

EUROPEAN PATENT SPECIFICATION

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⑤ **Fan shroud.**

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US-A-4 061 188

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Description

The present invention relates to a fan shroud arranged in the rear of a radiator of an automotive engine comprising a ventilation opening in which a cooling fan is disposed to draw air through the radiator and an air guide means positioned rearwardly of the radiator.

Figs. 1 and 2 show an 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 application 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.

Another fan shroud arrangement comprising air guide means positioned rearwardly of the radiator is known from US—A—3 937 192 wherein a single cooling fan is surrounded by dual concentric shrouds for producing an ejector action within the annular space between both shrouds, in order to diminish air flow recirculation around the outer tips of the fan plates. However, this solution results in a complicated fan shroud structure and the vibration-free mounting of the outer shroud, which must allow air stream to flow in the clearance between the inner and outer shrouds, is difficult.

A similar fan shroud arrangement is known from EP—A—0026997, disclosing a cooling fan with an inlet shroud attached to the tips of the fan blades. The cooling fan including the inner fan shroud at the tips of the fan blades is fitted

rotatably within a fixed shroud secured to an engine cooling radiator. The outer fixed shroud exhibits a cylindrical ejector portion extending axially rearwards by a predetermined length beyond said fan blades in order to block a recirculation passage formed by the clearance between the fixed and rotatable shrouds by a portion of the discharged air stream.

In this case, problems have also been encountered in suppressing noise sufficiently which is generated by fan operation in the ejector cooling system. Moreover, the entire arrangement involves increased production costs, due to the provision of a second fan shroud secured to the blade tips of the fan and the complicated structure of both fans.

The claimed invention has been designed to effectively increase the efficiency of the cooling system of an automotive vehicle in accordance with the preamble of the claim and to prevent the air which 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.

Moreover, the invention aims at a less complicated fan shroud which is easy to manufacture and to assemble to the engine cooling system.

Finally, the supply of air discharged from a cooling fan should be more effective without the need arising to apply intensified ejector cooling so as to avoid the deficiencies inherent in such systems.

This task has been solved by incorporating the features according to the characterising portion of the claim.

Thus, an air guide means is formed by an air guide ring projecting integrally rearwards from the intermediate portion of the fan shroud radially spaced from the flange portion thereof. A free annular rear edge of the air guide ring projects more rearwards than an annular near edge of the flange portion of the fan shroud.

Consequently, the air guide ring deflects axially air which is going to escape radially from the cooling fan after having been sucked through the radiator.

The fan shroud according to this invention is quite easy to manufacture as a single piece by injection molding, and is effective in deflecting air axially rearwards of the cooling fan. Hence, the amount of air being supplied to the constituent parts of the engine such as the oil pan and the exhaust manifold is remarkably increased.

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 horizontal section of fan shroud

according to an embodiment of the present invention associated to a radiator.

Referring to Fig. 3, 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.

In accordance with the present invention, the fan shroud 22 further comprises an air guide means 28 provided to the rear of the fan shroud 22 for deflecting air that is going to escape radially of a cooling fan (not shown) which is disposed in the ventilation opening 24. The air guide means 28 comprises an air guide ring 30 placed around the cylindrical flange 26 at a predetermined space in between.

The air guide ring 30 has a front end joined directly with the fan shroud 22 proper and a rear free end projecting more rearwards than that of the cylindrical flange 26, i.e. the air guide ring projects integrally rearwards from an inclined intermediate portion of fan shroud 22 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 ring 30, air that is going to escape radially of the cooling fan after having passed through the radiator 12 is efficiently deflected rearwardly of the radiator 12 making it possible to prevent the air that has been heated during its passage through the radiator 12 from being recirculated 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.

Claim

A stationary fan-shroud (22) arranged in the rear of a radiator (12) of an automotive engine (14) comprising an inlet portion, the cross-section of which substantially corresponds to the relevant cross-section of the radiator (12), an intermediate portion having a gradually decreased cross-section and a flange portion (26) at the rear end of the fan shroud (22) forming a ventilation opening (24) for receiving a cooling fan (16) therein, said fan shroud (22) establishing an air guide means (28) in the rear of the radiator (12), characterized in that said air guide means (28) is formed by an air guide ring (30) projecting integrally rearwards from the intermediate portion of the fan shroud (22), radially spaced from the flange portion (24)

thereof, a free annular rear edge of the air guide ring (30) projecting more rearwards than an annular rear edge of the flange portion (26) of the fan shroud (22).

Patentanspruch

Stationäre Lüfterhaube (22), die an der Rückseite eines Kühlers (12) eines Kraftfahrzeugmotors (14) angeordnet ist, mit einem Einlaßabschnitt, dessen Querschnitt im wesentlichen dem zugehörigen Querschnitt des Kühlers (12) entspricht, einem Zwischenabschnitt mit allmählich abnehmendem Querschnitt und einem Flanschabschnitt (26) am hinteren Ende der Lüfterhaube (22), der eine Lüftungsöffnung (24) zur Aufnahme eines Kühllüfters (16) aufweist, wobei die Lüfterhaube (22) eine Luftführungseinrichtung (28) an der Rückseite des Kühlers (12) bildet, dadurch gekennzeichnet, daß die Luftführungseinrichtung (28) durch einen Luftführungsring (30) gebildet ist, der einstückig von dem Zwischenabschnitt der Lüfterhaube (22) nach hinten in radialem Abstand von dem Flanschabschnitt (24) der Lüfterhaube hervorsteht, wobei eine freie, ringförmige Hinterkante der Luftführungsringes (30) weiter nach hinten hervorsteht als eine ringförmige Hinterkante des Flanschabschnittes (26) der Lüfterhaube (22).

Revendication

Enveloppe de ventilateur stationnaire (22) agencée à l'arrière d'un radiateur (12) d'un moteur d'automobile (14) comprenant une partie d'entrée, dont la section transversale correspond sensiblement à la section transversale correspondante du radiateur (12), une partie intermédiaire ayant une section transversale diminuant graduellement et une partie de bride (26) à l'extrémité arrière de l'enveloppe de ventilateur (22) formant une ouverture de ventilation (24) pour y recevoir un ventilateur de refroidissement (16), ladite enveloppe de ventilateur (22) établissant un moyen de guidage de l'air (28) à l'arrière du radiateur (12), caractérisée en ce que ledit moyen de guidage de l'air (28) est formé d'une bague de guidage de l'air (30) faisant intégralement saillie vers l'arrière de la partie intermédiaire de l'enveloppe de radiateur (22), radialement espacée de sa partie de bride (24), un bord arrière annulaire libre de la bague de guidage de l'air (30) faisant plus saillie vers l'arrière qu'un bord annulaire arrière de la partie de bride (26) de l'enveloppe de ventilateur (22).

FIG.1
PRIOR ART

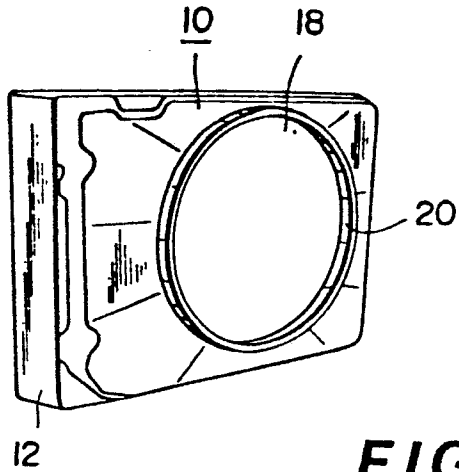


FIG.2
PRIOR ART

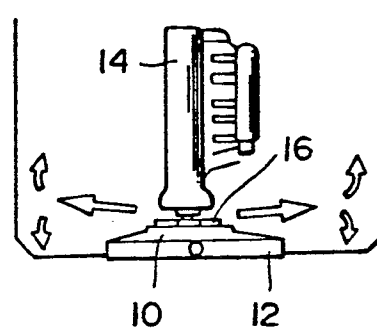


FIG.3

