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T. G. LUNDE

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BREATHER CAP HEATER

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FIG. 1

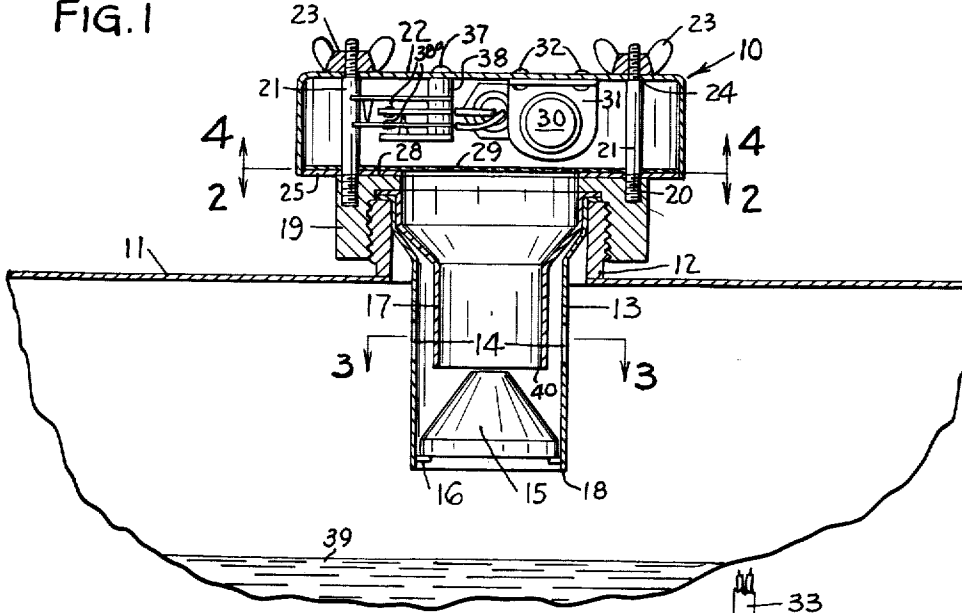


FIG. 2

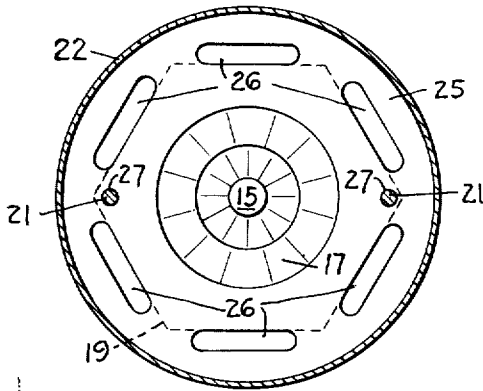


FIG. 4

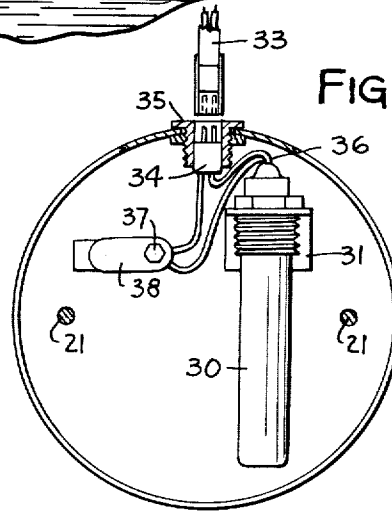
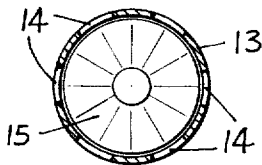


FIG. 3



INVENTOR
THEODORE G. LUNDE
BY *Theodore G. Lund*
ATTORNEY

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BREATHING CAP HEATER
Theodore G. Lunde, 2916 Cedar Ave.,
Minneapolis, Minn.
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This invention relates to breathing caps for tanks and the like and more particularly to a heated breathing cap to prevent frosting and freezing of said breather cap.

The preferred embodiment of my invention disclosed herein is useful on tanks such as are mounted on trucks. These tanks ordinarily contain liquids, and may be seriously damaged if an attempt is made to drain the tank without providing a vent or breather cap for allowing air to enter the tank during draining. Reference is made to my U.S. Patent No. 2,784,801, issued March 12, 1957, wherein disclosure is made of a tank incorporating such a breather or air vent.

In many sections of North America, during the winter months, the problem of freezing and extremely low temperatures is encountered. It is possible for ordinary breathing caps or air vents for outdoor tanks to freeze or frost during such inclement weather thereby closing or severely restricting the passage of air to and from the tanks during draining or filling.

It is therefore, an object of my invention to provide a heated breathing cap which prevents the freezing thereof so that an air passage from the interior of the tank to atmosphere is maintained.

It is a further object of my invention to provide a heated breathing cap which is easily removed from a tank and readily disassembled for cleaning.

It is another object of my invention to provide an actuating means for an electric heater of a heated breather cap so that the heater is energized at a predetermined temperature.

These and other objects and advantages of my invention will more fully appear from the following description, made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views and in which:

FIGURE 1 is a sectional elevational view of my novel heated breathing cap;

FIGURE 2 is a sectional view taken at 2-2 of FIG. 1;

FIGURE 3 is a section view taken at 3-3 of FIG. 1, and

FIGURE 4 is a sectional view disclosing the heating element and heating chamber taken at 4-4 of FIG. 1.

A breathing cap 10 is mounted on tank 11 in threadable engagement with an upstanding threaded cylinder 12 integral with said tank. The tank 11 is capable of containing fluids which are admitted and discharged at an opening (not shown) and in this regard reference is again made to my Patent No. 2,784,801.

Seated within threaded cylinder 12 is a flared housing 13 provided with apertures 14, a truncated conical float valve 15, float stop pins 16, and a main air passage throat 17. Throat 17 is provided with an opening 18 which is normally open to allow the passage of air therethrough, but which is closed by float valve 15 as fluid within the tank surges to carry float valve 15 into contact with opening 17.

The float 15 of my preferred embodiment is made from spun stainless steel, and normally rests on pins 16 mounted on the lower inner periphery of housing 13. The float 15 is spaced from the walls of housing 13 to facilitate movement of said float, and to provide an additional air passage or drainage for fluids which may inadvertently enter at apertures 14.

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The breathing cap 10 consists of a ferrule 19 which threadably engages threaded cylinder 12 and secures flanged portions of housing 13 and throat 17 to the upper surface of cylinder 12.

Ferrule 19 is provided with a plurality of threaded bores 20 into which are threaded bolts 21. The upper portion of bolts 21 pass through a cover cap 22 where the wing nuts 23 engaging bolts 21 secure cover cap 22 to the ferrule 19. The position of cover cap 22 is maintained by abutting on shoulder 24 of bolts 21.

A breather plate 25, provided with air passage apertures 26 and bolt openings 27, contacts the upper surface 28 of ferrule 19 and within cover cap 22 to form a heating chamber interior of the cap.

Coincident with breather plate 25 and overlying the plate is a filter pad 29 which allows the passage of air therethrough, and prevents dust particles and the like from entering the tank 11.

Interiorly of cover cap 22 is mounted a heating element 30 as by bracket 31 and rivets 32. Such heating elements are well known in the art, and in the preferred embodiment I disclose a direct current heating element rated at 12 volts, 50 watts and 4 amperes.

The heating element 30 receives electrical energy from an electrical power supply cable 33 which is connected to a source of electrical energy (not shown), as for example, the battery of a truck on which the tank is mounted.

A male plug 34 is mounted in a flange means 35 of cover cap 22, with the power supply cable 33 removably attached thereto. An electrical circuit 36 carries electrical energy from the plug 35 to the heating element 30.

Heating element 30 could of course, be continuously energized from a power source, but in the preferred embodiment the heating element 30 draws current only when bimetallic switch unit 38 is closed by ambient temperatures dropping near or at freezing temperature. Heat sensitive bimetallic switches are well known in the art and it is believed sufficient to state that the heating element 30 is energized upon closure of contacts 38 upon a predetermined drop in temperature. In the preferred embodiment, for example, the heating element 30 is energized when the ambient temperature is 35° F. and below.

Bimetallic switch unit 38 is attached to the top of cover cap 22 by a bolt 37 so that it is sensitive to the temperature of the exposed top of the cover cap 22.

When the tank is in use, liquid 39 will be enclosed in the tank. In transporting the tank, considerable sloshing of the liquid may be encountered. In the preferred embodiment, as the fluid sloshes into contact with opening 18 of housing 13, float valve 15 is raised or floated from pins 16 to cause the sloping sides of float valve 15 to close opening 40 of throat 17, thus preventing any of the liquid from entering the throat 17 or the interior of the breather cap 10.

When the float valve 15 is in the normally open position as shown in FIG. 1, air is free to circulate from the tank to atmosphere or vice versa through openings 26, filter 29, throat 17, and apertures 14, and around the outer periphery of float valve 15. Thus during the filling or discharging of the tank 11, air is allowed to circulate, as hereinabove described, to prevent a vacuum from occurring within its tank which might seriously damage the tank, as described in my hereinabove mentioned patent.

When ambient temperatures are at or below freezing, vapors, fluids, or the like which may be present within breathing cap 10, may freeze and cause closure or severe restriction of the air passage described above, and prevent the circulation of air from the tank to atmosphere or vice versa. Thus with bimetallic switch unit 38 sensi-

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tive to temperature, and, in the preferred embodiment, to temperatures 35° F. and below, the switch unit 33 will cause heating element 30 to be energized to heat the breathing cap 10 and the interior thereof to prevent icing or ice closure of the breathing cap 10, and the heat from the heating element 30 will be generally conductive along the plate 28, ferrule 19 and throat 17 to warm the entire breather cap and housing.

Further, any air entering the tank while the heater 30 is energized will be warmed by the heating element with the air warmed thereby being conducive of heating the parts of the breathing cap and housing, and to prevent chilled air from entering the tank 11.

Additionally, the heated breather cap 10 can be readily disassembled by removing wing units 23 to facilitate cleaning and repair. Such care of removal also allows a facile interchange of breathing caps with their attached heating elements and switch units.

Thus I have described a combined breathing cap and heater therefor combined with a housing for a float to prevent closure of said cap and assembly during freezing temperatures, and further the air entering through said breathing cap is warmed, and, in addition, the filter is warmed to maintain its effectiveness in freezing temperatures.

It will, of course, be understood that various changes may be made in the form, details, arrangements and proportions of the parts without departing from the scope of my invention as set forth in the appended claims.

What I claim is:

1. In a heated breather cap for a tank having a breather opening therein, the combination including means concentric of said opening for securing said breather cap to said tank, an aperture plate means mounted on said securing means, detachable cover cap means coextensive with said aperture plate means and enclosing a volume immediately above said apertured plate, and heating means mounted on the underside of said cover cap within said enclosed volume, said heating means being removable with said cap means when said cap means is detached, whereby said volume and apertured plate is heated by said heating means to prevent freezing thereof.

2. In a breather cap assembly for a tank, the combination including, a tank provided with an air inlet-outlet, valve means mounted in said air inlet-outlet for preventing discharge of liquid from said tank, means for securing said valve means to said tank and concentric of said air inlet-outlet, said valve means provided with apertures for allowing the passage of air, a valve seat means mounted within said valve means, an apertured plate concentric of said valve seat means for securing said valve means and having a diameter of greater extent, said apertured plates also provided with an opening concentric of said valve seat means, a filter means overlying said apertured plate for filtering air passing therethrough, a breather cover cap detachably secured to said valve securing means having a top surface in spaced relation from valve securing means, a heating element fixedly mounted on said cap interiorly of said cover cap and depending from

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said top surface for heating said interior, and actuating means for said heating element also fixedly mounted on said top surface of said cover cap and sensitive to ambient temperature.

3. In a breather cap assembly for a tank containing liquid, the combination including, an air inlet-outlet means located on said tank, a housing insertable in said inlet-outlet means, said housing provided with apertures and an opening therethrough, a throat concentric of said housing and insertable therein, means for securing said housing and throat to said inlet-outlet means, a float supported within the opening of said housing subjacent said throat, said float movable toward and in contact with said throat to close said throat when said liquid acts on said float, an apertured plate concentric of said securing means and mounted thereon, a cover cap removably mounted concentric of said plate and enclosing a volume between said cover cap and said plate, and heating means fixedly mounted interiorly on said cover cap and extending downwardly from the underside of the top of said cover cap for heating said enclosed volume, whereby air drawn into the tank through said apertured plate is heated by said heating means.

4. The breather cap assembly of claim 3 wherein said float is a truncated cone structure whereby said cone engages said throat for closure thereof.

5. The breather cap assembly of claim 3 including a said cover cap for energizing said heating means when ambient temperature is at or near freezing.

6. A breather cap for a container having a breather opening therein comprising a concave removable cover member, said cover being of sufficient size to overlie the marginal portion of said container circumjacent said breather opening, means carried by said cover member for removably attaching said cover member to said container to position both the top and side portions of said cover member in a spaced relationship with said opening and thereby provide a space through which gas may pass to and from said breather opening and the atmosphere, and a heating means fixedly attached to the underside of said cover member for heating said space and any gas passing therethrough, said heating means being removable with said cover member.

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