An air-conditioning ventilation seat module for vehicles, may include a blower unit having a housing, a thermoelectric module having a casing mounted in the housing, wherein a thermoelectric device may be mounted in the casing, and wherein an internal space of the casing may be divided into a cold air path and a hot air path, a separator connected to one side of the thermoelectric module between the cold air path and the hot air path and having a curved section in order to maximize an amount of absorbing a condensate that may be created by a temperature difference between the cold air path and the hot air path when the seat module operates in cooling mode.
FIG. 2 (Related Art)
AIR-CONDITIONING VENTILATION SEAT MODULE FOR VEHICLES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to Korean Patent Application No. 10-2010-0125670 filed on Dec. 9, 2010, the entire contents of which is incorporated herein for purposes by this reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention
[0003] The present invention relates, in general, to an air-conditioning ventilation seat for vehicles and, more particularly, to an air-conditioning ventilation seat for vehicles, in which an air-conditioning mode, an amount of absorbing condensate is maximized.

[0004] 2. Description of Related Art
[0005] Generally, vehicles are provided with an air conditioner, which includes a cooler and a heater, in order to regulate the temperature of the interior of a vehicle. However, such an air conditioner does not have the function of regulating the temperature of vehicle seats, so that for instance in the summer, although the temperature of vehicle interior is lowered by the operation of the air conditioner, the vehicle seat is not sufficiently cooled and if a passenger is sitting thereon, because of the passenger’s heat, the sweat of the passenger may make his hips and back moist, and cause him to suffer from heat rash.

[0006] Also in winter, although operating the heater drives up the temperature of the interior of a vehicle, the vehicle seat does not sufficiently heat up, but stays cold, so that the hips and back of a passenger who is sitting thereon feels cold.

[0007] Thus, recently, when manufacturing a vehicle, an air conditioner is often mounted separately and is designed to regulate the temperature of a vehicle seat. The air conditioner in general is configured such that an air supply pipe that is connected to an air conditioning system of a vehicle is mounted in the vehicle seat so that cooled or warmed air is discharged out of the vehicle seat from the air conditioning system through the air supply pipe. Besides the above air conditioner for a vehicle seat of the related art, as shown in FIG. 1, there is provided another air conditioner for a vehicle seat including a back part 2 and a cushion part 3, which includes, in the center of the cushion part 3 of the vehicle seat 1, a blower unit 10, in which a blowing fan and a motor are mounted, and having blast outlets 11 and 12, which are supplied with air from the vehicle interior and vent air in opposite directions. Blast ducts 16 each are mounted in the cushion part 3 and the back part 2 such that the respective blast ducts are connected to the blast outlets 11 and 12. The blast ducts 16 have on ends thereof cushion-side and back-side outlets 17 and 18 through which air is vented perpendicular to a direction of air supply. A cushion-side thermoelectric semiconductor module 19 and a back-side thermoelectric semiconductor module 20 are provided in the middle of the blast ducts 16 adjacent to the cushion-side and back-side outlets 17 and 18. The thermoelectric semiconductor modules 19 and 20 have first sides 19a and 20a serving as a cooler and second sides 19b and 20b serving as a heater. The roles of the first and second sides can be reversed by changing the polarity of the applied voltage. The thermoelectric semiconductor module is well known in the art, so a detailed description thereof will be omitted.

[0008] As shown in FIG. 2, the thermoelectric semiconductor modules 19 and 20 are mounted in the middle of the blast ducts 16, so that a first path P1 is formed between the first sides 19a and 20a of the modules 19 and 20 and the blast ducts 16 to communicate with the cushion-side outlet 17. Further, a second path P2 is formed between the second sides 19b and 20b of the modules 19 and 20 and the blast ducts 16 to communicate with the back-side outlet 18.

[0009] Thus, when the second sides 19b and 20b of the thermoelectric semiconductor modules 19 and 20 serve as a cooler, air blown from the blower unit 10 is heat-exchanged with cold air in the second path P2 in the blast duct 16 so that the cold air is vented out of the back-side outlet 18 towards the vehicle interior. On the contrary, when the first sides 19a and 20a of the thermoelectric semiconductor modules 19 and 20 serve as a heater, air blown from the blower unit 10 is heat-exchanged with hot air in the first path P1 in the blast duct 16 so that the hot air is vented out of the cushion-side outlet 17 towards the vehicle interior.

[0010] However, such a conventional air conditioner for a vehicle seat has drawbacks in that upon cooling, the temperature of the thermoelectric semiconductor modules 19 and 20, which serve as a heater, is lower than that of the air in the vehicle interior, causing the air to condense into moisture, which when introduced into the modules 19 and 20, reduces the cooling efficiency so that for instance a passenger sitting on the vehicle seat does not feel sufficiently cold, and leads to operational errors. Further, while a conventional air conditioner of a vehicle generally has a drain structure through which moisture is discharged out of a vehicle, in the above air conditioner for a vehicle seat, a ventilation module is mounted in the vehicle, making it difficult to discharge moisture out of the vehicle due to restrictions in the installation of the drain structure.

[0011] The information disclosed in this Background of the Invention section is only for enhancement of understanding of the general background of the invention and should not be taken as an acknowledgement or any form of suggestion that this information forms the prior art already known to a person skilled in the art.

BRIEF SUMMARY

[0012] Various aspects of the present invention are directed to providing an air-conditioning ventilation seat module for vehicles, which has a separator to maximize an amount of absorbing condensate that is created from a thermoelectric semiconductor device in a cooling mode.

[0013] In an aspect of the present invention, the air-conditioning ventilation seat module for vehicles, may include a blower unit having a housing, a thermoelectric module having a casing mounted in the housing, wherein a thermoelectric device may be mounted in the casing, and wherein an internal space of the casing may be divided into a cold air path and a hot air path, a separator connected to one side of the thermoelectric module between the cold air path and the hot air path and having a curved section in order to maximize an amount of absorbing a condensate that may be created by a temperature difference between the cold air path and the hot air path when the seat module operates in cooling mode.
[0014] The curved section curves towards the hot air path, wherein the cold air path may be disposed above the hot air path and the curved section curves down towards the hot air path.

[0015] The separator further includes a fitting section horizontally extending from an end of the curved section, wherein the separator may be made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

[0016] The casing may be provided in one side with a slot with a section in a shape of □, into which an end of the fitting section may be inserted and coupled.

[0017] The curved section has a surface portion which may be hidden such that an area exposed to cold air passing through the cold air path may be smaller than that exposed to hot air passing through the hot air path.

[0018] The housing includes an upper casing and a lower casing, the upper casing having, on a bottom in one side thereof, a guider to hide a portion of the surface portion of the curved section, wherein the thermoelectric module and the guider may be separated with a predetermined gap.

[0019] The guider may be brought into close contact with the curved section.

[0020] The lower casing may be bent from the hot air path with a predetermined angle and the curved section may be disposed at a connection point between the lower casing and the hot air path.

[0021] The separator may be made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

[0022] As set forth before, according to the construction of the invention, condensate that is created from the thermoelectric module in cooling mode can be removed, thereby preventing operational error of the thermoelectric module due to the condensate, and improving the air conditioning efficiency irrespective of factors associated with the creation of condensate.

[0023] The methods and apparatuses of the present invention have other features and advantages which will be apparent from or are set forth in more detail in the accompanying drawings, which are incorporated herein, and the following Detailed Description, which together serve to explain certain principles of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 is a view illustrating an air-conditioning ventilation seat module for vehicles according to the related art.

[0025] FIG. 2 is a view illustrating the operating principle of a conventional thermoelectric semiconductor device.

[0026] FIG. 3 is an exploded perspective view illustrating an air-conditioning ventilation seat module for vehicles according to an exemplary embodiment of the present invention, which is operating in cooling mode.

[0027] FIG. 4 is a view illustrating major components of an air-conditioning ventilation seat module for vehicles according to an exemplary embodiment of the present invention, which is operating in cooling mode.

[0028] FIG. 5 is a cross-sectional view illustrating the assembly of the seat module which is operating in cooling mode.

[0029] FIG. 6 is a view illustrating the operation of major components of the seat module which is operating in cooling mode.

[0030] FIG. 7 is a schematic view illustrating the overall operation of the seat module.

[0031] It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various features illustrative of the basic principles of the invention. The specific design features of the present invention as disclosed herein, including, for example, specific dimensions, orientations, locations, and shapes will be determined in part by the particular intended application and use environment.

[0032] In the figures, reference numbers refer to the same or equivalent parts of the present invention throughout the several figures of the drawing.

DETAILED DESCRIPTION

[0033] Reference will now be made in detail to various embodiments of the present invention(s), examples of which are illustrated in the accompanying drawings and described below. While the invention(s) will be described in conjunction with exemplary embodiments, it will be understood that the present description is not intended to limit the invention(s) to those exemplary embodiments. On the contrary, the invention(s) is/are intended to cover not only the exemplary embodiments, but also various alternatives, modifications, equivalents and other embodiments, which may be included within the spirit and scope of the invention as defined by the appended claims.

[0034] As shown in FIG. 1, an air-conditioning ventilation seat module for vehicles according to an exemplary embodiment of the present invention includes a blower unit 100, a thermoelectric module 200, and a separator 300.

[0035] The blower unit 100 includes a housing 110 to which a motor 120, a blowing fan 130, and a cover are mounted. The housing 110 preferably has a mounting part for a disc type blowing fan 130, the mounting part being of a shape corresponding to that of the blowing fan. The blowing fan 130 rotates with the operation of the motor 120 and sucks air provided in the vehicle interior.

[0036] The thermoelectric module 200 is mounted in one side of the housing 110. While a ventilation seat for vehicles can be operated in cooling mode or heating mode according to a passenger’s choice, the description will be made with respect to the case of operating in cooling mode for the sake of explanation. If operating in heating mode, it is sufficient to just apply reversely-biased current to the thermoelectric semiconductor device 240. Here, the operating principle is the same as operating in cooling mode, and positions of a cold air path 220 and a hot air path 230 can be switched with each other.

[0037] The thermoelectric module 200 includes a casing 210 and a thermoelectric semiconductor device 240. The thermoelectric semiconductor device 240 is mounted in the casing 210, so that the thermoelectric semiconductor device 240 divides the internal space of the casing 210 into a cold air path 220 and a hot air path 230. That is, it divides the internal space of the casing 210 in a horizontal direction, so as to allow cold air to flow through the upper side of the casing 210 and hot air to flow through the lower side of the casing 210. Thus, the temperature difference between air flowing through the paths 220 and 230 causes condensate to be created. To remove this condensate, the separator 300 to be described is mounted.

[0038] As shown in FIGS. 3 and 4, the separator 300 is connected to one side of the casing 210 of the thermoelectric module 200 in order to absorb the maximum amount of con-
densate created by the temperature difference between two paths 220 and 230. Particularly, the separator 300 has a curved section 310 for maximizing the absorption area of condensate. Further, if the curved section is formed, a problem of the restricted mounting space of the separator will be solved, and the absorption area of the condensate can be maximized.

The curved section 310 may preferably fall down towards the hot air path 230. If this is the case, the absorption area of condensate can be maximized, and the direction of condensate flow coincides with the direction of the force of gravity, further improving the absorption effect of condensate.

The separator 300 may preferably have a fitting section 320 that extends from one end of the curved section 310. Further, in order to facilitate coupling and decoupling of the fitting section 320 to the housing 110, a slot 212 with a section shaped like '=>' is preferably formed in the end side of the casing 210.

The separator 300 is preferably configured so that a portion of the curved section 310 is hidden such that an area exposed to the cold air passing through the cold air path 220 is smaller than that exposed to the hot air passing through the hot air path 230. While in order to effectively evaporate condensate that is absorbed in the separator 300, the maximum amount of air passing through the hot air path 230 should be utilized, if the effect of the cold air passing through the cold air path 220 is not maximized, the effect of evaporating condensate cannot be maximized. Thus, in order to minimize the effect of the cold air, a surface portion of the separator 300 that will be brought into contact with the cold air is preferably hidden.

To be specific, as shown in FIGS. 4 and 5, it may be configured so that the housing 110 includes an upper casing 114 and a lower casing 116, and the upper casing has, on the bottom in one side, a guider 114c to prevent the surface portion of the curved section 310 of the separator 300 from coming into direct contact with the cold air. Further, if the guider 114c is configured to be brought into close contact with the curved section 310, the effect of fixing the separator 300 can also be improved. The separator may be made of polypropylene non-woven fabric that has undergone hydrophilic treatment and a compression process to maximize the function of absorbing condensate.

In an exemplary embodiment of the present invention, the guider 114c and the thermoelectric module 200 may be spaced with a predetermined gap 118 such that condensate formed in the cooling path 220 may be absorbed to the separator 300 through the gap.

As shown in FIG. 6, in the cooling mode of the ventilation seat module, the condensate created by the temperature difference between the cold and hot air paths 220 and 230 is absorbed in the separator 300, and the absorbed condensate is evaporated by hot air passing through the hot air path 230, thereby solving a problem of degradation of the ventilation seat occurring owing to the condensate. Further, other problems such as an increase in condensate upon improvement of cooling efficiency, and a reduction in cooling efficiency upon the condensate increasing can also be solved.

In the meantime, as shown in FIG. 7, according to the air-conditioning ventilation seat module for vehicles, cold air is supplied in a cushion-side direction C or a back-side direction B through an air duct, thereby maximizing the cooling efficiency.

For convenience in explanation and accurate definition in the appended claims, the terms "upper", "lower", "inner" and "outer" are used to describe features of the exemplary embodiments with reference to the positions of such features as displayed in the figures.

The foregoing descriptions of specific exemplary embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teachings. The exemplary embodiments were chosen and described in order to explain certain principles of the invention and their practical application, to thereby enable others skilled in the art to make and utilize various exemplary embodiments of the present invention, as well as various alternatives and modifications thereof. It is intended that the scope of the invention be defined by the Claims appended hereto and their equivalents.

What is claimed is:

1. An air-conditioning ventilation seat module for vehicles, comprising:
   - a blower unit having a housing;
   - a thermoelectric module having a casing mounted in the housing, wherein a thermoelectric device is mounted in the casing;
   - wherein an internal space of the casing is divided into a cold air path and a hot air path;
   - a separator connected to a side of the thermoelectric module between the cold air path and the hot air path and having a curved section in order to maximize an amount of absorbing a condensate that is created by a temperature difference between the cold air path and the hot air path when the seat module operates in cooling mode.

2. The air-conditioning ventilation seat module for vehicles according to claim 1, wherein the separator is made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

3. The air-conditioning ventilation seat module for vehicles according to claim 1, wherein the curved section curves towards the hot air path.

4. The air-conditioning ventilation seat module for vehicles according to claim 1, wherein the separator is made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

5. The air-conditioning ventilation seat module for vehicles according to claim 4, wherein the separator is made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

6. The air-conditioning ventilation seat module for vehicles according to claim 1, wherein the separator further includes a fitting section horizontally extending from an end of the curved section.

7. The air-conditioning ventilation seat module for vehicles according to claim 6, wherein the separator is made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

8. The air-conditioning ventilation seat module for vehicles according to claim 6, wherein the casing is provided in a side with a slot with a cross-section in a shape of "\( \Rightarrow \)", into which an end of the fitting section is inserted and coupled.

9. The air-conditioning ventilation seat module for vehicles according to claim 8, wherein the separator is made of a...
polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

10. The air-conditioning ventilation seat module for vehicles according to claim 6, wherein the curved section has a surface portion which is hidden such that an area exposed to cold air passing through the cold air path is smaller than that exposed to hot air passing through the hot air path.

11. The air-conditioning ventilation seat module for vehicles according to claim 10, wherein the separator is made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

12. The air-conditioning ventilation seat module for vehicles according to claim 10, wherein the housing includes an upper casing and a lower casing, the upper casing having, on a bottom in a side thereof, a guider to hide a portion of the curved section.

13. The air-conditioning ventilation seat module for vehicles according to claim 12, wherein the thermoelectric module and the guider are separated with a predetermined gap.

14. The air-conditioning ventilation seat module for vehicles according to claim 12, wherein the separator is made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

15. The air-conditioning ventilation seat module for vehicles according to claim 12, wherein the guider is brought into close contact with the curved section.

16. The air-conditioning ventilation seat module for vehicles according to claim 15, wherein the separator is made of a polypropylene non-woven fabric that undergoes hydrophilic treatment and a compression process.

17. The air-conditioning ventilation seat module for vehicles according to claim 12, wherein the lower casing is bent from the hot air path with a predetermined angle and the curved section is disposed at a connection point between the lower casing and the hot air path.

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