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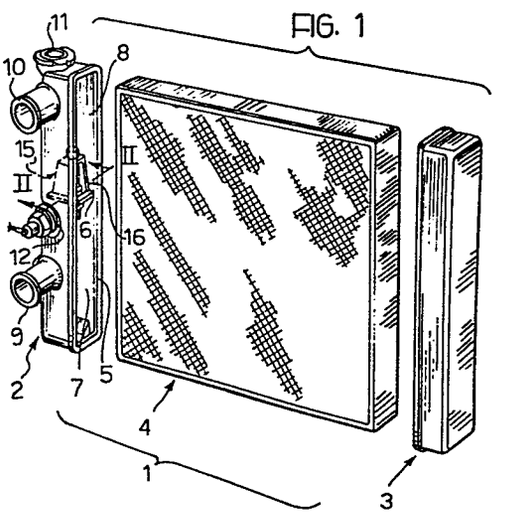
(54) Cooling radiator for motor vehicles.

(57) A cooling radiator for motor vehicles, of the type having at least one reversal in the direction of flow of the coolant liquid, comprises at least one manifold (2) provided with at least one partition (6) which divides the manifold into two chambers (8, 7), arranged one downstream of the other. The radiator includes one-way valve means (15) for controlling an aperture (22) in the partition (6), which allow the coolant to flow towards the downstream chamber through the aperture (22) when the pressure difference between the two chambers (7, 8) exceeds a predetermined value.

FIG. 1



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"Cooling radiator for motor vehicles"

The present invention relates to a cooling radiator for motor vehicles.

More particularly, the invention is concerned with a radiator of the type having at least one reversal in the direction of flow of the engine coolant liquid, comprising at least one manifold provided with at least one partition which divides the manifold into two chambers arranged one downstream of the other, in which the partition has at least one aperture which puts these chambers in communication.

In radiators of the aforesaid type, whatever the speed of the engine, some of the coolant flows through the aperture towards the downstream chamber without passing through the radiator. The radiator is not used to its full capacity, but the loss of pressure of the liquid is diminished. This is an advantage if the speed of the vehicle is very high, since the efficiency of the radiator is high in this case, and ensures sufficient heat exchange even if all the coolant does not pass completely through the radiator. If, on the other hand, the speed of the vehicle is reduced, it is disadvantageous since, in this case, it is necessary for all the liquid to pass completely through the radiator in order to use it to its full capacity, due to the reduced efficiency of the radiator.

This invention aims to provide a radiator, of the type specified above, which will eliminate the disadvantage cited above.

With a view to achieving this object, the pre-

sent invention provides a radiator of the aforesaid type, characterised in that it includes one-way valve means for controlling the aperture, which allow the coolant liquid to flow towards the downstream chamber through the aperture.

Further characteristics and advantages of this invention will emerge from the description which follows with reference to the accompanying drawings, provided purely by way of non-limiting example, in which:

Figure 1 is an exploded perspective view of a radiator according to the present invention, and

Figure 2 is an exploded perspective view, on an enlarged scale, of a detail of Figure 1.

In Figure 1 there is shown a radiator 1 for motor vehicles, comprising a first manifold 2 and a second manifold 3 fixed to an array 4 of pipes and fins.

The first manifold 2 has a body 5 of moulded plastics material, which defines an internal cavity.

The manifold 2 has an internal partition 6 which divides the internal cavity into an upstream chamber 7 and a downstream chamber 8.

The upstream chamber 7 has a union 9 for the liquid flowing into the radiator, while the downstream chamber 8 has a union 10 for the liquid leaving the radiator. The downstream chamber 8 also has a union 11 for **filling** the radiator 1, while the upstream chamber 7 has a **threaded** hole 12 for the mounting of a device for determining the temperature of the liquid.

The radiator 1 is of the aforesaid type with

two traversals for the liquid; this means that the coolant which comes in through the union 9 effects a first traversal from the first manifold to the second manifold in the lower part of the array 4, and a second traversal in the upper part of the array 4 from the second manifold to the first manifold, from which it emerges through the union 10.

The partition 6 has a seat 13 in which a one-way valve 15 is fixed by means of lateral guides 14.

Referring to Figures 1 and 2 there is shown a moulded plastics valve body 16 comprising a support body 17 and a head 18.

The support body 17 is U-shaped with a cross arm which consists of a plate 19 having two lateral guides 14 for fitting into the seat 13 of the partition 6. The plate 19 also supports two parallel arms in the form of spring strips 20 each of which has a snap-tooth 21 at its free end.

In its centre, the plate 19 has a through-hole 22 with a slightly conical edge 23 which constitutes the seat of the valve 15.

The head 18 comprises a flat part 24 with a tubular projection 25 and two lateral slots 26. The head 18 is fixed to the supporting body 17 by fitting the ends of the sprung strips 20 into the lateral slots 26 until snap engagement of the teeth 21 is effected.

The valve shutter 29 is frusto-conical; this shutter has three frontal centering tabs 30 which co-operate with the wall of the hole 22, in order to ensure centering of the shutter in the valve seat 23.

Moreover, at the rear, the shutter 29 has a cylindrical guide stem 31 which is fitted in to the cavity defined by the tubular projection 25.

A calibrated spring 32 is interposed in a compressed condition between the shutter 29 and the head 18 coaxially with the cylindrical stem 31. The function of the calibrated spring is to hold the shutter 29 in abutment with the valve seat 23 at differences of pressure between the chamber 7 and the chamber 8 below a predetermined value, thus keeping the valve 15 in the closed position.

The radiator functions as follows:

When the speed of the coolant in the radiator is low, that is, in the case of low engine speeds and low vehicle speeds, the pressure losses in the array 1 will be limited, since the difference in pressure between the upstream chamber 7 and the downstream chamber 8 is small. In these circumstances, the calibrated spring 32 keeps the valve closed and all the liquid entering the manifold 2 passes completely through the radiator 1, ensuring a high overall heat exchange in spite of the reduced efficiency of the radiator due to the low vehicle speed.

If the speed of the coolant in the radiator 1 is high, that is, at high engine speeds, the pressure losses in the array increase proportionally with the increase in pressure between the upstream chamber 7 and the downstream chamber 8. When this pressure difference exceeds a predeterminated value, it overcomes the force of the spring 32 and lifts the shutter 29 from the

valve seat 23, allowing part of the coolant to flow through the through-hole 22. Thus, the amount of coolant passing through the array 4 of the radiator is reduced and the pressure losses are therefore reduced at the same time.

CLAIMS:

1. Cooling radiator for motor vehicles of the type having at least one reversal in the direction of flow of the engine coolant liquid, comprising at least one manifold (2) provided with at least one partition (6) which divides the manifold into two chambers (7, 8) arranged one downstream of the other, in which the partition (6) has at least one aperture which puts these chambers into communication, characterised in that it includes one-way valve means for controlling the aperture, which allow the coolant liquid to flow towards the downstream chamber (8) through the aperture.

2. Radiator according to Claim 1, characterised in that the valve means comprise a valve calibrated so as to open when the difference in pressure between the two chambers (7, 8), due to pressure losses in the intervening course, exceeds a predetermined value.

3. Radiator according to Claim 2, characterised in that the one-way calibrated valve comprises a valve body (16) with one wall (19) which has the aperture (22) and constitutes a part of the partition (6), and a conical shutter (29) with centering tabs (30), which is pressed by a spring (32) against the edge (23) of the aperture (22), said edge (23) constituting the valve seat.

4. Radiator according to Claim 3, characterised in that the valve body (16) consists of two parts, and in that:

- the first part (17) is U-shaped with the cross arm constituting said wall (19) and supporting two

parallel arms (20) in the form of sprung strips,

- the second part (18) consists of a head with a tubular projection (25) for guiding a stem (31) of the conical shutter (29), the head being snap-engaged with the ends of the two parallel arms (20) of the U-shaped first part (17).

5. Radiator according to Claim 3, characterised in that the valve body (16) is fixed in a seat (13) of the partition (6) by lateral guides (14).

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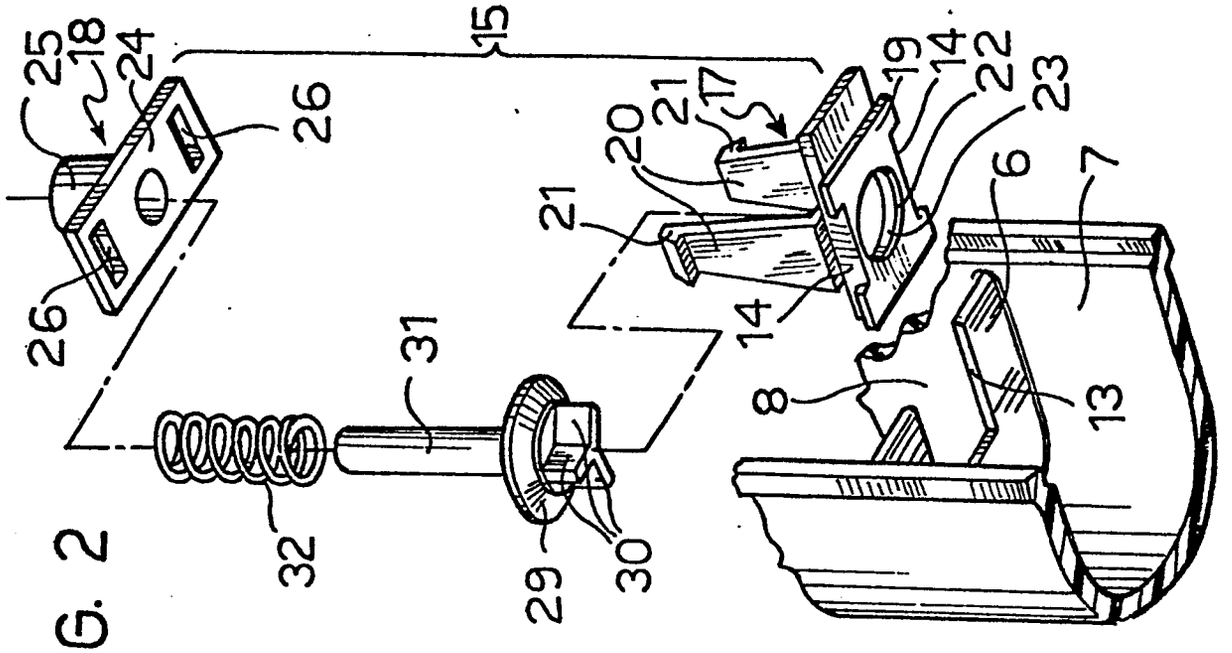

FIG. 2

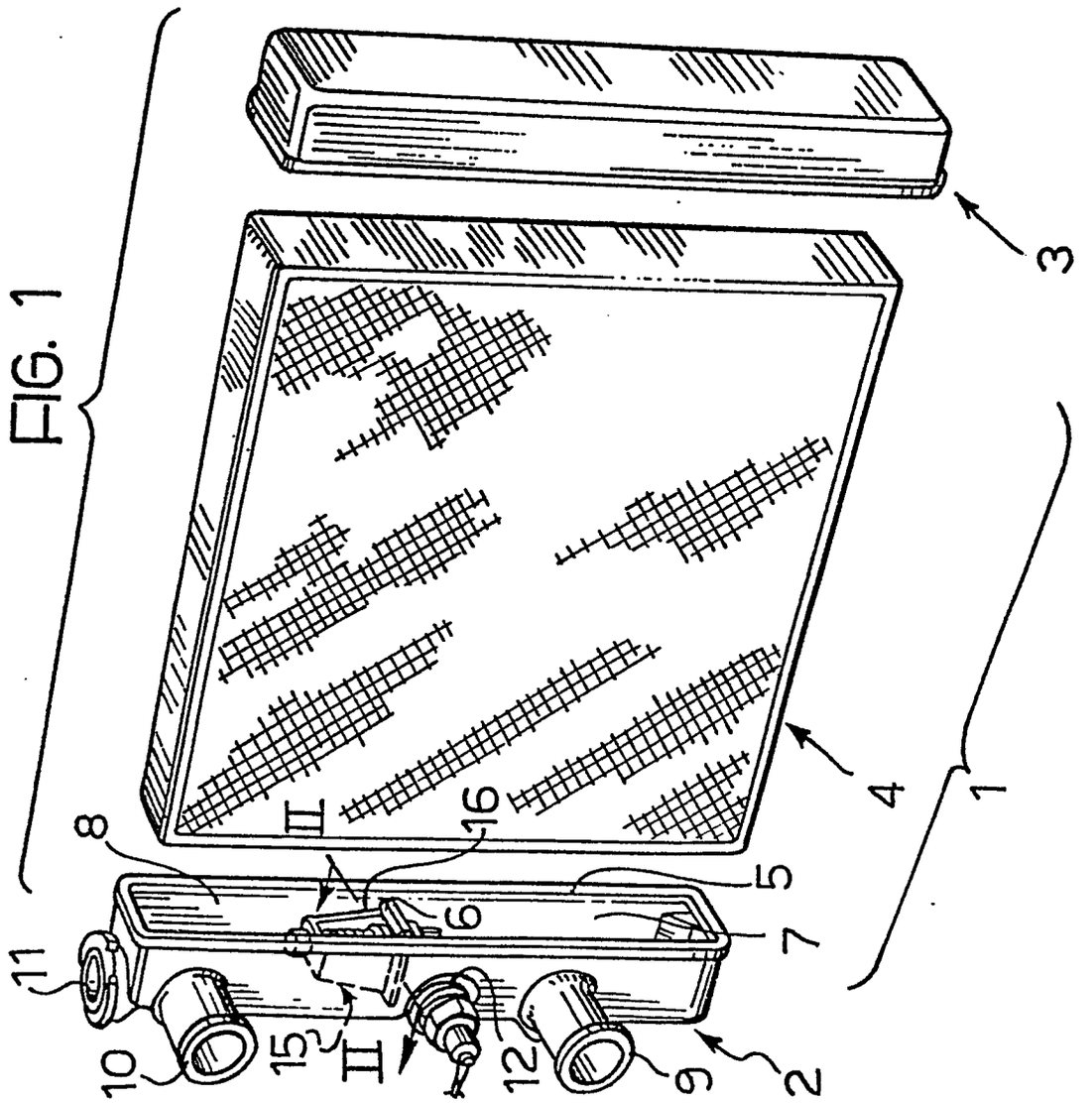

FIG. 1