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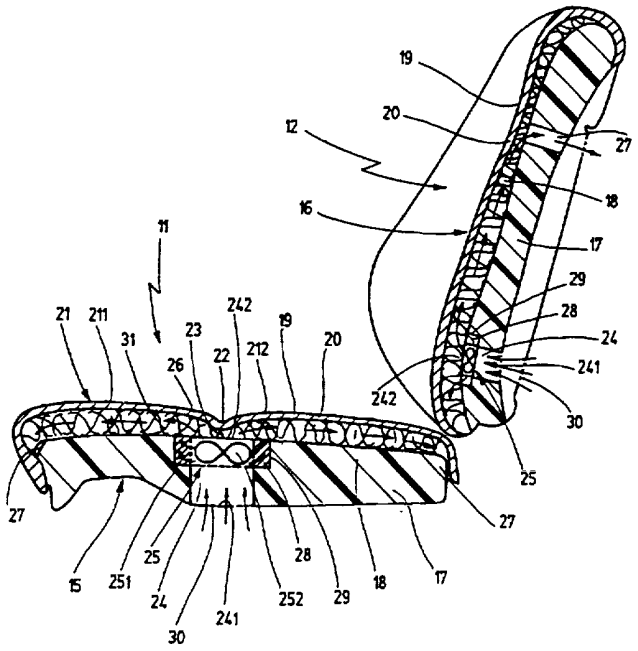
(54) Abstract Title
Ventilated cushion for a vehicle seat

(57) A cushion for a seat part and/or backrest of a vehicle seat, having a cushion support 17, having an air permeable ventilation layer 18 which is arranged above said support, a cushion covering which covers over the cushion surface and into which there are introduced stitching-down seams 22 which pass through the ventilation layer and are intended for forming cushion contours, and also having at least one electric fan 25 which is intended for active cushion ventilation and is accommodated in an air channel 24 which passes through the cushion support. The air channel is arranged in the region of a stitched-down seam 22 such that the air passing out of the air channel 24 flows into the ventilation layer 18 on both sides of the stitched-down seam 22. The fan may also be embedded in an air-permeable rubberized hair layer which encloses the ventilation - layer - side mouth region of the air channel.



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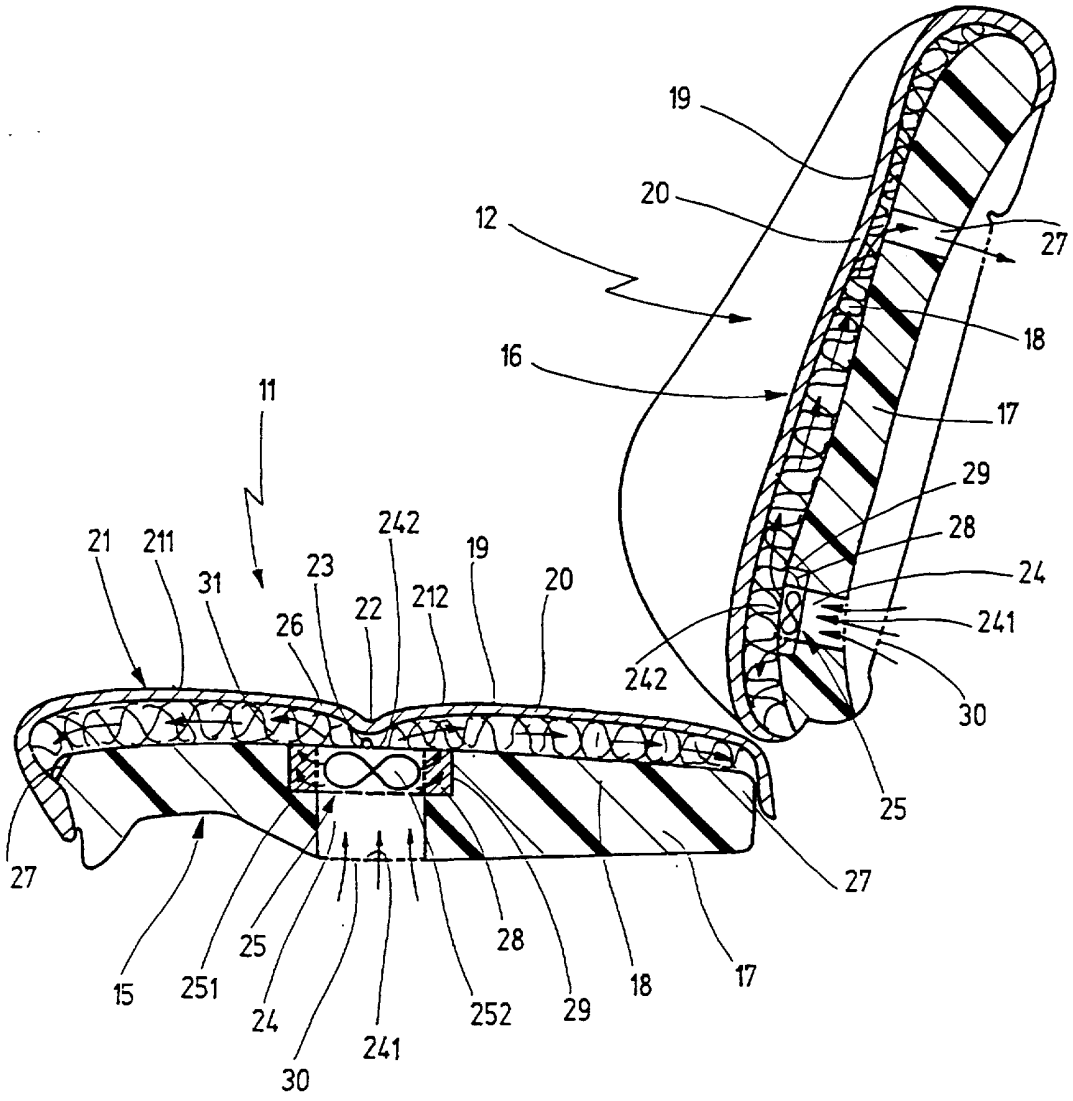
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Cushion for a seat part and/or backrest of a vehicle seat

The invention relates to a cushion for a seat part and/or backrest of a vehicle seat, having a cushion support, an air permeable ventilation layer which covers the top side of the cushion support, a cushion covering which covers over the cushion surface and into which there are introduced stitched-down seams which pass through the ventilation layer and are intended for forming cushion contours, and having at least one ventilator or fan which is intended for active cushion ventilation and is accommodated in an air channel and passes through the cushion support from its underside, which is directed away from the ventilation layer, to the top side.

A known cushion of this type (DE 196 28 698 C1) has, for the purpose of improving the temperature-controlled seat comfort, in particular for quick cooling of the cushion surface which has been heated by solar heat and for effective dissipation of perspiration moisture, a multiplicity of miniature fans distributed in the cushion support, these being accommodated in each case in an air channel which passes through the cushion support from its underside to the ventilation layer. The fans are distributed so as to ensure uniform through-ventilation of the ventilation layer over its surface area. Since, for reasons of comfort, all the miniature fans have to have suitable vibration damping, the technical outlay is not inconsiderable, which is reflected in the relatively high production costs, with the result that this actively ventilated cushion is used only in passenger cars in the upper price bracket.

The present invention seeks to configure a cushion with active seat ventilation of the type mentioned in the introduction which, with a view to more cost-effective production, is of simple design.

According to the present invention there is provided a cushion for a seat part and/or backrest of a vehicle seat, having a cushion support, an air permeable ventilation layer which covers the top side of the cushion support, a cushion covering which covers over the cushion surface and into which there are introduced stitched-down seams which pass through the ventilation layer and are intended for forming cushion contours, and having at least one ventilator or fan which is intended for active cushion ventilation and is accommodated in an air channel and passes through the cushion support

from its underside, which is directed away from the ventilation layer, to the top side, wherein the at least one air channel is arranged in the region of a stitched-down seam such that the air passing out of the air channel flows into the ventilation layer on both sides of the stitched-down seam.

The cushion according to the invention has the advantage that, by virtue of the at least one fan being arranged in the region of a stitched-down seam, which, if not completely blocking the flow of air through the ventilation layer, does vastly obstruct it, the cushion sections on both sides of the stitched-down seam can be ventilated equally well and effectively with just a single fan. This means that the number of fans necessary for the cushion ventilation and the number of vibration-damped mountings necessary in the cushion are reduced and limited to just one or two fans, depending on how many stitched-down seams there are in the cushion. In the case of straightforward seat cushions, e.g. in the case of inexpensive all-foam seats, it is usually just a single transverse stitched-down seam which is provided, so that just a single fan is necessary. In order to achieve the same ventilation power as a multiplicity of small miniature fans, use may be made of a larger fan which has increased air throughput and, in terms of production and installation costs, is still considerably cheaper than a plurality of miniature fans integrated individually in the seat cushion, especially since the vibration damping is easier to carry out for a larger fan.

Advantageous embodiments of the cushion according to the invention along with expedient configurations and developments of the invention can be gathered from the rest of the claims.

According to an advantageous embodiment of the invention, the air channel is cut into the cushion support such that a stitch-down wire which is necessary for producing the stitched-down seam crosses over the air channel approximately centrally at the ventilation-layer-side mouth thereof. This arrangement of the air channel ensures that approximately symmetrical cushion sections which are produced by the stitching-down operation are ventilated equally intensively.

An advantageous embodiment of the invention provides that, in the region of the ventilation-layer-side air-channel mouth, a barrier layer is positioned on the top side of the ventilation layer, the top side being directed away from the air-channel mouth, and the barrier layer has a surface area which is greater than the clear cross section of the air-channel mouth. The barrier layer preferably consists of air-impermeable material and

is perforated. This covering of the top side of the ventilation layer in the immediate air-outlet region of the fan forces the air to spread out into the ventilation layer over a wide surface area and to ventilate the cushion surface uniformly. In order to achieve continuous air flow in the ventilation layer in this case, an advantageous embodiment of the invention provides in the cushion support air-outflow channels which are intended for the discharge of the air flowing through the ventilation layer, open out on the top side and underside of the cushion support and are arranged at the greatest possible distance from the ventilation-layer-side mouth region of the air channel with integrated fan.

According to a preferred embodiment of the invention, the fan is embedded at least partially in a rubberized-hair layer which encloses the ventilation-layer-side mouth region of the air channel. This design measure achieves very efficient and cost-effective vibration damping of the fan. This method of vibration damping provides considerable savings even independently of the air channels being arranged, so as to reduce the number of fans, at a stitched-down seam in each case, but, in conjunction with the fans being arranged at a stitched-down seam, it causes the overall production costs for the cushion to be reduced to a considerable extent. By virtue of the fan housing being fastened in the rubberized-hair layer, which according to a preferred embodiment of the invention preferably takes place by adhesive bonding, and the positioning of the rubberized-hair layer in the cutout of the cushion, on the one hand the installation of the fan is very straightforward and time-efficient, and on the other hand the fan is integrated in the cushion support in a vibration-damped and protected manner via the rubberized-hair layer. The underside of the air channel can be protected by a covering grid.

If according to a further embodiment of the invention, in the section covered by the rubberized-hair layer, the fan housing is of air-permeable design, e.g. provided with axial air-outlet slots, then embedding the fan in the air-permeable hair layer can result in the air being channelled over a wide surface area since the air is also discharged radially from the fan and flows into the ventilation layer via the rubberized-hair layer in a widely distributed manner.

The invention is described in more detail hereinbelow with reference to an embodiment illustrated in the drawing, which shows a schematic illustration of a longitudinal section of a vehicle seat with a seat part and backrest.

The vehicle seat which is illustrated schematically in the drawing has, in a known manner, a seat part 11 which is retained adjustably on the vehicle floor, and a

backrest 12, which is connected to the seat part 11 via a pivot latching mechanism for the purpose of inclination adjustment. The seat part 11 and backrest 12 each have a cushion carrier and, respectively, a seat cushion 15 and backrest cushion 16 fastened on the cushion carrier. The cushion carrier (not illustrated here) may be designed, for example, as a spring core made of spring wire which is clamped in a frame of the seat part or of the backrest.

The seat cushion 15 comprises a cushion support 17, which rests on the cushion carrier and is made of foam, and a ventilation layer 18, which covers the top side of the cushion support 17, this top side being directed away from the cushion carrier, and can have air flowing through it and consists of a coarse-meshed knitted spacing fabric or a rubberized-hair layer, as well as a cushion covering 19, which covers over the cushion surface and is made of textile material or perforated leather or imitation leather. There is generally also arranged, between the ventilation layer 18 and the air-permeable cushion covering 19, an air-permeable pressure-distributing layer 20, which may consist of a knitted spacing fabric, a nonwoven fabric or an open-cell foam. For the purpose of forming cushion contours, such as a level seat surface, side pieces and the like, and of producing cushion tensioning, stitched-down seams are introduced into the cushion covering 19, said seams passing through the ventilation layer 18 and reducing the dimensions of the ventilation layer 18. In that embodiment of the seat cushion 15 which is illustrated in the drawing, a stitched-down seam 22 runs transversely in the region of the level seat surface and subdivides the level seat surface 21 into two level-seat surface sections 211 and 212 of approximately the same size. The stitching-down operation is carried out in this case on a stitch-down wire 23 which is fixed in the cushion carrier.

For active ventilation of the seat cushion 15 for the purpose of improving the temperature-controlled seat comfort, an air channel 24 is cut into the cushion support 17, said air channel opening out on the underside and top side of the cushion support 17, and a ventilator or fan 25 is integrated in the air channel 24 such that air is taken in via the air-channel mouth 241 on the underside of the cushion support 17 and is blown into the ventilation layer 18 via the air-channel mouth 242 on the top side of the cushion support 17. The air channel 24 is arranged in the cushion support 17 in this case such that the stitch-down wire 23 of the stitched-down seam 22 crosses over the top air-channel mouth 242 approximately centrally, this providing on the left and right of the stitched-down seam 22 an air-outlet surface of approximately the same size, which ensures that

approximately equal quantities of air flow into the ventilation layer 18 in the level-seat-surface section 211 and into the ventilation layer 18 in the level-seat-surface section 212.

In order to improve the flow through the ventilation layer 18, in the region of the top air-channel mouth 242, a barrier layer 26 is positioned on the top side of the ventilation layer 18, the top side being directed away from the air-channel mouth 242, and the barrier layer has a surface area which is greater than the clear cross section of the air-channel mouth 242. In the embodiment, the barrier layer 26 consists of an air-impermeable sheet, which is perforated in order that some of the air passing out of the fan 25 also ventilates the cushion region which is covered by the barrier layer 26. This barrier layer 26 forces the air flowing out of the air channel 24 to spread out in the ventilation layer 18 over a wide surface area and to ventilate the seat surface uniformly. In order to achieve a continuous air flow in this case, there are formed in the cushion support 17 air-outflow channels 27 which open out on the top side of the cushion support and in the side regions of the cushion supports 17 and are at the greatest possible distance from the air-channel mouth 242. Of the air-outflow channels 27 which are arranged at a transverse distance from one another, the sectional illustration of the drawing illustrates two air-outflow channels 27, of which one air-outflow channel 27 is arranged on the rear side of the cushion support 17 and the other air-outflow channel 27 is arranged on the front side of the cushion support 17.

The fan 25 has an annular, hollow-cylindrical housing 251 in which an impeller 252 is mounted in a rotatable manner, coaxially with the fan housing 251. The fan housing 251, which is pushed into the air channel 24, can fill the entire air channel 24, but in the embodiment described has just a small axial width, with the result that the fan housing 251 extends over just part of the length of the air channel 24. In this case, the fan housing 251 is arranged in the vicinity of the top air-channel mouth 242 and terminates flush with the same. For the purpose of fastening the fan 25 in the cushion support 17, with relatively cost-effective vibration damping being achieved at the same time, the fan 25 is embedded in a rubberized-hair layer 28 which encloses the top mouth region of the air channel 24. In this case, the fan housing 251 is adhesively bonded in the rubberized-hair layer 28, and said rubberized-hair layer 28 is positioned in a cutout 29 introduced from the top side of the cushion support 17. As is indicated in the drawing, in the region of the rubberized-hair layer 28, the fan housing 251 is of air-permeable design, i.e. provided with perforations or in this case axial air slots 31, with the result that the air can

also flow out radially from the fan housing 251. This part of the air flow flows through the air-permeable rubberized-hair layer 28 and is distributed over a wide surface area, via the rubberized-hair layer 28, in the ventilation layer 18 to the left and right of the stitched-down seam 22 in the level-seat-surface sections 211 and 212.

As is also schematically indicated in the drawing, the bottom air-channel mouth 241 of the air channel 24 is covered by a protective grid 30, with the result that the entire fan 25 is accommodated in a protected and vibration-damped manner in the cushion support 17.

The backrest cushion 16 illustrated in the drawing is basically of the same construction as the above described seat cushion 15, so there is no need to describe the construction of this cushion in detail. To clarify correspondence, those elements of the backrest cushion 16 which correspond, in terms of construction and functioning, with those in the seat cushion 15 are provided with the same designations. Furthermore, the backrest cushion 16 is somewhat modified to the extent that the air channel 24 with integrated fan 25, rather than being arranged centrally in the backrest cushion 16, is arranged in the lumbar region thereof, and the air-outflow channel 27 passes through the entire cushion support 17 and opens out on the top side and underside thereof.

Claims

1. A cushion for a seat part and/or backrest of a vehicle seat, having a cushion support, an air permeable ventilation layer which covers the top side of the cushion support, a cushion covering which covers over the cushion surface and into which there are introduced stitched-down seams which pass through the ventilation layer and are intended for forming cushion contours, and having at least one ventilator or fan which is intended for active cushion ventilation and is accommodated in an air channel and passes through the cushion support from its underside, which is directed away from the ventilation layer, to the top side, wherein the at least one air channel is arranged in the region of a stitched-down seam such that the air passing out of the air channel flows into the ventilation layer on both sides of the stitched-down seam.

2. A cushion according to Claim 1, wherein the stitched-down seam has a stitch-down wire on which the stitching-down operation is carried out, and the air channel is cut into the cushion support such that the stitch-down wire crosses over the air channel approximately centrally at the ventilation-layer-side air-channel mouth thereof.

3. A cushion according to Claim 1 or 2, wherein, in the region of the ventilation-layer-side air-channel mouth, a barrier layer is positioned on the top side of the ventilation layer, the top side being directed away from said air-channel mouth, and the barrier layer is of air-impermeable material and its surface area is greater than the clear cross section of the air-channel mouth.

4. A cushion according to Claim 3, wherein the barrier layer is perforated.

5. A cushion according to any one of Claims 1 - 4, wherein formed in the cushion support are air-outflow channels which open out on the top side and underside or border side of the cushion support and are arranged at the greatest possible distance from the air channel with integrated fan.

6. A cushion according to any one of Claims 1 - 5, wherein the fan has a hollow-cylindrical housing which is inserted into the air channel and extends wholly or partially over the length of the air channel, which is cut into the cushion support.

7. A cushion according to Claim 6, wherein the fan has an impeller which is mounted in a rotatable manner in the fan housing, with coaxial bearing axis, and the impeller is arranged in the vicinity of the ventilation-layer-side air-channel mouth.

8. A cushion cushion for a seat part and/or backrest of a vehicle seat, having a cushion support, an air permeable ventilation layer which covers the top side of the cushion support, a cushion covering which covers over the cushion surface and into which there are introduced stitched-down seams which pass through the ventilation layer and are intended for forming cushion contours, and having at least one ventilator or fan which is intended for active cushion ventilation and is accommodated in an air channel and passes through the cushion support from its underside, which is directed away from the ventilation layer, to the top side, wherein the fan is embedded at least partially in an air-permeable rubberized-hair layer which encloses the ventilation-layer-side mouth region of the air channel.

9. A cushion according to any one of claims 1 to 7, wherein the fan is embedded at least partially in an air-permeable rubberized-hair layer which encloses the ventilation-layer-side mouth region of the air channel.

10. A cushion according to Claim 8 or 9, wherein the rubberized-hair layer is positioned in a cutout in the cushion support, said cutout being introduced from the ventilation-layer, top side of the cushion support.

11. A cushion according to Claim 8, 9 or 10, wherein the fan housing is adhesively bonded in the rubberized-hair layer.

12. A cushion according to any one of Claims 8 - 11, wherein, in the section covered by the rubberized-hair layer, the fan housing has axial air-outlet slots.

13. A cushion according to any one of Claims 1 - 12, wherein the air-channel mouth, which is located on the underside of the cushion support, is covered in a flush manner with a protective grid.

14. A cushion for a seat part and/or backrest of a vehicle seat, substantially as described herein with reference to, and as illustrated in, the accompanying drawing .

Application No: GB 9924272.9 **Examiner:** N Franklin
Claims searched: 1-7,9-14 **Date of search:** 23 February 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): A4L (LACA, LACC, LACF) A4M

Int Cl (Ed.7): B60N 2/44

Other: Online: EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
P,X	EP 0 909 677A1	(DAIMLER CRYSLER AG) See Figures & English abstract	1 at least
P,X	DE 198 04 100C1	(DAIMLER CRYSLER AG) See Figures & English abstract	1 at least
P,X	US 5 902 014	(DINKEL) See Figure 1 Equivalent of DE 196 28 698 acknowledged on page 1	1 at least

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Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.