An automotive vehicle seat for accommodating a blower module, wherein the automotive vehicle seat is designed as a "unitary seat" and comprises all necessary components in an already prefabricated state for supplying hot or cold air to the seat so as to equip or retrofit said seat in case of need with the blower module.
AUTOMOTIVE VEHICLE SEAT AND BLOWER MODULE FOR SUCH AN AUTOMOTIVE VEHICLE SEAT

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an automotive vehicle seat and a blower module for such an automotive vehicle seat.

[0003] 2. Description of the Related Art

[0004] To increase comfort inside an automotive vehicle, heated and ventilated seats are already standard. Seat heating and seat ventilation, however, are normally separated systems. The mounting efforts due to the necessary electrical wiring and the number of components are huge. Considerable efforts are also needed whenever the lateral cheeks are to be heated or ventilated. Heating by means of a looped heating wire or in the form of a foil heating element effects a heat transfer at points that is not homogeneous. Especially with heating wires, there is also the risk of hot spots, i.e. heated locations with low heat discharge.

OBJECTS AND SUMMARY OF THE INVENTION

[0005] An essential problem which car manufacturers are faced with is that comfort at a high level is expensive and can thus only be offered as an option since it is not desired by all customers on account of the costs entailed thereby. Options, however, confront the car manufacturer with logistic problems and problems in stockkeeping, which in turn has a negative effect on the costs.

[0006] An automotive vehicle seat heated at high comfort can thus only be offered as an option because of the costs entailed thereby. To minimize the above problems a car manufacturer is faced with, the present invention therefore starts from the following approach:

[0007] Offered is a “unitary seat” in which all measures are already taken without any considerable extra work for retrofitting a “comfort heating” without any trouble in that all components needed thereto are already provided with the exception of the expensive units. The automotive vehicle seat can then be retrofitted in an easy way, if required.

[0008] In an automotive vehicle seat according to claim 1, in which knitwear incorporated for air guidance and air distribution is already integrated, it has been found that said knitwear is also advantageous without an inserted blower module and also during summer operation, i.e. without heating, because an air exchange is allowed between the surface sections, and the moisture produced during sitting is distributed and discharged to the outside. For a car manufacturer this means virtually no extra work for preparing the vehicle seat for “comfort heating” so as to retrofit it in case of need.

[0009] It poses problems to construct a blower module with a heating power of about 300 watt such that it is suited for retrofitting in a “unitary seat”. Of course, a buyer who is not interested in “comfort heating” cannot be expected to accept an automotive vehicle seat which already optically indicates that he has not been able to afford such an optional feature. Therefore, the unitary seat must be designed such that it is acceptable without comfort heating, does not create any considerable extra costs caused by adaptation to the blower module and, nevertheless, allows easy retrofitting. The automotive vehicle seat according to claim 1 seems to meet all of these requirements.

[0010] The blower module according to claim 2 is adapted to the above requirements in that it has a constructional form with a small constructional height thanks to the radial blower and the other components arranged in one plane.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention will now be explained in more detail with reference to an embodiment shown in the drawing, in which:

[0012] FIG. 1 (1a to 1f) shows the automotive vehicle seat in different views;

[0013] FIG. 2 shows the cell structure of the knitwear in a detail view;

[0014] FIG. 3 shows the blower module with removed cover.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] The automotive vehicle seat comprises a seat cushion part 1 and a backrest 2 in its standard form. Both the seat cushion part 1 and the backrest 2 consist essentially of a support body 3, particularly advantageously of rigid foam material, e.g. polyurethane, but also as a sprung seat in which the necessary fastening rails and frames are integrated. The surface of the rigid foam material has adhesively secured thereto a knitwear 4 on which the outer cover, e.g. velour or leather, rests.

[0016] Air flow channels 6 which terminate in a chamber 7 and are open over their whole lengths towards the knitwear 4 are provided in the rigid foam material.

[0017] An elastic seal 14 for preventing the transmission of vibrations is provided between the chamber 7 and the air exit channel of the blower module. The knitwear 4 has a thickness of about 1 cm and consists of individual honey-combed cells, each being about 1 cm². The cells are interconnected via fibers that cannot be fully compressed under load, so that the air blown into the chamber 7 is distributed over the whole area of the knitwear 4 and can evenly exit at all locations of the cover 5.

[0018] The knitwear 4, which is shown in more detail in FIG. 2, consists, for instance, of a honeycombed nylon braiding with a base layer 4a and a cover layer 4b and a multitude of spacers 4c between said layers 4a, 4b. Base layer and cover layer 4a, 4b comprise interconnected cells of about 60 mm² on their edges. These are formed by a twisted yarn which consists of about 20 individual filaments and has a diameter of about 0.05 mm. At least at the corner points, the cells of the opposite layers 4a, 4b are interconnected by spacers 4c made from the same material and are spaced apart in the unloaded state at a distance of about 1 cm. The spacers 4c have a preferably arcuate shape to impart a predetermined elasticity to the knitwear 4. Desired is an elasticity or flexibility that at an initial surface pressure of 0 to about 20 g/cm² does virtually not effect any deformations yet and then, at a rising surface pressure of up to 100 g/cm², leads
to an approximately linear approach of the two layers 4a, 4b, but even at a maximum surface load still permits an air exchange between the two layers.

[0019] To enable the air (hot air or cold air) blown in by the blower module 8 to distribute as uniformly as possible also into the areas remote from the air flow channels 6, it must be ensured that the flow resistance per area of the surface cover 5 is considerably greater than that of the knitwear 4. In the case of a surface cover of leather, the leather comprises a multitude of passage openings at a mutual distance of about 4 mm and a diameter of about 1 mm.

[0020] In the illustrated embodiment, both the seat cushion part 1 and the back part 2 are provided with a blower module 8, each being provided in a chamber 9 or recess in the lower part of the seat cushion part 1 and the rear part of the backrest 2, respectively. Both in the presence and in the absence of an inserted blower module 8, the chamber 9 is closed by a cover (not shown in more detail) which comprises the necessary recesses for the blower module 8 and ends flush with the seat contour on the outside, and just comprises one or several, preferably laterally arranged, air intake openings leading via corresponding channels to the blower module 8.

[0021] The seat cushion part 1 is provided in the corner portion relative to the backrest 2 with a box-shaped air outlet 16 so that air can optionally exit in addition at said place. The air outlet 16 is connected at the inlet side to the air flow channel 6 and terminates at the outlet side with a grating 17.

[0022] The blower module 8 is shown in more detail in FIG. 3. It consists of a flat box having a constructional height of about 3 cm, in which a radial blower 10, a heat register 11 preferably composed of PTC elements, an electrical controller 12 built on a printed circuit board and a temperature sensor 13a and 13b, respectively, are arranged side by side. The outer circumference of the box has provided thereon a number of fastening tabs 14 which serve to connect the box to corresponding mating pieces in the support body 2. The temperature sensors 13a and 13b, respectively, are provided in the cold air tract and warm air tract, respectively, and are connected to the electronic controller 12. The electronic controller 12 is further connected via lines (not shown in more detail) to the on-board network of the vehicle, the radial blower 10 and corresponding control elements which are preferably mounted in the seat portion and via which the heating power and the rotational speed of the blower can be adjusted independently of each other.

[0023] The electronic controller 12 operates with the following functional profile:

Winter Operation—Heating

[0024] Directly after the heater has been switched on, the radial blower 10 is slowly running up for about 5 sec to the set rated speed to make the cold air, which is still inside the seat, exit at a slow pace. The desired heating power is output in a controlled way to the heat register, the control being configured such that it is ensured that the generator is not overloaded. Hence, it might happen that less heating power is taken than required by the user. The rotational speed of the radial blower 10 is adjustable either independently or is coupled at least partly with the heating power, the speed of the radial blower 10 being automatically raised at increased heating powers.

Summer Operation—Cooling

[0025] During summer operation the radial blower 10 first operates in the suction mode for about 3 min after it has been switched on, and then in the blow mode. The radial blower can thus be operated in two different modes that can be activated by voltage reversal. The air inlet can also be connected to the cooling compressor of the automotive vehicle for summer operation. Thanks to the use of a radial blower 10 it has been possible to give the blower module 8 a very flat design so that it can even be accommodated in the backrest. The radial blower 10 sucks air from an opening directly positioned thereunder in the box, it pushes the air through channels guided along the PTC heating elements into the blow-out tract and via a cover (not shown) of the box into the air flow channels 6 arranged in the rigid foam material of the support body 3.

[0026] In cases where an automotive vehicle in its originally delivered state has not been equipped yet, or not yet equipped in all seats, with a blower module 8 and must be retrofitted, such a retrofitting is very simple. To this end the cover of the chamber 7 has to be removed. The blower module 8 must be inserted and connected to the control and supply lines that have preferably been laid already.

We claim:

1. An automotive vehicle seat comprising: a seat cushion part including a substantially horizontal seat surface, and a backrest substantially perpendicular thereto, said seat cushion part and said backrest comprising an air-permeable, breathable surface cover facing the body to be accommodated, wherein

said surface cover has disposed thereunder a knitwear which comprises an air-permeable cover layer, a base layer and a multitude of spacers which connect said two layers and keep them spaced apart to let the air, which has been blown into said knitwear at a desired location, exit out of said surface cover, the air being distributed as uniformly as possible over the whole area,

said knitwear has arranged therebehind or thereunder a support body which preferably consists of a plastic foam and has formed therein air flow channels which at the inlet side terminate in a chamber and at the outlet side into said knitwear, said channels being open over their whole lengths, and wherein

and, said chamber is formed by a recess formed in said support body to accommodate a blower module in said chamber.

2. A blower module for use in an automotive vehicle seat according to claim 1, characterized by

an air intake opening,

at least one blow-out opening,

a radial blower which at the inlet side communicates with said air intake opening,

a heat register comprising electric heat resistors,

an electronic controller,
one temperature sensor each arranged in the intake tract and the blow-out tract, respectively, which are connected as actual value sensors to said electronic controller, and wherein
said units are constructionally arranged side by side in one plane.

3. An automotive vehicle seat comprising:

a seat cushion part including a substantially horizontal seat surface, and

a backrest substantially perpendicular thereto, said seat cushion part and said backrest comprising

an air-permeable, breathable surface cover configured to face a person’s body when the person is seated on the seat,

a knitted layer which is located under said surface cover and which comprises an air-permeable cover layer, a base layer, and a plurality of spacers which interconnect said cover layer and said base layer and which maintain a spacing therebetween to let air blown into said knitted layer, exit out of said surface cover, the air being distributable at least generally uniformly over an entire surface area of the surface cover,

a support body which is located at least one of under and behind said knitted layer and which is formed at least in part from a plastic foam having formed therein air flow channels, said air flow channels having an inlet side which terminates in a chamber and an outlet side opening into said knitted layer, said air flow channels being open over entire lengths thereof, said chamber being formed by a recess in said support body and being configured to accommodate a blower module.

4. The automotive seat according to claim 3, further comprising a blower module including

at least one intake tract terminating at an air intake opening,

at least one blow-out tract terminating a blow-out opening,

a radial blower which having an inlet side which communicates with said air intake opening,

a heat register comprising electric heat resistors,

an electronic controller, and
temperature sensors which are arranged in said intake tract and said blow-out tract, respectively, and which are electronically connected to said electronic controller, wherein said blower, said heat resistors, said electronic controller, and said temperature sensors are constructionally arranged side by side in one plane.

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