

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 306 559 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
28.12.2005 Bulletin 2005/52

(51) Int Cl.7: **F04D 29/66, F04D 25/08**

(21) Application number: **02010978.1**

(22) Date of filing: **16.05.2002**

(54) **Ventilation assembly for vehicles**

Lüftereinheit für Fahrzeuge

Ensemble de ventilation pour véhicules

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**

(30) Priority: **24.10.2001 IT TO20011015**

(43) Date of publication of application:
02.05.2003 Bulletin 2003/18

(73) Proprietor: **DENSO THERMAL SYSTEMS S.p.A.**
10046 Poirino (Torino) (IT)

(72) Inventors:
• **Aimone, Adelio**
10044 Pianezza (IT)

• **Tortorelli, Giovanni**
10023 Chieri (IT)

(74) Representative: **Marchitelli, Mauro**
c/o Buzzi, Notaro & Antonielli d'Oulx
Via Maria Vittoria 18
10123 Torino (IT)

(56) References cited:
EP-A- 0 372 718 EP-A- 0 922 861
US-A- 2 272 985 US-A- 5 049 770
US-A- 5 567 127

EP 1 306 559 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a ventilation assembly for vehicles, comprising a shell or casing forming a duct having an intake section and an outlet section for the flow of air and a fan set in a seat of the shell between the intake section and the outlet section. Normally, the electric motor for operating the fan is carried by a supporting element fixed to the shell of the ventilation assembly, the said supporting element having a projecting portion basically tubular in shape, within which the motor is housed.

[0002] The problem underlying the present invention is that of noise of ventilation assemblies. Automobile manufacturers impose increasingly stringent limits on allowable noise levels, and traditional solutions are unable to respect such limits.

[0003] EP0372718 discloses a ventilation assembly according to the precharacterizing portion of claim 1, comprising a high-speed electric motor sealed within a noise-attenuating cover. The motor is surrounded by an aluminium cover and by a polypropylene shell. Foam pads are sandwiched between the cover and the shell.

[0004] The purpose of the present invention is to provide a simple and inexpensive solution that will enable reduction of noise of a ventilation assembly of the type defined above.

[0005] According to the present invention, the above purpose is achieved thanks to the characteristics that form the subject of the claims.

[0006] The present invention will now be described in detail with reference to the attached drawings, which are provided purely by way of non-limiting example and in which:

- Figure 1 is a perspective view illustrating a ventilation assembly according to the present invention;
- Figure 2 is an exploded perspective view of the part indicated by the arrow II in Figure 1; and
- Figure 3 is a plan view of the element indicated by the arrow III in Figure 2 in a widened position.

[0007] With reference to Figure 1, number 10 designates a ventilation assembly for vehicles. The ventilation assembly 10 comprises a shell or casing 12 made of plastic material defining a duct for passage of a flow of air. The shell 12 has an intake section 14, an outlet section 16, and a seat 18 for a centrifugal fan.

[0008] With reference to Figure 2, the ventilation assembly comprises a supporting element 20 made of plastic material, which carries an electric motor 22, a variable speed drive 24 and a centrifugal fan 26 mounted on the shaft of the motor 22. The supporting element 20 has a wall 28, from which there extends an integral projecting portion 30 with a basically tubular shape forming within it a seat, inside which the motor 22 is housed. The supporting element 20 is fixed to the part of the shell 12 forming the seat 18 for the centrifugal fan. As illus-

trated in Figure 1, the projecting portion within which the motor is housed projects from the shell in a direction substantially parallel to the axis of the circular seat 18, inside which the fan is housed.

[0009] With reference again to Figure 2, applied on the outer surface of the projecting portion 30 is a flexible sheet 32 made of sound-deadening material. Figure 3 illustrates the development in a plane of the sheet 32. This sheet is cut according to a given profile in such a way that it is able to cover the entire outer surface of the projecting portion 30. An covering element 34 is fixed to the supporting element 20 and is set in such a way as to surround the sheet of sound-deadening material 32. The covering element 34 forms a gap with a substantially constant thickness around a side wall 36 and a base wall 38 of the projecting portion 30. The said gap is filled with the sheet of sound-deadening material 32. Fixing of the covering element 34 to the supporting element 20 can be performed by screws 40 or else by snap-action engagement means (not illustrated). Preferably, the gap surrounding the projecting portion 30 has a thickness of approximately 5 mm, whilst the thickness of the sheet of sound-absorbing material 32 is approximately twice the thickness of the gap, so that said sheet is compressed in the gap. The sheet 32 is preferably made up of a plurality of thin layers of non-woven material joined together and consisting of polypropylene and polyester fibres. A material that is commercially available and that provides an excellent result as regards the properties of acoustic attenuation is produced by the company 3M and marketed under the brand name Thinsulate. As an alternative to this product, it is possible to use flexible sheets of non-woven fabric with various compositions of fibres, either stratified or formed by a single layer.

[0010] As may be seen in Figure 1, the covering element 40 completely surrounds the projecting portion within which the motor is housed. Experimental tests conducted by the present applicant have demonstrated that the housing of the motor is the place in which most of the noise is generated in a ventilation assembly. The assembly according to the present invention enables selective acoustic insulation of the noisiest area. The assembly according to the present invention can be applied to currently existing ventilation assemblies without substantial modifications of the moulds in so far as it envisages simply the addition of the covering element 34 and of the sound-absorbing material 32, without requiring any substantial modifications to the supporting element 20.

[0011] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may vary widely with respect to what is described and illustrated herein purely by way of example, without thereby departing from the scope of the ensuing claims.

Claims

1. A ventilation assembly (10) for vehicles, comprising:

- a shell or casing (10) forming a duct for a flow of air having an intake section (14) and an outlet section (16);
- a fan (26) set in a seat (18) of said shell between the intake section (14) and the outlet section (16); and
- a supporting element (20) carrying a motor (22) for operating the fan (26), the supporting element (20) having a projecting portion (30) basically tubular in shape, within which the motor (22) is housed,
- a covering element (34) fixed to said supporting element (20) and forming a gap around the aforesaid projecting portion (30), and
- a sheet of flexible sound-absorbing material (32) set in said gap,

characterized in that the covering element (34) forms a gap with a substantially constant thickness around a side wall (36) and a base wall (38) of the projecting portion (30), said gap being filled with the sheet of sound-absorbing material (32), the thickness of the sheet of sound-absorbing material (32) being approximately twice the thickness of the gap, so that said sheet (32) is compressed in the gap.

2. The ventilation assembly according to Claim 1, **characterized in that** the aforesaid sheet of sound-absorbing material (32) is formed by a plurality of layers of non-woven fabric joined together.
3. The ventilation assembly according to Claim 2, **characterized in that** the aforesaid sheet of sound-absorbing material (32) is formed by polypropylene and polyester fibres.

Patentansprüche

1. Lüftereinheit (10) für Fahrzeuge, umfassend:

- eine Kapsel oder Schalung (10), die einen Leitkanal für einen Luftstrom bildet und ein Ansaugsegment (14) sowie ein Abzugsegment (16) aufweist;
- einen Lüfter (26), der in einem Sitz (18) der Kapsel zwischen dem Ansaugsegment (14) und dem Abzugsegment (16) angeordnet ist; und
- ein Tragelement (20), das einen Motor (22) zum Betreiben des Lüfters (26) trägt, wobei das Tragelement (20) einen vorspringenden Ab-

schnitt (30) von grundsätzlich röhrenförmiger Gestalt aufweist, in dem der Motor (22) untergebracht ist,

- ein Umkleidungselement (34), das an dem Tragelement (20) befestigt ist und einen Zwischenraum um den vorher erwähnten vorspringenden Abschnitt (30) herum ausbildet, und
- eine Matte (32) aus schmiegsamem, schalldämpfendem Material, die in dem Zwischenraum angeordnet ist,

dadurch gekennzeichnet, dass

das Umkleidungselement (34) um eine Seitenwand (36) und eine Bodenwand (38) des vorspringenden Abschnitts (30) herum einen Zwischenraum mit einer im Wesentlichen gleichmäßigen Dicke ausbildet und der Zwischenraum mit der Matte (32) aus schalldämpfendem Material ausgefüllt ist, wobei die Dicke der Matte (32) aus schalldämpfendem Material ungefähr zweimal so mächtig ist wie der Zwischenraum, so dass die Matte (32) in dem Zwischenraum zusammengedrückt ist.

2. Lüftereinheit gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die vorher erwähnte Matte (32) aus schalldämpfendem Material durch eine Vielzahl von zusammengefügtten Faserviesschichten gebildet ist.

3. Lüftereinheit gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die vorher erwähnte Matte (32) aus schalldämpfendem Material durch Polypropylen- und Polyesterfasern gebildet ist.

Revendications

1. Ensemble de ventilation (10) pour des véhicules, comprenant :

- une coque ou un boîtier (10) formant un conduit pour un écoulement d'air ayant un tronçon d'entrée (14) et un tronçon de sortie (16) ;
- un ventilateur (26) placé dans un siège (18) de ladite coque entre le tronçon d'entrée (14) et le tronçon de sortie (16) ; et
- un élément de support (20) portant un moteur (22) pour entraîner le ventilateur (26), l'élément de support (20) ayant une portion en projection (30) essentiellement de forme tubulaire, dans laquelle est logé le moteur (22),
- un élément de recouvrement (34) fixé sur ledit élément de support (20) et formant un intervalle autour de la portion en projection (30) précitée, et
- une feuille d'un matériau flexible d'absorption sonore (32) placée dans ledit intervalle,

caractérisé en ce que l'élément de recouvrement (34) forme un intervalle avec une épaisseur sensiblement constante autour d'une paroi latérale (36) et d'une paroi de base (38) de la portion en projection (30), ledit intervalle étant rempli avec la feuille de matériau d'absorption sonore (32), l'épaisseur de la feuille de matériau d'absorption sonore (32) étant approximativement deux fois l'épaisseur de l'intervalle, de sorte que ladite feuille (32) est comprimée dans l'intervalle. 5 10

2. Ensemble de ventilation selon la revendication 1, **caractérisé en ce que** la feuille précitée de matériau d'absorption sonore (32) est formée par une pluralité de couches de textile non-tissé jointes ensemble. 15

3. Ensemble de ventilation selon la revendication 2, **caractérisé en ce que** la feuille précitée de matériau d'absorption sonore (32) est formée par des fibres de polypropylène et de polyester. 20

25

30

35

40

45

50

55

FIG. 1



