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(54) **VEHICLE SEAT AND CUSHION THEREFOR**

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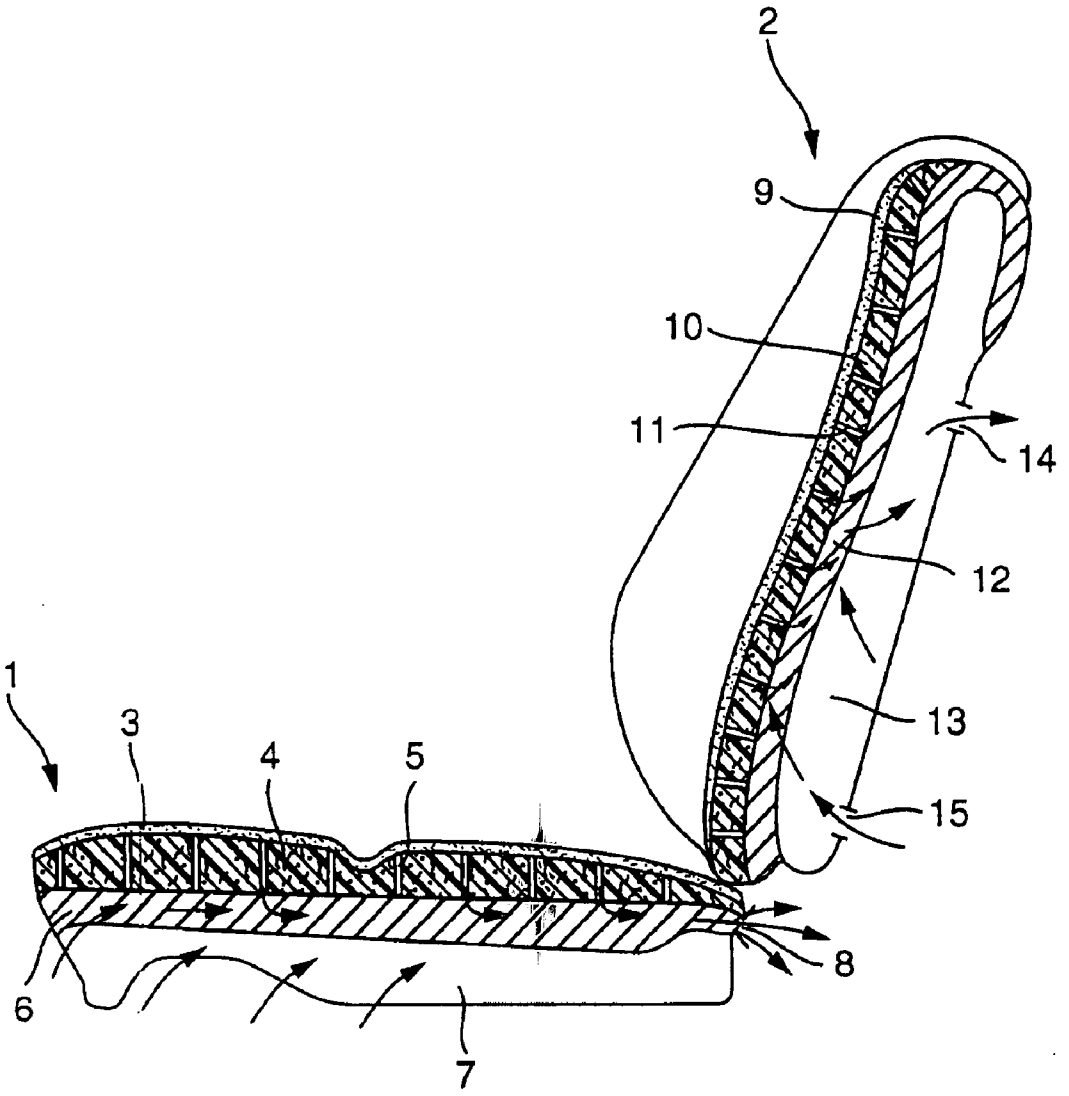
(57) **ABSTRACT**

A vehicle seat (and a cushion for a vehicle seat) comprise an assembly of layers with at least one air-guiding layer. An outlet opening is provided in the region of the air-guiding layer and is arranged in such a manner that the discharging of warm and moist air causes dry and cool ambient air to automatically flow into the air-guiding layer.



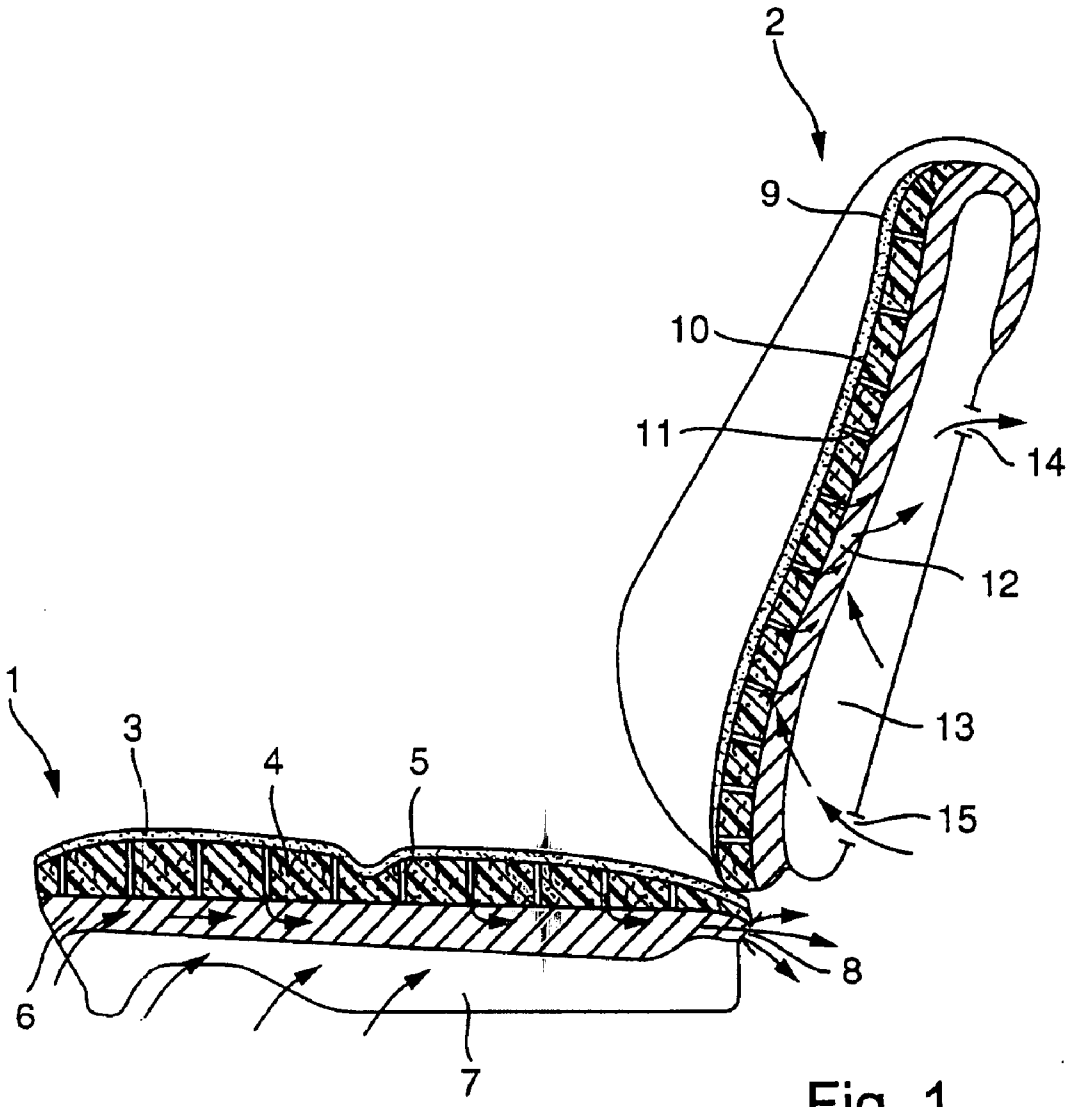


Fig. 1

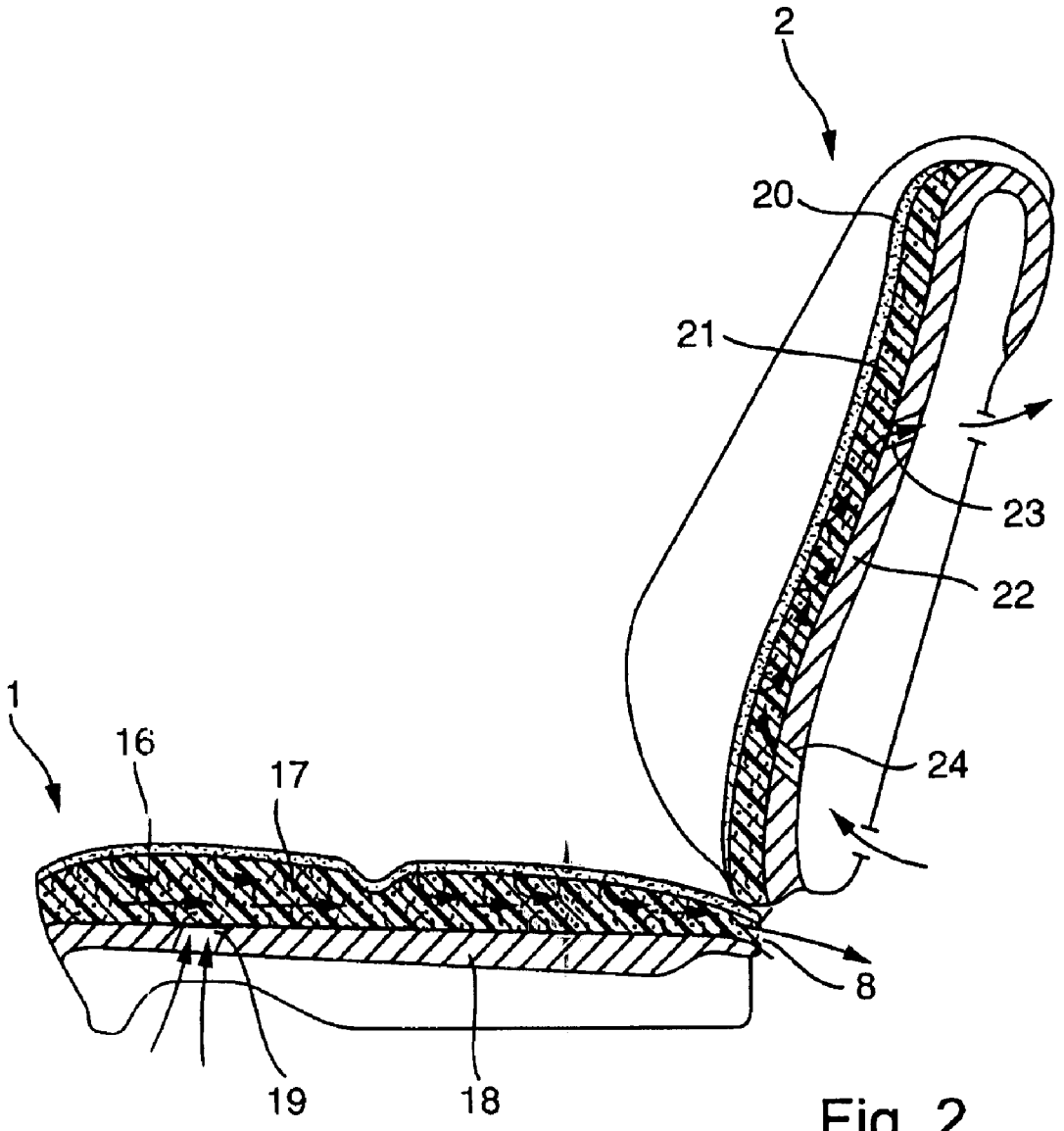


Fig. 2

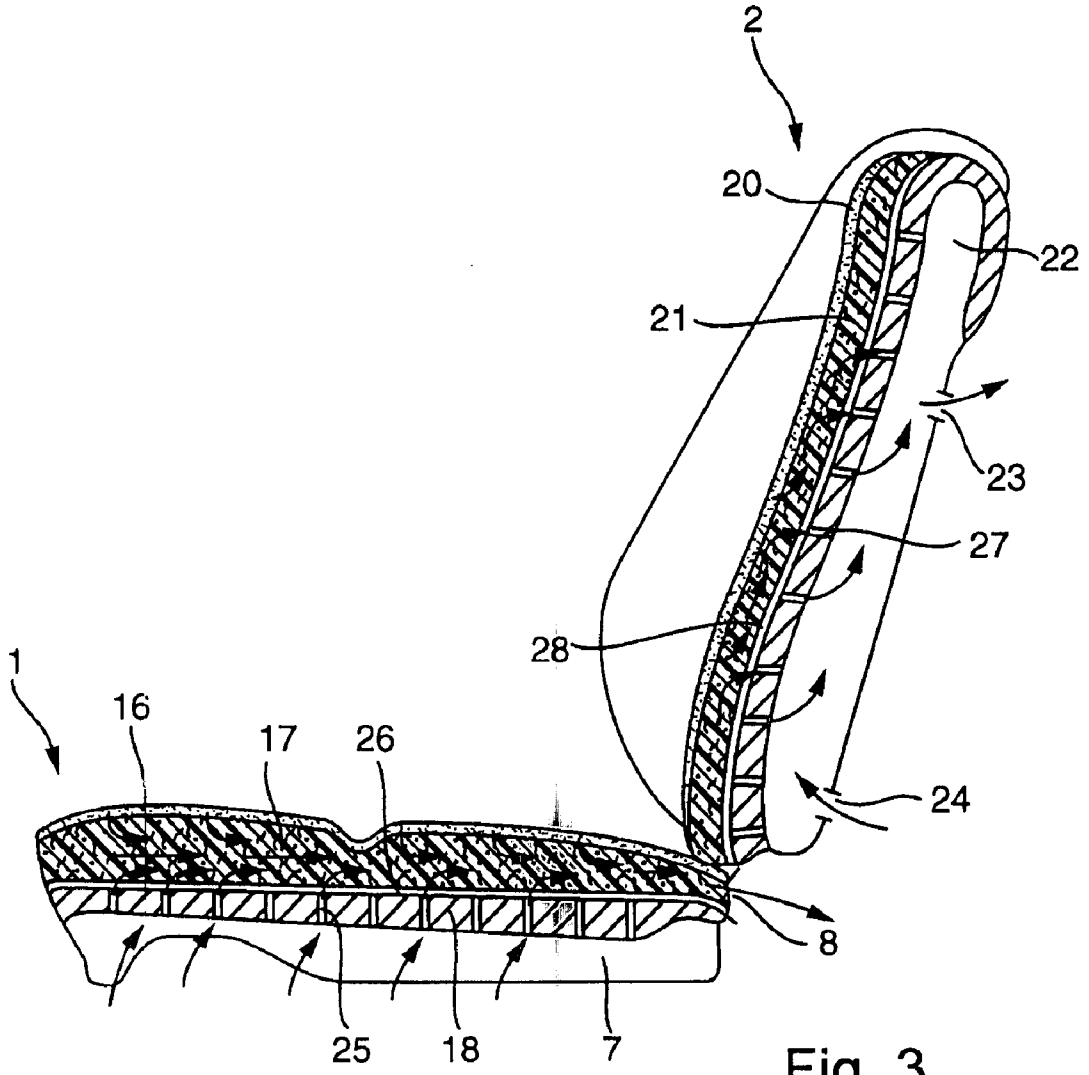


Fig. 3

VEHICLE SEAT AND CUSHION THEREFOR

BACKGROUND AND SUMMARY OF THE INVENTION

[0001] This application is a national stage of PCT International Application No. PCT/EP2006/000540, filed Jan. 21, 2006, which claims priority under 35 U.S.C. § 119 to German Patent Application No. 10 2005 006 060.9, filed Feb. 10, 2005, the disclosure of which is expressly incorporated by reference herein.

[0002] The invention relates to a vehicle seat and to a cushion for a vehicle seat.

[0003] In the case of the materials that are currently used for seat cushions for vehicle seats, aeration at the contact surfaces of the seat, against which the body parts of the vehicle occupant bear, is often not always adequate, particularly if there is a relatively high air temperature and air humidity. As a result, moisture is stored at these contact surfaces, which has a considerable adverse effect on the seat comfort.

[0004] For example, cold foams made of polyurethane, which can be formed into corresponding molded parts, are used for seat cushions. However, while they do have a low weight, the molded parts produced from foam have the disadvantage of being less air-permeable.

[0005] A further possibility is to provide a mixture of natural fibers, such as coconut fibers, animal hairs and the like, with a binding agent (in particular, latex), and to mold it into a cushion part, this being known under the general term of "rubberized hair". Despite the relatively high weight of such cushion parts made of rubberized hair, they have high air permeability and are eminently suitable for targeted air-conditioning of a vehicle seat produced from cushion parts of this type.

[0006] A number of proposals are known from the prior art for ventilating and air-conditioning cushions for vehicle seats in order, if appropriate, to remove increased moisture which is inevitably produced by the vehicle occupants.

[0007] For example, German patent document DE 200 02 447 U1 discloses a seat cushion for vehicle seats, in which the core part, which is produced from an expanded plastics material, is penetrated by a plurality of depressions. The depressions serve primarily to adapt to certain seat anatomies and can only partly permit circulation of air, since the exchange of air can take place only by means of an air-permeable pad arranged above the core part. If appropriate, the air-permeable pad is connected to a channel in which a fan is arranged.

[0008] German patent document DE 102 43 315 A1 likewise discloses a vehicle seat cushion, which has a cushion core that is penetrated by a channel system. The channel system is formed from horizontal partial channels arranged at right angles to one another and from further channels extending vertically from the latter into the core. The ventilation is produced by means of a fan which introduces air from these vertical channels into the cushion core, the air then being discharged again through further vertical channels.

[0009] Vertical channels which serve exclusively for ventilation are also disclosed, for example, in German patent document DE 37 22 814 C2.

[0010] In addition to ventilation of the seat (and therefore the removal of moisture) by means of ventilation devices, it is also known to provide, within the seat structure, an activated carbon insert which can absorb the moisture. However, an activated carbon insert of this type is associated with the considerable disadvantage that the sweat moisture coming from the vehicle occupant is regularly stored. Therefore the effect of inserts of this type is considerably reduced over time, it is also possible, under some circumstances, for an odor to form.

[0011] Active seat ventilation devices are disadvantageous since the construction of cushions or vehicle seats containing them has turned out to be complicated and cost-intensive. Furthermore, the additional units which are to be provided for such ventilation are associated with an increased weight and an increased requirement for space.

[0012] One object of the present invention, therefore, is to provide a cushion for a vehicle seat (as well as a vehicle seat) which can remove moisture simply and cost-effectively.

[0013] This and other objects and advantages are achieved by the vehicle seat and cushion according to the invention, in which an outlet opening is arranged in relation to an air-guiding layer within the cushion (which can be used in a vehicle seat both as a seat cushion and as a backrest), in such a manner that the discharge of warm and moist air causes cool, dry ambient air to flow into the air-guiding layer automatically.

[0014] In this connection, the configuration according to the invention makes use of the "chimney effect" known from thermodynamics and thermionics, in which the suction effect of warm, moist air flowing out in a channel system causes cooler and therefore drier air to flow into the channel system from the environment. In this manner, the partial pressure of the water vapor or the diffusion gradient of the water vapor in the interior of the cushion can be considerably increased.

[0015] For this purpose, a temperature gradient between a temperature of circa 35° C., which usually prevails at the contact surface between the occupant and the cushion, and an ambient temperature of circa 24° C. is sufficient to obtain this effect, which permits a virtually complete removal of the sweat moisture through the seat.

[0016] The cushion according to the invention comprises a plurality of layers, namely a foam core, the air-guiding layer and a cover covering said layers. Different arrangements of the individual layers are of course possible. For example, in one embodiment, the air-guiding layer is arranged between the cover and the foam core while, in another embodiment, the foam core is arranged between the cover and the air-guiding layer. Moreover, the foam core can be penetrated by horizontal and/or vertical channels, and therefore, depending in each case on the embodiment, either cool and dry air or warm and moist air can be conducted through the channel system.

[0017] In order to be able to absorb corresponding warm and moist air at the contact surfaces with the vehicle occupant, the cover is produced from an air-permeable and hydrophilic fleece lamination.

[0018] According to the invention, the air-guiding layer is composed either of a spacer knit, a reticulated foam or of rubberized hair.

[0019] A cushion constructed according to the preceding embodiments can be used both for a seat cushion and for a backrest of a vehicle seat. In the case of a backrest, the outlet opening of the cushion is arranged on the rear side of the backrest, as seen in the direction of travel, and in the upper end region of the cushion. Furthermore, according to the invention at least one inlet opening is provided which likewise opens toward the rear side and through which the cool

and dry air is sucked. The outlet opening is provided in the region of the backrest at the greatest possible distance from the inlet opening.

[0020] In the case of the seat cushion, the outlet opening is situated at the rear end, preferably of the air-guiding layer. If appropriate, an inlet opening is likewise situated here arranged at the greatest possible distance from the outlet opening which can be provided on the end side or the lower side of the seat cushion.

[0021] By means of simple structural measures and a corresponding layered construction according to the invention, warm and moist air can be removed effectively from such cushions and vehicle seats.

[0022] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] FIG. **1** is a schematic cross-sectional illustration of a first embodiment of the invention;

[0024] FIG. **2** is a schematic cross-sectional illustration of a second embodiment of the invention; and

[0025] FIG. **3** is a schematic cross-sectional illustration of a third embodiment of the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0026] As shown in FIG. **1** a first embodiment of a vehicle seat according to the invention comprises a seat cushion **1** and a backrest **2**, both of which are essentially composed of the same layered construction according to the invention. The layered construction is composed of an upper cover **3**, comprising a fleece lamination, a foam core **4**, which is arranged below it and has vertical air- and moisture-guiding channels **5**, and of an air-guiding layer **6**, which in turn is arranged below it and is composed of a rubber knit.

[0027] The assembly of the layers **3**, **4** and **6** is arranged on a spring core **7** for the seat cushion **1**. The cover **3** is air- and moisture-permeable, and therefore warm and moist air can be introduced through the channels **5** in the foam core **4** into the rubber knit **6**. An outlet opening **8**, through which the warm and moist air can flow out, is situated at the rear end of the seat cushion **1**, in the region of the rubber knit **6**.

[0028] The flow of warm and moist air out through this outlet opening **6** causes dry and cool air to be sucked up from the environment into the rubber knit **6** which, for this purpose, has an air-permeable surface towards the spring core **7**.

[0029] The same principle is realized in the region of the backrest **2**, which also comprises an air- and moisture-permeable cover **9** arranged above a foam core **10** with channels **11** provided essentially horizontally therein. Behind the foam core **10** (as seen in the direction of travel), an air-guiding layer **12** is provided in the form of, for example, a rubber knit, which is supported on a spring core **13**. An outlet opening **14** is situated at the upper end of the backrest **2**. An inlet opening **15** is provided in the lower region of the backrest **2** at the greatest possible distance from said outlet opening **14**. The openings **14** and **15** open in the rear tensioning part of the backrest **2**. The flow of the warm and moist air via the cover **9** and the channels **11** into the rubber knit **12** causes dry and cool additional air to be sucked up from below through the inlet opening **15**.

[0030] FIG. **2** shows a second embodiment of a vehicle seat, in which the air-guiding layer **17** made of a rubber knit is arranged directly below a cover **16**. A foam core **18** is provided therebelow, with at least one downwardly directed inlet opening **19** being provided in the foam core **18** and being arranged, preferably in the front region of the seat cushion **1**, in order to suck up dry and cool additional air. If appropriate, a corresponding opening is provided in the region of the seat cushion shell or of the spring core.

[0031] The backrest **2** is constructed in an analogous manner from a cover **20**, an air-guiding layer **21** and a foam core **22**. On the rear side of said backrest, an outlet opening **23** and an inlet opening **24** are provided at a distance from each other sufficient in order to produce the "chimney effect".

[0032] A third embodiment of the vehicle seat and cushion according to the invention is shown in FIG. **3**. The construction corresponds essentially to the embodiment according to FIG. **2**, but with the difference that the foam core **18** of the seat cushion **1** is penetrated by a plurality of vertical channels **25** and at least one horizontal channel **26**.

[0033] The suction effect on account of moist and warm outgoing air flowing out through the outlet opening **8** in the rear end of the seat cushion **1** causes dry and cool additional air to be sucked up from the lower side of the spring core **7**, or of the cushion shell, through the vertical channels **25** of the foam core **18** and to be mixed with the warm and moist air, which flows in through the rubber knit **17**, in the horizontal channel **26** before the mixed air can emerge through the outlet opening **14**.

[0034] The flow conditions are similar in the region of the backrest **2**, with the dry and cool additional air being supplied via the inlet opening **24** to the horizontal channels **27** and then subsequently to the at least one essentially vertically running channel **28** before moist and warm outgoing air can emerge via the outlet opening **23**.

[0035] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.

LIST OF REFERENCE NUMBERS

[0036] **1** Seat cushion
[0037] **2** Backrest
[0038] **3** Cover seat cushion
[0039] **4** Foam core seat cushion
[0040] **5** Channels in the foam core
[0041] **6** Air-guiding layer/rubber knit seat cushion
[0042] **7** Spring core/cushion shell
[0043] **8** Outlet opening
[0044] **9** Cover backrest
[0045] **10** Foam core backrest
[0046] **11** Channels in the foam core
[0047] **12** Air-guiding layer/rubber knit backrest
[0048] **13** Spring core
[0049] **14** Outlet opening
[0050] **15** Inlet opening
[0051] **16** Cover seat cushion
[0052] **17** Air-guiding layer seat cushion
[0053] **18** Foam core seat cushion
[0054] **19** Inlet opening
[0055] **20** Cover backrest

[0056] **21** Air-guiding layer backrest
[0057] **22** Foam core backrest
[0058] **23** Outlet opening
[0059] **24** Inlet opening
[0060] **25** Vertical channel seat cushion
[0061] **26** Horizontal channels seat cushion
[0062] **27** Horizontal channels backrest
[0063] **28** Vertical channel backrest

1.-**9**. (canceled)

10. A vehicle seat cushion comprising an assembly of layers with a cover, a foam core and an air-guiding layer, with at least one outlet opening being provided for removing warm and moist air, wherein the outlet opening is configured and arranged in fluid flow communication with the air-guiding layer in such a manner that discharging of warm and moist air from the outlet opening causes dry and cool ambient air to automatically flow into the air-guiding layer.

11. The cushion as claimed in claim **10**, wherein the air-guiding layer is arranged between the cover and the foam core.

12. The cushion as claimed in claim **10**, wherein the foam core is arranged between the cover and the air-guiding layer.

13. The cushion as claimed in claim **10**, wherein the foam core has channels that are one of horizontal and vertical.

14. The cushion as claimed in claim **10**, wherein the cover comprises a hydrophilic fleece lamination.

15. The cushion as claimed in claim **10**, wherein the air-guiding layer comprises a knit, a reticulated foam or rubberized hair.

16. A seating surface for a vehicle seat, comprising a cushion as claimed in claim **10**, wherein the at least one outlet opening is arranged on a rear end of the cushion, relative to a direction of travel, in an area of the air-guiding layer.

17. A backrest for a vehicle seat, comprising a cushion as claimed in claim **10**, wherein:

the at least one outlet opening is arranged on a rear end of a backrest, relative to a direction of travel;

at least one inlet opening is provided in the rear end; and

the outlet opening is arranged at an upper end of the cushion, at a greatest possible distance from the inlet opening.

18. A vehicle seat for a motor vehicle, comprising a seat cushion as claimed in claim **16**.

19. A vehicle seat for a motor vehicle, comprising a backrest as claimed in claim **17**.

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