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(54) Power saving and energy storage device for electric fan

(57) A power saving and energy storage device for an electric fan comprises an electric fan having a DC motor; at least one power generator module; and at least one electric storage unit. A shaft penetrates the DC motor, is connected with blades at one end and has an installation member at another end. The DC motor drives the shaft to rotate the blades. The power generator module is arranged in the installation member and includes a three-phase electric generation coil penetrated by the installation member and attached to the sidewall of the DC motor and a magnet ring arranged in the shaft and surrounds the three-phase electric generation coil. The rotating shaft drives the magnet ring to induce an alternating electromotive force in the three-phase electric generation coil. The electric storage unit receives and stores the alternating electromotive force. Thereby is recycled mechanical energy of the electric fan.

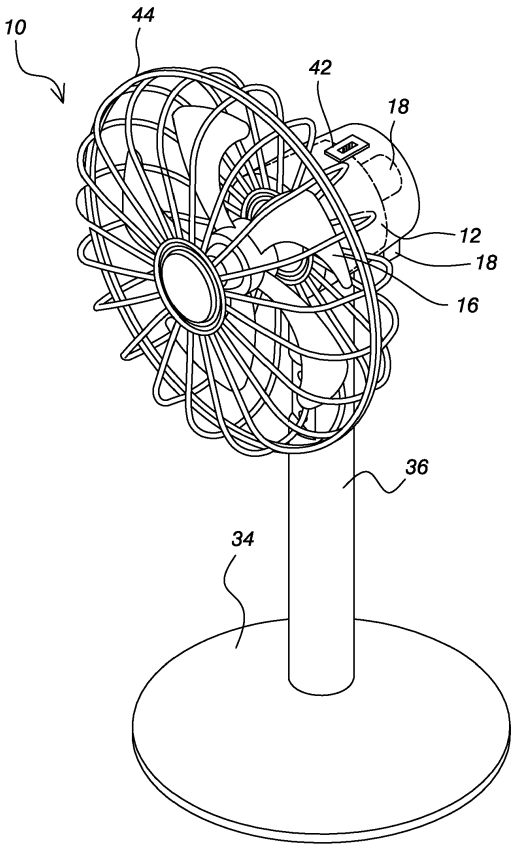

Fig. 1

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Description

[0001] This application claims priority for Taiwan patent application no. 102142991 filed at November 26, 2013, the content of which is incorporated by reference in its entirely.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a device for an electric fan, particularly to a power saving and energy storage device able to recycle energy from an electric fan.

Description of the Related Art

[0003] In the current electric fans, the motor thereof is driven by commercial power to generate mechanical energy for rotating the fan blades. However, there has not yet been any technology or device to recycle the mechanical energy generated by the motor. Therefore, much mechanical energy is wasted in operation of electric fans.

[0004] In summer, the electric fan is the most frequently used household electric device. However, the conventional electric fan technology does not pay attention to recycling mechanical energy but only addresses using electricity to drive electric fans. Owing to the global warming awareness and fast energy price inflation, people are highly concerned about how to save energy and reduce carbon emission, and many organizations encourage renewable energy. If there is a device able to recycle the energy of the electric fans, energy consumption and expenditure should be obviously reduced.

[0005] Accordingly, the present invention proposes a power saving and energy storage device for an electric fan to overcome the abovementioned problems.

SUMMARY OF THE INVENTION

[0006] The primary objective of the present invention is to provide a power saving and energy storage device for an electric fan, which recycles the mechanical energy of the blades of the electric fans to generate electric energy and stores the electric energy, whereby the mechanical energy of the fan blades is recycled to obtain regenerated electric energy.

[0007] Another objective of the present invention is to provide a power saving and energy storage device for an electric fan, wherein the electric fan is swiveled to provide air flows for all the users around the electric fan.

[0008] To achieve the abovementioned objectives, the present invention proposes a power saving and energy storage device for an electric fan, which comprises an electric fan, a power generator module, and an electric storage unit arranged inside the electric fan. The electric fan includes a DC (Direct Current) motor. The DC motor has a first shaft penetrating the DC motor. One end of the first shaft is connected with blades. The DC motor drives the first shaft to rotate the blades. The other end of the first shaft has an installation member where the power generator module is mounted. The power generator module includes a three-phase electric generation coil and a magnet ring. The three-phase electric generation coil is penetrated by the installation member and attached to the sidewall of the DC motor. The magnet ring is arranged in the first shaft and surrounds the three-phase electric generation coil. While the first shaft rotates, the magnet ring also rotates. Thus, the magnetic field of the magnet ring induces an alternating electromotive force in the three-phase electric generation coil. Then, the electromotive force is sent to the electric storage unit inside the electric fan and stored as electric energy therein.

[0009] Below, the embodiments are described in detail to make easily understood the objectives, technical contents, characteristics and accomplishments of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig.1 is a perspective view schematically showing a power saving and energy storage device for an electric fan according to one embodiment of the present invention;

Fig.2 is an exploded view schematically showing a power saving and energy storage device for an electric fan according to one embodiment of the present invention;

Fig.3 is a block diagram schematically showing the circuit of a power saving and energy storage device for an electric fan according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Refer to Figs.1-3. In a first embodiment, the power saving and energy storage device for an electric fan of the present invention comprises an electric fan 10, a power generator module 18, and an electric storage unit 28 arranged inside the electric fan 10. The electric fan 10 includes a DC (Direct Current) motor 12. The DC motor 12 has a first shaft 14 penetrating the DC motor 12. One end of the first shaft 14 is connected with blades 16 of the electric fan 10. The DC motor 12 drives the first shaft 14 to rotate the blades 16. A protection cover 44 covers the blades 16 and protects the user from being hit by the blades 16. The other end of the first shaft 14 has an installation member 142 where the power generator module 18 is mounted. The power generator module 18 includes a three-phase electric generation coil 22 and a magnet ring 24. The three-phase electric generation coil 22 is penetrated by the installation member 142 and

attached to the sidewall of the DC motor 12 lest the three-phase electric generation coil 22 rotate with the first shaft 14. The magnet ring 24 surrounds the three-phase electric generation coil 22. A magnet ring seat 25 is arranged in the first shaft 14 and fixes the magnet ring 24 to the first shaft 14, whereby the magnet ring 24 rotates together with the first shaft 14. While the first shaft 14 rotates, the magnet ring 24 also rotates, and the magnetic field of the magnet ring 24 induces an alternating electromotive force in the three-phase electric generation coil 22. The electric storage unit 28 is electrically connected with a rectifier 30. The rectifier 30 is further electrically connected with the three-phase electric generation coil 22, receiving the alternating electromotive force and outputting a DC electric energy to the electric storage unit 28. The electric storage unit 28 is electrically connected with a sensor 32 which can measure the quantity of electricity in the electric storage unit 28. In a second embodiment, an additional power generator module 18 is further arranged in the other end of the shaft 14, i.e. the end where the blades 14 are mounted, to increase the efficiency of power generation. The mechanical structure and circuit layout of the second embodiment are the same as the first embodiment and will not repeat herein. In one embodiment, the electric fan 10 is in form of a box fan. In one embodiment, the electric fan 10 is used to drive a wind power generator.

[0012] In the first embodiment, the electric fan 10 is exemplified by a standing fan and thus further comprises a base 34, a pole 36 standing on the base 34, and a synchronous DC motor 38. The synchronous DC motor 38 is mounted on the top of the pole 36 via a second shaft 50 that is fixed to the pole 36. The synchronous motor 38 is also coupled to the DC motor 12 via a coupling element 52. While the synchronous DC motor 38 rotates, it intends to rotate the second shaft 50. However, the second shaft 50 is fixed to the pole 36. Thus, the synchronous DC motor 38 itself and the DC motor 12 that is coupled to the synchronous DC motor 38 rotate. Thereby, the DC motor 12 swivels 360 degrees, and the blades 10 sends air flows to all the users around the electric fan 10. Refer to Figs.1-3 again. In the first embodiment, the electric fan 10 includes a power supply socket 42 electrically connected with the electric storage unit 28, whereby the electric storage unit 28 can send electric energy to the power supply socket 42. In one embodiment, the power supply socket 42 is a USB (Universal Serial Bus) socket. The power supply socket 42 can cooperate with different types of USB adaptors to charge or supply power to different types of electric devices. In the first embodiment, the power supply socket 42 is arranged on the electric fan 10. In the present invention, the power supply socket 42 may be in other forms. In one embodiment, the power supply socket 42, together with the insulated wire, hangs outside the electric fan 10, cooperating with different types of USB adaptors to charge or supply power to different types of electric devices.

[0013] Refer to Fig.3. In the first embodiment, the present invention further comprises a switching device 48. The switching device 48 is electrically connected with the DC motor 12, the synchronous DC motor 38, the commercial power supply 40 and the electric storage unit 28, switching the electric connection of the DC motor 12 between the commercial power supply 40 and the electric storage unit 28. Thereby, the switching device 48 can switch the DC motor 12 to be powered by the commercial power supply 40 or the electric storage unit 28. The user can use the switching device 48 to switch the DC motor 12 to be disconnected from the commercial power supply 40 and directly powered by the electric storage unit 28. While the electric storage unit 28 that is powering the DC motor 12 is insufficient to drive the DC motor 12, the user can use the switching device 48 to switch the DC motor 12 to be powered by the commercial power supply 40 again. The switching device 48 can also switch the synchronous DC motor 38 in the same way. The user can use the switching device 48 to switch the synchronous DC motor 38 to be disconnected from the commercial power supply 40 and powered by the electric storage unit 28. While the electric storage unit 28 that is powering the synchronous DC motor 38 is insufficient to drive the synchronous DC motor 38, the user can use the switching device 48 to switch the synchronous DC motor 38 to be powered by the commercial power supply 40 again.

[0014] In the abovementioned embodiments, the three-phase electric generation coil 22 and the magnet ring 24 convert the mechanical energy output by the DC motor 12 into electric energy. The electric storage unit 28 stores the electric energy and supplies the stored electric energy to the intended devices. Thereby, energy is recycled, and the objective of environmental protection is achieved. In conclusion, the present invention can effectively utilize the mechanical energy rotating the blades to generate electric energy and store the electric energy. Further, the electric fan of the present invention is swiveled to provide air flows for all the users around the electric fan.

[0015] The embodiments described above are only to exemplify the present invention but not to limit the scope of the present invention. Any equivalent modification or variation according to the characteristic or spirit of the present invention is to be also included within the scope of the present invention.

Claims

1. A power saving and energy storage device for an electric fan, comprising
   an electric fan having a direct current motor therein-side, wherein said direct current motor has a first shaft penetrating said direct current motor, connected with blades at one end thereof and having an installation member at another end thereof, and wherein said direct current motor drives said first shaft to rotate said blades;

at least one power generator module arranged in said installation member of said first shaft and each including a three-phase electric generation coil and a magnet ring, and wherein said three-phase electric generation coil is penetrated by said installation member and attached to a sidewall of said direct current motor, and wherein said magnet ring is arranged in said first shaft and surrounds said three-phase electric generation coil, and wherein said first shaft is driven to rotate said magnet ring, and a magnetic field of said magnet ring induces an alternating electromotive force in said three-phase electric generation coil; and

at least one electric storage unit arranged inside said electric fan, electrically connected with said three-phase electric generation coil, receiving said alternating electromotive force and storing said alternating electromotive force as electric energy.

2. The power saving and energy storage device for an electric fan according to claim 1, wherein said electric fan includes

a base with a pole standing thereon; and

a synchronous direct current motor arranged in a top of said pole, coupled to said direct current motor, electrically connected with said electric storage unit or a commercial power supply, and having a second shaft connected with said pole, wherein while said synchronous direct current motor is powered by said electric storage unit or said commercial power supply to drive said second shaft, said direct current motor is swiveled.

3. The power saving and energy storage device for an electric fan according to claim 2, wherein said synchronous direct current motor includes a fixing element coupling said synchronous direct current motor to said direct current motor.

4. The power saving and energy storage device for an electric fan according to claim 1, wherein said power generator module further includes a magnet ring seat arranged in said magnet ring and fixing said magnet ring to said first shaft.

5. The power saving and energy storage device for an electric fan according to claim 1, wherein said electric fan has a protection cover covering said blades.

6. The power saving and energy storage device for an electric fan according to claim 2 further comprising a power supply socket electrically connected with said electric storage unit and receiving said electric energy from said electric storage unit.

7. The power saving and energy storage device for an electric fan according to claim 1 further comprising a rectifier electrically connected with said three-phase electric generation coil and said electric storage unit, receiving said alternating electromotive force, and outputting direct current electric energy to said electric storage unit.

8. The power saving and energy storage device for an electric fan according to claim 1 further comprising a sensor electrically connected with said electric storage unit and measuring a quantity of electricity of said electric storage unit.

9. The power saving and energy storage device for an electric fan according to claim 1 further comprising a switching device electrically connected with a commercial power supply, said direct current motor and said electric storage unit, and switching electric connection of said direct current motor between said commercial power supply and said electric storage unit.

10. the power saving and energy storage device for an electric fan according to claim 2 further comprising a switching device electrically connected with said commercial power supply, said direct current motor and said electric storage unit, and switching electric connection of said synchronous direct current motor between said commercial power supply and said electric storage unit.

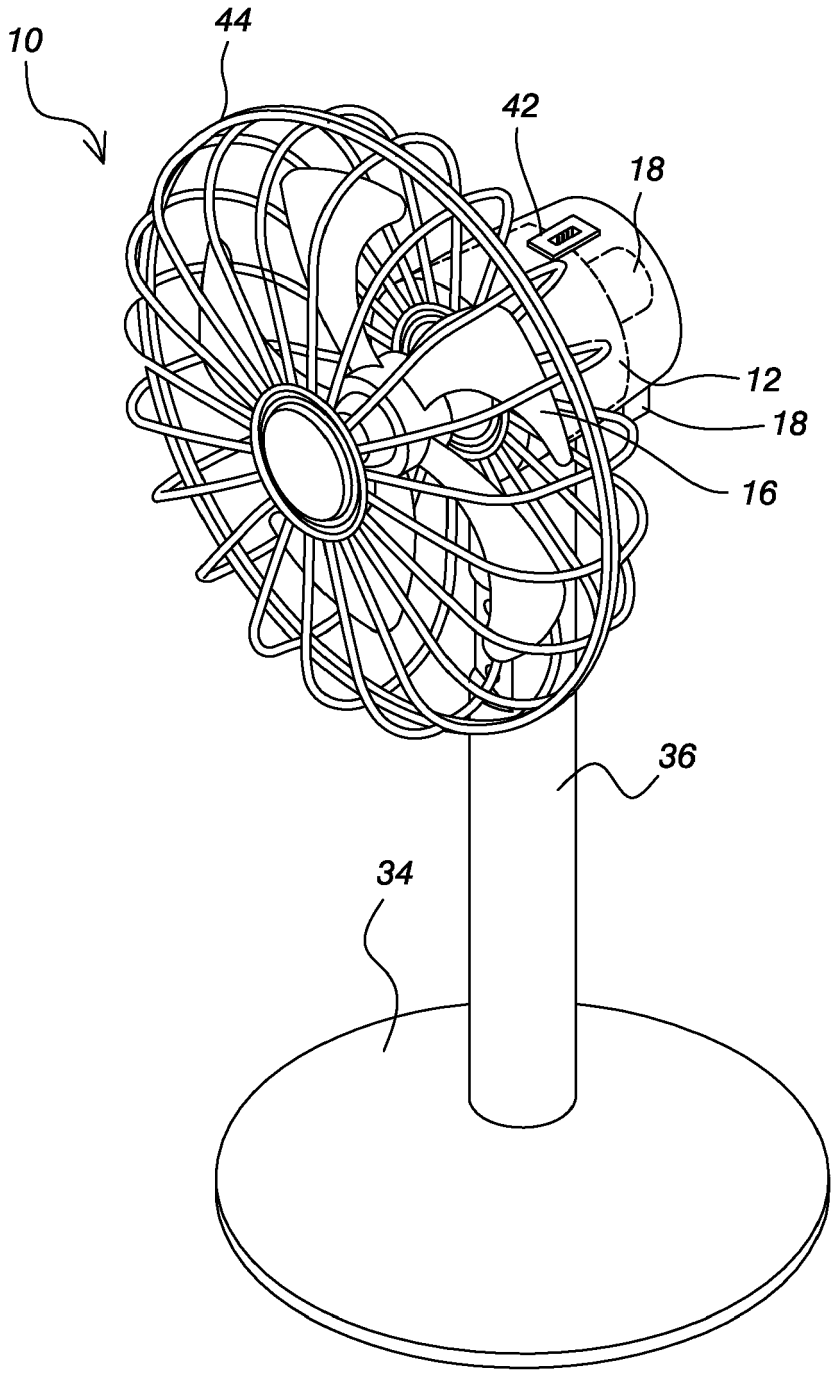

Fig. 1

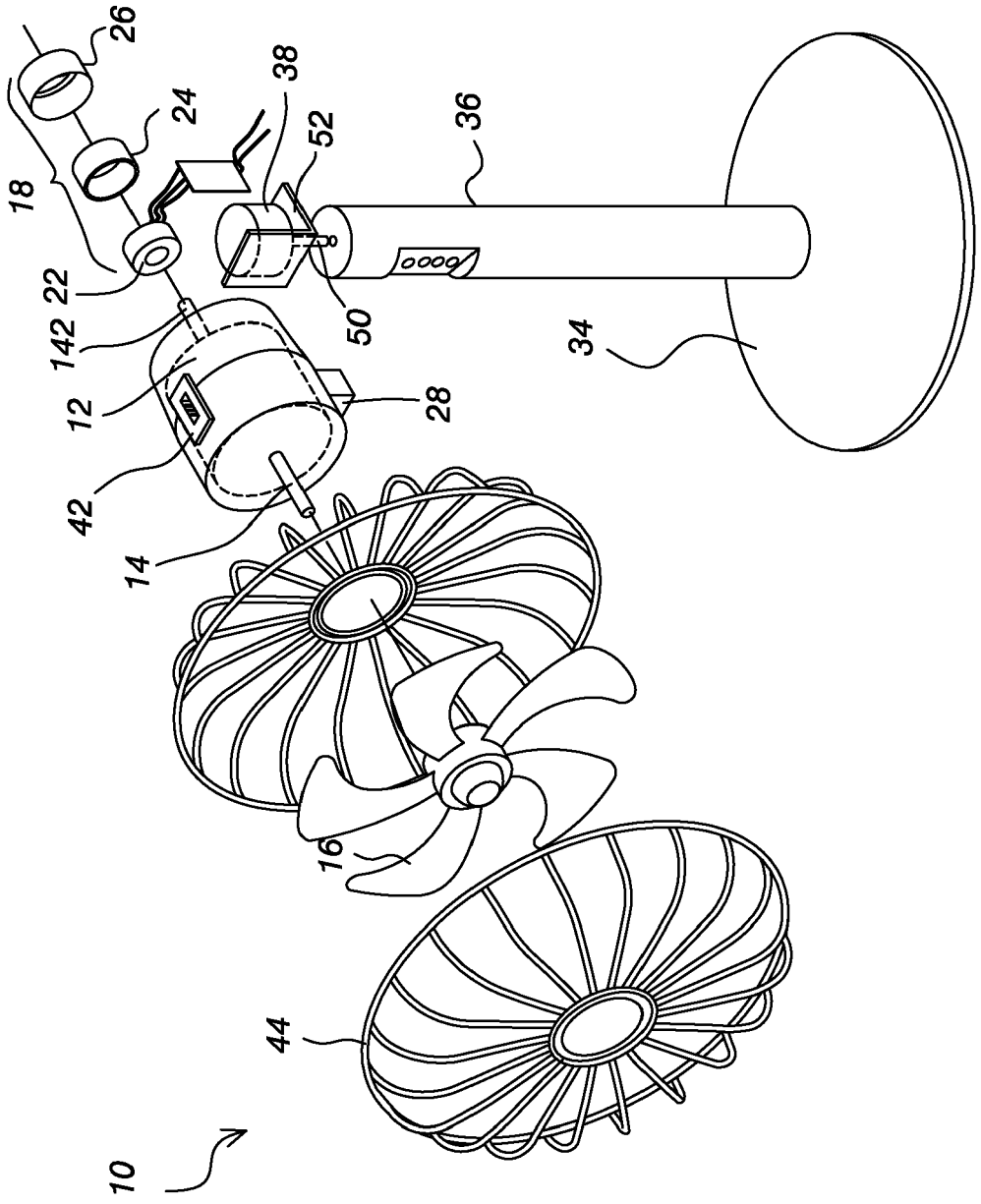

Fig. 2

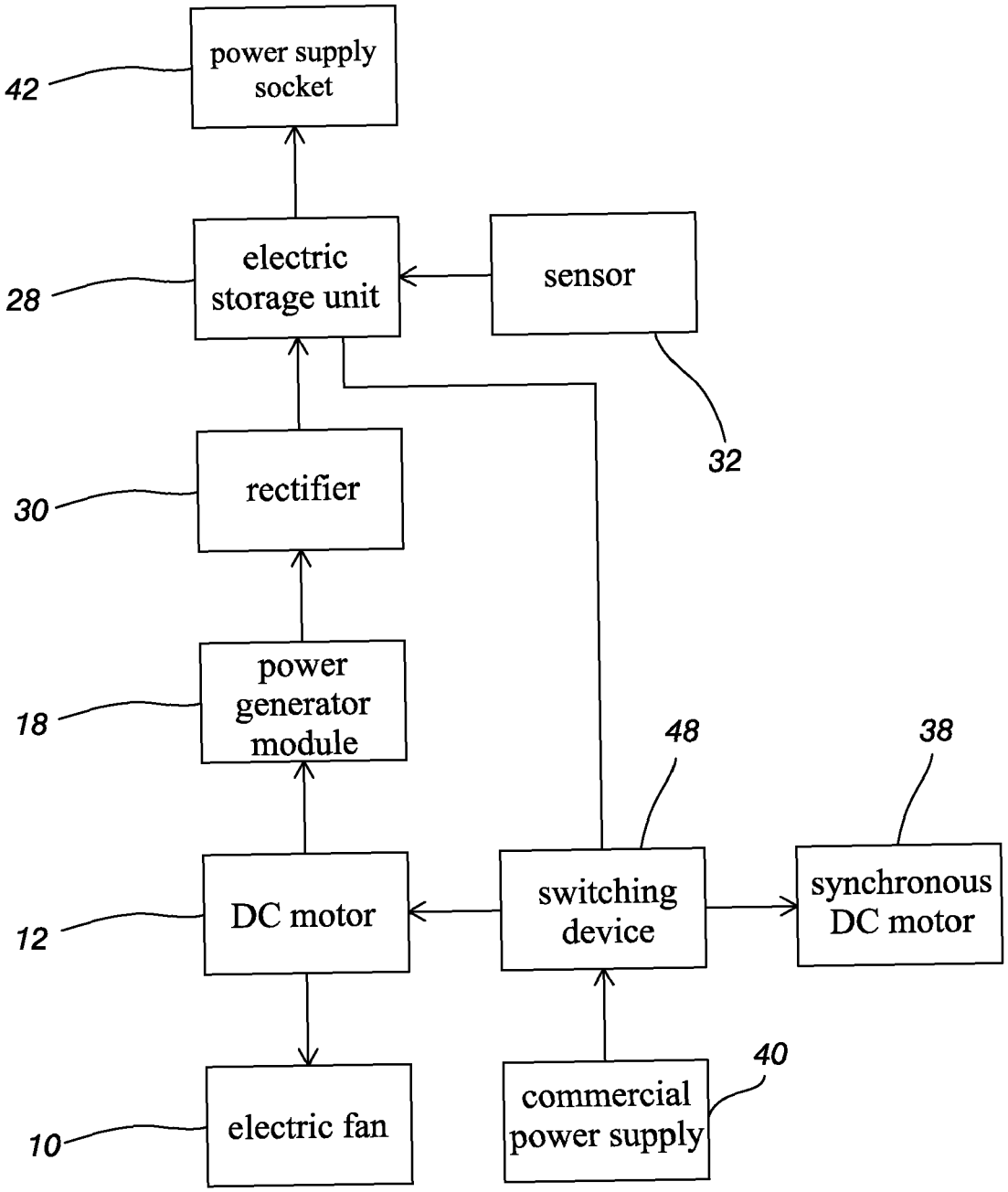
power supply socket
42
electric storage unit
28
sensor
32
rectifier
30
power generator module
18
48
38
DC motor
12
switching device
synchronous DC motor
electric fan
10
commercial power supply
40

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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