

July 22, 1941.

D. B. MECORNEY

2,249,971

COOLING SYSTEM PRESSURE RELIEF DEVICE

Filed March 31, 1939

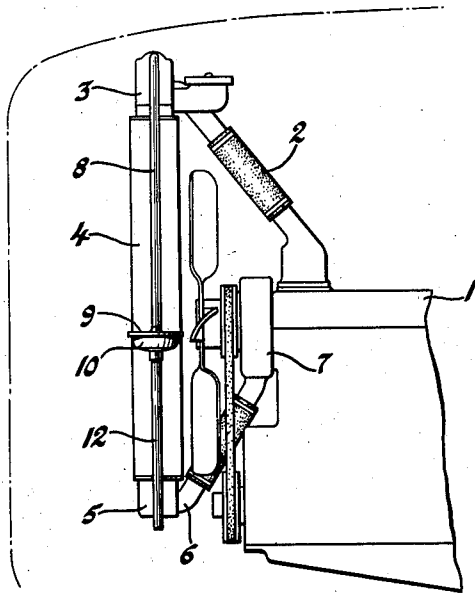


Fig. 1

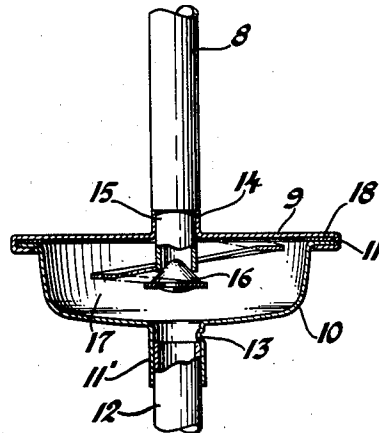


Fig. 2

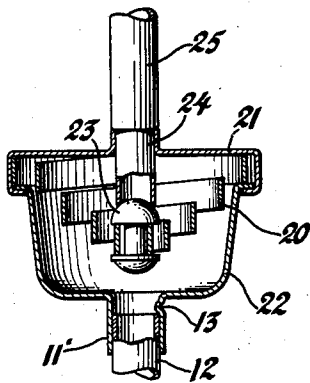


Fig. 4

Fig. 3

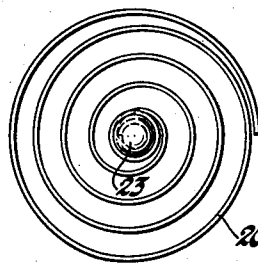
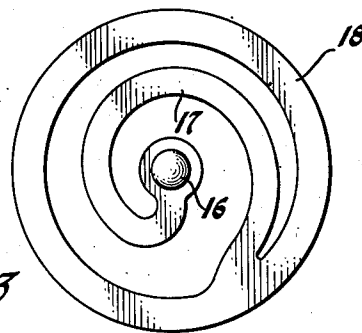


Fig. 5

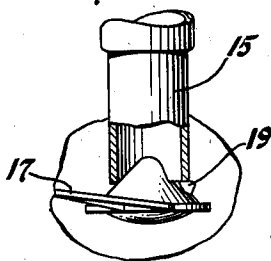


Fig. 6

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UNITED STATES PATENT OFFICE

2,249,971

COOLING SYSTEM PRESSURE RELIEF
DEVICE

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Application March 31, 1939, Serial No. 265,111

1 Claim. (Cl. 137—53)

This invention relates to engine cooling systems and more particularly to pressure control valving for a closed system. The use of closed systems for increased efficiency is predicated on the well understood fact that the boiling point of a liquid increases with pressure on the liquid. To limit operating pressures and avoid bursting strains on the system a blowoff valve must be employed and the type of valve in general use is so constructed as to relieve the pressure quickly. A sudden drop in pressure immediately reduces the boiling point of the hot liquid and the resultant conversion from liquid to steam or increased rate of boiling, means a rapid expansion of the system contents and continued surging of the liquid and steam from the system until a balance is again established. If on the other hand the system can be operated without sudden change in pressure the boiling point will remain substantially constant and with this in mind it is an object of the present invention to provide an improved valve arrangement by which pressure in excess of a predetermined value will be relieved slowly and without the possibility of a rapid change in pressure to intensify the rate of boiling.

In the accompanying drawing Figure 1 is a side elevation of a portion of a cooling system in which the improved control valve unit is embodied; Figure 2 is a sectional view of one embodiment of the valve assembly; Figure 3 is a plan view of the valve and its seating spring; Figure 4 is a sectional view of an optional valve assembly; Figure 5 is a plan view of the spring and valve shown in Figure 4 and Figure 6 is a detailed view showing an optional formation of the seating portions associated with the valve.

In the conventional engine cooling system the outlet of the cooling jacket of the engine 1 has a connection 2 with the top tank 3 of the radiator core 4 and the bottom tank 5 has a connection 6 leading to the engine driven pump 7 for the circulation of the cooling liquid through the system. An overflow pipe 8 leading from the top tank 3 is provided for venting the system and according to the present invention it is proposed to incorporate in the overflow a valve arrangement which closes the system to atmosphere.

As seen in Figure 2 a valve casing is formed of a pair of complementary stampings 9 and 10 having rim portions fitted together and joined as at 11 by turning one of the edge portions over the other. The cupped casing section 10 is shown with a tubular extension 11' to be fitted and soldered on the end of a drainpipe 12 leading to

a point below the radiator. A dent or boss 13 formed in the tube 11 will engage the end of the drainpipe 12 and help in properly locating the parts. The cover 9 of the casing also has a tubular extension as shown at 14 into which is fitted a tube section 15, the outer end of which may be soldered in the end of the overflow 8 and the tube 15 extends into the hollow casing and terminates at a point below the plane of the joint 11. Its inner end affords a seat for a button or tapered valve element 16 which extends into the tube and is riveted or otherwise secured on the free end of a volute spring 17. This spring arm 17 is shown as being stamped from a flat plate and extends inwardly from an annular ring 18 by which the spring is mounted in the casing with the ring 18 interposed between the adjoining parts of the casing members 9 and 10.

With the valve in the closed position shown in Figure 2 the system will be closed to atmosphere and operated under internal pressure incident to heat expansion of the cooling liquid. When the pressure exceeds the force of the spring 17 the valve will be unseated to allow excess pressure to bleed from the system slowly and at substantially the rate of pressure increase so that the system will operate at substantially constant pressure. To prevent a subatmospheric pressure condition within the system incident to cooling of the contents an inwardly opening check valve may be incorporated in a suitable part of the system as for example in the usual spout closure cap. Optionally an offset portion 19 may be formed on the valve as shown in Figure 6 to prevent tight closing of the seating portions and enable breathing past the valve. The slight clearance at this point will not interfere with the build up of pressure in the normal operation of the system.

Instead of the flat spring shown in Figure 3 there may be used a volute spring formed by a coil of spring material as indicated at 20 in Figure 5. Here again the peripheral coil of the spring will be located or anchored in the joint between the casing members 21 and 22 and its central free end will carry a valve button 23 to seat over the opening through the tube extension 24 projecting through the casing wall 21 and fitted to the overflow pipe 25. As will be readily apparent the action of the modified valve will be similar to that heretofore described.

I claim:

For use with a cooling liquid circulating system having a vent to atmosphere, a vent valve including a pair of complementary sheet metal

stampings peripherally joined to afford a hollow cage open to atmosphere, a vent coupling conduit projecting through the wall of one of said stampings and terminating in a plane beyond said joint, a self-centering valve button to seat on the end of the conduit and to be unseated for the relief of internal pressure, and a volute spring

formed with its convolutions initially in a common plane and arranged with its peripheral portion clamped within the joint between said stampings and its free central portion normally seating said valve button under initial spring stress.

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