# United States Patent

**Foults**

[15] **3,700,166**

[45] **Oct. 24, 1972**


[54] **FILLING AND VALVING ASSEMBLY FOR RADIATOR SYSTEM**


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[73] Assignee: **Scovill Manufacturing Company,** Waterbury, Conn.



[22] Filed: **Aug. 20, 1971**

[21] Appl. No.: **173,395**

[52] **U.S. Cl.**.....**236/34.5,** 123/41.54, 236/92 R

[51] **Int. Cl.**.....**F01p 7/16**

[58] **Field of Search** .....236/92, 34.5, 34; 220/44, 55; 123/41.54, 41.1



[56] **References Cited**

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| 3,463,346 | 8/1969 | Mitchell | 220/44 R |



*Primary Examiner*—William E. Wayner

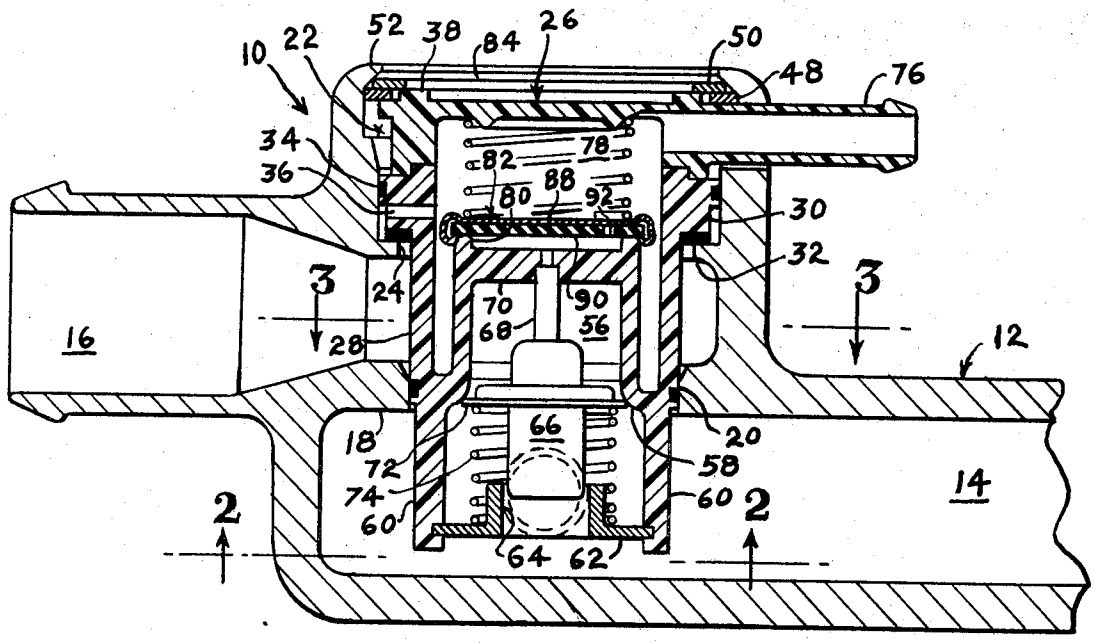
*Attorney*—Dallett Hoopes



[57] **ABSTRACT**

Removable filler cap for pressurized radiator system includes thermostat, pressure escape, vacuum break, and is held in place by a pair of safety locking rings.


**3 Claims, 11 Drawing Figures**



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SHEET 1 OF 3

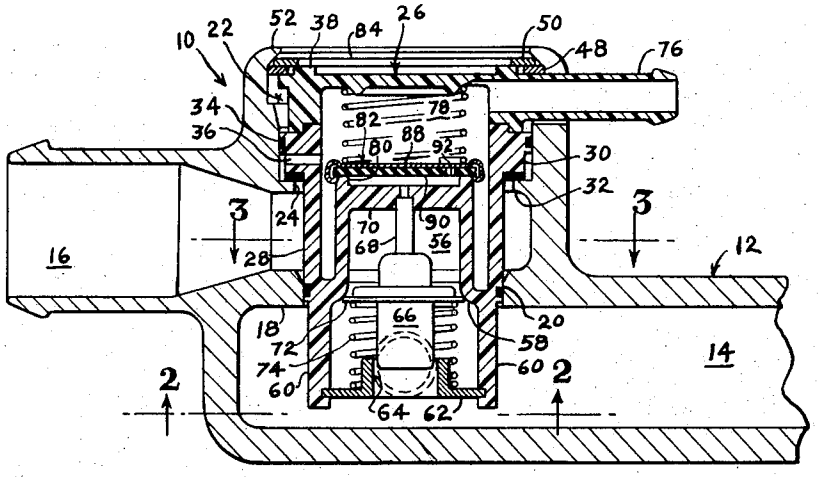



Fig. 1.

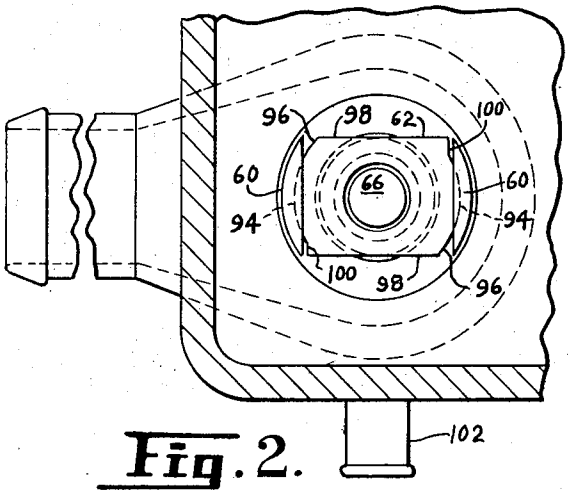



Fig. 2.

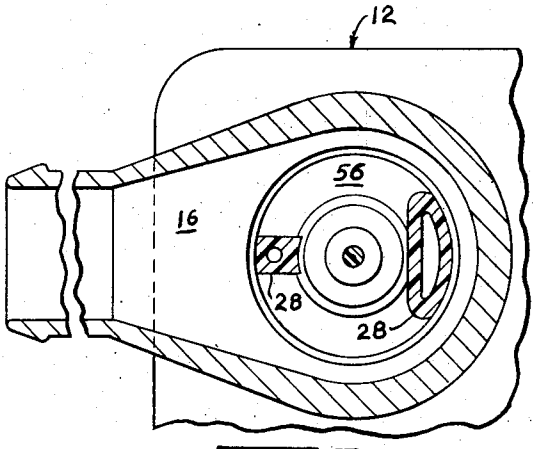



Fig. 3.

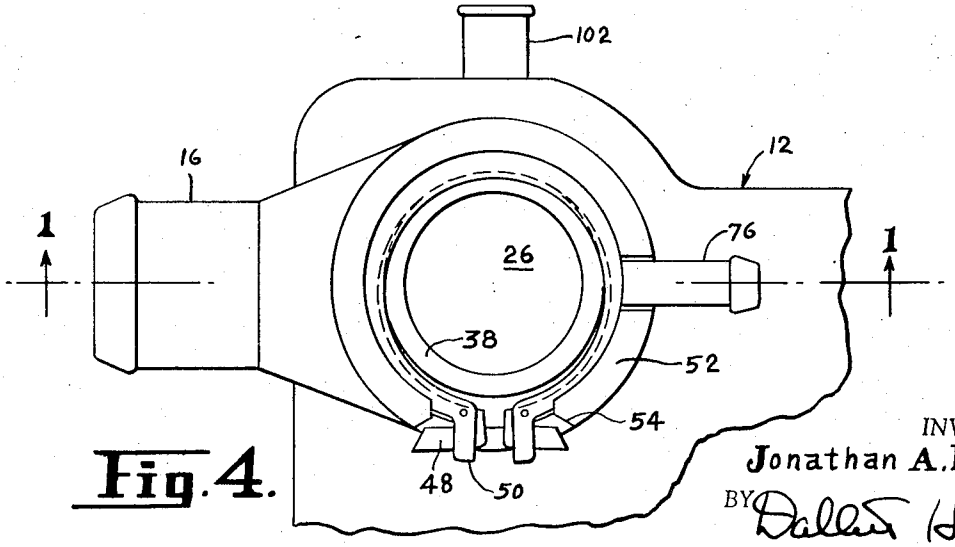



Fig. 4.

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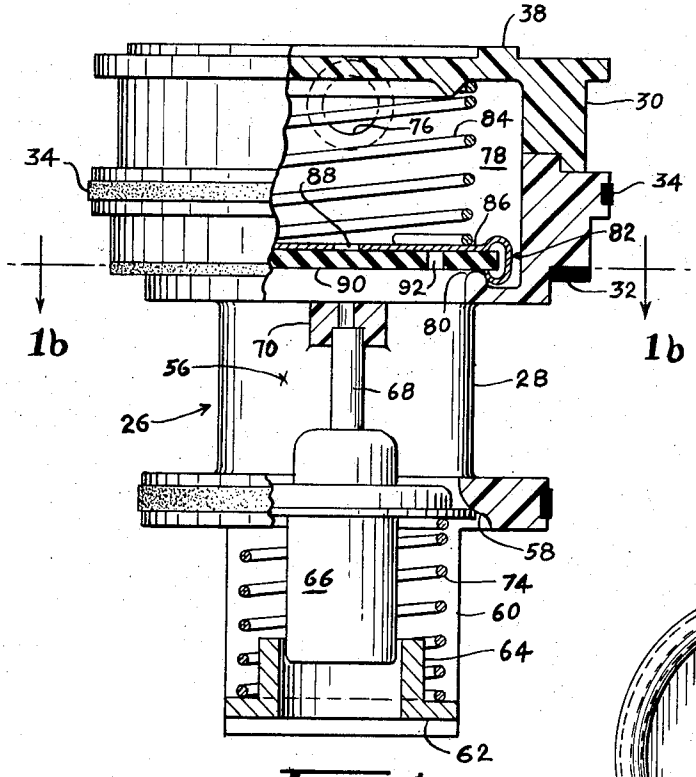



Fig. 1a.

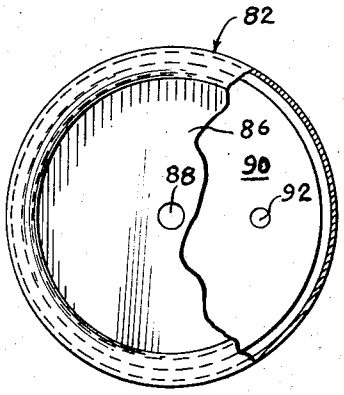



Fig. 1c.

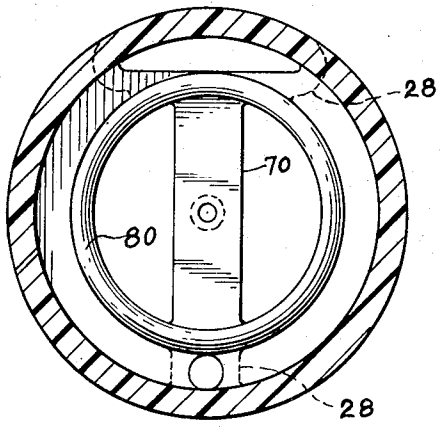



Fig. 1b.

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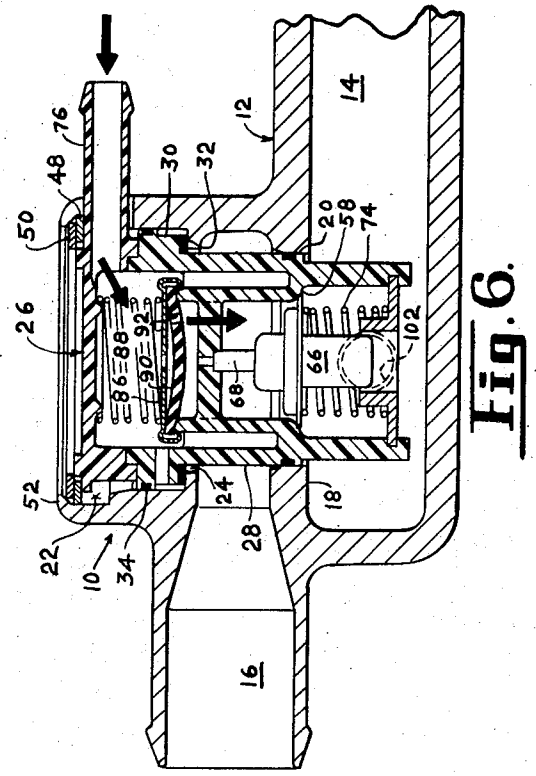


Fig. 6.

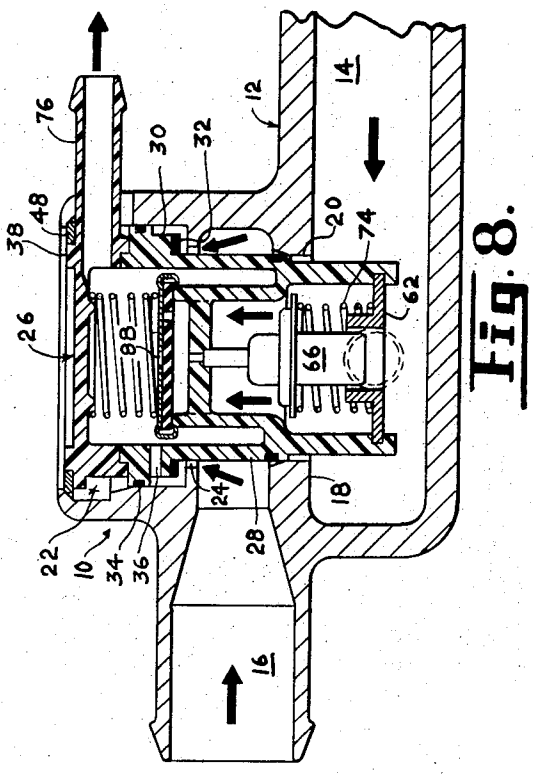


Fig. 8.

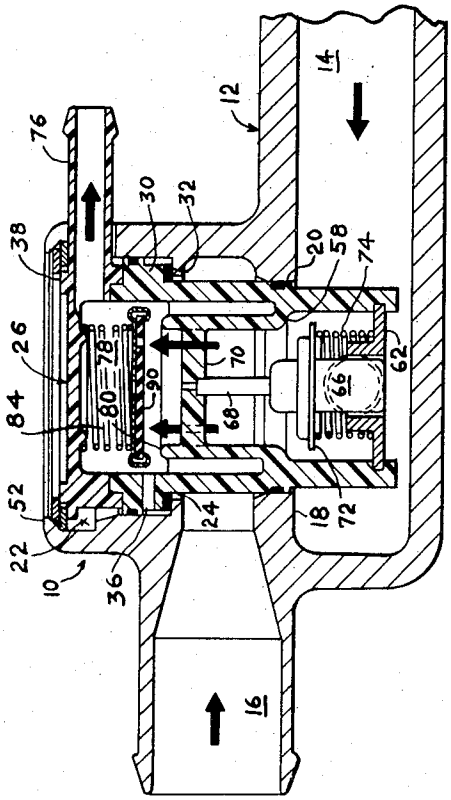


Fig. 5.

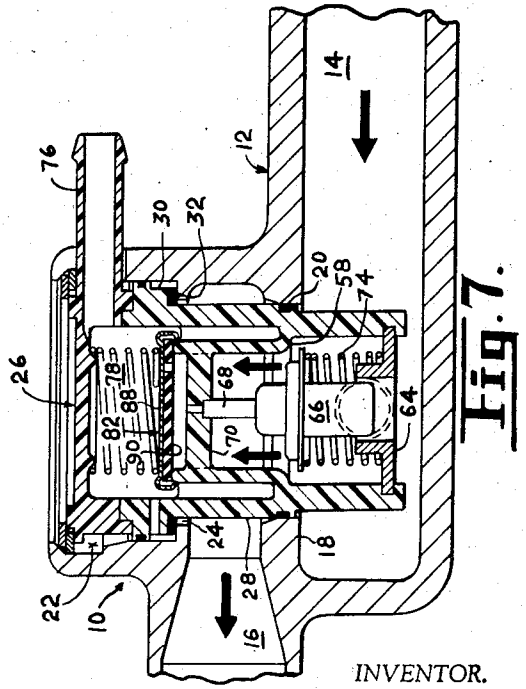


Fig. 7.

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# FILLING AND VALVING ASSEMBLY FOR RADIATOR SYSTEM

This invention relates to a filling and valving assembly for a pressurized automobile radiator system. More specifically, the invention relates to such an assembly wherein means are provided for thermostatic control of flow through the system depending on temperature of the system, for venting the system upon occurrence of excessive pressure, for relieving vacuum developed in the system, and for filling the system.

This invention relates to an improvement on the radiator system filler cap disclosed in U.S. Pat. No. 3,463,346 to William C. Mitchell. That structure included a filler cap with special safety means for removal, and means for venting pressure and vacuum. The present invention includes provision for the conventional thermostatic control of circulation in a radiator system depending on temperature, as well as the structural advantages of the Mitchell cap, all in the same simple structure. There is thus provided a multipurpose unit especially desirable in radiator systems of cars in which space under the hood is limited. Also, of course, the convenience of having the radiator thermostat along with other system controls in a single readily demountable unit is an advantage not suggested in the prior art.

Other objects of the invention will be apparent from the following specification describing a preferred embodiment of the invention and including drawings wherein:

FIG. **1** is a sectional view of a portion of a radiator system embodying the invention;

FIG. **1***a* is an enlarged sectional view of the unit only shown in FIG. **1** and rotated 90° about a vertical axis;

FIG. **1***b* is a section taken on the line **1***b*—**1***b* of FIG. **1***a*;

FIG. **1***c* is a top view of the valve disc as shown in FIG. **1***a* with portions broken away;

FIG. **2** is a sectional view taken on the line **2**—**2** of FIG. **1**;

FIG. **3** is a sectional view taken on the line **3**—**3** of FIG. **1**;

FIG. **4** is a top plan view from which the sectional view of FIG. **1** is taken on the line **1**—**1**;

FIG. **5** is a view similar to FIG. **1** but showing the condition of the assembly during pressure venting;

FIG. **6** is a view similar to FIG. **1** but showing the assembly during vacuum breaking;

FIG. **7** is a sectional view similar to FIG. **1** but showing the thermostat in the open condition permitting flow through the system; and

FIG. **8** is a sectional view similar to FIG. **1** but showing the control unit in a stage of removal while the system is under pressure.

Referring more specifically to FIG. **1**, the assembly embodying the invention is generally designated **10**. It comprises a housing portion **12** including a first channel **14** and a second channel **16**. These two channels are vertically stacked and separated by a housing partition **18** in which there is an opening **20**. Above the channel **16** is a vent fill recess **22** open to the atmosphere and having an opening **24** into the housing portion and aligned with the opening **20** in the partition **18**.

A control unit **26** is provided and includes a cage **28** and an enlarged head portion **30**. Intermediate the cage portion **28** and the head **30** is an annular shoulder **32** provided with a seal and normally resting on the housing portion about the opening **24**. The head has a peripheral sealing rib **34** which engages the wall of the recess **22**. Below the rib **34**, a vent hole **36** penetrates the head. The top of the head **30** of the unit carries annular boss **38** and is engaged by a pair of C-shaped rings **48** and **50** which fit under an inward flange **52** about the top of the recess **22**. At the top of the housing portion as shown in FIG. **4**, the ends of the rings **48** and **50** extend out through a cut-out **54** in the top of the housing portion. In this regard, the structure is similar to the cap in the aforementioned Mitchell patent.

The control unit **26** (FIG. **1***a*) is provided with a first passage **56** by which communication is possible between the first channel **14** and the second channel **16**. In the passage is an annular valve seat **58**.

Legs **60** depend from the cage and support a retaining plate **62** having a central opening and an upward annular flange **64** thereabout. A conventional heat-actuated motor **66**, such as is available from Scovill Manufacturing Company under the trademark "Vernatherm," is provided in the passage **56**. It comprises a cylinder body enclosing a heat responsive wax and a working piston **68** which abuts at its upper end a bridge **70**, part of the cage. The motor assembly **66** has an outward valving disc **72** which, when the system is cool, engages the seat **58** and closes off the passage **56**, the unit being biased upwardly by the spring **74**. The spring **74** is held in compression between the valving disc **72** and the plate **62**.

As shown, the upper end or head **30** of the control unit **26** is provided with a vent spout **76**. Within the unit a passage **78** makes possible communication between the vent spout **76** and the second channel **16**.

Within the cage **28** of the control unit is a second annular valve seat **80** which is disposed in the passage **78**. A valving disc **82** normally seats on the seat **80**, being pressed downward thereagainst by the pressure spring **84**. Spring **84** is disposed in compression between the top of the head **30** and the valve disc **82**. Upon the occurrence of high pressure in the system, forces develop sufficient to raise disc **82** from its seat **80** and permit venting through the passage **78** and out the spout **76**.

The valve disc **82** (FIG. 1c) comprises two parts, a metal backing plate **86** having a central opening **88** and a rubber diaphragm **90** having an off-center opening **92**. The periphery of the plate **86** is crimped over the periphery of the diaphragm **90** to provide a unitary assembly.

FIG. **2** shows the structure of the retaining plate **62** and the leg **60** to which is attributable a desirable feature of the invention. As shown, the inside surfaces of the leg **60** are provided with arcuate recesses **94** and the retaining plate **62** is formed with correspondingly arcuate ends **96**. The sides **98** of plate **62** are cut off as shown (FIG. **2**) with the result that to remove the motor **66**, if desired or necessary, the plate **62** may be simply rotated counterclockwise (FIG. **2**) until the ends **96** are proximate the legs **60** so that the unit is disassembled. As an aid in installation, stops **100** are provided to limit the clockwise rotation of the plate **62**.

The structure of the embodiment shown having been described, operation will be now clear from FIGS. **5** through **8**.

In FIG. 7, the motor **66** is shown with its piston **68** extended. This extension is due to the thermal response of the waxy substance within the cylinder of the motor **66**. Pressure of the end of the piston **68** against the bridge **70** causes the entire body of the motor **66** to lower against the bias of the spring **74**. This backs the valving disc **72** away from the seat **58** and permits flow through the system as shown by the arrows (FIG. 7). Even when the valving disc **72** is seated, there is flow through the channel **14** out the heater or bypass connection **102**.

Upon the occurrence of high pressure in the system, venting is effected through the mechanism shown in FIG. 5. This simply involves the pressure developing a force against the valving disc **82** sufficient to raise the disc from the seat **80**, working against the spring **84**. The vented pressure then passes through the remainder of passage **78** and out spout **76**. On reduction of the pressure, the spring **84** will cause the disc to resume its position on seat **80**.

FIG. **6** demonstrates the breaking of vacuum which may be developed in the system after cooling. As shown, the motor **66** has reduced the extension of its piston **68** due to the bias of the spring **74** so that the disc **72** rests on the seat **58**. If, in cooling, a vacuum develops within the system, higher pressure in the atmosphere will work against the resilient diaphragm **90** pushing it away from the rigid plate **86** so that atmospheric pressure comes into the system through openings **88** and **92**. When the pressure within the system substantially equals the atmospheric pressure, the resilient diaphragm **90** will return to its position against the plate **86** and connection to the atmosphere will be blocked. Obviously, thereafter upon the development of any pressure at all in the system, the diaphragm **90** will even more securely close the openings **88** and **92** as it presses against the plate **86**.

FIG. **8** is a view showing the control unit **26** partially removed. In this view, ring **50** (not shown) has been removed leaving the ring **48** only restraining further removal of the control unit. In the position shown, there is venting of the pressure within the chamber, past the shoulder **32** which normally seats as shown in FIG. **1** about the opening **24**, through the vent hole **36**, and out through the vent **76**. The rib **34** blocks venting directly upward around the head **30**. After the pressure has vented, the second ring **48** may be removed and the entire unit **26** withdrawn vertically upward. As described in the Mitchell patent, removal of the two rings **48** and **50** at the same time is precluded by the raised annular boss **38** disposed inside the rings on the top of the head **30**. The height of the boss **38** may be substantially equal to the height of one of the rings.

The many advantages of the compact effective structure shown are now clear. Variations are possible within the scope of the invention which may be described in the following claim language.

I claim:

**1**. A filling and valving assembly for a pressurized radiator system comprising:

a. a housing portion including a first and second channel, the second channel disposed above the first in the housing portion, and a vent-fill recess above the channels, a first opening between the vent-fill recess and the second channel, and a second opening between the second channel and the first channel, the first and second openings being in verticle alignment;

b. a control unit extending from the vent-fill recess through the first opening, through the second channel, through the second opening in sealing relation and into the first channel, the unit having a downwardly directed annular shoulder normally resting on and sealingly engaging the housing portion about the first opening;

c. releaseable means holding the unit down in the housing portion with the shoulder so disposed;

d. first passage means in the unit connecting the second and first channels;

e. temperature responsive valve means selectively blocking or permitting passage through the first passage means;

f. second passage means in the unit connecting the second channel and vent means adapted to vent to the atmosphere; and

g. spring-pressed means in the unit normally blocking the second passage but yielding upon occurrence of excess pressure in the second channel.

**2**. A filling and valving assembly as described in claim **1** wherein spring-pressed means includes resilient valve means normally closed, but adapted to open the second passage upon occurrence of negative pressure in the second channel.

**3**. A filling and valving assembly as described in claim **1** wherein the releaseable means for releasing the unit and selectively holding it loosely in place for venting pressure prior to complete removal of the unit.

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