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(54) **COLD/HOT AIR RADIAL AND CIRCULATORY DELIVERY DEVICE**

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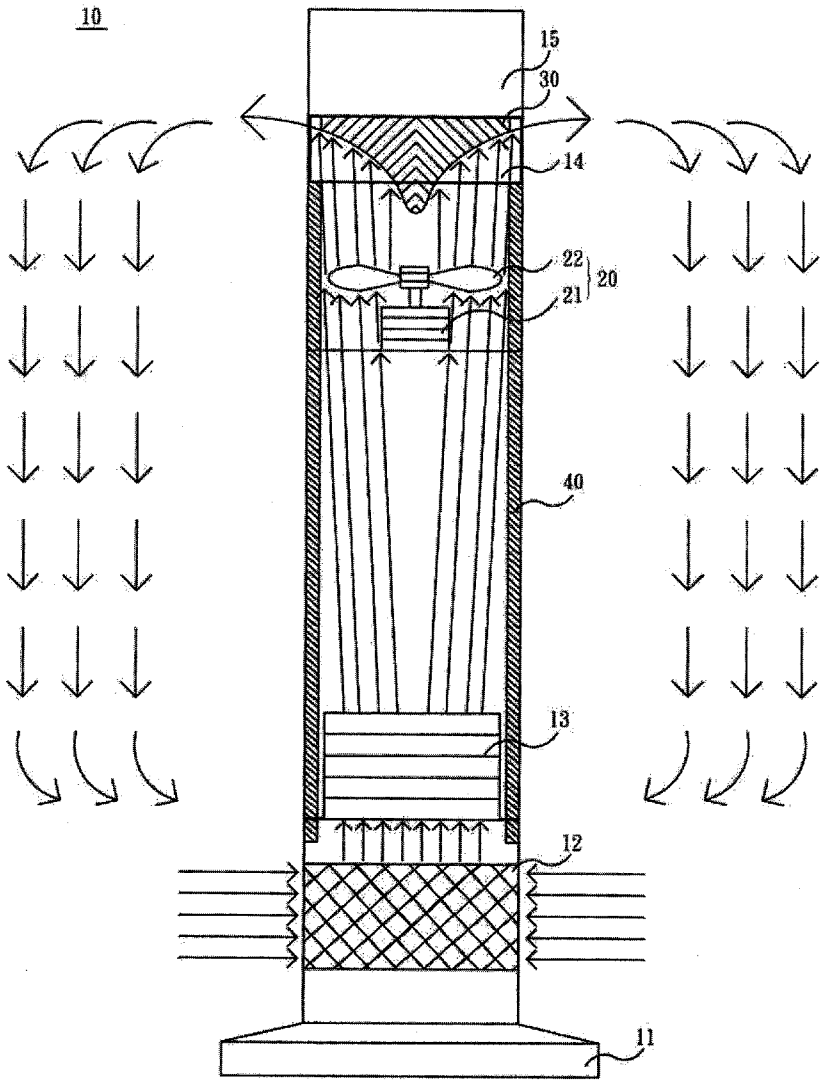
(57) **ABSTRACT**

A cold/hot air radial and circulatory delivery device, comprising a cylindrical shell, which comprises a base part, an air inlet part, a middle electromechanical gear, an airflow suction motor, an air outlet part, and a circuit distribution area. The base part is set under the cylindrical shell so as to erect the cylindrical shell on the ground. The middle electromechanical gear includes a cooling/heating apparatus. An airflow guiding plate is set on the airflow outlet, wherein the guiding plate is a cone whose center is concave, making the profile of the guiding plate form concave arcs surrounding the cone in a V-shape, whereby when the guiding plate is placed on the cylindrical shell, the cooled/heated air can smoothly blow forth radially in a wide angle, equalizing the ambient temperature effectively through circulating currents.



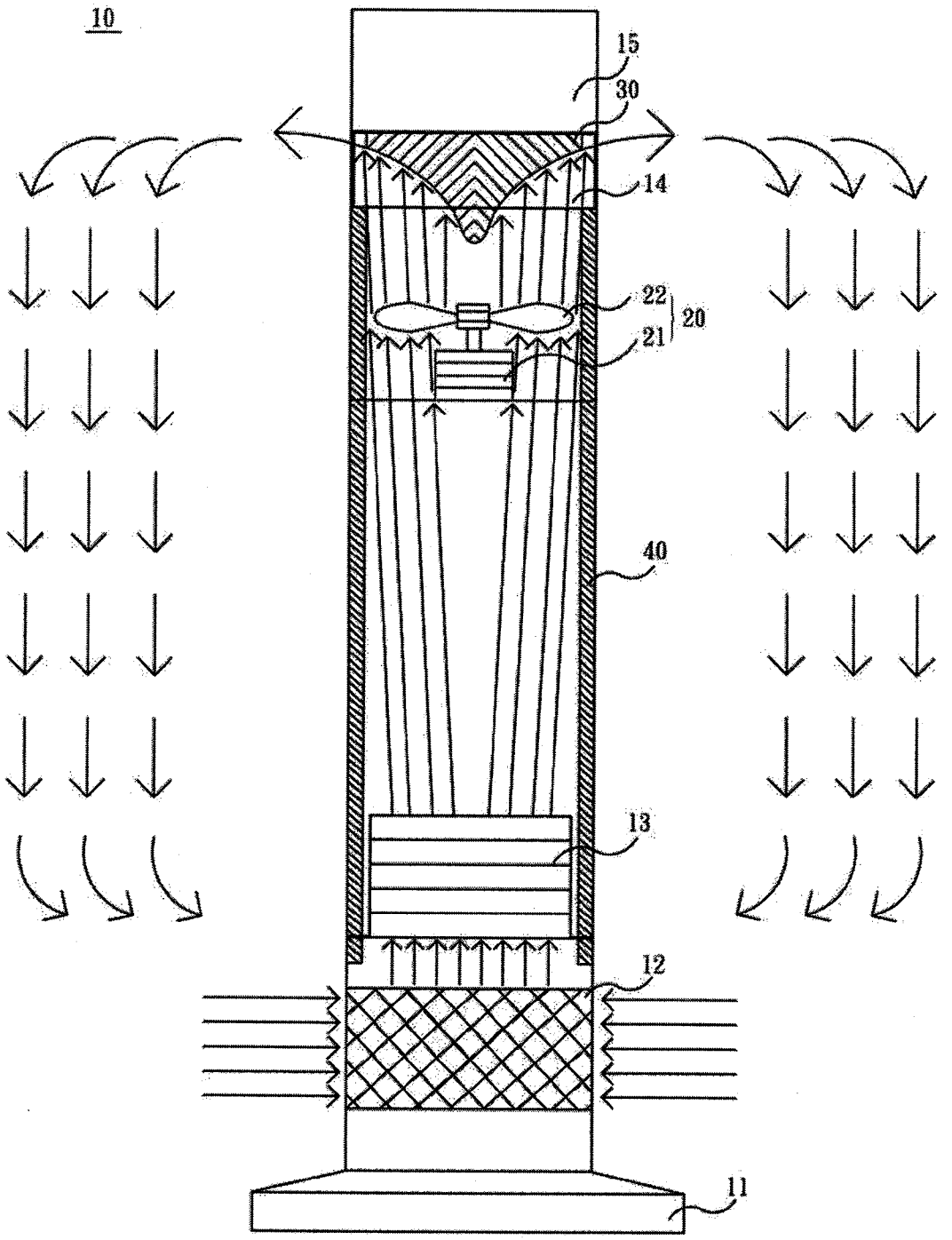


FIG. 1

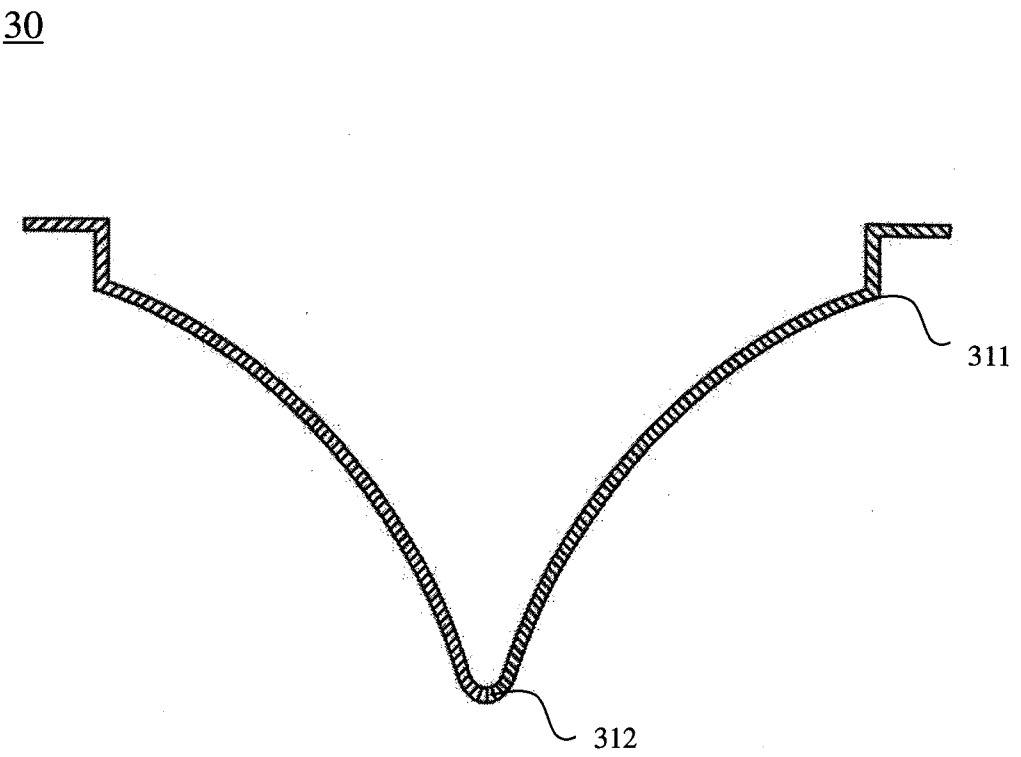


FIG. 2

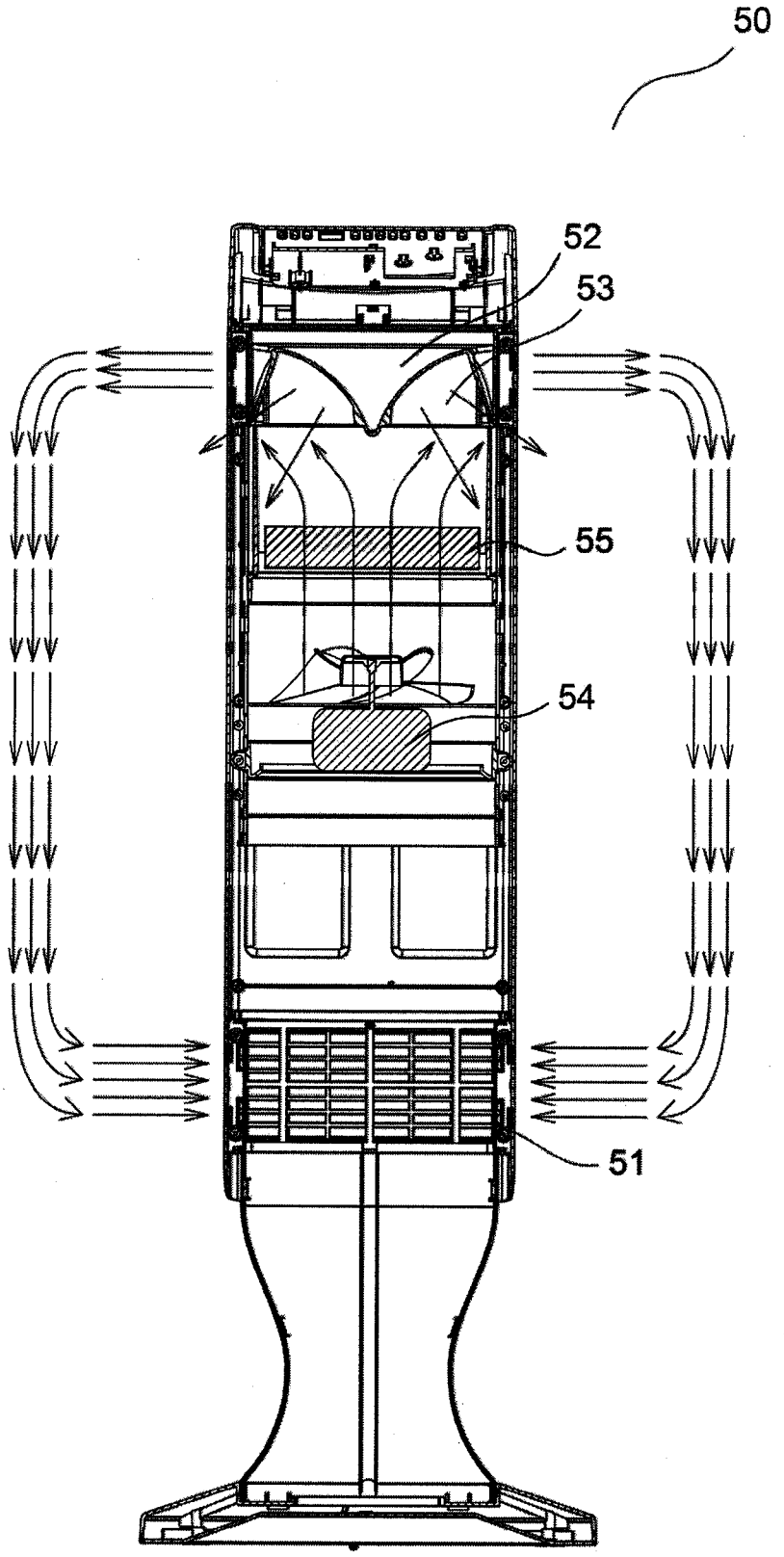


FIG. 3

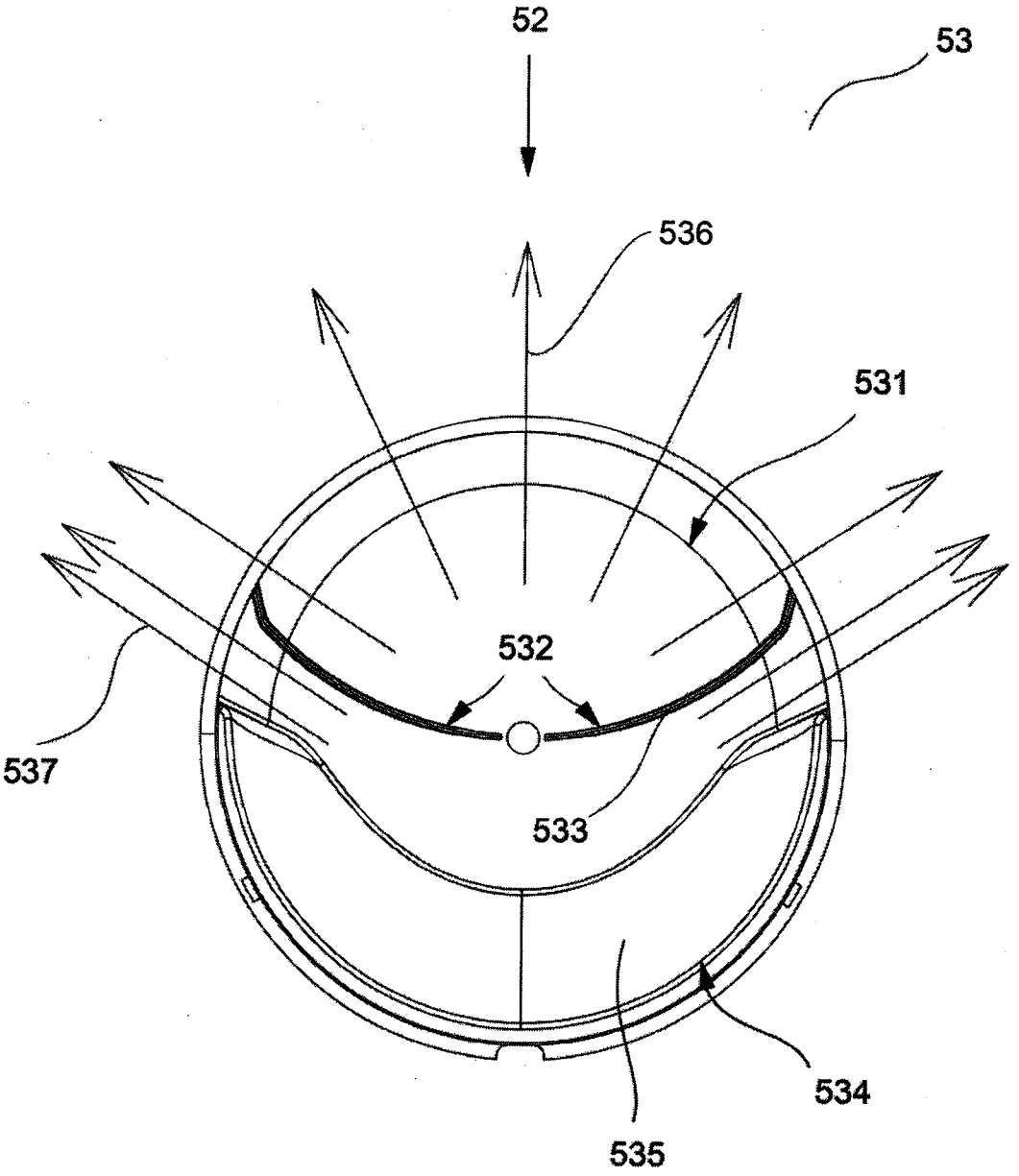


FIG. 4

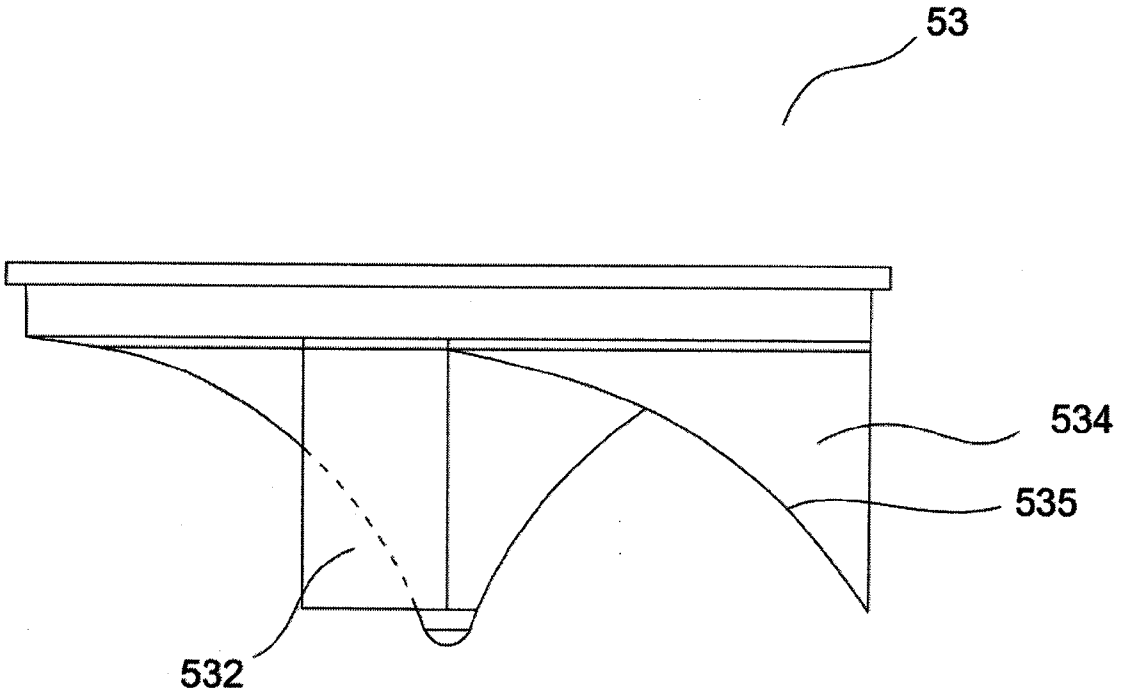


FIG. 5

COLD/HOT AIR RADIAL AND CIRCULATORY DELIVERY DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The present invention relates to a cold/hot air radial and circulatory delivery device, and more particularly to a cold/hot air radial and circulatory delivery device that can effectively equalize the indoor temperature.

[0003] 2. Description of Related Art

[0004] In accordance with purposes of industrial manufacture and improvement of comfort on medical and residential environment, air conditioners can be classified into heating or cooling equipment.

[0005] Currently, most pieces of heating equipment use radially transmitting ceramic heater, which heats its ceramic substrate through a conductor of high-voltage currents, and in turn transmits the heat to the medium around through radiation. However, since the effectiveness of radial heating is inversely proportional to distance, the longer the distance between the electric heater and the user is, the worse the effect of heating is. In addition, most ceramic heaters only have the heating function and are incapable of cooling.

[0006] Another option is the hot/cold air conditioner, which pressurizes the refrigerant to condense the air or heats the air by a heating module to raise/lower the room temperature. However, its drawback is that the pipe lines must be buried within the wall. It is not only the construction that costs a lot, the air conditioner itself is also quite expensive, making it rather inappropriate for household uses.

[0007] On the other hand, in hotels, office buildings, or senior housings, there is usually a central air conditioning system to adjust the temperature of each interior area individually. Its way of heating is to heat the incoming airflow through the steam generated by the boiler to increase the temperature. As for the cooling function, the system cools the air through a cooling tower by having the wind passing through the cooling water. However, this kind of equipment is expensive and energy-consuming. Besides, the central system might also have unnecessary space covered within (e.g. areas other than bedrooms during sleeping time).

[0008] Prior art such as Taiwan patent application No.100209092 reveals an improvement of electric heater structure, which combines a electric heater and an electric fan, putting the electric fan in an appropriate place below the electric heater. The wind of the electric fan can bring the heated air coming out of the electric heater to farther yonder to make the indoor space warm and comfortable. This structure can be applied to all kinds of electric heaters and also appliances of similar structure. However, the blowing surface of this structure is much cramped, and it cannot produce circulating airflows. Therefore, it is difficult to equalize temperature in each area of the space, leaving people away from the electric heater still in coldness.

[0009] To summarize, how to effectively use the wind generated by the fan and equalize the indoor temperature is the subject this invention orients to delve.

SUMMARY OF THE INVENTION

[0010] Therefore, in view of the defects of the above transmission cold/heat air device, the present inventor has invented an effective cold/hot air radial and circulatory delivery device to equalize the interior temperature.

[0011] The present invention relates to a cold/hot air radial and circulatory delivery device, comprising a cylindrical shell, which comprises a base part, an air inlet part, a middle electromechanical gear, an airflow suction motor, an air outlet part, and a circuit distribution area; wherein the base part is located at the lower end of the cylindrical shell, so as to erect the cylindrical shell on the ground; the middle electromechanical gear includes a cooling/heating apparatus to heat or cool the airflow coming in from the air inlet part, and an airflow guiding plate set on the airflow outlet, wherein the guiding plate is a cone whose center is concave, making the profile of the guiding plate form concave arcs surrounding the cone in a V-shape, whereby when the guiding plate is placed on the cylindrical shell, the cold/hot air pumped up by the airflow suction motor (or the air first pumped up by the airflow suction motor which then passes through the cooling/heating apparatus for cooling/heating) can smoothly blow forth radially in a wide angle through the curves of the guiding plate. In accordance with different embodiments of the present invention, the wide angle of the guiding plate ranges from about 180 to 360 degrees.

[0012] According to the cold/hot air radial and circulatory delivery device, the air inlet part under the cylindrical shell is formed as a circularity, and the air inlet part is set with at least one filter inside, which prevents foreign objects and insects from invading while also filtering the dust in the air to purifying the air.

[0013] According to the cold/hot air radial and circulatory delivery device, due to the arcs of the guiding plate caused by the concave center, the heated/cooled airflow can smoothly send forth radially in a wide angle to all directions from the air outlet part. With the coordination between the air outlet part and the suction of the air inlet part below, the surrounding air can circulate circulatoryly. Besides, because the suction of the airflow suction motor under the guiding plate sucks air in through the air inlet part, and the incoming air is in turn cooled/heated by the cooling/heating apparatus of the middle electromechanical gear, temperatures of the ambient air can be equalized through the circulation of the air.

[0014] According to the cold/hot air radial and circulatory delivery device, the cooling/heating apparatus can be adjusted to each user's need to be only configured with cooling apparatus and used as an electric fan in the summer, or to be only configured with heating apparatus and used as an electric heater in the winter, or rather to be configured with both the cooling and the heating apparatus so as to have both the functions of cooling and heating. When the apparatus functions as a cooling apparatus, it may include a plurality of cooling tubes and refrigerant is filled and circulated in the tubes to cool the passing airflow transmitted toward the air outlet part and had the airflow flow in a wide angle outward through the guiding plate. When the apparatus functions as a heating apparatus, it may be a ceramic heater to heat the passing airflow transmitted toward the air outlet part and had the airflow flow in a wide angle outward through the guiding plate. When the apparatus functions as an apparatus of both cooling and heating, it can be divided into an upper part and a lower part, wherein in the preferred embodiment the ceramic heater of the apparatus is set in the upper part while the cooling tubes are set in the lower part. In the cooling mode, the ceramic heater would cease from operation and the refrigerant would be filled and made flow in the cooling tubes for cooling. Likewise, in the heating mode, the cooling apparatus would cease from operation and only the ceramic heater

would function for heating. The reason for placing the ceramic heater on the upper part and the cooling tubes on the lower part is to prevent the hot air that would rise from the lower part if the ceramic heater is set therein from damaging the cooling tubes. If the ceramic heater is set beneath the cooling tubes, the hot air would rise and pass through the cooling tubes, bringing adverse effects to the cooling tubes and eventually damaging them in the long run. If the ceramic heater is set above the cooling tubes, when the ceramic heater is not in operation and only the cooling tubes are operating, the cooled air coming out of the cooling tubes would not bring any adverse effects to the ceramic heater as it passes through; therefore, this is a preferable arrangement. In the most preferable embodiment of the apparatus of both cooling and heating, the order of components of the ideal configuration would be respectively the cooling tubes, the suction motor, and the ceramic heater from bottom to top. This configuration can prevent the heated air from damaging the suction motor as it passes through the suction motor.

[0015] According to the cold/hot air radial and circulatory delivery device, the inner face of the cylindrical shell may be further set with an insulation layer between the cylindrical shell and the cooling/heating apparatus to prevent the cooled/heated air of the middle electromechanical gear from changing its temperature owing to the temperature outside the cylindrical shell. Moreover, the insulation layer can also ensure the exterior covering of the cylindrical shell of the cold/hot air radial and circulatory delivery device from the effects of the temperature outside.

[0016] According to the cold/hot air radial and circulatory delivery device, the circuit distribution area of the shell is set with a manipulative keyboard, to which a remote controller can also be attached. With a wireless signal receiver inside the manipulative keyboard, the cold/hot air radial and circulatory delivery device can be controlled remotely to perform different factions.

[0017] To sum up, the airflow of the cold/hot air radial and circulatory delivery device is sent forth outward in a wide angle (preferably 360 degrees) and turned slightly upward. With the coordination of cold/hot circulating airflows and the suction of the suction motor set beneath the airflow guiding plate of the air outlet part, the air around can be circulated circulatoryly and the ambient temperatures can therefore be equalized. In this way, the drawback of traditional electric fans and electric heaters of capable of performing only one function can be easily solved.

BRIEF DESCRIPTION OF THE FIGURES

[0018] FIG. **1** shows a schematic diagram of the cross sectional view of the structure of the first embodiment.

[0019] FIG. **2** shows a schematic diagram of the cross sectional view of the guiding plate of the first embodiment.

[0020] FIG. **3** shows a schematic diagram of the cross sectional view of the structure of the second embodiment.

[0021] FIG. **4** shows a schematic diagram of the guiding plate of the second embodiment.

[0022] FIG. **5** shows a schematic diagram of the lateral view of the guiding plate of the second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0023] In the following detailed description, only certain exemplary embodiments of the present invention are shown and described by way of illustration. As those skilled in the art would recognize, the described exemplary embodiments may be modified in various ways without departing from the spirit or scope of the present invention. Accordingly, the figures and descriptions are to be regarded as illustrative in nature rather than restrictive.

[0024] In the following embodiments of the present invention, it shall be clearly stated in advance that the words "upper" and "lower" correspond to the upper direction and lower direction in the figures.

[0025] Referring to FIG. **1**, FIG. **1** shows a cross sectional view of the first embodiment. As the figure shows, the present invention provides a cold/hot air radial and circulatory delivery device, comprising a cylindrical shell (**10**), which comprises a base part (**11**), an air inlet part (**12**), a middle electromechanical gear (**13**), an airflow suction motor (**20**), an air outlet part (**14**), and a circuit distribution area (**15**). The base part (**11**) is set under the cylindrical shell (**10**) so as to erect the cylindrical shell (**10**) on the ground. The middle electromechanical gear (**13**) includes a cooling/heating apparatus to cool/heat the air coming in from the air inlet part. An airflow guiding plate (**30**) is set on the air outlet part (**14**); the guiding plate (**30**) is a cone whose center is concave, making the profile of the guiding plate form concave arcs surrounding the cone in a V-shape, whereby when the guiding plate (**30**) is placed on the cylindrical shell (**10**), the cold/hot air pumped up by the airflow suction motor (**20**) can smoothly blow forth radially in an angle of 360 degrees through the curves of the guiding plate (**30**).

[0026] Also referring to FIG. **2**, the term "guiding plate is a cone whose center is concave" means that the guiding plate (**30**) is a disk whose center is extending toward the suction motor (**20**). Based on the structure, the circular frame (**311**) of the guiding plate (**30**) tapers off inward and downward toward the center of the guiding plate (**312**).

[0027] The term "lower side of the guiding plate" signifies the side of the guiding plate that faces the suction motor (**20**).

[0028] More specifically, the air inlet part (**12**), the middle electromechanical gear (**13**), and the radial air outlet part (**14**) are mutually interlinked. The base part (**11**) is set under the cylindrical shell (**10**) so as to erect the cylindrical shell (**10**) on a plane (such as the ground or the platform shown in FIG. **1**). And the outer diameter of the base part (**11**) is longer than the outer diameter of the cylindrical shell (**10**), whereby heavy materials can be put in the shell to stabilize the device and keep it on the plane without tipping over.

[0029] The suction motor (**20**) of the present invention is located between the middle electromechanical gear (**13**) and the air outlet part (**14**) in the cylindrical shell (**10**), providing a force (suction) to suck slowly the air around the air inlet part (**12**) into the cylindrical shell (**10**) and making the incoming air pass through the middle electromechanical gear (**13**) to be cooled/heated and transmitted toward the air outlet part (**14**). The advantage of this design is that the suction motor (**20**) is set in the upper part, so when the airflow passes through the cooling/heating apparatus, because the amount of incoming air is greater than the amount of air that passes through the cooling/heating apparatus, there are less noises generated from the windward side under the cooling/heating apparatus. The structure and the suction capacity of the suction motor (**20**) are not limited in the present invention, which only exemplifies in the description, but should accord to the actual requirement of the implementation which those skilled in the prior art are familiar with. In the present embodiment, the suction motor (**20**) comprises a motor (**21**) and a fan (**22**),

wherein the motor (**21**) leads the fan (**22**) to rotate and thereby sucks the air around into the cylindrical shell (**10**).

[0030] The cooling/heating apparatus (not shown in the figure) is set in the middle electromechanical gear (**13**) of the cylindrical shell (**10**). The apparatus may include a plurality of cooling tubes and/or a ceramic heater which spread around the electromechanical gear (**13**) in a certain density to cool/heat the air that passes through the tubes/ceramic heater and have it transmitted to the radial air outlet part (**14**) above. As for the operation mechanism of the cooling/heating apparatus, it is not limited in the present invention. As an example, when the apparatus is functioning as a cooling apparatus, refrigerant is filled and made flow in the tubes to cool the passing airflow and transmit it to the air outlet part (**14**) which in turn sends the airflow forth outward and upward through the guiding plate (**30**) in an angle of 360 degrees. When the apparatus is functioning as a heating apparatus, the ceramic heater heats the passing airflow and transmit it to the air outlet part (**14**) to blow outward through the guiding plate (**30**) in an angle of 360 degrees. When the apparatus functions as an apparatus of both cooling and heating, the apparatus can be divided into an upper part and a lower part, wherein the upper part is the ceramic heater and the lower part are the cooling tubes. In the cooling mode, the ceramic heater would cease from operation and the refrigerant would be filled and made flow in the cooling tubes for cooling. Likewise, in the heating mode, the cooling apparatus would cease from operation and only the ceramic heater would function for heating.

[0031] Besides, there is a suction motor (**20**) installed between the middle electromechanical gear (**13**) and the air outlet part (**14**) in the cylindrical shell (**10**) to suck the air into the cylindrical shell (**10**) through the air inlet part (**12**). To make the air smoothly flow into the cylindrical shell (**10**) through the air inlet part (**12**), the air inlet part (**12**) is circular wherein a filter can be set inside to prevent foreign objects and insects from invading while also filtering the dust in the air, purifying the air sucked in by the cold/hot air radial and circulatory delivery device and then sending forth clean air through the air outlet part.

[0032] In addition, in the cold/hot air radial and circulatory delivery device of the present invention, an insulation layer (**40**) can be further set within the cylindrical shell (**10**) so that the cooled/heated air of the middle electromechanical gear (**13**) would not change its temperature due to heat conduction of circulating airflows when it reaches the air outlet part (**14**). Moreover, the insulation layer (**40**) can also ensure the cylindrical shell (**10**) of the cold/hot air radial and circulatory delivery device from hurting users due to extremely high/low temperature.

[0033] The circuit distribution area (**15**) is set on the top of the shell of the present invention, wherein a removable manipulative keyboard (unshown in the figure) can be set. A wireless signal transmitter can be installed inside the manipulative keyboard while a wireless signal receiver is set within the circuit distribution area (**15**). In this way, when the manipulative keyboard is installed in the circuit distribution area (**15**), users can manually input operating instructions like turning on, turning off, airflow adjusting, switching to cooling or heating mode, and timing to have the apparatus perform different functions. And when the manipulative keyboard is removed from the circuit distribution area (**15**), users can remotely control the functions through the wireless signal transmitter inside the manipulative keyboard that transmits signals to the wireless signal receiver in the circuit distribution area (**15**).

[0034] In actual operation, first, the user has to turn on the apparatus through the manipulative keyboard to start the suction motor (**20**) working, which then sucks the air around the cylindrical shell (**10**) in through the air inlet part (**12**) and has it pass through the cooling/heating apparatus (cooling tubes/ceramic heater) of the middle electromechanical gear (**13**) to be cooled/heated. Then, as the suction motor (**20**) keeps operating, the cooled/heated air would be delivered to the air outlet part (**14**) and pass through the guiding plate (**30**) set in the area, blowing outward through the arcs of the circular frame of the guiding plate that can guide airflows to 360 degrees and becoming a radial airflow. With the circulating currents generated by the continual suction of air through the air inlet part (**12**) set in the lower part of the device, the cooling/heating of air through the middle electromechanical gear (**13**), and the blowing forth of the cooled/heated air through the guiding plate (**30**) of the air outlet part (**14**) in 360 degrees, the ambient temperature can be easily equalized, which effectively resolve the problem of traditional electric fans and electric heaters as theirs effects being too partial and too narrow. Above is the first embodiment of the present invention, and because its guiding plate (**30**) sends the cooled/heated air outward in 360 degrees, it is better to be put near the center of a space.

[0035] Please refer to FIG. **3** and FIG. **5**, which show respectively a cross sectional view and a schematic diagram of the guiding plate of the second embodiment. As the figures show, the differences between the first and the second embodiment are the designs of the guiding plate (**53**), the air outlet part (**52**), and the air inlet part (**51**) as well as the placement of the middle electromechanical gear (**55**); the other parts that are identical would be spared of repeating here. Referring to FIG. **3**, in the present embodiment, the air inlet part (**51**) is set exactly under the air outlet part (**52**), and the opening angle of the air inlet part (**51**) and the air outlet part (**52**) are exactly the same so as to correspond with each other in the circulation of currents. In view of the fact that all noises of wind shear are generated from the windward side (including the windward side of both the electric fan and the guiding plate), to increase the wind pressure of outputting wind while simultaneously decreasing noises of the windward side, it is better to have the area of the air inlet part (**51**) larger than the area of air outlet part (**52**). More specifically, when the area of air inlet part (**51**) is one and a half time larger than the area of air input (**52**), the effect will be most significant.

[0036] In the second embodiment, in order to equalize the intensity of wind, to avoid the problem of having the airflow concentrated solely frontward, and to coordinate with the types of apparatuses that can be set at borders, the airflow only blow outward to the front, the left and the right in 180 degrees. As shown in FIG. **4** and FIG. **5**, the V-shape of the present invention includes a windward side (**531**) for receiving the pumped cold/hot air from the suction motor and an air outlet part (**52**) set beside the windward side (**531**). To guide the airflow to both sides of the air outlet part (**14**), there are two main wind boards (**532**) extending from the center of the windward side (**531**) toward the two sides of the air outlet part (**52**) respectively, and a minor wind board (**534**) is set on the windward side (**531**) opposite to the air outlet part (**52**). The main wind boards (**531**) and the windward side (**531**) collec-

tively form a first guiding trail (**536**) that channels the cold/hot air downward to the air outlet part (**52**) and makes the air blow outward to the front. On the other hand, the minor wind board (**534**) and the windward side (**531**) collectively form a second guiding trail (**537**) that channels the cold/hot air downward to the air outlet part (**14**) and makes the air blow outward to both sides of the air outlet part (**52**). To reduce the noises of wind shear and to avoid the turbulences generated from the air resistance, the main wind board (**532**) has an arc surface (**533**) that guides cold/hot air to abate the friction between the airflow and the surface of main wind boards (**532**). Likewise, the minor wind board (**534**) also has an arc surface (**535**) to abate the friction among the pumped cold/hot air, the windward surface (**531**), and the minor wind board (**534**), reducing the noises of wind shear as well as avoiding the turbulences of airflow by reducing the air resistance.

[0037] Moreover, to prevent the heat radiation and hot wind generated by the heating device of the electromechanical apparatus (**55**) from hindering the operation of the suction motor (**54**), the middle electromechanical gear (**55**) is set above the suction motor (**54**) in the present embodiment. When the air flows in, it would first pass through the suction motor (**54**) by whose guidance it later turns upward and passes through the middle electromechanical gear (**55**) to be heated, after which it is then sent forth through the guiding plate (**53**). This structure can prevent the suction motor (**54**) from being damaged by high temperature.

[0038] While the present invention has been elaborated by exemplifying certain preferred embodiments, it is not to be limited to the disclosed embodiments. On the contrary, it is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims and equivalents thereof.

What is claimed is:

1. A cold/hot air radial and circulatory delivery device, comprising:

a cylindrical shell, which comprises a base part, an air inlet part, a middle electromechanical gear, an air suction motor, an air outlet part, and a circuit distribution area;

wherein, the base part is located at the lower end of the cylindrical shell, so as to erect the cylindrical shell from the ground;

the middle electromechanical gear includes a cooling/heating apparatus to heat or cool an airflow coming in from the air inlet part; and

an airflow guiding plate set on the air outlet part, wherein the guiding plate is a cone whose center is concave, making the profile of the guiding plate form concave arcs surrounding of the cone in a V-shape, whereby when the guiding plate is placed on the cylindrical shell, the cold/hot air pumped up by the airflow suction motor can smoothly blow forth radially upward through the curves of the guiding plate in an angle of 360 degrees.

2. The delivery device of claim **1**, wherein the air inlet part under the cylindrical shell is circular.

3. The delivery device of claim **1**, wherein the air inlet part is set with a filter.

4. The delivery device of claim **1**, wherein the circuit distribution area is set with a manipulative keyboard.

5. The delivery device of claim **4**, wherein the manipulative keyboard includes a wireless signal transmitter while a wireless signal receiver is installed in the circuit distribution area.

6. The delivery device of claim **1**, wherein the cylindrical shell further comprises an insulation layer set around the inner side of the cylindrical shell.

7. The delivery device of claim **1**, wherein the V-shape structure comprises a windward side set beside the air outlet part that receives the cold/hot air pumped up by the airflow suction motor, two main wind boards set on the windward side extending from the windward side to both sides of the air outlet part, and a minor wind board set on the windward side opposite to the air outlet part; the main wind boards and the windward side collectively form a first guiding trail that channels the cold/hot air downward to the air outlet part and makes the air blow outward to the front; the minor wind board and the windward side collectively form a second guiding trail that channels the cold/hot air downward to the air outlet part and makes the air blow outward to both sides of the air outlet part.

8. The delivery device of claim **7**, wherein the first wind board has an arc surface.

9. The delivery device of claim **7**, wherein the main wind board extend from the center of the windward side to both sides of the air outlet part in the V-shape structure.

10. The delivery device of claim **7**, wherein the air inlet part is set exactly beneath the air outlet part.

11. The delivery device of claim **7**, wherein the air inlet part and the air outlet part have the same opening angle.

12. The delivery device of claim **7**, wherein the area of the air inlet part is 1.5 times larger than the area of the air outlet part.

13. The delivery device of claim **7**, wherein the minor wind board has an arc surface that corresponds to the pumped cold/hot air.

* * * * *