

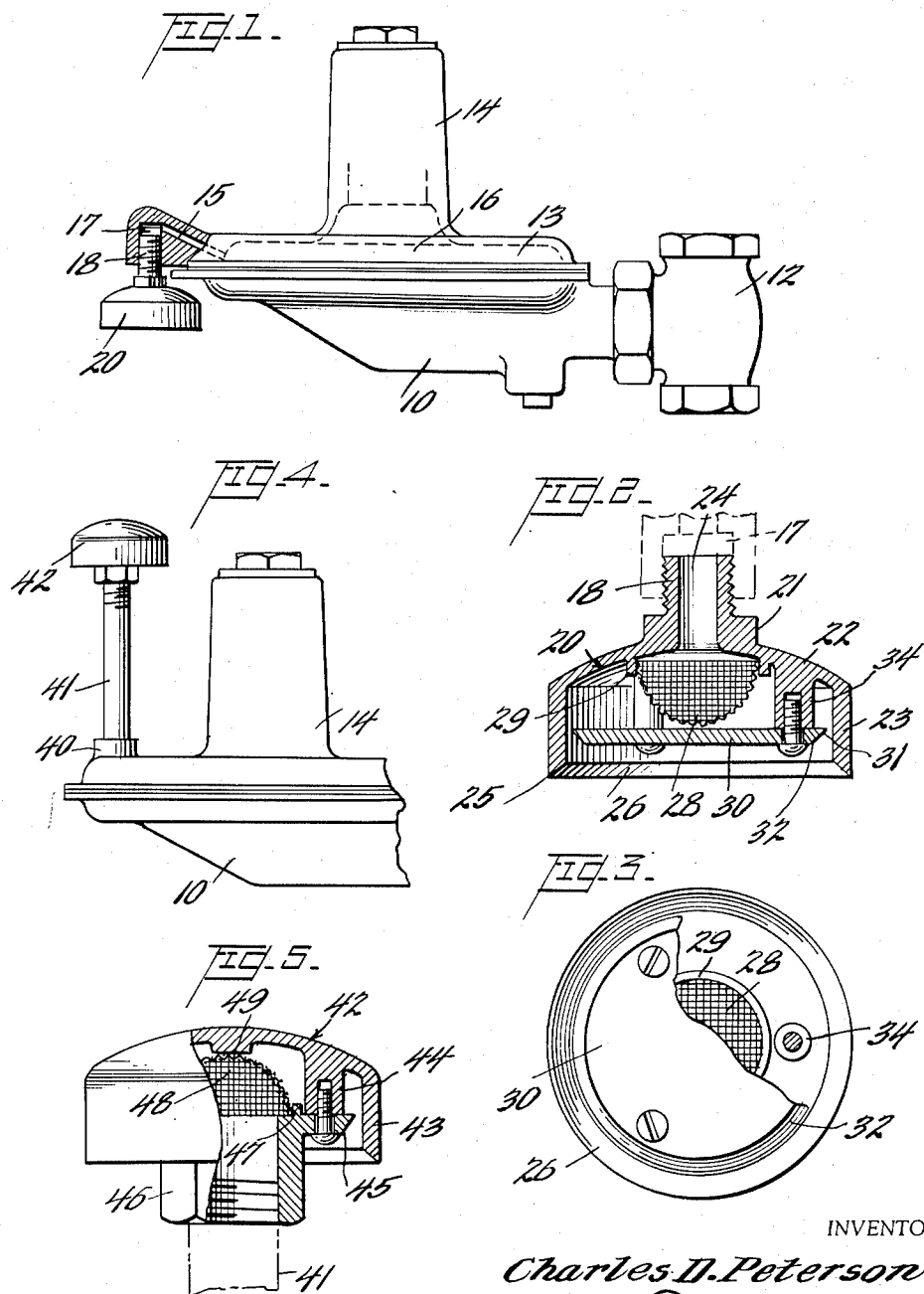
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C. D. PETERSON

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WEATHERPROOF BREATHER AND RELIEF VENT FOR GAS REGULATORS

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INVENTOR

Charles D. Peterson

BY

Leech & Radue

ATTORNEYS

UNITED STATES PATENT OFFICE

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WEATHERPROOF BREATHER AND RELIEF
VENT FOR GAS REGULATORSCharles D. Peterson, Dallas, Tex., assignor to Uni-
versal Controls Corporation, Dallas, Tex., a cor-
poration of Texas

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This invention relates to breathers or relief vents, and although of general application is directed primarily to such breathers and vents for gas service pressure regulators as used out-doors.

It is a general object of the present invention to provide novel and improved vents or breathers capable of functioning satisfactorily under all weather conditions.

It is a specific object of the invention to provide vents or breathers for use either above or below the diaphragm housing of a gas regulator and which are constructed and arranged to prevent closure by insects or sealing by moisture or freezing.

One of the important features of the invention comprises the arrangement of a breather with a housing or bell including a dome-like top and depending skirt portion having a sharpened lower edge to facilitate drip, together with a disc of slightly less diameter than that of the inner wall of the skirt fitted up within the skirt and secured to spacers within the housing.

Another important feature of the invention resides in a breather or relief vent constructed to have a bell-like body or shell, a partially closing disc therefor spaced upwardly from the bottom of the skirt of the shell and having a uniform narrow spacing from the walls of the skirt, together with a hemispherical screen element between the shell and disc with the open side presented to the passage through the vent and an opposite area engaged by a portion of the assembly to hold the screen tightly in position.

A further important feature of the invention resides in the provision of a circular stop ridge integral with one of the parts of the assembly and adapted to surround and contact the periphery of the open side of the hemispherical screen to insure its positioning and to hold it against undesired flaring.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawing and following specification, wherein are disclosed two exemplary embodiments of the invention, with the understanding that such changes and modifications may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawings:

Fig. 1 is a side elevation partly broken away illustrating a commercial form of gas pressure regulator equipped with a breather or vent con-

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structed in accordance with one embodiment of this invention;

Fig. 2 is a central vertical section through the vent or breather of Fig. 1;

Fig. 3 is a bottom plan view thereof with a portion of the closure disc broken away;

Fig. 4 is a fragmentary view similar to Fig. 1 but showing a different mounting for the breather; and

Fig. 5 is an elevation partly in central vertical section of the breather or vent shown in Fig. 4.

In many parts of the country, particularly in the Southwest, it is the practice not only to use individual gas pressure regulators for each service line, but to install these out of doors, usually adjacent one wall of a house or other building served by the gas. As a result such regulators are exposed to all weather and other adverse conditions, and particularly have been troubled with stoppages of the vent passage to the air or back side of the diaphragm resulting from freezes following or occurring during rain or sleet storms or the like. In certain cases whole areas have been affected and many difficulties have resulted. The vent is associated with the chamber closing the back face of the diaphragm which responds to gas pressure to actuate the regulator valve. Under certain operating conditions the diaphragm actuated valve may be partially or fully opened at the time the freeze-up occurs, and since the air behind the diaphragm can no longer be vented the valve is not automatically closed as the demand reduces, so that the pressure within the household system is excessive and fires have resulted. This and other troubles involve complaints from customers that their gas stoves and other appliances are not operating properly. Other hazards threaten the usual type of vents and they must all be screened to keep out certain types of wasps known as "mud daubers" which have the annoying habit of closing small openings with mud. The screen is fairly effective against such insects but if unprotected contributes to the freezing troubles since it provides a fine mesh area on which moisture can collect and freeze.

In accordance with the present invention improved forms of breathers or relief vents for gas service regulators have been provided to overcome these previously experienced difficulties.

Referring now to Fig. 1, there is shown a commercial form of pressure regulator 10, including the valve and fitting 12, which is inserted in the service line, the diaphragm housing 13, the spring casing 14 and the vent passage 15

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leading from the chamber 16 on the upper or back side of the diaphragm whereby it is free to move under the discharge pressure of gas on its under side determined by the position of the valve and the rate of gas consumption. In this particular form of regulator an internally threaded downwardly directed port 17 is connected to the vent passage 15. This is normally closed by a screen positioned by a snap ring, but when these are removed will receive the threaded nipple 18 on the breather or relief vent 20 constructed in accordance with one form of the present invention.

Referring now to Fig. 2, it will be seen that the threaded nipple 18 is preferably formed integral with a die casting forming the shell of the breather 20. Such a die casting includes the hexagonal nut 21 just below the nipple for engagement by a wrench for positioning the breather, a flaring conical or dome-like portion 22 and a cylindrical skirt 23 depending from the edge of the dome portion. The nipple is through-bored as at 24 and the lower edge of the skirt is horizontal and sharpened as at 25 by an internal chamfer 26 to improve the rate at which water drips from the edge and to prevent the accumulation of any amount thereof on the skirt edge.

The primary closure for the vent is a rigid disc 30 having a sharpened edge 31 resulting from the edge chamfer 32. This sharpened edge is of a diameter approximately $\frac{1}{8}$ of an inch less than the inner wall of the skirt, giving a continuous uninterrupted peripheral spacing of about $\frac{1}{16}$ of an inch, which spacing effectively excludes insects of the "mud dauber" type, preventing them from having access to the small vent passage 15 and offering too large an open annulus for them to close. The horizontal lower face of the disc 30 is spaced well up above the lower edge of the skirt so that no moisture can reach it as the result of drops blowing from the edge 25 or driving rain drops or mist. The sharpened periphery of the disc is well protected against any accumulation of moisture so that this annulus is never closed as the result of rain or freezing. Because of the sharpened edge of the disc there is no tendency for liquid to be distributed about the annulus by capillarity.

The disc is supported in the desired position by engagement with the lower ends of a plurality of integral studs 34 depending from the dome beyond the periphery of the rib 29 and well inside the edge of the disc. Screws passing through holes in the disc are received in threads in these studs to complete the assembly.

Some users desire the added protection of a screen and this can be provided as shown by covering the opening 24 with a substantially hemispherical screen 28 of relatively coarse mesh which acts as a secondary defense against insects and blowing dirt and leaves. The open side of the hemisphere has its edges confined and positioned by the bead or rib 29 integral with the dome. This prevents flaring of the relatively flexible screen under the pressure on its lower tip exerted by the disc 30 which engages it sufficiently to cause slight distortion to insure its remaining rigidly in position.

This form of device either with or without the screen has been found entirely satisfactory to prevent the occurrence of difficulties which have plagued users of gas pressure regulators equipped with previously known forms of vents. The im-

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proved results are achieved through the novel construction illustrated. The distance between the lower edge of the skirt and the under surface of the disc is approximately $\frac{3}{8}$ of an inch, to prevent freezing or blowing of liquid on to the disc. The sharpened periphery prevents the holding of liquid by capillary attraction and the coarse mesh of the screen insures against closure of any of its openings in case any water should reach it as by condensation.

In another form of commercial pressure regulator, such as shown in Fig. 4, the vent opening is upward through a boss 40. In accordance with the present invention this is fitted with a tall standpipe 41 equipped with a second form of the invention as shown at 42. This so-called inverted form is illustrated in more detail in Fig. 5. Here the housing has a fully closed dome 42 fitted with a skirt as previously defined, shown at 43, and with the studs 44 for mounting the closure disc 45. In this case the closure disc has a centrally disposed depending integral boss 46 drilled and interiorly threaded to receive the upper end of the standpipe 41 for the passage of the venting air. Just within the periphery of the studs 44 the inner face of the disc is fitted with an integral bead 47 to confine the lower edges of the inverted hemispherical screen 48, which rests on the flat area within the bead. The inner face of the dome is provided with a downward projection 49 to engage the tip of the screen and hold it firmly in position within the bead. Clearly this embodiment can have the screen omitted if desired.

All of the important features which lead to the satisfactory operation of the first embodiment are incorporated in this one, but it is made to operate from the top of a standpipe rather than at the lower end of a nipple. The tall standpipe prevents any rain hitting the top face of the diaphragm housing from splashing up on to the under side of the disc.

I claim:

1. A weatherproof breather and vent for the purposes described including in combination a shell member having a convex upper portion and a wall depending from the periphery thereof, a circular plate member having a sharpened edge extending horizontally across the shell below the convex portion with the entire plate edge spaced slightly from the inner periphery of the said wall above its lower edge, means joining and spacing said members, a vent passage extending through one of said members and adapted to be connected to apparatus requiring venting and breathing and a substantially hemispherical screen clamped between said members and having its open side directed toward said passage.

2. The device as defined in claim 1 in which the member engaging the open edge of the screen is provided with an integral flange confining said edge.

3. A weatherproof breather and vent for the purposes described including in combination a shell having a dome-like upper portion and a wall depending from the periphery thereof and having its lower edge chamfered inwardly, a flat circular plate extending horizontally across the shell below the conical portion with the entire plate edge spaced slightly from the inner periphery of the said wall above said chamfered edge, studs depending from the dome-like portion of the shell, fasteners passing through said plate and received in the studs to position the plate in respect to the shell, a vent pipe extending up-

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wardly from the apex of the upper portion and threaded for connection to apparatus requiring venting and breathing, and a substantially hemispherical screen clamped between said shell and plate and having its open side directed toward said pipe.

4. The device as defined in claim 3 in which the said dome-like portion inwardly of the studs is provided with an integral depending flange confining the upper edge of said screen to prevent expansion thereof due to said clamping.

5. A weatherproof breather cap for the purposes described including in combination a shell member having a closed top portion and a substantially cylindrical wall depending from the periphery thereof and having its lower edge sharpened to augment water drip therefrom, a circular plate having a sharpened edge extending horizontally across the shell well below the top with the entire plate edge spaced slightly from the inner periphery of the cylindrical wall above said lower edge, means joining and spacing the shell and plate well in from the periphery of the latter, a vent pipe depending from the center of said plate and adapted to be connected to apparatus requiring breathing, and a substantially hemispherical screen having its open side resting on said plate over the pipe bore, said screen engaging both the plate and shell for positioning thereby.

6. The device as defined in claim 5 in which the plate is provided with an integral upstanding flange confining the edge of the screen.

7. A weather and insect proof breather and vent cap including a bell-like body portion having an open bottom with an edge inclined to augment water drip, a plate portion extending transversely of said body, spaced above said bottom and having a continuous uniform clearance between its periphery and the walls of said body portion, a vent tube opening through one of said portions into the space confined above said plate, and a screen having an area of the order of ten

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times that of the tube bore confined between said portions and protecting the tube entrance.

8. A weatherproof breather cap of the type described including in combination a shell member of relatively heavy metal having a cap portion and a substantially vertical skirt wall depending from the periphery thereof, the bottom of said wall being chamfered wholly on its inner periphery to present a sharp lower edge to augment water drip therefrom, a plate member of relatively heavy metal extending substantially horizontally across the shell member below the cap portion and well above the sharp lower edge of the skirt, the peripheral area beneath said plate being wholly open, the entire plate edge being uniformly spaced from the inner wall of the skirt a distance of the order of one-sixteenth of an inch, the said edge of the plate being formed sharp by chamfering the lower portion thereof whereby the tendency of liquid to distribute about the edge and between it and the skirt wall is eliminated, circumferentially spaced means integral with the shell and spaced well in from the plate periphery joining it to and spacing it from the shell, and a vent tube extending vertically from the center of one of said members.

CHARLES D. PETERSON.

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