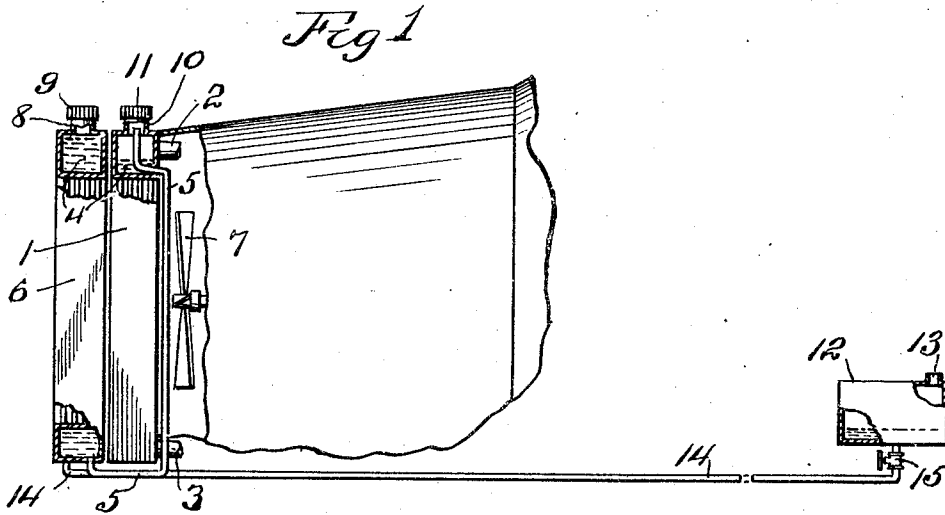
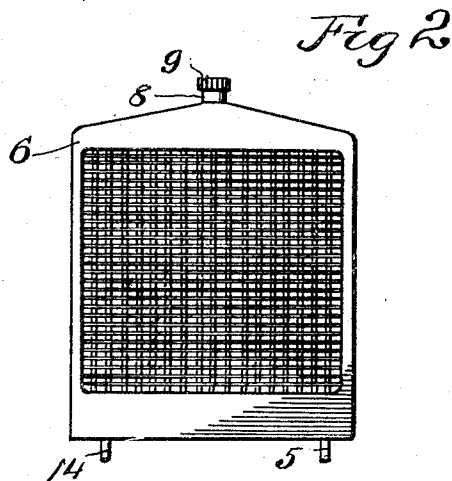


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P. L. HOWE
ENGINE COOLING MEANS
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Witness:

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ENGINE-COOLING MEANS.

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My invention relates to improvements in engine cooling means. It relates particularly to a cooling means adapted to be used in connection with explosive engines, such as are used for propelling automobiles, cars, airplanes and dirigibles, and which employ a radiator containing a cooling liquid, such as water, water mixed with alcohol, or glycerine or other nonfreezing liquids.

One of the objects of my invention is to provide a cooling means of the kind described, which will conserve the cooling liquid employed, and which is simple, cheap, durable, not liable to get out of order, and which can be readily and easily applied to engines now in use.

In the accompanying drawing, which illustrates the preferred embodiment of my invention, as applied to an automobile,

Fig. 1 is a side view, partly in side elevation, partly in vertical section, and partly broken away, of my improved cooling means, shown applied to an automobile, the radiator, fans and portions of the hood of which are shown.

Fig. 2 is a front elevation of the condenser.

Similar reference characters designate similar parts in the different views.

1 designates an ordinary liquid containing automobile radiator, having the usual inlet pipe 2 and outlet pipe 3 connected with the engine, not shown.

The radiator 1 is adapted to contain cooling liquid 4, which may, such as is commonly employed, be water, water mixed with alcohol or glycerine, or other non-freezing liquid.

The radiator 1 has a vapor vent, which, as shown, is a pipe 5, the upper end of which is above the liquid level in the radiator 1, and which, usually, in ordinary use communicates with the atmosphere, but which, in my improved construction, connects with a liquid containing condenser 6 below the liquid level therein, preferably to the bottom thereof, as shown. The condenser 6 may be another radiator similar to the radiator 1, and located, preferably in the air path of the fan 7 located in the rear of the radiator 1, and preferably supported in any desired manner directly in front of the radiator 1, as shown.

The condenser 6 may have the usual top filling tube 8 normally closed by a cap 9,

so that the condenser will be closed to the atmosphere. The radiator 1 has the usual filling tube 10 normally closed by a cap 11, so that the radiator is also closed to the atmosphere when in use.

12 designates a tank adapted to contain liquid and having in its top an opening 13 which is always in communication with the atmosphere. A conductor 14 connects at one end with the condenser 6 below the liquid level therein, as at the bottom thereof, as shown. The other end of the conductor 14 is connected to the tank 12 below the air opening 13, preferably to the bottom thereof, as shown.

A shut-off valve 15, manually operable, may be provided in the conductor 14.

The condenser 6, tank 12 and conductor 14 form together a liquid containing means adapted to receive and condense vapor discharged from the radiator 1 through the vent pipe 5 into the condenser 6.

In the operation of my invention, when the liquid 4 in the radiator 1 becomes heated and forms vapor, the caps 9 and 11, being tightly closed, pressure will obtain in the radiator 1, which will force the liquid and vapor in the pipe 5 into the condenser 6, where the vapor will be immediately condensed.

The shut-off valve 15 having been manually opened, the liquid added to that in the condenser 6 through the condensation of the vapor, will pass through the conductor 14 into the tank 12.

It will be understood that the radiator 1 and condenser 6 have both been primarily filled with the cooling liquid 4.

When the engine cools, a partial vacuum will be formed in the upper part of the radiator 1, upon which the atmospheric pressure in the tank 12 will force therefrom through the conductor 14 and into the condenser 6, an amount corresponding to the degree of cooling of the liquid in the radiator 1, which has been effected. An amount of liquid will be forced from the condenser 6 through the vent pipe 5, back into the radiator 1, corresponding to the amount of liquid which has been forced by atmospheric pressure from the tank 12 through the conductor 14 into the condenser 6.

The shut-off valve 15 is normally open, and need be closed only when the cap 9 is removed so that the condenser 6 may be

filled. The valve 15, however, is required and must be closed during the filling operation, when the tank 12 is located, as shown at an elevation at which the liquid will flow by gravity from the condenser 6 into the tank 12.

With the use of my invention, the loss of alcohol from the cooling liquid by evaporation, and the loss of the cooling liquid itself by evaporation will be very small, as such can only occur, with the parts in operative condition, only through the air opening 13 of the tank 12, which opening may be quite small.

I do not limit my invention to the structure shown and described, as many modifications, within the scope of the appended claims, may be made without departing from the spirit of my invention.

What I claim is:

1. In an engine cooling means, a liquid containing radiator having a vapor vent, a liquid containing condenser closed to the atmosphere and into which said vent discharges below the liquid level therein, and liquid receiving and containing means open to the atmosphere and communicating with said condenser below the liquid level in the condenser.

2. In an engine cooling means, a liquid containing radiator having a vapor vent, a liquid containing condenser closed to the atmosphere and into which said vent discharges below the liquid level therein, a tank open to the atmosphere, and a conductor connecting with said condenser below the liquid level therein and connecting with said tank and disposed so that liquid will pass there-

through from the condenser to said tank and from the tank to said condenser.

3. In an engine cooling means, a liquid containing radiator, having a vapor vent, a liquid containing condenser closed to the atmosphere and into which said vent discharges below the liquid level therein, a tank open to the atmosphere, a conductor connected to said condenser below the liquid level therein and connected to said tank and disposed so that liquid will pass therethrough from said condenser to said tank and from said tank to said condenser, and a manually operable shut-off valve in said conductor.

4. In an engine cooling means, a liquid containing radiator having a vapor vent, a liquid containing condenser closed to the atmosphere and into which said vent discharges below the liquid level therein, a tank having an opening communicating with the atmosphere, and a conductor connected with said condenser below the liquid level therein and connected with said tank below said opening.

5. In an engine cooling means, a liquid containing radiator having a vapor vent, a liquid containing condenser closed to the atmosphere and into which said vent discharges below the liquid level therein, a tank having an opening communicating with the atmosphere, a conductor connected with said condenser below the liquid level therein and connected with said tank below said opening, and a manually operable shut-off valve in said conductor.

In testimony whereof I have signed my name to this specification.

PHILIP L. HOWE.