleeve stem, an adjustable member, a spider securing said valve guide to said adjustable member, means for threadedly adjusting said adjustable member in said valve body, said inlet valve sleeve stem being secured to said inlet valve by a spider, a spring seat formed in said inlet valve spider, and an inlet valve compression spring resting between said spring seat and said valve guide spider whereby adjustment of said adjustable member will adjust the compression on said spring against said inlet valve.

6. A breather valve comprising a valve body adapted to be secured to a vent pipe extending through a wall or deck, said breather valve comprising a gooseneck extension and a valve body proper, a circular inlet mouth located at the top of said valve proper, a trough formed at the bottom of said valve proper below said inlet mouth, an inlet valve seating within said inlet mouth, said inlet mouth discharging any entrained foreign matter in the air to said trough member, an outlet valve, a valve stem on said inlet valve, a valve stem on said outlet valve, one of said valve stems being in the form of a sleeve adapted to slidably receive and guide the other of said valve stems, an inlet valve seat formed at the top of said valve body, said inlet valve seating against said valve seat, an outlet valve seat formed in said inlet valve, said outlet valve seating against said seat in said inlet valve, said inlet valve stem being in the form of a sleeve, an outlet valve stem in the form of a cylinder slidably extending through said sleeved inlet valve stem, a valve guide slidably receiving said inlet valve sleeve stem, an adjustable member, a spider securing said valve guide to said adjustable member, means for threadedly adjusting said adjustable member in said valve body, said inlet valve sleeve stem being secured to said inlet valve by a spider, a spring seat formed in said inlet valve spider, an inlet valve compression spring resting between said spring seat and said valve guide spider whereby adjustment of said adjustable member will adjust the compression on said spring against said inlet valve, the end of said outlet valve cylindrical stem being threaded, a spring seat adjustably secured on said threaded end, and a compression spring resting between said latter spring seat and the bottom of said valve guide spider whereby adjustment of said latter spring seat adjusts the compression of the spring holding said outlet valve closed.

JOHN D. CRECCA.
STEPHEN M. PHILLIPS.