A modular solar air circulating and conditioning apparatus includes a box body, a heat absorbing unit and a transparent cover. The box body includes a surrounding wall and a bottom. The wall has a connecting portion and the bottom has a pipe portion interconnected with the containing space of the box body. The heat absorbing unit is a carrier coated with a layer of heat absorbing element. The transparent cover is installed to the surrounding wall, and a pipe portion is disposed on a surface of the transparent cover and interconnected with the containing space of the surrounding wall. In use, solar energy is absorbed by the heat absorbing unit, and then transmitted into a house through a conveying pipe connected to the pipe portion to warm the house.
MODULAR SOLAR AIR CIRCULATING AND CONDITIONING APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention generally relates to an air conditioning apparatus, and more particularly to a modular solar air circulating and conditioning apparatus.

[0003] 2. Description of Prior Art

[0004] People have increasingly higher demands for energy sources to improve lives and create comfortable environments, since the first time we knew how to make use of the resources of the nature. Thereafter, countries over the world spare no efforts on the research and development on energy sources.

[0005] In known energy sources, solar energy is inexhaustible, and thus solar high-tech products such as solar water heater having a heat collector for collecting solar energy to produce hot water and a solar battery using a light-electricity converter to convert sunlight into electric power for supplying the electric power to electric appliances or transportation means are introduced to the market.

[0006] An air conditioning system having a solar air conditioning apparatus for collecting solar heat and circulating hot air in a house to warm and regulate the temperature of the house in cold weather is disclosed in R.O.C. Pat. No. 579416 entitled “Solar air conditioning system”, and such solar air conditioning apparatus includes a solar heat collector module, an inlet module and an outlet module, wherein the solar heat collector module includes a heat absorbing module, a transparent cover board and a bottom, and the heat absorbing module forms a plurality of heat absorbing passages by enclosing a plurality of support boards and heat absorbing plates, and the inlet module is installed at an inlet of the heat absorbing module and interconnected with the plurality of heat absorbing passages, and the outlet module is installed at an outlet of the heat absorbing module. After sunlight is passed through the transparent cover board and absorbed by the heat absorbing plate, the heat source is transmitted into a house for warming and regulating the temperature of the house in winters, and the heat source is guided out of the house in summers, and fresh air is introduced into the house to achieve the desired effects of the air circulating and conditioning system.

[0007] Although the foregoing patented invention can warm a house in winters and guide fresh air into the house and discharge a heat source out of the house in hot weather to achieve the effect of regulating the temperature in the house, yet the overall structural design is too complicated, the volume is too large, and the modular structure cannot be installed by users easily.

SUMMARY OF THE INVENTION

[0008] In view of the shortcomings of the prior art, it is a primary objective of the present invention to simplify the structure of a solar air circulating and conditioning apparatus, and make it smaller in volume and lighter in weight; such that the modular structures of the apparatus can be installed by users easily and quickly.

[0009] To achieve the foregoing objective, the present invention provides a modular solar air circulating and conditioning apparatus, comprising: a box body, a heat absorbing unit and a transparent cover; wherein the box body includes a surrounding body, a bottom coupled to a lower edge of the surrounding body, a containing space formed by the surrounding wall and the bottom, a connecting portion disposed on an upper edge of the surrounding wall, and a pipe portion disposed on the surrounding wall and the bottom respectively, and having a passage disposed in the pipe portion and interconnected with the containing space; the heat absorbing unit is installed in the containing space and includes a carrier made of metal, and the carrier is coated with a layer of heat absorbing element for absorbing solar heat; and the transparent cover is installed at the upper edge of the surrounding wall for passing through the sunlight and a pipe portion is disposed on a surface of the transparent cover, and a passage in the pipe portion is interconnected with the containing space.

BRIEF DESCRIPTION OF DRAWINGS

[0010] FIG. 1 is an exploded view of a solar air circulating and conditioning apparatus of the present invention;

[0011] FIG. 2 is a perspective view of a solar air circulating and conditioning apparatus of the present invention;

[0012] FIG. 3 is a side cross-sectional view of a solar air circulating and conditioning apparatus of the present invention;

[0013] FIG. 4 is a schematic view of a flow of heat energy of a solar air circulating and conditioning apparatus in accordance with the present invention;

[0014] FIG. 5 is a schematic view of an application of connecting several solar air circulating and conditioning apparatuses in accordance with the present invention;

[0015] FIG. 6 is a cross-sectional view of an application of connecting several solar air circulating and conditioning apparatuses in accordance with the present invention as depicted in FIG. 5;

[0016] FIG. 7 is a schematic view of another application of connecting several solar air circulating and conditioning apparatuses in accordance with the present invention;

[0017] FIG. 8 is a schematic view of another preferred embodiment of the present invention; and

[0018] FIG. 9 is a schematic view of a further preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] The technical characteristics, features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings.

[0020] Referring to FIGS. 1 and 2 for an exploded view and a perspective view of a solar air circulating and conditioning apparatus of the present invention respectively, the air conditioning apparatus 10 comprises: a box body 1, a heat absorbing unit 2 and a transparent cover 3.

[0021] The box body 1 includes a surrounding wall 11, a bottom 17 coupled to a lower edge of the surrounding wall 11, a containing space 12 formed by the surrounding wall 11 and the bottom 17, a connecting portion 13 with an L-shaped cross section and disposed on an internal side of an upper edge of the surrounding wall 11, two symmetrical circular pipe portions 14, 14 disposed on the surrounding wall 11, passages 141, 141' disposed in the two pipe portions 14, 14 and interconnected with the containing space 12, a pipe portion 15 disposed at the bottom 17 of the box body 1, a passage 151 disposed in the pipe portion 15 and interconnected with the containing space 12, such that the pipe portions 14, 14, 15
provide a heat source to be distributed and achieve the purpose of connecting the pipe portion of another box body (not shown in the figure), and a thermal insulating element 16α being an insulating material attached onto an internal wall of the surrounding wall 11 for preventing an internal heat source from transmitting from the surrounding wall 11 of the box body 1 to the outside.

[0022] The heat absorbing unit 2 is installed in the containing space 12, and has a carrier 21 disposed thereon, and the carrier 21 is made of a metal and has a layer heat absorbing element 22 disposed on a side of the carrier 21a, and the heat absorbing element 22 is provided for absorbing solar heat, and another side of the heat absorbing element 22 has a thermal insulating element 23 made of an insulating material for preventing the internal heat source from being transmitted from the bottom of the box body 1 to the outside. Further, through holes 24, 25 with a same position and a same shape are disposed on the carrier 21, and the heat absorbing element 22 and the thermal insulating element 23 provide a heat source to flow into a passage 151 in the pipe portion 15. In the figures, the heat absorbing element 22 is a far infrared ray, a positive temperature coefficient (PTC) inorganic oxidized heat-retaining paint or a dark paint (such as a black paint).

[0023] The transparent cover 3 is a board made of a transparent material (either glass or acrylic), and the transparent cover 3 is installed at an upper edge of the surrounding wall 11 and connected with an L-shaped connecting portion 13, and a surface of the transparent cover 3 has a pipe portion 31, and the transparent cover 3 is covered onto the connecting portion 13 of the surrounding wall 11, such that the passage 311 in the pipe portion 31 is interconnected with the containing space 11.

[0024] Since the solar air circulating and conditioning apparatus 10 is modularized, users can install a plurality of air conditioning apparatuses 10 together easily and quickly.

[0025] Referring to FIGS. 3 and 4 for a side cross-sectional view of a solar air circulating and conditioning apparatus and a schematic view of a flow of heat energy of a solar air circulating and conditioning apparatus in accordance with the present invention respectively, when the air conditioning apparatus 10 is installed, the heat absorbing unit 2 is installed in the containing space 12 of the box body 1, and the transparent cover 3 is covered onto the connecting portion 13 at the upper edge of the surrounding wall 11. The pipe portion 15, 31 can be connected to the conveying pipe 4, 4' or a pipe portion of another box body (not shown in the figure). The pipe portion 14, 14' not connected with the other box body or the conveying pipe 4, 4' is plugged with a plug (or cap) 5, 5' for preventing bugs from entering or heat sources from leaking.

[0026] Since the transparent cover 3 is provided for passing sunlight into the box body 1, the heat absorbing element 22 can absorb solar heat to produce a heat source in the box body 1, and the pipe portion 14, 14', 15, 31 is provided for outputting the heat source or transmitting the heat source into another box body (not shown in the figure).

[0027] Referring to FIGS. 5 and 6 for a schematic view and a cross-sectional view of an application of connecting several solar air circulating and conditioning apparatuses in accordance with the present invention respectively, a plurality of air conditioning apparatuses 10, 10α, 10β can be connected and secured to a roof of a house 8 by a fixing element 20 of an L-shaped metal bracket. When the air conditioning apparatuses 10, 10α, 10β are connected with each other, a socketed pipe 6 is sheathed onto the pipe portion 14α and 14 of the air conditioning apparatus 10, 10α and 10β, and the bottom of the air conditioning apparatus 10 or the pipe portion 15, 14' of the air conditioning apparatus 10β is connected to a conveying pipe 7, 7', and the unconnected pipe portion 14, 31 is sealed by the plug (or cap) 5, 5' for preventing bugs from entering or heat sources from leaking. A heat source produced by the solar energy absorbed by a plurality of heat absorbing units 2 is transmitted into a house through the conveying pipe 7, 7' for warming and regulating the temperature of the house or guiding out of the house through the conveying pipe 7', such that after the heat source is passed through the air conditioning apparatus 10β, 10α, 10c, the heat source can be transmitted into the conveying pipe 7 to achieve the circulating effect for warming and regulating the temperature in the house.

[0028] To transmit the heat source into the house quickly, a fan (not shown in the figure) is installed at a pipe body or an outlet of the conveying pipe 7, 7' for sending the heat source transmitted by the conveying pipe 7, 7' into the house or to a remote position.

[0029] Referring to FIG. 7 for a schematic view of another application of connecting several solar air circulating and conditioning apparatuses in accordance with the present invention, the invention uses a long conveying pipe 9 to connect the pipe portions 31 of a plurality of air conditioning apparatuses 10, 10α, 10β, such that the air conditioning apparatuses 10, 10α, 10β are connected in parallel (or the pipe portions 14, 14' are connected serially) with each other, and the heat source absorbed by the plurality of air conditioning apparatuses 10, 10α, 10β flows into the conveying pipe 9 and from the conveying pipe 9 into the house for warming and regulating the temperature in the house.

[0030] Referring to FIG. 8 for a schematic view of another preferred embodiment of the present invention, the transparent cover 3 is comprised of a first cover board 32 and a second cover board 33, and the first cover board 32 is covered onto an upper edge of the thermal insulating element 16, and the first cover board 32 includes a hollow pipe portion 321, and the second cover board 33 is covered onto the box body 1, and the second cover board 33 includes a hole 331 sheathed onto the pipe portion 321. The first cover board 32 and the second cover board 33 are provided for passing through the sunlight, but preventing heat energy from being transmitted from the second cover board 33 to the outside or causing a heat loss.

[0031] Referring to FIG. 9 for a further preferred embodiment of the present invention, the surrounding wall 11 of the box body 1 is made of an insulating material or a conducting material (such as a metal), and the bottom 17 of the box body 1 can be used for forming a combinational box body directly by the thermal insulating element 23 of heat absorbing unit 2.

[0032] While the invention is described in by way of examples and in terms of preferred embodiments, it is to be understood that the invention is not limited thereto. On the contrary, the aim is to cover all modifications, alternatives and equivalents falling within the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A modular solar air circulating and conditioning apparatus, comprising:

   "a box body, having a surrounding wall disposed thereon, a bottom disposed at a lower edge of the surrounding wall, a containing space formed by the surrounding wall and the bottom, a pipe portion disposed on the surrounding..."
wall and the bottom of the box body, and a passage disposed in the pipe portion and interconnected to the containing space; a heat absorbing unit, installed in the containing space, and having a carrier disposed thereon and a layer of heat absorbing element coated onto the carrier; and a transparent cover, installed on a connecting portion at an upper edge of the surrounding wall.

2. The modular solar air circulating and conditioning apparatus of claim 1, wherein the surrounding wall includes a connecting portion disposed at the upper edge of the surrounding wall, and the connecting portion comes with an L-shaped cross section.

3. The modular solar air circulating and conditioning apparatus of claim 1, wherein the surrounding wall includes a thermal insulating element attached on an internal wall of the surrounding wall, and the thermal insulating element is made of an insulating material.

4. The modular solar air circulating and conditioning apparatus of claim 1, wherein the surrounding wall is made of an insulating material or a conducting material.

5. The modular solar air circulating and conditioning apparatus of claim 4, wherein the conducting material is metal.

6. The modular solar air circulating and conditioning apparatus of claim 1, wherein the two pipe portions are disposed on corresponding opposite sides of the surrounding wall.

7. The modular solar air circulating and conditioning apparatus of claim 1, wherein the carrier is made of metal.

8. The modular solar air circulating and conditioning apparatus of claim 1, wherein the heat absorbing element is made of one selected from the collection of a far infrared ray, a positive temperature coefficient (PTC) inorganic oxidized heat-retaining paint and a dark paint.

9. The modular solar air circulating and conditioning apparatus of claim 1, wherein the carrier includes a thermal insulating element attached onto another side of the carrier, and the thermal insulating element is made of a insulating material.

10. The modular solar air circulating and conditioning apparatus of claim 9, wherein the carrier includes a thermal insulating element attached onto another side of the carrier to serve as the bottom of the box body.

11. The modular solar air circulating and conditioning apparatus of claim 1, wherein the transparent cover is a sheet member made of a transparent material selected from the collection of glass and acrylic.

12. The modular solar air circulating and conditioning apparatus of claim 1, wherein the transparent cover includes a pipe portion disposed on a surface of the transparent cover, and the passage in the pipe portion is interconnected with the containing space of the box body.

13. The modular solar air circulating and conditioning apparatus of claim 1, wherein the transparent cover is comprised of a first cover board and a second cover board, and the first cover board is covered onto an upper edge of the thermal insulating element, and the first cover board includes a hollow pipe portion disposed thereon, and the second cover board is covered onto the box body, and the second cover board includes a through hole sheathed onto the pipe portion.

14. The modular solar air circulating and conditioning apparatus of claim 1, wherein the pipe portion is coupled to a conveying pipe for transmitting a heat source.

15. The modular solar air circulating and conditioning apparatus of claim 14, further comprising a fan installed at an outlet of the conveying pipe for quickly transmitting or sending a heat source to a remote end.

16. The modular solar air circulating and conditioning apparatus of claim 1, further comprising a socketed pipe sheathed onto the two pipe portions for connecting the solar air circulating and conditioning apparatuses in parallel or in series.

17. The modular solar air circulating and conditioning apparatus of claim 1, further comprising a long conveying pipe for simultaneously connecting a plurality of pipe portions of the solar air circulating and conditioning apparatus.

18. The modular solar air circulating and conditioning apparatus of claim 1, wherein the pipe portion is installed with a cap or a plug, when the pipe portion is not in use.

19. The modular solar air circulating and conditioning apparatus of claim 1, wherein the air conditioning apparatus is mounted to a construction by a fixing element of an L-shaped metal bracket.

20. The modular solar air circulating and conditioning apparatus of claim 8, wherein the dark paint is a black paint.

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