Feb. 29, 1944. J. W. HEINEY 2,343,145

RADIATOR SURGE TANK

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FIG. 1.

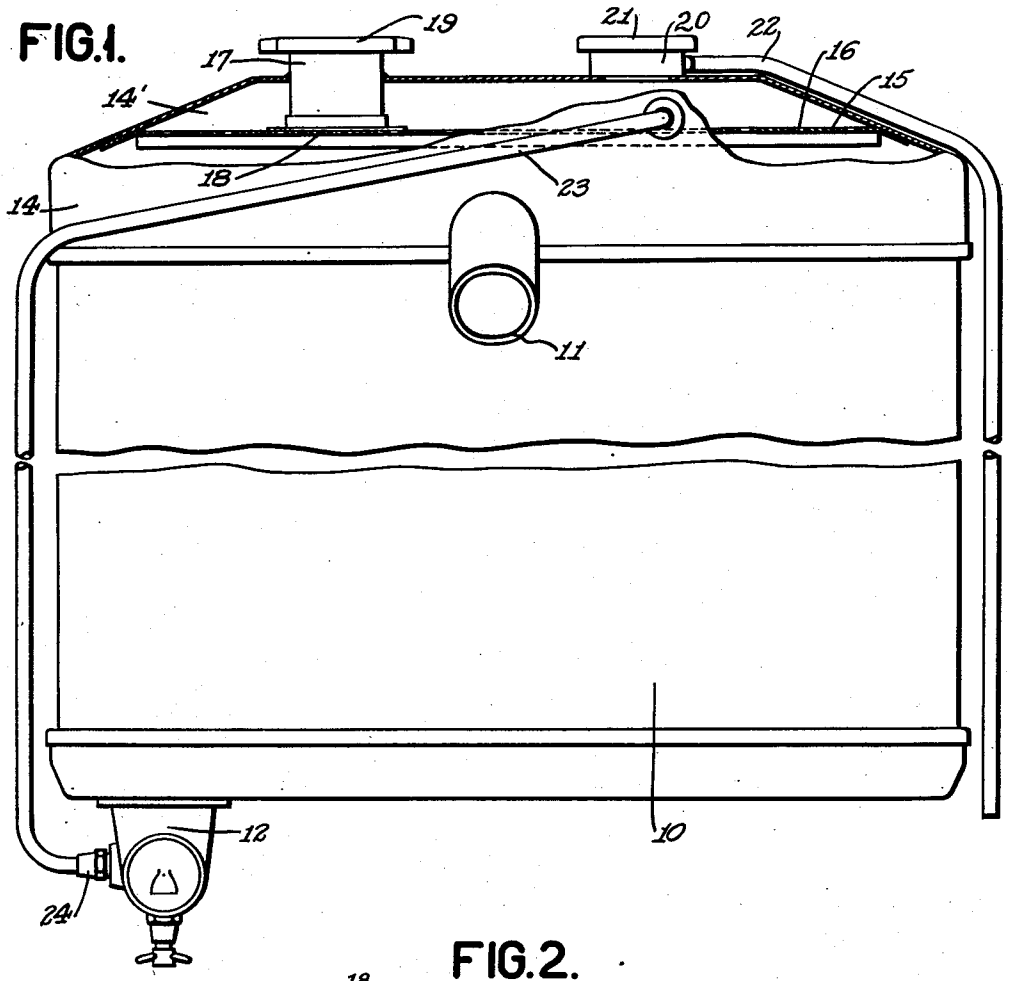
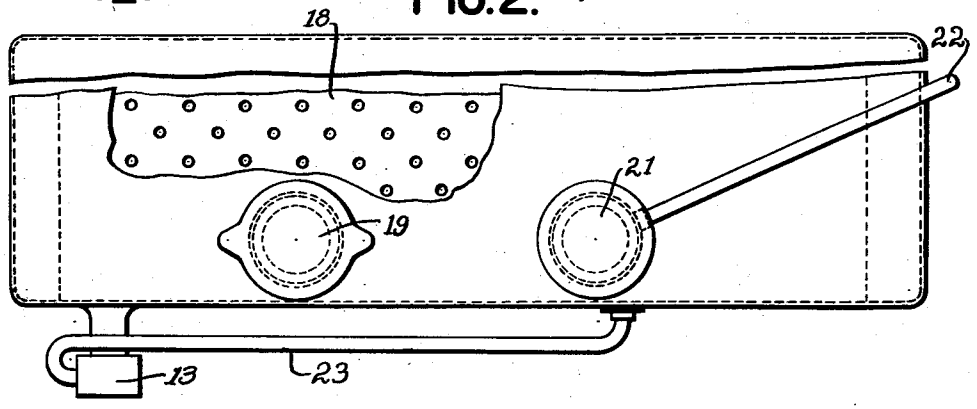


FIG. 2.



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FIG.3.

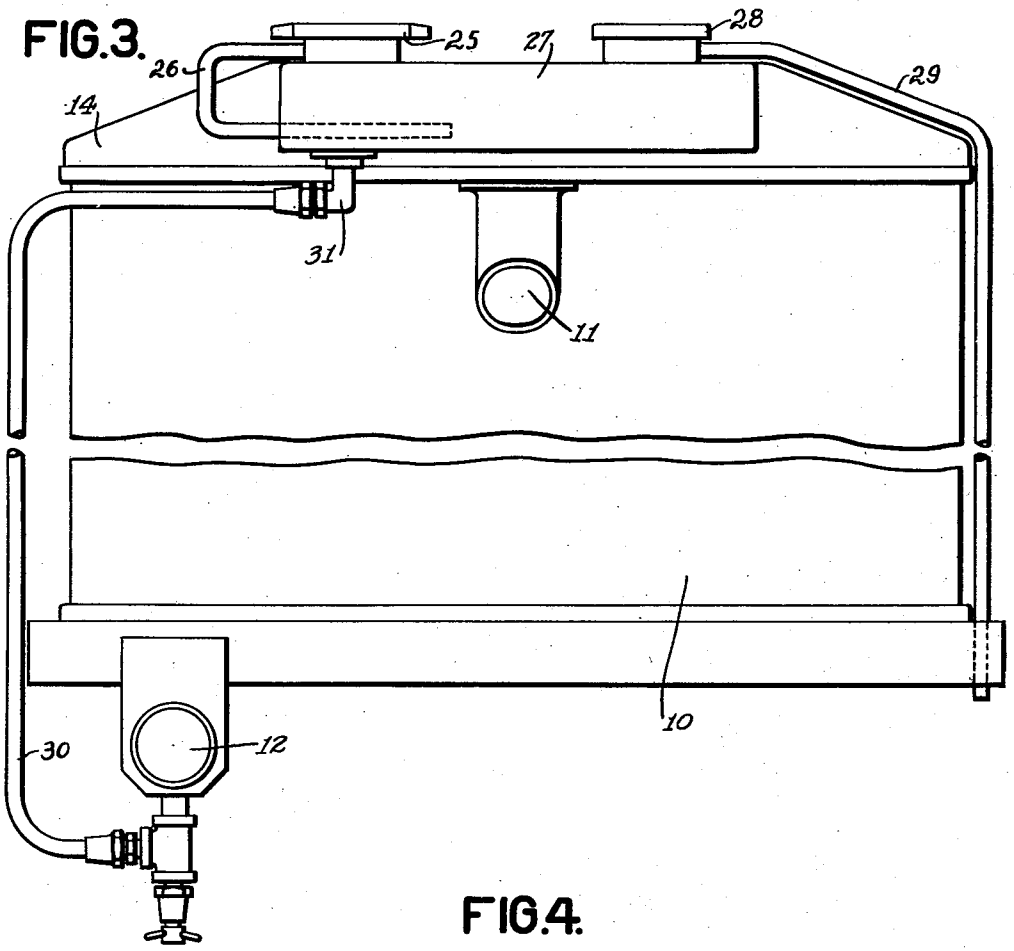
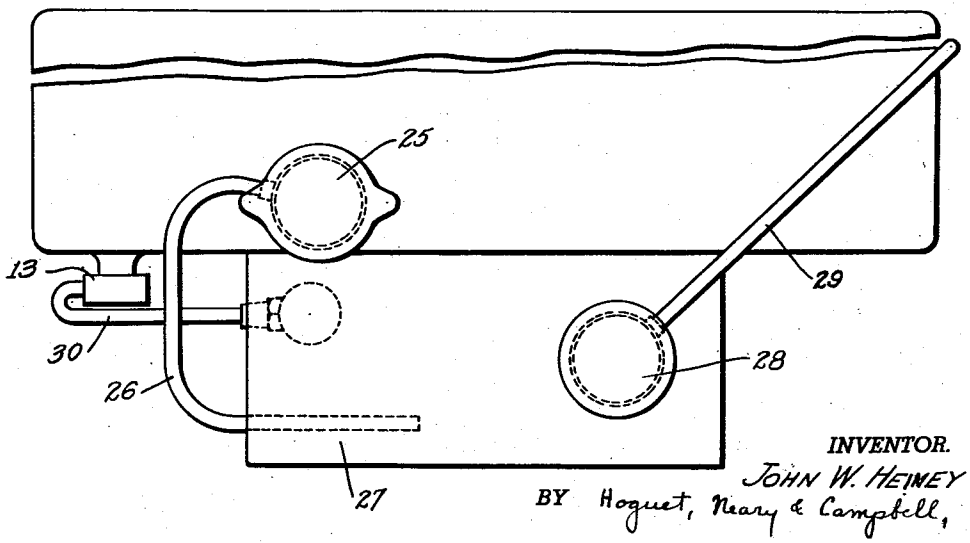


FIG.4.



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Fig. 5.

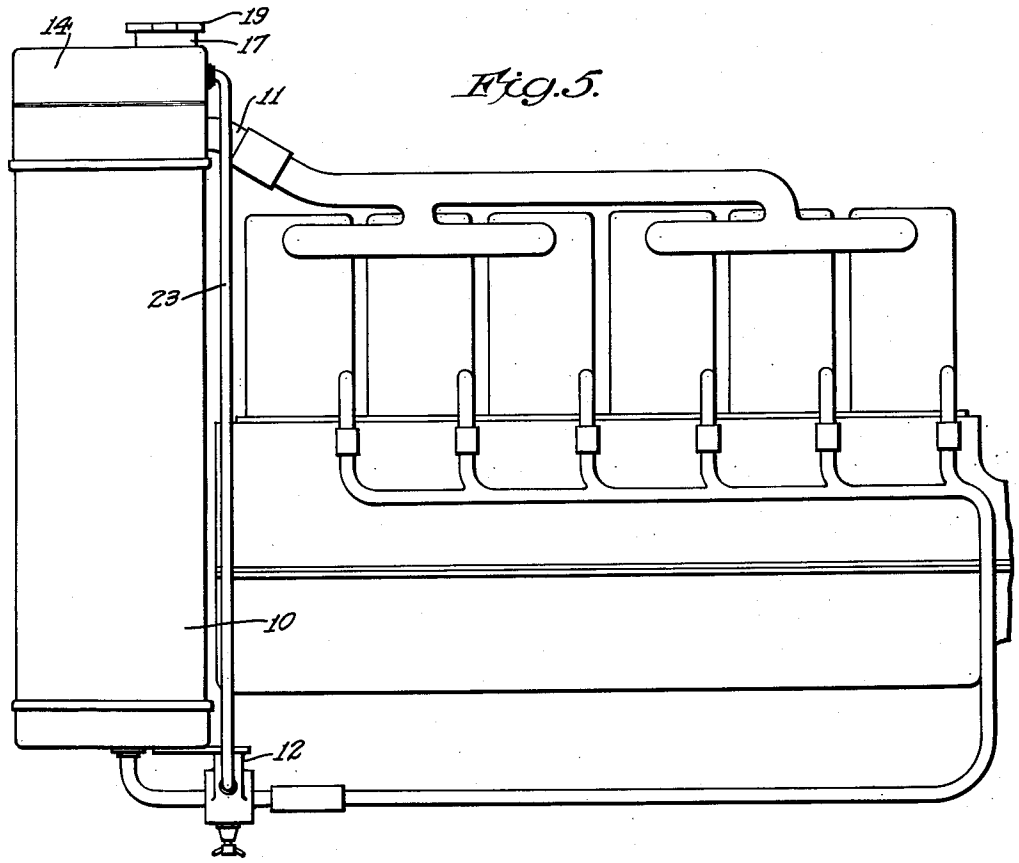
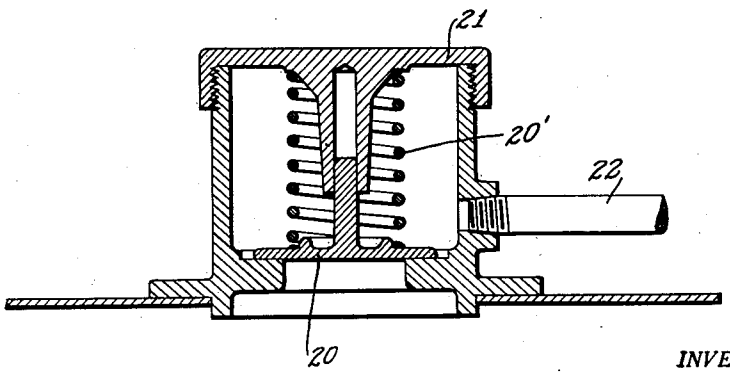


Fig. 6.



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Patented Feb. 29, 1944 2,343,145

UNITED STATES PATENT OFFICE

2,343,145

RADIATOR SURGE TANK

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Application May 12, 1942, Serial No. 442,664

1 Claim. (Cl. 257—127)

The present invention relates to liquid cooling systems for motor vehicle engines and embodies, more specifically, an improved form of radiator mechanism and liquid cooling system by means of which loss of cooling liquid is avoided during operation of the system.

The invention relates, more especially, to cooling systems of the above character wherein means is provided for equalizing the pressure in the cooling liquid throughout the cooling system without loss of cooling liquid from the system.

In the operation of internal combustion engines which are cooled by liquid cooling systems, and which engines are used on vehicles, the liquid in the cooling system is frequently caused to surge, with a consequent loss of the cooling liquid. Inspection of the liquid during initial operation and excessive aeration thereof also causes loss of this fluid. Under certain conditions of operation it will be readily apparent that this loss of cooling liquid may become disadvantageous and even very serious.

Accordingly, an object of the present invention is to provide a liquid cooling system for motor vehicles wherein means is provided to prevent the loss of cooling liquid during the operation.

Another object of the invention is to provide a cooling system of the above character wherein means is provided for equalizing the pressure throughout the cooling system without causing attending loss of the cooling liquid.

A further object of the invention is to provide a cooling system of the above character wherein means is provided to prevent excessive spillage that ordinarily arises from sudden surging of the liquid within the system and wherein any liquid that tends to surge is returned to the intake side of the liquid pump that circulates the liquid in the system.

A further object of the invention is to provide a mechanism of the above character wherein, without materially increasing the size of the cooling system, ample provision is made for the expansion of the liquid during operation and facility provided for de-aeration of such liquid.

The foregoing objects are attained, according to the present invention, by providing a surge tank structure by means of which the tendency of the cooling liquid to surge is substantially retarded and the surge liquid returned to the intake side of the liquid pump. The invention will be understood more fully in connection with the accompanying drawings, wherein

Fig. 1 is a view in elevation, partly broken away and in section, showing a radiator structure in accordance with the present invention;

Fig. 2 is a plan view of the radiator shown in Fig. 1, also partly broken away and in section;

Fig. 3 is a view similar to Fig. 1, showing a modified form of the invention;

Fig. 4 is a plan view of the device shown in Fig. 3;

Fig. 5 is a view in side elevation showing the present invention mounted upon an internal combustion engine; and

Fig. 6 is an enlarged detail view showing one form of spring loaded pressure cap.

Referring to the form of the invention shown in Fig. 1, a radiator, such as a motor vehicle radiator, is illustrated at 10 as being provided with the usual intake pipe 11 and suitable heat radiating elements, such as tubes and fins, which are not shown and will be readily understood as being constructed in accordance with well-known practice. The outlet of the radiator is illustrated at 12 and is connected with a pump 13 which serves to circulate the cooling liquid through the cooling system in order that it may be returned to the inlet 11 of the radiator.

The radiator 10 is provided with an upper tank 14 which, in accordance with the present invention, is provided with a plate 15 secured across the upper portion thereof and formed with a plurality of apertures 16, the size and number of which may be varied to produce the desired result. The plate 15 thus forms a surge tank 14' in the upper portion of the tank 14. A radiator filler spout 17 communicates with the tank 14 below the plate 15 by means of an aperture 18 and is provided with a liquid-tight cap 19. An outlet is shown at 20 and is formed with a spring load pressure cap 21 which serves to vent air when pressure is built up to a predetermined value, as well as to vent water in extreme cases of surging. The outlet 20 connects with a vent pipe 22 which is of usual structure. Fig. 5 illustrates the manner in which the foregoing mechanism may be utilized with an internal combustion engine and the cooling system thereof, while Fig. 6 illustrates a suggested form of spring loaded pressure cap. It will be seen that the outlet 20 is maintained in a seated position by means of a spring 20' and that, when the pressure within the radiator becomes sufficiently great, the outlet 20 will be raised against the action of the spring 20', and the fluid will escape into the pipe 22.

Above the apertured plate 15 a return pipe

23 is connected, the return pipe being connected at 24 to the intake side of the pump 13.

In operation, the liquid system is first filled to a point just below the baffle plate 15. The expansion of the liquid caused by the normal heat in operation causes the cooling liquid to flow into the surge tank 14' and to a level normally slightly above the overflow return pipe 23. This surge liquid is thus returned by pipe 23 to the pump and is not lost from the cooling system. Air from the cooling liquid escapes through the pressure valve 21 and vent pipe 22, this escape valve also serving as a relief valve in case of excessive pressure within the system.

Referring to the modified form of the invention shown in Figs. 3 and 4, the invention is shown as being embodied in a cooling system generally similar to that referred to in connection with the description of Figs. 1 and 2. However, the radiator tank 14 is provided with a liquid-tight filler spout and cap 25 which is connected, by means of a tube 26, to a surge tank 27 that is preferably mounted directly upon the tank 14. A pressure relief valve and cap mechanism 28 is provided, similar in construction to the elements 20 and 21 of the form of the invention shown in Figs. 1 and 2. A vent pipe 29 thus serves to vent air or excess liquid under the conditions hereinbefore mentioned.

Surge water that flows through the pipe 26 into the surge tank 27 drains back to the intake side of the pump 13 through pipe 30 and fitting 31 that connects it to the surge tank 27.

In the form of the invention shown in Figs. 3 and 4, the liquid system is filled through the spout 25 in accordance with usual practice. During operation, the expanded liquid escapes into the surge tank 27 and is drained back to the intake side of the pump 13. Air or excess liquid under pressure may escape through the pressure cap or valve 28 and vent 29, as previously described.

It will thus be seen that the present invention serves to provide an effective baffle to prevent excessive loss or spillage due to sudden surging or expansion of the cooling liquid in the cooling system. The mechanism returns the surged liquid to the cooling system and serves to equalize the pressure throughout the system without loss of cooling liquid. Moreover, de-aeration is readily accomplished without loss of any liquid.

While the invention has been described with reference to the specific structure shown in the accompanying drawings, it is not to be limited save as defined in the appended claim.

I claim:

In a liquid cooling system for motors embodying a radiator tank and a circulating pump and connections to circulate water normally through the system, means for reducing loss of water from said system comprising a surge tank located in the upper portion of the radiator tank and separated therefrom by an apertured member providing restricted communication between the surge tank and the radiator tank, means for returning water from the surge tank to said system, pressure responsive means communicating with the surge tank to permit the escape of air and liquid under pressure therefrom, and means for filling the radiator tank with water including a tube extending downward below said apertured member whereby air is trapped in said surge tank above said member and prevented from escape by said pressure responsive means so that filling of the surge tank with water is avoided.

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