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(12) # EUROPEAN PATENT APPLICATION

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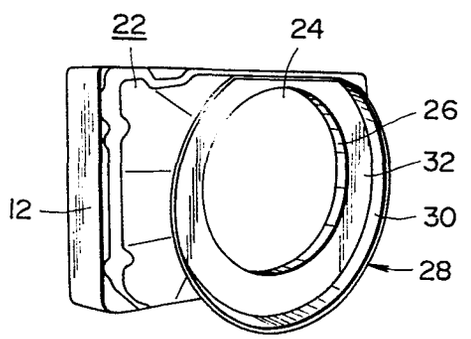
(54) **Fan shroud.**

(57) A fan shroud (22, 22′, 22″) is provided with an air guide ring (30, 30′, 30″) for deflecting air that is going to escape radially of a cooling fan (16) after having passed through a radiator (12), rearwardly of the radiator (12).



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FAN SHROUD

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the cooling of automotive engines and particularly to a fan shroud arranged in the rear of a radiator to increase the cooling system efficiency.

2. Description of the Prior Art

Figs. 1 and 2 show a typical example of a fan shroud 10 arranged in the rear of a radiator 12 of a water-cooled automotive engine 14. A cooling fan 16 is shrouded by the fan shroud 10 to increase the cooling system efficiency. As better seen from Fig. 1, the fan shroud 10 is rectangular in external shape in accordance with the shape of a radiator core (not shown) and has a ventilation opening 18 in which the cooling fan 16 is disposed to draw air through the radiator 12. At the periphery of the ventilation opening 18, the fan shroud 10 is formed with a short cylindrical flange 20 which is uniform in diameter.

It has been revealed by the experiments conducted by the applicant that the prior art fan shroud is encountered by the following disadvantages. That is, with the above described fan shroud, part of the air that has

passed through the radiator 12 is allowed to flow radially of the cooling fan 16 under the influence of rear obstacles such as the constituent parts of the engine 14, as indicated by the arrows in Fig. 2. The radial airflow is then partially deflected forwardly of the vehicle body and flows through the vehicle body openings such as the openings of a front grille back to the front of the radiator. In this manner, the air that has been heated during its passage through the radiator 12 is partially circulated back to the front of the radiator 12, raising the temperature of air that is going to be drawn into the radiator 12 and reducing the cooling efficiency of the radiator 12. Another disadvantage is that the amount of air to be supplied to the constituent parts of the engine 14 such as an oil pan and an exhaust manifold for cooling same is reduced since part of the air that has passed through the radiator 12 is allowed to flow radially of the cooling fan 16 and thus deflected away from those parts.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a novel and improved fan shroud which is arranged in the rear of a radiator of an automotive engine. The fan shroud comprises, as usual, a ventilation opening in which a cooling fan is disposed to draw

air through the radiator. In accordance with the present invention, the fan shroud is further provided with an air guide means for deflecting air that is going to escape radially of the radiator after having passed through the radiator, rearwardly of the radiator.

The fan shroud of this invention is quite effective for overcoming the disadvantages noted above. That is, with the fan shroud of this invention, air that is going to escape radially of the cooling fan after having passed through the radiator is efficiently deflected rearwardly of the radiator, making it possible to prevent the air that has been heated during its passage through the radiator from being circulated back to the front of the radiator as well as to increase the amount of air to be supplied to the constituent parts of the engine such as the oil pan and the exhaust manifold.

It is accordingly an object of the present invention to provide a novel and improved fan shroud for use with a water-cooled automotive engine which can overcome the above noted disadvantages inherent in the comparable prior art fan shroud.

It is another object of the present invention to provide a novel and improved fan shroud of the above described character which makes it possible to prevent the air that has been heated during its passage through

the radiator from being circulated back to the front of the radiator as well as to increase the amount of air to be supplied to the constituent parts of the engine such as the oil pan and the exhaust manifold.

It is a further object of the present invention to provide an novel and improved fan shroud of the above described character which effectively increases the cooling system efficiency of an automotive vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The features and advantages of the fan shroud according to the present invention will become more clearly appreciated from the following description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of a prior art fan shroud mounted to the rear of a radiator;

Fig. 2 is a schematic view of an engine compartment of a vehicle in which the fan shroud of Fig. 1 is installed;

Fig. 3 is a view similar to Fig. 1 but shows a fan shroud according an embodiment of the present invention;

Fig. 4 is a horizontal section of the fan shroud of Fig. 3;

Fig. 5 is a view similar to Fig. 2 but shows an engine compartment in which the fan shroud of Fig. 3 is installed;

Fig. 6 is a view similar to Fig. 4 but shows a fan shroud according to a second embodiment of the present invention; and

Fig. 7 is a view similar to Fig. 4 but shows a fan shroud according to the third embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs. 3 to 5, in which like parts to those of Figs. 1 and 2 are designated by like reference characters, a fan shroud according to an embodiment of the present invention is indicated at 22 and shown to comprise a ventilation opening 24 and a short cylindrical flange 26 provided to the periphery of the ventilation opening 24 in a manner to project rearwardly therefrom. The foregoing structure substantially follows the conventional fashion.

In accordance with the present invention, the fan shroud 22 further comprises an air guide means 28 provided to the rear end of the cylindrical flange 26 for defelcting air that is going to escape radially of the cooling fan 16, rearwardly of the radiator 12. The air guide means 28 briefly comprises an air guide ring 30 placed around the cylindrical flange 26 at a predetermined space therebetween. More specifically, the air guide means 28 further comprises an integral

annular disc 32 joined at the inner periphery thereof with the rear end of the cylindrical flange 26 and extending radially outwardly toward the outer periphery thereof. The air guide ring 30 is truncated cone-shaped and has a smaller diameter end joined with the outer periphery of the annular disc 32 and a larger diameter end located rearwardly of the smaller diameter end.

In the illustrated embodiment, as seen from Fig. 3, the annular disc 32 is partially reduced in width to enable the associated part of the air guide ring 30 to be formed not to project beyond the upper end of the radiator 12.

The fan shroud 22 is formed into a single piece from a synthetic resinous material by injection molding. That is, the air guide means 28 in the embodiment of Figs. 3 to 5 is formed integral with the remaining part of the fan shroud 22.

Referring to Fig. 6, in which parts are designated by like reference characters as their corresponding parts of the previous embodiment of Figs. 3 to 5, with prime marks added, a fan shroud according to the second embodiment of the present invention is generally indicated at 22' and shown to comprise an air guide means 28' including an air guide ring 30' and an annular disc 32' which are integral with each other but formed separately

from the cylindrical flange 26' with a view to making the production of the mold and the molding operation easy. The separately formed air guide means 28' is bonded at the flanged inner periphery of the annular disc 32' to the outer cylindrical surface of the cylindrical flange 26'.

Referring to Fig. 7, in which parts are designated by like reference characters as their corresponding parts of the embodiment of Figs. 3 to 5, with prime marks added, a fan shroud according to the third embodiment of the present invention is indicated at 22" and shown to comprise an air guide ring 30" placed around the cylindrical flange 26" at a predetermined space therebetween. The air guide ring 30" has a front end joined directly with the fan shroud proper and a rear free end projecting more rearwards than that of the cylindrical flange 26". In this embodiment, the air guide means 28" is constituted by the air guide ring 30" only, and the fan shroud 22" is formed into a single piece from a synthetic resinous material by injection molding.

In operation, due to the provision of the air guide means, air that is going to escape radially of the cooling fan 16 after having passed through the radiator 12 is efficiently deflected rearwardly of the radiator 12 as indicated by the arrows in Fig. 5,

making it possible to prevent the air that has been heated during its passage through the radiator 12 from being recirulated back to the front of the radiator 12 as well as to increase the amount of air to be supplied to the constituent parts of the engine such as the oil pan and the exhaust manifold.

Obviously, many variations and modifications of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

WHAT IS CLAIMED IS:

1. A fan shroud (22, 22', 22") arranged in the rear of a radiator (12) of an automotive engine (14), comprising a ventilation opening (24, 24', 24") in which a cooling fan (16) is disposed to draw air through the radiator (12), and an air guide means (28, 28', 28") for deflecting air that is going to escape radially of the cooling fan (16) after having passed through the radiator (12), rearwardly of the radiator (12).

2. A fan shroud (22, 22', 22") as set forth in Claim 1, in which said air guide means (28, 28', 28") comprises an air guide ring (30, 30', 30") placed around the periphery of said ventilation opening (24, 24', 24") at a predetermined space therebetween.

3. A fan shroud (22, 22') as set forth in Claim 2, in which said air guide means (28, 28') further comprises an integral annular disc (32, 32') extending radially outwardly from the periphery of said ventilation opening (24, 24'), and in which said air guide ring (30, 30') is truncated cone-shaped and has a smaller diameter end joined with the outer periphery of said annular disc (32, 32') and a larger diameter end located rearwardly of said smaller diameter end.

4. A fan shroud (22, 22') as set forth in Claim 3, further comprising a short cylindrical flange (26, 26') provided to the periphery of said ventilation opening (24, 24') in a manner to project rearwardly therefrom, and in which said annular disc (32, 32') is joined at the inner periphery thereof with the rear end of said cylindrical flange (26, 26').

5. A fan shroud (22) as set forth in Claim 4, in which said annular disc (32) and said air guide ring (30) are formed integral with said cylindrical flange (26).

6. A fan shroud (22') as set forth in Claim 4, in which said annular disc (32') and said air guide ring (30') are formed separately from said cylindrical flange (26') and bonded at the inner periphery of said annular disc (32') to the outer cylindrical surface of said cylindrical flange (26').

7. A fan shroud (22") as set forth in Claim 2, further comprising an integral short cylindrical flange (26") provided to the periphery of said ventilation opening (24"), and in which said air guide ring (30") has a front end joined directly with the fan shroud proper

and a rear free end projecting more rearwards than that of said cylindrical flange (26").

8. A fan shroud (22") as set forth in Claim 7, in which said guide ring (30") is formed integral with said fan shroud proper.

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FIG.1
PRIOR ART

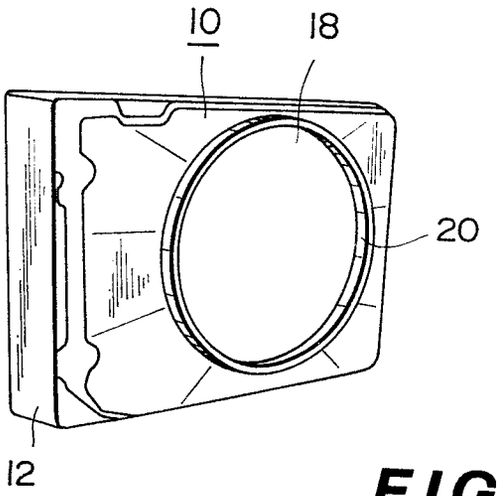

FIG.2
PRIOR ART

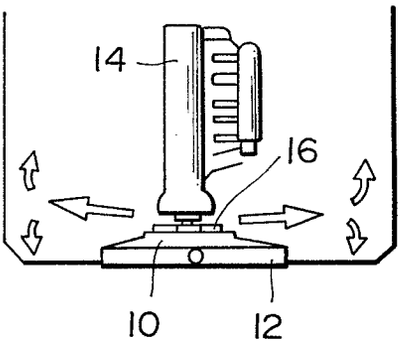

FIG.3

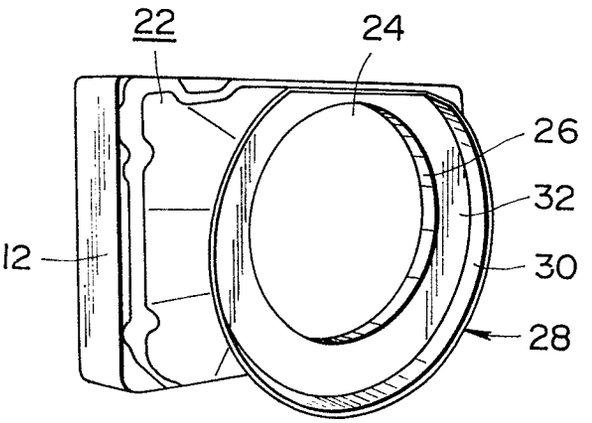

FIG.4

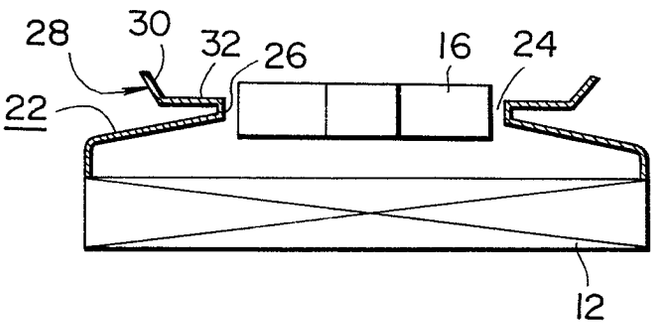

FIG.5

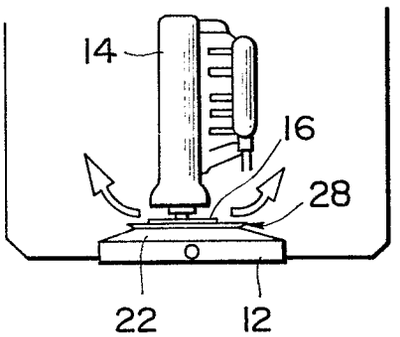

FIG.6

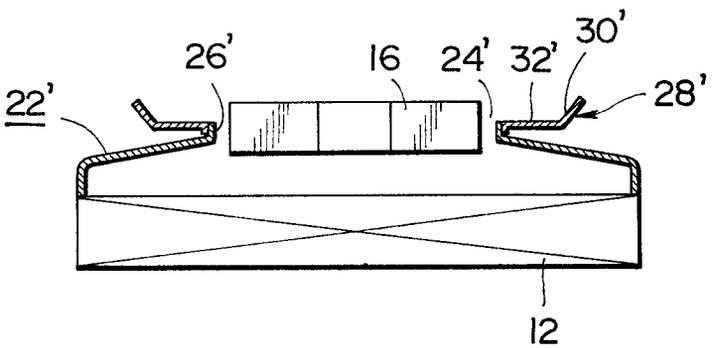

FIG.7