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(54) Title: AN AIR COOLED UMBRELLA

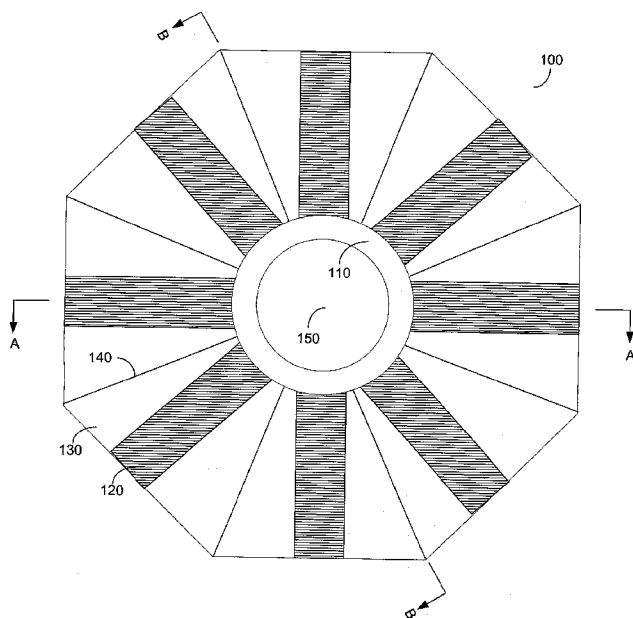


FIGURE 1

(57) Abstract: An air cooled sunshade, e.g., umbrella, provides cooling under the canopy of the umbrella. The foldable canopy of the umbrella comprises of a plurality of segments of elongated panels that have embedded solar panels and a plurality of segments of foldable material to allow the canopy to easily stretch when in the open position and collapse in the closed position, typically arrange having one elongated panel connected on foldable segment arranged around a center piece. In an embodiment of the invention the foldable material is formed as a pipe having an upper layer and a lower layer, the lower layer having pours through which air can flow to the area under the canopy. The air can then flow from a fan or an air conditioner mounted on the center piece and allowing air to evenly flow under the canopy. The solar panels are connected to provide the necessary energy.

- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

AN AIR COOLED UMBRELLA

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This patent application claims the benefit of US provisional patent application No. 61/411,255 filed on November 8, 2010, the content of which are incorporated herein by reference.

TECHNICAL FIELD

[002] The invention generally relates to umbrellas, and more specifically to umbrellas used to cover a larger sitting or playing area, and even more specifically these umbrellas that are equipped with solar cells to generate electrical energy.

BACKGROUND OF THE INVENTION

[003] The use of umbrellas in general, and in particular use of umbrellas for the sake of shading larger sitting and playing areas is well-known in the art. Such use provides shade and a somewhat cooler and less exposed area to beaming sun rays. However, on hot days in general, and in particular on windless days, heat in the canopied area may still be unpleasant. Therefore different solutions have been proposed to help in removing the warm air that accumulates in the canopy area. Some such solutions provide fans as part of the canopy to enable movement of such warm air.

[004] With the advent of solar cells, some solutions even propose the addition of solar cells to harness the sun's energy for the production of electricity and driving the fans therefrom. This is of particular use when the umbrella is placed in such areas as the beach or other areas where the use of high voltage electricity is not practical or hazardous. The solutions provided in the prior art suffer from various disadvantages, including but not limited to, insufficient solar cells to accumulate enough energy, exposed fan wings, and limited cooling capabilities.

[005] It would therefore be advantageous to provide a solution that would overcome the deficiencies of the prior art. In particular it would be advantageous if such a solution provides for ample conversion of solar energy to electrical energy, be safe to use, and provided extended cooling capabilities.

BRIEF DESCRIPTION OF THE DRAWINGS

[006] The subject matter that is regarded as the invention is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention will be apparent from the following detailed description taken in conjunction with the accompanying drawings.

[007] Figure 1 is a top view of an opened canopy of an umbrella implemented according to the principles of the invention.

[008] Figure 2 is first cross-section A-A of a side view of the umbrella.

[009] Figure 3 is a second cross-section B-B of a side view of the umbrella.

[0010] Figure 4 is a schematic block diagram of the electrical circuit for a sunshade.

DETAILED DESCRIPTION OF THE INVENTION

[0011] An air cooled sunshade, e.g., umbrella provides cooling under the canopy of the umbrella. The foldable canopy of the umbrella comprises of a plurality of segments of elongated panels that have embedded solar panels and a plurality of segments of foldable material to allow the canopy to easily stretch when in the open position and collapse in the closed position, typically arranged having one elongated panel connected on foldable material segment arranged around a center piece. In an embodiment of the invention the foldable material is

formed as a pipe having an upper layer and a lower layer, the lower layer having pores through which air can flow to the area under the canopy. The air can then flow from a fan or an air conditioner mounted on the center piece and allowing air to evenly flow under the canopy. The solar panels are connected to provide the necessary energy.

[0012] According to the principles of the invention an exemplary and non-limiting canopy of the sunshade, for example in the form of an umbrella, is created from a plurality of segments of two types that are connected to each other. A first type of segment is an elongated panel into which at least a solar cell is embedded. The panel may be of fortified glass or durable transparent plastic of any kind suitable for the task. The second type of segment is made of a durable but flexible material in an elongated form that is connected to the first type of segment along its long side. Such pairs of segments are then connected to each other to create the canopy of the sunshade. Any one of these segments may be further equipped with a rib at the bottom part of the segment to be connected to a radial support arm. The radial support arm is connected to a sliding ring that is mounted on a center pole. The sliding ring may move up and down of the pole to adjust the canopy from a closed position when the sliding ring moves to its lowest position on the pole, to a fully opened canopy when the sliding ring is at its highest point on the pole. A fan is mounted in a housing at the top of the sunshade such that air is sucked from the outside, through the fan housing. The housing is designed to have a plurality of output tubes located at positions corresponding to the second type of segment. This segment is further designed as a tube having an upper side and a bottom side, the tube being closed at one end and fitting the output of the housing in the other end. The bottom side is further designed to have pores in various location of the bottom side. When air flows through the housing it is pushed into the plurality of second segments and flows in laminar fashion from the pore in the bottom side of the second segment downwards, thereby spreading the airflow evenly

throughout the canopy.

[0013] In one embodiment of the invention instead of the housing having a mere fan, it is equipped with a direct current (DC) air conditioner and hence can provide ample cooling to the area under the canopy. The first type segment has all the electrical outputs coming from the solar cells connected to the housing where the electricity is provided to the fan or DC air conditioner, or otherwise to a battery that is part of the housing for the purpose of storage. In one embodiment of the invention display sheets, made for example of organic light emitting diodes (OLED) are used for at least one of the sides of the segments. These sheets can then be used for display purposes, for example, for the display of an advertisement, in the form of an image and/or a video clip. It may be further used for display on the inside and/or outside of the canopy. The display may use the power provided by the solar cells making it self-sufficient.

[0014] Fig. 1 depicts an exemplary and non-limiting schematic diagram of a top view 100 of an opened canopy of a sunshade in the form of an umbrella implemented according to the principles of the invention. The canopy comprises of segments 120, which are segments of the first type as discussed hereinabove, and segments 130, which are segments of the second type as discussed hereinabove. In this exemplary case where the canopy has the exemplary and non-limiting effective shape of an octagon, the segment 130 also has a seam 140 which may be used for the purpose of connecting a rib (not shown) to which a radial support rod is connected. The segments 120 and 130 are connected to each other to form the entire canopy. The segment 120 is an elongated panel into which a solar cell or cells are embedded and further having output wires (not shown) that are used to collect the electric energy and power the systems of the umbrella as discussed herein below in more detail. The segment 130 is formed as a tube having its outer end sealed and connected on its other end to the bottom part 110 of a housing 150 to allow the flow of air from the housing 150 into the tube of segment 130, as further

explained below with respect of Fig. 3. In one embodiment of the invention at least one of the segments 120 or 130 is coated with an OLED sheet that is further electrically connected to the housing 150. Control circuit within the housing 150 controls the display on the OLED sheet(s) providing, for example, advertisements displayed on at least portions of the canopy. Typically the advertisement, or otherwise and image or video clip, are stored in memory of the control circuit. In one embodiment of the invention an interface, such as a universal serial bus (USB), to the control circuit is used for the purpose of uploading displayable content to the memory. In yet another embodiment of the invention a battery is used to store energy and in yet another embodiment, an electrical cord allows the connection of the system to an electricity outlet to allow for the supply of electricity to the umbrella to supplement the energy harvested from the sun.

[0015] Fig. 2 shows an exemplary and non-limiting first cross-section A-A 200 of a side view of the umbrella. The canopy is mounted on a rod 210, equipped, for example, in one end with a sharp point for the purpose of affixing the rod into the ground. This cross-section A-A cuts through the panels 120 to reveal the solar cell 125, embedded within the panel 120. Electrical connection from the segment 120 provided from the solar cell 125 is connected to the housing 150 to an electrical circuit (not shown) that would be obvious to those of ordinary skill in the art. The segments 120 are connected to the housing 150 by means of a pivot 250 that allows the segment 120 to move upwards when the canopy is to be opened and downwards when the canopy is to be closed. Radial support rods 240 maybe affixed to the segment 120 at one end and to a sliding ring 220 on the other end. As the sliding ring 220 is pushed up or down the canopy with either open or close respectively. The sliding ring 220 can be locked into position by means known to those of ordinary skill in the art and are therefore not shown herein. The housing 150 houses a fan 230 that when allowed to spin using the power provided from the solar cell 125 pushes air through the chamber of the housing 150 sucking air from the outside top and

into the chamber, and as further explained in more detail with respect of Fig. 3. While a fan 230 is shown herein, it is envisioned that the fan can be replaced by a DC air-conditioner, such that the housing 150 is capable of moving through the chamber of the housing 150 air that was chilled in the DC air-conditioner.

[0016] Fig. 3 shows an exemplary and non-limiting second cross-section B-B 300 of a side view of the umbrella. This cross-section B-B cuts through the tube segment 130. The segment 130 has an upper part which is sealed and a bottom part which has pores 310. The segment 130 is sealed on one end of its length and is connected to a tube that leads into the chamber of the housing 150 in the other end. This allows the flow of air from the chamber of the housing 150 through the tube of segment 130 and then through the pores 310 of the bottom part of the segment 130 providing an essentially laminar air flow from the top of the umbrella towards the bottom, providing a cooler sensation to persons sitting under the canopy. In the embodiment where a DC air conditioner is used in the housing 150, an air conditioned environment is provided.

[0017] In one embodiment of the invention additional electronics may be added to be powered from the housing 150. For example, loudspeakers may be added to allow the playing of music from a gadget such as an Apple Computers® iPod® and other like devices. In yet another embodiment the panel may be replaced by flexible and/or foldable solar panels to provide additional folding capability of the canopy.

[0018] Fig. 4 shows an exemplary and non-limiting schematic block diagram 400 of the electrical circuit for a sunshade, e.g., the umbrella discussed in greater detail hereinabove. The solar cells 125 feeds a power regulator 410 which generates one or more supply voltages as may be necessary. The power regulator 410 provides the power to the elements of the circuit. A control circuit

420, which may comprise a microprocessor or microcontroller, is connected to memory 430 which may store a plurality of instructions for the control of other parts of the circuit. The memory 430 may further contain content uploaded to the memory via, for example, interface 470. The control circuit 420 controls the operation of the fan 440 and the optional air conditioner 450. A display 460 connected to the control circuit 420 and optionally coupled to the memory 430 allows the display of content from the memory 430 under the control of the control circuit 420.

[0019] All examples and conditional language recited herein are intended for pedagogical purposes to aid the reader in understanding the principles of the invention and the concepts contributed by the inventor to furthering the art, and are to be construed as being without limitation to such specifically recited examples and conditions. Moreover, all statements herein reciting principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future, i.e., any elements developed that perform the same function, regardless of structure.

CLAIMS

What is claimed is:

1. A sunshade comprising:

a plurality of elongated panels containing solar cells, each panel having an upper side and a bottom side, wherein the solar cells are placed to receive solar rays from the upper side of each panel;

a plurality of elongated segments made of a flexible material in a form of a sleeve, each sleeve having an upper side and a bottom side, the bottom side having pores, each elongated segment connected between two of the plurality of elongated panels, such that a canopy is formed from the plurality of elongated panels and the plurality of elongated segments;

a base portion connecting the plurality of elongated panels and the plurality of elongated segments at a narrow side of each of the panels and each of the segments allowing each of the plurality of elongated panels and the plurality of elongated segments to move at the point of connection to the base portion for the purpose of opening or closing the canopy; and

a housing unit connected to the base portion and containing: connecting tubes to each of the sleeves; an electrical circuit to receive the energy generated in each of the solar cells of the plurality elongated panels and to generate a regulated voltage therefrom; and at least a fan receiving power from the electrical circuit to force air from outside of the canopy through the connecting tubes and into the sleeves in order to enable air to flow into the area under the canopy.

2. The sunshade of claim 1, wherein the sunshade is an umbrella.

3. The sunshade of claim 1, wherein the sunshade further comprises:

a plurality of support rods connected to at least one of the plurality of elongated panels and/or at least one of the plurality of elongated segments;

a pole connected to the bottom of the base portion; and

a ring mounted around the pole to which the plurality of support rods are connected;

such that upon moving of the ring away from the bottom of the base portion causes the canopy to close and upon moving the ring towards the bottom of the base portion causes the canopy to open.
4. The sunshade of claim 1, further comprising:

a display affixed and/or integrated to at least a part of the at least one of the plurality of elongated panels and/or at least one of the plurality of elongated segments; and

a control circuit in the housing to control the display.
5. The sunshade of claim 4, wherein the display is at least one of: liquid crystal display (LCD), organic light emitting diodes (OLED) display.
6. The apparatus of claim 4, wherein the display is used for the purpose of displaying at least an image stored in memory of the control circuit.
7. The apparatus of claim 4, wherein the display is used for the purpose of displaying at least a video clip stored in memory of the control circuit.

8. The apparatus of claim 4, further comprising an interface for uploading displayable content to a memory of the control circuit.
9. The sunshade of claim 1, wherein the housing further contains an air conditioner for the purpose of cooling the air from outside prior to moving it into the sleeves.
10. The sunshade of claim 9, where in the air conditioner operates on direct current (DC).

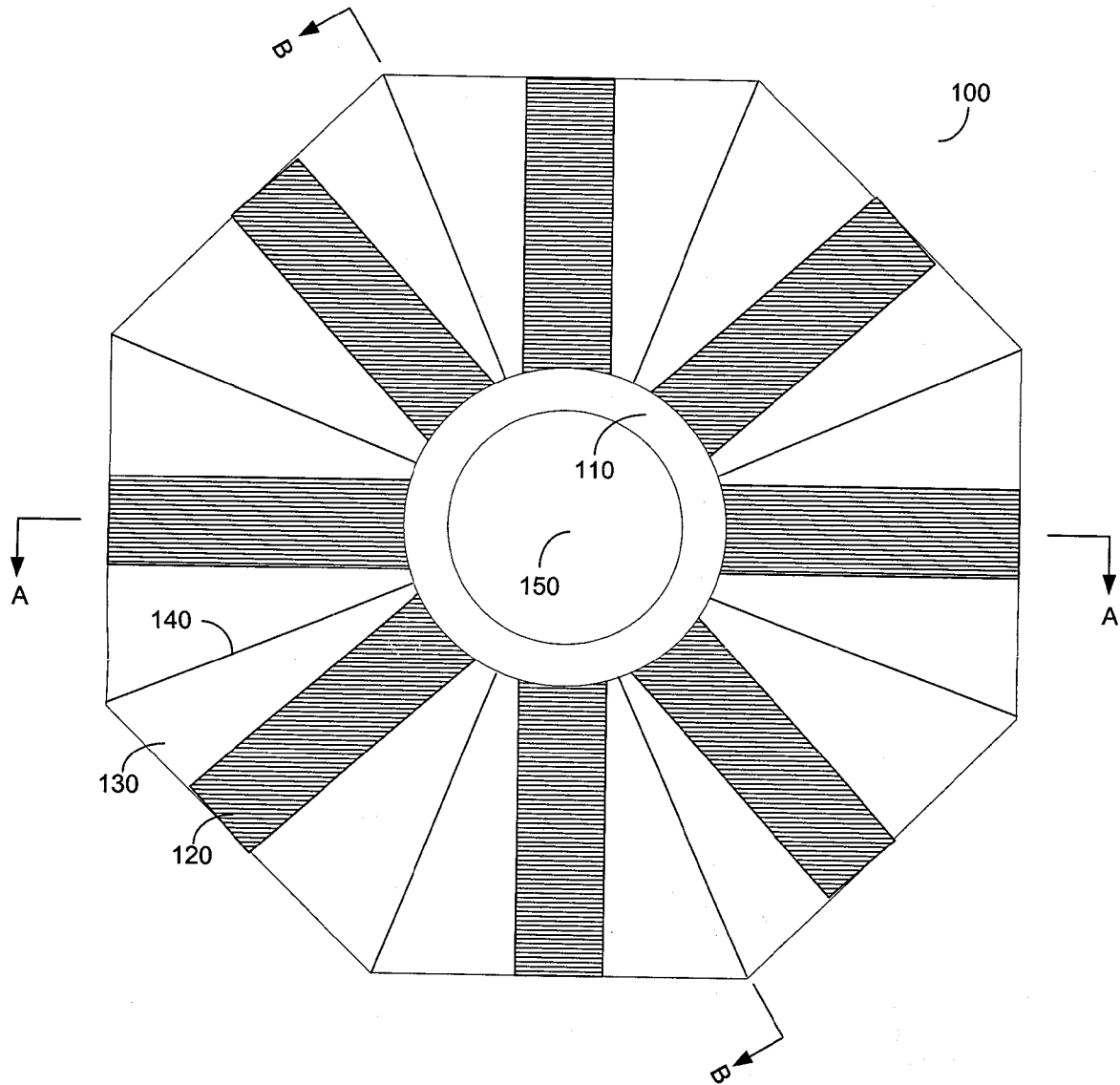


FIGURE 1

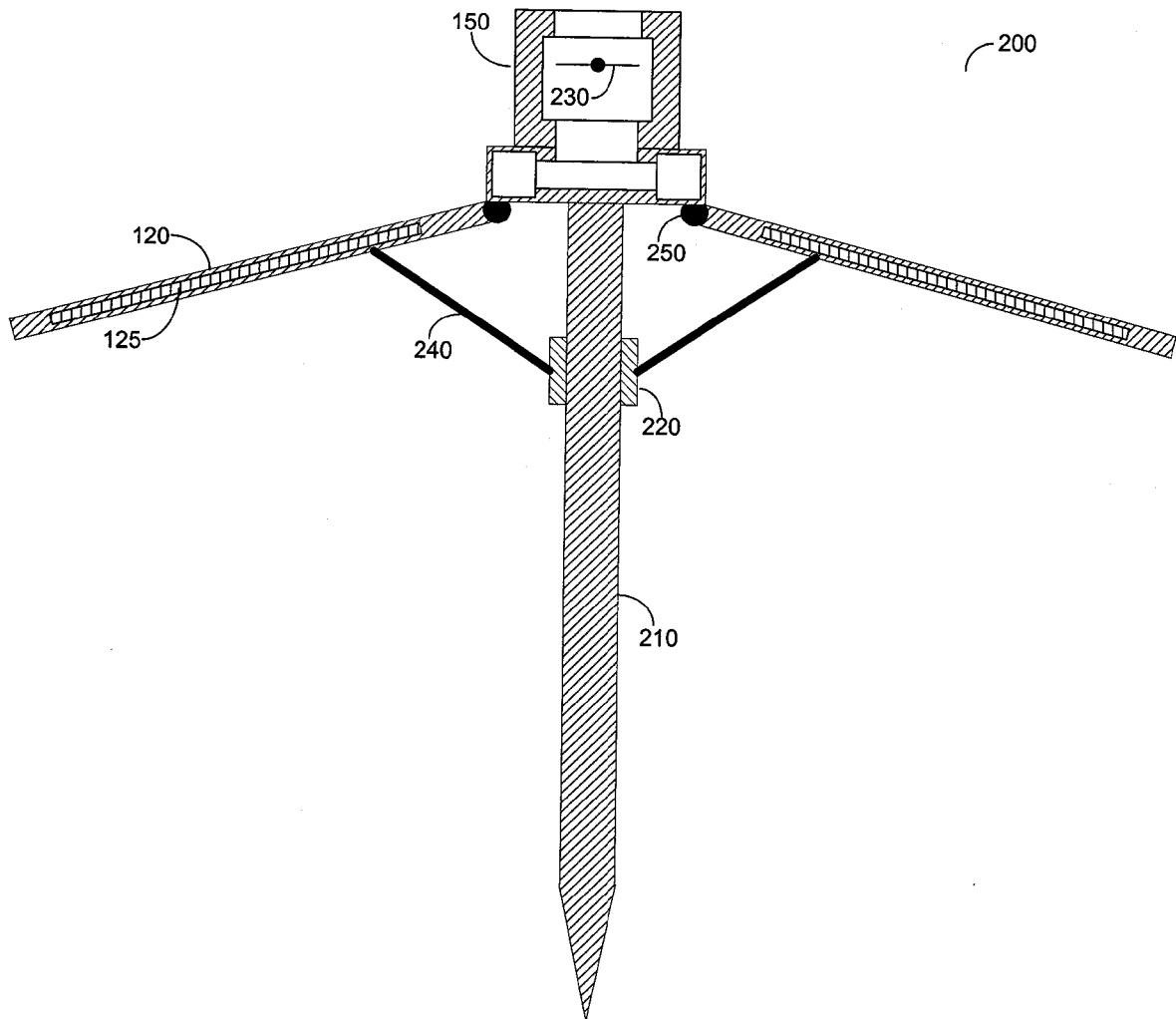


FIGURE 2

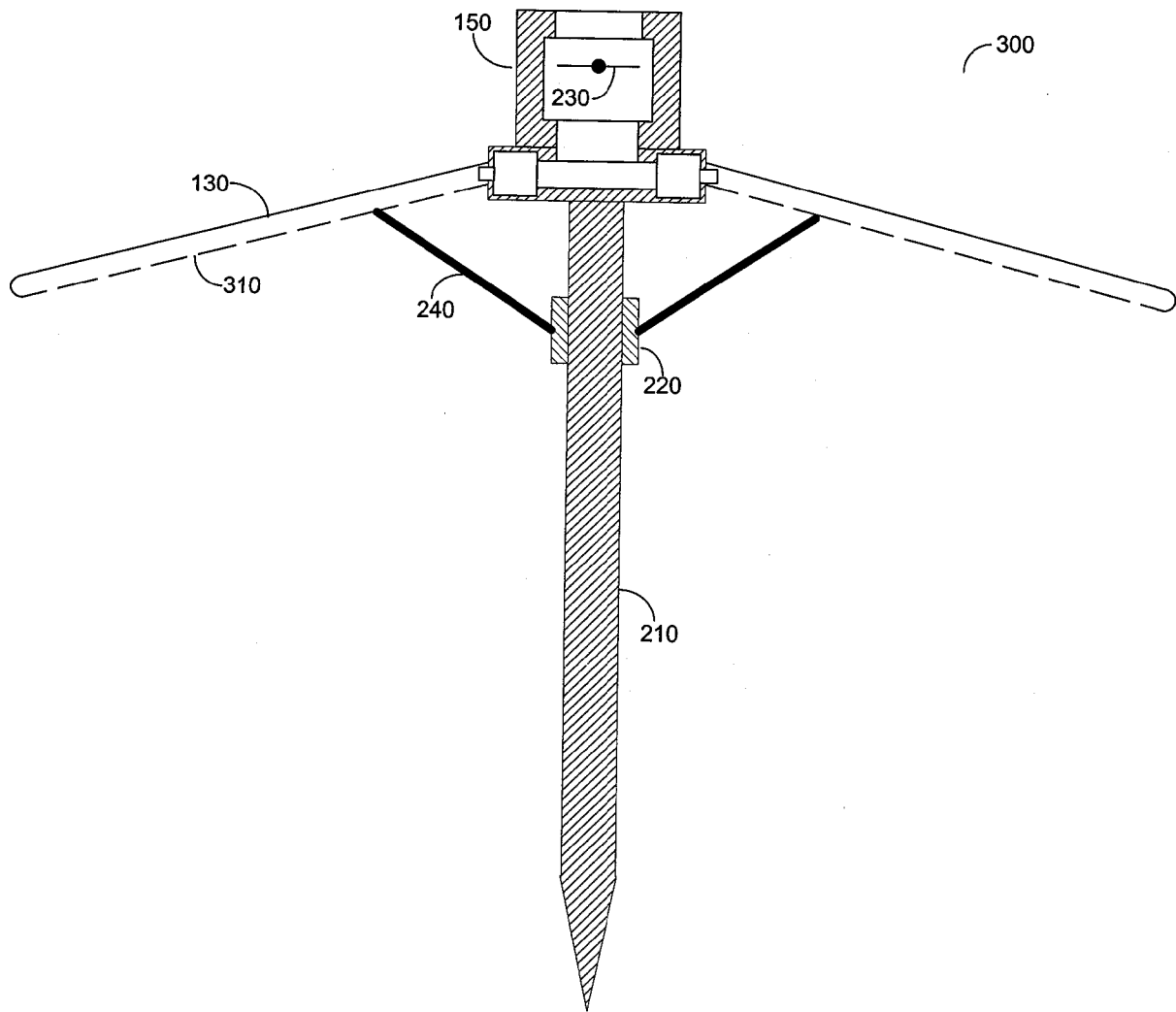


FIGURE 3

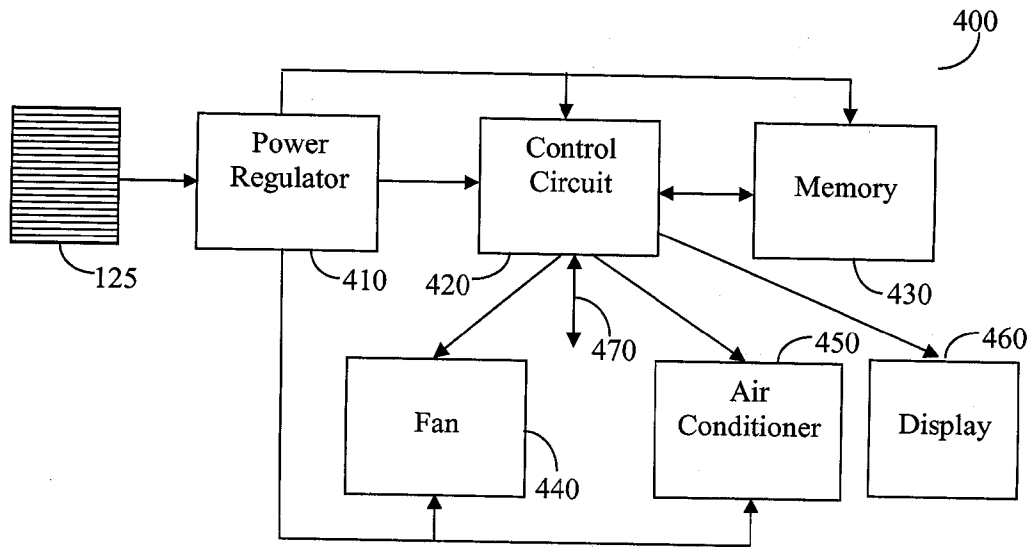


FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL 11/00856

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - E04H 15/02 (2012.01) USPC - 135/96 According to International Patent Classification (IPC) or to both national classification and IPC</p>																							
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) USPC 135/96</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched IPC(8): E04H 15/02 (2012.01) USPC: 135/15.1, 16, 33.7, 87, 96, 98; 362/102</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST (PGPB, USPT, EPAB, JPAB) and Google: sunshade, umbrella, parasol, broly, parapluie, rainshade, gamp, bumbershoot, air, cool, circulate, warm, heat, hot, fan, air conditioner, solar, photovoltaic, PV, cell, panel, module, canopy, hole, aperture, slit, pore, porous, openings, vent, slot, display, LCD, OLED, liquid crystal, segment</p>																							
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>US 2005/0161067 A1 (Hollins) 28 July 2005 (28.07.2005), entire document, especially para [0003]-[0005]; [0023]-[0024]; [0034]; Fig. 1 and 4</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>US 5,349,975 A (Valdner) 27 September 1994 (27.11.1994), entire document, col 2, ln 6-30; Fig. 1</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>US 2008/0235086 A1 (Ma) 25 September 2008 (25.09.2008), entire document, especially para [0026]; Fig. 1</td> <td>4-8</td> </tr> <tr> <td>Y</td> <td>US 7,537,015 B1 (Molnar, IV et al) 26 May 2009 (26.05.2009), entire document, especially col 5, ln 46-53; col 8, ln 53-55; col 11, ln 2-20; Fig. 1 and 12-13</td> <td>9-10</td> </tr> <tr> <td>A</td> <td>US 2004/0084071 A1 (Gray) 06 May 2004 (06.05.2004), entire document, especially para [0005]-[0014]; Fig. 1</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>US 5,868,152 A (Brown) 09 February 1999 (09.02.1999), entire document, especially col 3, ln 28 to col 5, ln 15; Fig. 1 and 3</td> <td>1-10</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	US 2005/0161067 A1 (Hollins) 28 July 2005 (28.07.2005), entire document, especially para [0003]-[0005]; [0023]-[0024]; [0034]; Fig. 1 and 4	1-10	Y	US 5,349,975 A (Valdner) 27 September 1994 (27.11.1994), entire document, col 2, ln 6-30; Fig. 1	1-10	Y	US 2008/0235086 A1 (Ma) 25 September 2008 (25.09.2008), entire document, especially para [0026]; Fig. 1	4-8	Y	US 7,537,015 B1 (Molnar, IV et al) 26 May 2009 (26.05.2009), entire document, especially col 5, ln 46-53; col 8, ln 53-55; col 11, ln 2-20; Fig. 1 and 12-13	9-10	A	US 2004/0084071 A1 (Gray) 06 May 2004 (06.05.2004), entire document, especially para [0005]-[0014]; Fig. 1	1-10	A	US 5,868,152 A (Brown) 09 February 1999 (09.02.1999), entire document, especially col 3, ln 28 to col 5, ln 15; Fig. 1 and 3	1-10
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<p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/></p>																							
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<p>Date of the actual completion of the international search 04 April 2012 (04.04.2012)</p>		<p>Date of mailing of the international search report 23 APR 2012</p>																					
<p>Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201</p>		<p>Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774</p>																					