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(54) Thermoelectric cooling chip based air conditioner

(57) A thermoelectric cooling chip based air conditioner includes a semiconductor thermoelectric cooling chip as the primary constituent component. The thermoelectric cooling chip induces cold and heat respectively on two surfaces thereof through thermoelectric effect. The surface that generates cold uses a cooling fin and a cooling water circulation piping to store the cold in the cooling fm. A control interface of a host device is provided and includes a temperature setting switch that controls a desired temperature, whereby cold air is brown out by a cold air fan to effect cooling of an indoor space. The surface that generates heat uses a heat dissipation fin and a heat dissipation water circulation piping to effect removal of heat therefrom and a heat dissipation fan is then used to discharge air. Thus, the air conditioner, when put into operation, may efficiently lower the room temperature of the indoor space.

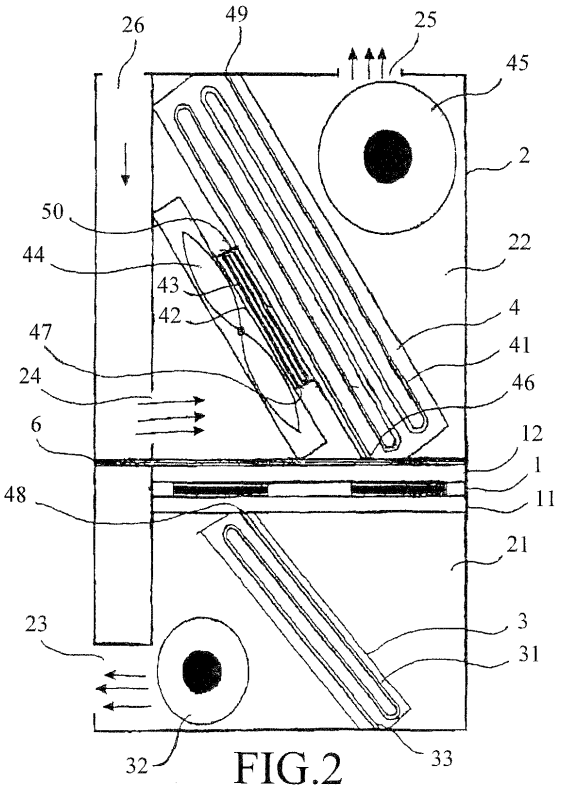

FIG.2

EP 2 295 879 A1

Description

(a) Technical Field of the Invention

[0001] The present invention generally relates to an air conditioner, and more particularly to an air conditioner that uses semiconductor thermoelectric cooling chips combined with other cooling components.

(b) Description of the Prior Art

[0002] A traditional air conditioner is composed of coolant and a compressor. It is well known that the use of coolant may cause damage to the ozonosphere of the Earth and leads to greenhouse effect that changes the climate of the Earth and also hurts the natural environment, eventually affecting the living of human beings. Further, the compressors that are currently used in the traditional air conditioners make the air conditioners bulky, leading to inconvenience of transportation and installation of the air conditioner. Further, the compressor consumes a great amount of electrical power and makes substantial noise. These are the drawbacks of the traditional air conditioners that can be further improved.

SUMMARY OF THE INVENTION

[0003] In view of the above discussed problems and drawbacks of the conventional air conditioners, the present invention aims to provide a thermoelectric cooling chip based air conditioner, which uses a semiconductor thermoelectric cooling chip as the primary constituent component. The thermoelectric cooling chip may induce cold and heat respectively on two surfaces thereof through thermoelectric effect. The surface that generates cold uses a cooling fin and a cooling water circulation piping to store the cold in the cooling fin. A control interface of a host device is provided and comprises a temperature setting switch that controls a desired temperature, whereby cold air is brown out by a cold air fan to effect cooling of an indoor space. The surface that generates heat uses a heat dissipation fin and a heat dissipation water circulation piping to effect removal of heat therefrom and a heat dissipation fan is then used to discharge air. Thus, the air conditioner, when put into operation, may efficiently lower the room temperature of the indoor space to effect air cooling and it uses no compressor and coolant, so that the overall structure of the air conditioner is simplified, making the air conditioners compact and light for easy transportation and installation. The operation of the air conditioner is power saving and generates less noise, so that it offers a great help to conservation of environments. Apparently, the present invention is novel and has never been proposed before, showing the advantages of novelty and improvements and offering excellent industrial values.

[0004] The foregoing objectives and summary provide only a brief introduction to the present invention. To fully appreciate these and other objects of the present invention as well as the invention itself, all of which will become apparent to those skilled in the art, the following detailed description of the invention and the claims should be read in conjunction with the accompanying drawings. Throughout the specification and drawings identical reference numerals refer to identical or similar parts.

[0005] Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG 1 is a schematic front view of the present invention.

FIG 2 is a cross-sectional view of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0007] The following descriptions are exemplary embodiments only, and are not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description provides a convenient illustration for implementing exemplary embodiments of the invention. Various changes to the described embodiments may be made in the function and arrangement of the elements described without departing from the scope of the invention as set forth in the appended claims.

[0008] As shown in FIGS. 1 and 2, the present invention provides an air conditioner that is operated essentially with semiconductor thermoelectric cooling chips 1 as primary constituent components thereof. Each of the thermoelectric cooling chips 1 has a first surface serving as a cooling surface to which a cooling panel 11 is coupled and a second, opposite surface serving as a heating surface to which a heat dissipation panel 12 is coupled. The assembly of the thermoelectric cooling chips 1 and the cooling panel 11 and the heat dissipation panel 12 coupled thereto is set inside an enclosure 2 to divide an interior space of the enclosure 2 into a cooling chamber 21 and a heating chamber 22. The cooling chamber 21 has a cold air outlet opening 23. The heating chamber 22 has an air intake opening 24 and a hot air discharge opening 25. In the embodiment illustrated, the enclosure 2 has a back that forms an air conduit 26.

[0009] The cooling chamber 21 receives therein a cooling fin 3 that is coupled to the cooling panel 11 and is provided with a cooling water circulation piping 31. The cooling chamber 21 comprises a cold air fan 32 at a location corresponding to the cold air outlet opening 23.

[0010] The heating chamber 22 receives therein a heat dissipation fin 4 that is coupled to the heat dissipation panel 12 and is provided with a heat dissipation water circulation piping 41 and is further coupled to an enhanced heat dissipation fin 42 and an enhanced heat dissipation water circulation piping 43 mounted to the enhanced heat dissipation fin 42, and also contains an air intake fan 44 that is coupled to the enhanced heat dissipation fin 42 for drawing in air through the air conduit 26 to facilitate heat dissipation effected in the heat dissipation fin 4 and the enhanced heat dissipation fin 42. The heat dissipation fin 4 is provided with a heat dissipation fan 45 at a location corresponding to the hot air discharge opening 25.

[0011] A water inlet 33 and a water outlet 48 of the cooling water circulation piping 31 provided on the cooling fin 3, a water inlet 46 and a water outlet 49 of the heat dissipation water circulation piping 41 provided on the heat dissipation fin 4, and a water inlet 47 and a water outlet 50 of the enhanced heat dissipation water circulation piping 43 provided on the enhanced heat dissipation fin 42 are respectively connected to pumps 5, whereby cooling water or medium and heat dissipation water or medium that are respectively filled in the cooling water circulation piping 31, the heat dissipation water circulation piping 41, and the enhanced heat dissipation water circulation piping 43 can be circulated as being driven by the pumps 5 to realize efficient cooling and efficient heat dissipation respectively. Further, since both the heat dissipation water circulation piping 41 and the enhanced heat dissipation water circulation piping 43 function to remove the heat that is generated in the heating surfaces of the thermoelectric cooling chips 1 and absorbed by the heat dissipation fin 4, the efficiency of heat removal and cooling can thus be doubled or speeded up, whereby the temperature of the heat dissipation fin 4 can be rapidly lowered down and the hot air that is discharged from the air conditioner may even have a temperature lower than the room temperature of the indoor space in which the air conditioner is installed, so as not to affect the temperature of the cold air blown into the space from the cold air outlet opening 23. Thus, the thermoelectric cooling chip based air conditioner of the present invention can be installed at any suitable location in an indoor space, not limited to a window of the indoor space as that applied to the conventional air conditioners.

[0012] In the embodiment illustrated, the heat dissipation panel 12 comprises a bakelite pad 6 to reduce and control the temperature of the heat dissipation panel 12 that radiates heat.

[0013] To operate, the present invention is actuated and controlled by a power switch 10 and a temperature setting switch 20 that can be controlled through a host device (not shown) in order to induce cold and heat on the two surfaces of the thermoelectric cooling chip 1 through thermoelectric effect. The surface that generates cold uses the cooling fin 3 and the cooling water circulation piping 31 to store the cold in the cooling fin, whereby when the room temperature reaches the temperature set by the temperature setting switch 20, the cold air fan 32 blows the cold out of the cold air outlet opening 23 to fill into the indoor space. The surface that generates heat uses the heat dissipation fin 4 and the heat dissipation water circulation piping 41 and the enhanced heat dissipation fin 42 and the enhanced heat dissipation water circulation piping 43, and the fresh air that is drawn from the air conduit by the air intake fan 44 to effect removal of heat and the air is then discharged through the hot air discharge opening 25 by being driven by the heat dissipation fan 45, where the temperature of the discharged air may be close to or even lower than the room temperature of the indoor space, whereby there will be no need to discharge the air outdoors. This removes the conventional constraints for the site of installation of air conditioners so that the installation site of the air conditioner of the present invention does not need to be limited to a window, a pre-formed air-conditioner cavity defined in a wall, or an outside-adjacent wall.

[0014] To summarize, the thermoelectric cooling chip based air conditioner uses semiconductor thermoelectric cooling chips as primary constituent components. Each thermoelectric cooling chip may induce cold and heat respectively on two surfaces thereof through thermoelectric effect. In the arrangement in accordance with the present invention, the cold and the heat are set in two spaced chambers formed inside an enclosure and respectively carry out absorption of heat through a cooling fin and a cooling water circulation piping coupled to the cooling fin and heat dissipation fins and heat dissipation water circulation pipes coupled to the heat dissipation fins to effect cooling. A cold air fan and a heat dissipation fan are then used to blow out the cold and to discharge the heat to realize air conditioning. The structure of the air conditioner of the present invention, as a whole, uses no compressor and coolant, so that the weight of the air conditioner is lessened and is easy to transport and install and the operation of the air conditioner is power saving and noise reduced, whereby environmental protection can be realized. The constituent components of the present invention can be used to construct a heater or a combined device of air conditioner and heater, a refrigerator, and other heating/cooling devices. Thus, it is contemplated that any cooling/heating device that is made up of primary components of thermoelectric cooling chips and cooling and heat dissipation parts, including air conditioners, heaters, air cooling/heating devices, refrigerators, and other heating/cooling devices is considered within the scope of the present invention.

[0015] While certain novel features of this invention have been shown and described and are pointed out in the annexed claim, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present inven-

tion.

Claims

1. A thermoelectric cooling chip based air conditioner, comprising a thermoelectric cooling chip having two surfaces respectively serving as a cooling surface and a heating surface, the thermoelectric cooling chip is arranged inside an enclosure to divide an interior space of the enclosure into a cooling chamber and a heating chamber, within which a cooling fin and a heat dissipation fin are respectively mounted for absorbing cold induced by the thermoelectric cooling chip in the cooling surface and heat induced by the thermoelectric cooling chip in the heating surface, the cold induced in the cooling surface being blown out by a cold air fan to form cooling air stream, the heat induced in the heating surface being discharged by being driven by a heat dissipation fan.

2. The thermoelectric cooling chip based air conditioner according to claim 1, wherein the cooling fin comprises a cooling water circulation piping.

3. The thermoelectric cooling chip based air conditioner according to claim 1, wherein the heat dissipation fin comprises a heat dissipation water circulation piping and is coupled to an enhanced heat dissipation fin and an enhanced heat dissipation water circulation piping arranged in the enhanced heat dissipation fin, the enhanced heat dissipation fin comprising an air intake fan for facilitating heat dissipation of the heat dissipation fin and the enhanced heat dissipation fin.

4. The thermoelectric cooling chip based air conditioner according to claim 1, wherein the cooling chamber comprises a cold air outlet opening and a cold air fan that drives cold air out of the cold air outlet opening.

5. The thermoelectric cooling chip based air conditioner according to claim 1, wherein the heating chamber comprises a hot air discharge opening and a heat dissipation fan that drives hot air inside the heating chamber that has subjected to cooling out of the hot air discharge opening.

6. The thermoelectric cooling chip based air conditioner according to claim 1, wherein inlets and outlets of a cooling water circulation piping of the cooling fin, a heat dissipation water circulation piping of the heat dissipation fin, and an enhanced heat dissipation water circulation piping of an enhanced heat dissipation fin are respectively connected to pumps for circulation of media therethrough.

7. The thermoelectric cooling chip based air conditioner according to claim 1, wherein the cooling surface and the heating surface of the thermoelectric cooling chip are respectively coupled to a cooling panel and a heat dissipation panel.

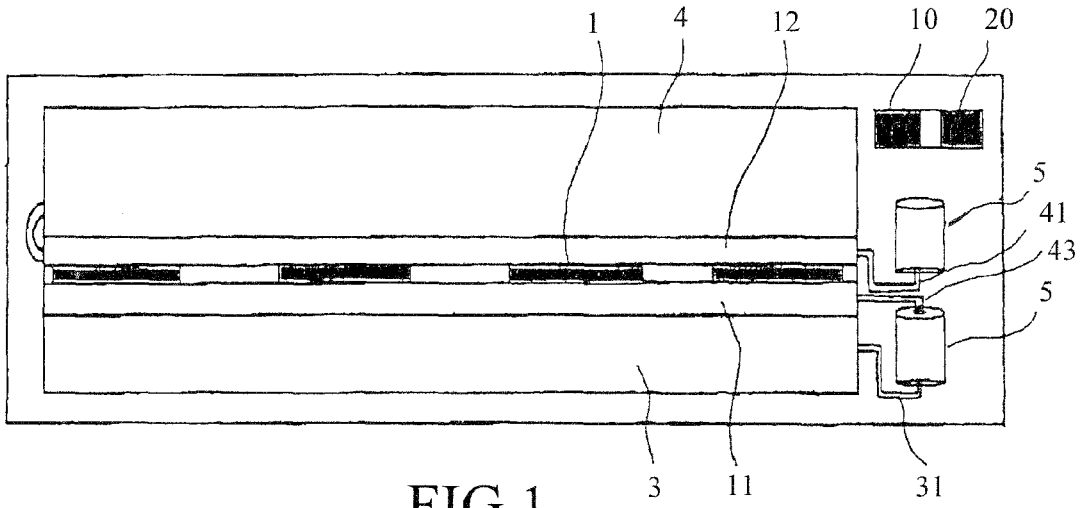
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FIG.1

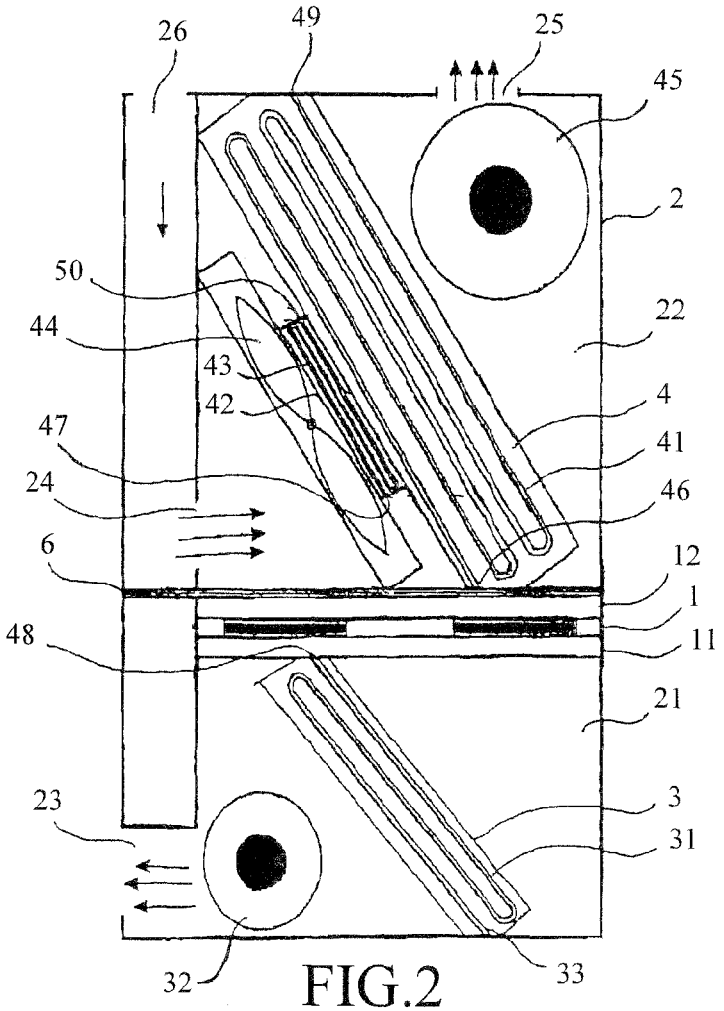
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FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 09 17 2997

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/177621 A1 (CHEN TSUNG-CHIH [TW]) 16 September 2004 (2004-09-16) * paragraphs [0005], [0006], [0019], [0020]; figures 6,7 *	1-7	INV. F24F1/02 F24F5/00
X	EP 1 767 874 A1 (CHEN CHUAN SHENG [TW]) 28 March 2007 (2007-03-28) * paragraph [0008]; figures 1-3 * * abstract *	1-7	
X	EP 1 923 641 A2 (ORRA CORP [US]) 21 May 2008 (2008-05-21) * abstract; figure 2 *	1-7	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 November 2010	Vuc, Arianda

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 17 2997

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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