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RADIATOR USED WITH INTERNAL COMBUSTION ENGINES

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Fig. 1.

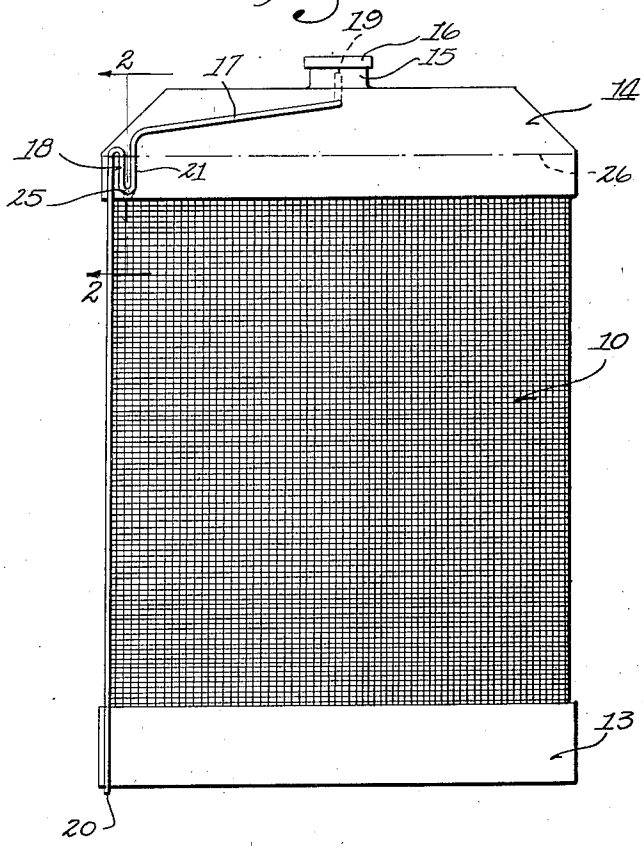
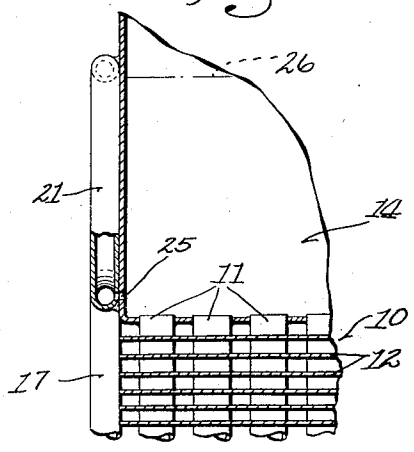


Fig. 2.



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RADIATOR USED WITH INTERNAL COMBUSTION ENGINES

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5 Claims. (Cl. 257—125)

Our invention relates to improvements in radiators used with internal combustion engines.

The object of our invention is to provide in an automotive type radiator an overflow pipe provided with a trap and means associated with the trap to insure the restoration of a sufficient quantity of liquid in the trap to prevent the escape of vapors, and to thereby control pressures in the radiator.

More particularly stated, it is the object of our invention to provide a trap in the overflow pipe of a radiator wherein a "bleed hole" is so positioned as to restore a liquid seal in the trap whenever pressures of vapor or air blow through the trap and displace the liquid seal, thus assuring a prompt restoration of the means for controlling pressures and limiting loss of vapor.

In the drawing:

Figure 1 is an elevation of an automotive radiator of generally conventional type with my improved overflow pipe incorporated therewith.

Figure 2 is a fragmentary section on line 2—2 of Fig. 1.

Like parts are designated by the same reference characters throughout the several views.

The conventional type of automotive radiator includes a core 10 made up of tubes 11 and "fins" 12. At the lower end of the tubes 11 is a tank or header 13, and at the top of the tubes is another tank or header 14. Within the tubes and the tanks a liquid coolant is provided and the supply of liquid may be introduced through a filler opening 15, whereby to bring the liquid in the radiator, and especially in the upper tank 14, to the level desired.

In modern automotive practice, it is usually preferred that a cap 16 for the radiator filler opening 15, shall be substantially air-tight and an overflow pipe 17 is provided for the relief of excess liquid or of vapors under high pressure. We are aware that outlet or overflow pipes have been provided heretofore with various types of traps, some of which have a configuration somewhat like the trap shown at 18, but if the trap 18 is merely a trap and nothing else, it is common for the trap to operate as follows:

Assuming that the liquid level has been properly established when the motor served by the radiator is cold, it is not long before the operation of the motor will heat the liquid in the radiator and cause expansion thereof, whereby to pass some of the liquid through the orifice 19 in the upper end of the overflow pipe. The liquid thus passing into the overflow pipe will pass through the trap and be delivered as excess coolant through the outlet opening 20. When the expansion of the coolant ceases and all of the excess has been delivered through the overflow pipe 17, the heating process may progress to the point where vapor under pressure accumulates in the filler opening 15 under the cap 16. Under the pressure of this vapor in the old type overflow pipes provided with a conventional trap 18, the vapor will push the trapped liquid out of the U-tube 21, and thus remove the liquid seal which is so much desired in modern automotive radiator practice. Thereafter any vapor accumulating in the upper portion of the tank 14 will be passed out through the overflow pipe 17 and will be lost since it is common knowledge that the aspirating effect of the air movement past the outlet opening 20 due to the movement of the automotive vehicle equipped with a radiator, will draw the vapor from the upper portion of the tank 14, and when this action has continued for sufficient time, will result in lowering the liquid in tank 14 below the normal or safe level.

In our improved overflow pipe provided with a U-tube 21 forming part of a trap 18, we provide an opening 25 and this opening is so shaped and positioned as to receive liquid from a point in the tank 14 which is very definitely below the normal level of liquid in the tank,—for instance, very definitely below the dotted line 26 which marks the point at which the trap 18 will normally control the liquid level in the tank 14.

The bleed opening 25 is of suitable diameter, preferably approximately $\frac{3}{32}$ of an inch to slowly fill the U-tube 21 with liquid after vapor has been "blown down" through the overflow pipe 17. Thus when the liquid in the radiator has been overheated and vapor under pressure has developed in the upper portion of the tank 14, the pressure will force vapor through the overflow pipe 17 by forcing the quantity of liquid out of the U-tube, and out of the outlet opening 20. When the excess pressures have been dissipated, the liquid seal in the U-tube 21 will be restored through the bleed opening 25. It will be understood that the diameter of the bleed opening 25 is gauged according to the diameter of the tube used in the overflow pipe 17, whereby to determine that the pressure upon the top of the liquid in the tank 14 cannot force liquid through the bleed opening 25 into the U-tube so rapidly that the pressure of vapors through the outlet orifice 19 cannot clear the liquid seal from the U-tube 21, and we have found that in an overflow pipe 17 of the inside diameter of ¼ of an inch, a bleed opening 25 of a diameter of $\frac{3}{32}$ of an inch

is satisfactory, and in an outlet pipe of $\frac{5}{16}$ of an inch a bleed opening of $\frac{1}{8}$ of an inch is satisfactory.

It thus appears that we have provided an overflow pipe for an automotive radiator which will be constantly sealed against vapor release, except at those times when excess pressures must be relieved, and after the relief of such excess pressures, the liquid seal in the U-tube 21 is restored so as to prevent escape of vapor under ordinary pressures.

Likewise, if there is a tendency to establish a partial vacuum in the radiator system, air to relieve it may be received through the trap and the liquid seal will be immediately re-established after the air has bubbled into the upper header or tank.

We claim:

1. In a radiator to be provided with liquid, an overflow pipe, a trap in the overflow pipe, and a connection for liquid between the radiator and the lowermost portion of the trap.

2. A radiator provided with liquid and having an overflow pipe extending from an orifice generally downwardly to an outlet for discharge of overflow liquid, a trap in the overflow pipe comprising a downward and upward reverse bend of the overflow pipe, whereby to accumulate liquid in the reverse bend and blockade vapor which might otherwise escape through the orifice, the lowermost portion of the reverse bend being below the normal liquid level in the radiator, and a connection for liquid between the lowermost portion of the trap and the liquid in the radiator, whereby to establish a quantity of liquid in the trap.

3. In a radiator provided with a header tank, an overflow pipe extending from a high point in the tank to a point of discharge at a point below the tank, a trap in the overflow pipe whereby to establish a liquid level in the tank below the overflow point, the trap having a convolution to receive liquid whereby to block vapor attempting to escape through the overflow pipe from the upper portion of the tank, the lowermost portion of the convolution being connected with the liquid in the tank, whereby to pass liquid into the trap to restore the seal in the event that the liquid in the trap is inadequate in quantity to block the vapor, the liquid connection comprising a conduit of smaller diameter than the diameter of the overflow pipe.

4. In a radiator to be provided with liquid, an overflow pipe, a trap in the overflow pipe, and a connection for liquid between the radiator and the lowermost portion of the trap, the diameter of said connection being in the ratio of $\frac{3}{32}$ of an inch or less for a $\frac{1}{4}$ inch overflow pipe.

5. In a radiator provided with a header tank, an overflow pipe extending from a high point in the tank to a point of discharge outside the radiator, a trap in the overflow pipe whereby to establish a liquid level in the tank below the overflow point, said trap being provided with a convolution the lower-most portion of which is contiguous to the radiator, said radiator and said convolution at their point of contiguity being provided with an opening for passage of liquid to assure a liquid seal in said trap.

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