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(54) **CONTROL METHOD FOR ASSEMBLING OR DISASSEMBLING IMPELLER OF AIR CONDITIONER, AND AIR CONDITIONER**

(57) A control method for disassembling and assembling an impeller of an air conditioner is provided. The control method includes: controlling the electromagnetic coil (12) to control a force application direction on an impeller (10), and incorporating forward rotation or reverse rotation of a motor (20), and when the electromagnetic coil (12) is controlled to apply a force on the impeller (10) in a direction away from the motor (20), the motor (20) is rotated reversely, such that the impeller (10) is automatically separated from the motor (20), and when the electromagnetic coil (12) is controlled to apply a force to the impeller (10) in a direction approaching the motor (20), the motor (20) is rotated forward, and the impeller (10) is automatically engaged with the motor (20), so that the impeller (10) can be automatically disassembled or assembled, thus reduce manual operation and improve operation efficiency.

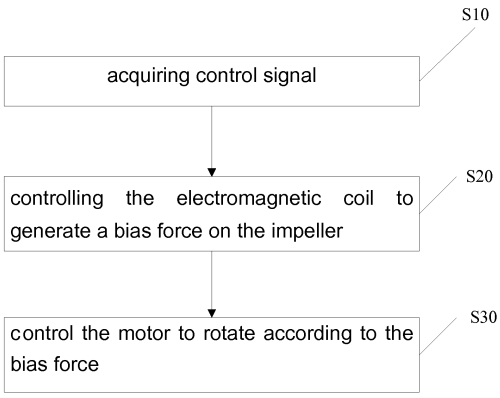

Fig. 1

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Description

Technical Field

[0001] The present disclosure relates to a technical field of air conditioner, and in particular, to an air conditioner and a control method for disassembling and assembling an impeller of an air conditioner.

Background

[0002] The air conditioner acts as a commonly used household appliance, the key components of which lie in an air duct system. During the long-term use of the air conditioner, dopants such as dust entering an air passage and a water passage from an air inlet severely contaminate the whole air passage and a water passage system, and if the cleaning is not performed in time, the environment will be compromised during the operation of the air conditioner as a contamination source, thereby greatly harming the health of the user.

[0003] Traditional air conditioners, the air duct and water duct system and the bottom shell of the air conditioner as a whole, and the air duct and water duct system are firstly fitted and fixed as base parts, and if washing is required, a specialized person needs to disassemble each part of the air conditioner and then disassemble and clean the part, thereby complicating disassembly.

[0004] In Chinese patent CN2823621Y, a fan device of a household appliance is disclosed, and the fan device is mounted on a rack, and includes a coupling device, the coupling device comprising an impeller nesting embedded in a center of another end face of the fan and a motor shaft nesting fixedly mounted on a main shaft of a drive motor. One or more mounting grooves are disposed in the impeller nesting, and one or more mounting clamps are disposed in the motor shaft nesting, and when the fan needs to be removed for cleaning and mounting, the fan needs to be manually shifted, and the fan moves a certain distance in the axial direction of the fan end, and the fan itself is heavier. When in use, a large force of air is required to be dialed, and during disassembly or installation, the windmill and the motor are not easily separated and installed.

Summary

[0005] The technical problem to be solved by an embodiment of the present disclosure is that the blades and the motor are not easily installed or separated in the prior art, and further provided is a disassemble and assemble structure for an impeller and a motor, and a control method therefor, and an air conditioner with a longer service life.

[0006] According to a first aspect, an embodiment of the present disclosure provides a control method for disassembling and assembling an impeller of an air conditioner, including the following steps: controlling the electromagnetic coil to generate a biasing force on the impeller, the biasing force including: a force acting on the impeller to keep the impeller away from or toward a motor; the motor is controlled to rotate according to the bias force to separate or engage the impeller from the motor.

[0007] In an exemplary embodiment, the bias force is a force acting on the impeller in a direction away from the motor; controlling the motor to rotate according to the biasing force includes: controlling the motor to rotate reversely according to the bias force to separate the impeller from the motor; or the bias force is a force acting on the impeller in a direction away from the motor; controlling the motor to rotate according to the biasing force includes: controlling the motor to rotate forward according to the biasing force to engage the impeller with the motor.

[0008] In an exemplary embodiment, the step of controlling the electromagnetic coil to generate the bias force on the impeller includes: controlling the electromagnetic coil to energize so that the electromagnetic coil applies a force in a direction away from the motor to the impeller; or controlling the electromagnetic coil to be de-energized so that a reset spring installed between the electromagnetic coil and the impeller applies a force in a direction close to the motor to the impeller.

[0009] In an exemplary embodiment, the step of controlling the electromagnetic coil to generate the bias force on the impeller includes: controlling the electromagnetic coil to apply a first direction current so that the electromagnetic coil applies a force in a direction away from the motor to the magnetic matching part mounted on the side, close to the electromagnetic coil, of the impeller; or, controlling the electromagnetic coil to apply a second direction current so that the electromagnetic coil applies a force in a direction toward the motor to the magnetic matching part.

[0010] In an exemplary embodiment, before controlling the electromagnetic coil to generate the bias force on the impeller, the control method includes: acquiring a control signal, wherein the control signal includes a disassembly control signal or an assembly control signal.

[0011] According to a second aspect, an embodiment of the present disclosure provides an air conditioner, including: an impeller having an impeller shaft rotatably disposed on a bottom housing component, wherein a disassemble and assemble structure is disposed at an end, away from the motor, of the impeller, and the disassemble and assemble structure includes: an electromagnetic coil generates a biasing force on the impeller, and the biasing force includes: a force acting on the impeller to keep the impeller away from or toward a motor, the electromagnetic coil being provided on an adjacent part adjacent to the impeller; and a controller controlling the motor to rotate according to the biasing force to disengage or engage the impeller with the motor.

[0012] In an exemplary embodiment, the bias force is a force acting on the impeller to keep the impeller away from the motor; the controller controls the motor to rotate

reversely according to the bias force, so as to separate the impeller from the motor; or the bias force is a force acting on the impeller to keep the impeller away from the motor; and the controller controls the motor to rotate forward according to the bias force, so as to engage the impeller with the motor.

[0013] In an exemplary embodiment, the air conditioner further includes: a reset spring disposed between the electromagnetic coil and the impeller, when the controller controls the electromagnetic coil to be energized, an acting force in the direction approaching the motor is generated, when the controller controls the electromagnetic coil to be powered off, the controller releases a force to the impeller shaft, a position for restoring the impeller shaft to dock with the motor.

[0014] In an exemplary embodiment, the air conditioner further includes: a magnetic matching part installed on a side, close to the electromagnetic coil, of the impeller; and when the controller controls the electromagnetic coil to apply the first direction current, applying a force in a direction away from the motor to the magnetic matching part, when the controller controls the electromagnetic coil to apply the second direction current, a force in the direction approaching the motor is applied to the magnetic matching part, and the impeller shaft is restored to a position docked with the motor.

[0015] In an exemplary embodiment, the air conditioner further includes: an acquisition module, configured to acquire a control signal, wherein the control signal includes a disassembly control signal or an installation control signal.

[0016] According to the method for controlling impeller disassembly of an air conditioner and the air conditioner provided by the embodiments of the present disclosure, the direction of the electromagnetic coil controlling the application of the acting force to the impeller is controlled, and when the electromagnetic coil is controlled to apply the acting force away from the impeller, the motor is reversed to automatically separate the impeller from the motor. When the electromagnetic coil is controlled to apply a force to the impeller toward the motor, the motor is transmitting to automatically engage the impeller with the motor, so that the impeller can be automatically detached or mounted, thereby reducing manual operation and improving working efficiency.

Brief Description of the Drawings

[0017] To illustrate the technical solutions in the embodiments of the present disclosure or in the prior art more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments or the prior art. Obviously, the accompanying drawings in the following description are some embodiments of the present disclosure. For a person of ordinary skill in the art, other drawings can be obtained from these drawings without creative efforts.

Fig. 1 is a schematic flowchart of a control method for disassembling and assembling an impeller of an air conditioner according to an embodiment of the present disclosure;

Fig. 2 is a schematic diagram showing a cooperation structure of an impeller and a motor according to an embodiment of the present disclosure;

Fig. 3 shows a schematic diagram of an air conditioner module according to an embodiment of the present disclosure;

Fig. 4 is a schematic structural diagram of an air duct module according to an embodiment of the present disclosure;

Fig. 5 shows a schematic diagram of a disassemble and assemble structure for an impeller and a motor according to an embodiment of the present disclosure;

Fig. 6 shows a schematic diagram of a mounting position of an electromagnetic coil according to an embodiment of the present disclosure;

Fig. 7 shows another schematic diagram of a disassemble and assemble structure for an impeller and a motor according to an embodiment of the present disclosure;

Fig. 8 shows another schematic diagram of a disassemble and assemble structure for an impeller and an electric motor according to an embodiment of the present disclosure;

Fig. 9 shows a schematic diagram of a connecting cylinder and an impeller cooperating structure according to an embodiment of the present disclosure;

Fig. 10 shows a control mechanism of an air conditioner according to an embodiment of the present disclosure.

[0018] In the drawings,

10, impeller; 11, magnetic matching part; 12, electromagnetic coil; 13, reset spring; 14, connecting cylinder; 15, impeller shaft; 20, motor; 16, shaft cover; 17, impeller end face sleeve; 18, shaft hole; 21, motor shaft cover; 110, helical structure; 50, memory; 60, processor.

Detailed Description of the Embodiments

[0019] The technical solutions of the present disclosure will be clearly and completely described below with reference to the accompanying drawings, and obviously, the described embodiments are a part of the embodiments of the present disclosure rather than all of the embodiments. Based on the embodiments of the present disclosure, all other embodiments be obtained by those skilled in the art without creative efforts fall within the scope of protection of the present disclosure.

[0020] In the description of the present disclosure, it should be noted that the terms "installation", "connection" and "connection" should be understood broadly, for example, may be a fixed connection, may also be a detachable connection, or may be integrally connected, unless

otherwise specified and defined. may be a mechanical connection or an electrical connection; The communication may be a direct connection or an indirect connection via an intermediate medium, or an internal connection of two elements, or a wireless connection or a wired connection. For a person of ordinary skill in the art, the specific meaning of the above terms in the present disclosure can be understood in particular.

[0021] An embodiment of the present disclosure further provides a control method for disassembling/assembling an impeller of an air conditioner, as shown in Fig. 1, the control method includes the following steps:

S11. Acquire a control signal. In the present embodiment, the control signal includes a disassembly control signal or an assembly control signal. In a specific embodiment, when the user needs to clean the air conditioner, the impeller needs to be dismounted, the user or the operator sends a disassembly control signal, where the disassembly control signal may be a cleaning instruction sent by the user, or the disassembly signal sent by the operator during maintenance. The specific disassembly control signal may be sent to a receiving end of the air conditioner through a remote controller or terminal, and the impeller is reinstalled after cleaning or repair is completed, the user or operator may send an assembly control signal through the remote controller or terminal, and the receiving end transmits the disassembly control signal or the assembly control signal to the controller.

S12, controlling the electromagnetic coil to generate a bias force to the impeller. In a specific embodiment, the control electromagnetic coil generates a magnetic attraction force to attract the magnetic matching part, and since the magnetic matching part is provided on the impeller, that is, the electromagnetic coil attracts the impeller; a force in a direction away from the motor is applied to the impeller. After receiving the mounting signal, the electromagnetic coil is controlled to generate a repulsive force that repels magnetic matching part, specifically, the repulsive force may be a magnetic repulsive force, or may be an elastic force or other thrust force. A force is applied in a direction approaching the motor to the impeller.

S13, controlling the motor to rotate according to the bias force. In a specific embodiment, after receiving the disassembly signal, an acting force in a direction away from the motor is applied to the impeller, and the motor is controlled to be rotated reversely to separate the motor from the impeller. After receiving the assembly signal, applying a force in the direction of approaching the motor to the impeller, and pushing the impeller close to the motor until the engageable distance is reached, and controlling the motor to rotate reversely, so as to engage the impeller with the motor. In the present embodiment, as shown in Fig. 2, a moving surface of a motor shaft sleeve 21 and an impeller end face shaft sleeve 17 are designed as a spiral structure 110, so that during operation, an axial force exists on a matching surface of the impeller end face shaft sleeve 17 and the motor shaft sleeve 21, and this axial force makes the impeller firmly operate without departing from the motor shaft sleeve 21.

[0022] Due to the existence of the spiral structure 110, when a distance between the motor shaft sleeve 21 and the impeller end face shaft sleeve 17 is approached a certain distance, a rotation of the motor is started, both of which are affected by the spiral structure 100 more and more closely until engaged in place. Because the motor is rotating continuously, the matching structure of the two is more and more tightened. When disassembly is required, since the spiral structure 110 is present, only the motor needs to be rotated reversely, and during the reversal, the motor engages with the impeller until disengaged.

[0023] In an optional embodiment, when the magnetic matching part on the end face of the impeller is an injection molded piece or a metal magnetic material having a magnetic material, the magnetic polarity of the electromagnetic coil can be changed by controlling a direction of current flowing into the electromagnetic coil, so that the electromagnetic coil attracts or repels the blade, in an exemplary embodiment, controlling the electromagnetic coil to flow into the first direction current, and causing the electromagnetic coil to generate a force applied to the magnetic matching part in a direction away from the motor. During disassembly, the electromagnetic coil is controlled to generate a magnetic polarity opposite to a magnetic polarity of the magnetic matching part, for example, if a side, opposite to the electromagnetic coil, of the magnetic matching part is an N pole, the direction of current flowing through the electromagnetic coil is controlled so that the side, opposite to the magnetic matching part, of the electromagnetic coil generates S pole magnetism, and an acting force in the direction away from the motor is applied to the impeller. During mounting, the electromagnetic coil is controlled to pass a second direction current, so that the electromagnetic coil applies a force to the magnetic matching part to keep the magnetic matching part approach the motor, and the magnetic polarity of the electromagnetic coil is the same as that of the magnetic matching part, the impeller is thus repelled and a force is applied to the impeller in the direction approaching the motor.

[0024] In an exemplary embodiment, a reset spring is provided between the impeller shaft of the impeller and the electromagnetic coil; the electromagnetic coil applies a force in the direction approaching the motor to the impeller by means of the spring force of the reset spring, in particular the following steps: controlling the electromagnetic coil to be energized; when the electromagnetic coil is energized, the reset spring generates a biasing force

toward the motor direction; the electromagnetic coil is controlled to be energized, and when the electromagnetic coil is de-energized, the reset spring releases the bias force on the impeller shaft to reset the impeller shaft to the position where the electromagnetic coil is docked.

[0025] The reset spring is directly connected to the impeller shaft, and during operation of the impeller, the rotation of the impeller may cause a follow-up of the spring, may produce abnormal noise, and may influence the user experience, and in an alternative embodiment, the magnetic matching part further includes a connecting cylinder;

when the electromagnetic coil applies a force in a direction away from the motor to the impeller shaft, the connecting cylinder moves to a first preset position in a direction away from the motor, and the reset spring is compressed and a movement distance thereof is greater than a movement distance of the impeller shaft, so as to provide an axial room for dismantling the impeller; when the electromagnetic coil applies a force in the direction approaching motor to the impeller shaft, the connecting cylinder is adapted to abut against the impeller shaft and move to a second preset position under the action of the reset spring; controlling the motor to be rotated reversely when the connecting cylinder moves to the first preset position; controlling the motor to be rotated forward when the connecting cylinder moves to the second preset position. The first preset position may be an axial space for the impeller to be detached, and the second preset position may be a position for the impeller to be automatically engaged with the motor.

[0026] By controlling the electromagnetic coil to control the direction in which the acting force is applied to the impeller, incorporating forward rotation or reverse rotation of the motor, the motor is rotated reversely when controlling the electromagnetic coil to apply the acting force away from the motor to the impeller, the impeller is automatically separated from the motor, and when controlling the electromagnetic coil to apply the acting force toward the motor to the impeller, the motor is rotated forward and the impeller is automatically engaged with the motor, so that the impeller can be automatically disassembled or mounted, thereby reducing manual operation and improving working efficiency.

[0027] An embodiment of the present disclosure further provides an air conditioner, as shown in Fig. 3, a modular air conditioner indoor unit of the present disclosure, including a base module 100, a heat exchange module 200, an air duct module 300 and an appearance module 400.

[0028] As shown in Fig. 4, one end of the impeller 10 is rotatably connected with a motor 20, and the other end is rotatably connected with the bottom shell 310 of the air duct module 300 by using the disassemble and assemble structure, as shown in Fig. 5, the disassemble and assemble structure includes:

a magnetic matching part 11 provided at one end, away from the motor 20, of the impeller 10; and an electromagnetic coil 12 disposed on an adjacent component adjacent to the magnetic matching part 11, the electromagnetic coil 12 generates a biasing force with the magnetic matching part for applying a force away from or toward the direction of the motor 20 to the impeller 10. In particular embodiments, the magnetic matching part 11 provided on an end face of one end, away from the motor 20, of the impeller 10 may be an iron ring or an injection molded piece or a metal magnetic material of an iron sheet or a magnetic material. When the end face is an injection molded piece or metal magnetic material of magnetic material, the electromagnetic coil 12 may generate a magnetic fit with the magnetic matching part 11 by changing the direction of current. For example, the opposite surface of the magnetic matching component 11 and the electromagnetic coil 12 is a magnetic positive pole, when a forward current is applied, an end, opposite to the magnetic matching part 11, of the electromagnetic coil 12 is a magnetic positive pole, and the electromagnetic coil 12 may generate a force toward the direction of the motor 20 on the impeller 10, and when a reverse current is applied thereto. One end, opposite to the magnetic matching part 11, of the electromagnetic coil 12 is a magnetic negative pole, and the electromagnetic coil 12 can generate a force away from the electric motor 20 on the impeller 10.

[0029] In an exemplary embodiment, as shown in Fig. 6, the electromagnetic coil 12 is mounted on the base module 100, and may be connected in a structure such as a screw or a snap. Other connecting forms that can be fastened to divert the electromagnetic coil 12 on the base module 100 may also be used, which is not limited in the present embodiment.

[0030] The magnetic matching part 11 is a metal that can be attracted by a magnetic material, such as iron or nickel, to ensure that the electromagnetic coil 12 applies a force in a direction toward the motor 20 to the impeller 10, in an exemplary embodiment, as shown in Fig. 7, the disassemble and assemble structure can further include a reset spring 13 disposed between the impeller shaft 15 and the electromagnetic coil 12, when the electromagnetic coil 12 is energized, a biasing force is generated toward the direction of the motor 20, and when the electromagnetic coil 12 is de-energized, the biasing force is released to the impeller shaft 15 for restoring the impeller shaft 15 at a position docked with the motor 20. Under normal operation of the impeller 10, the reset spring 13 is in a natural state.

[0031] The reset spring 13 is directly connected to the impeller shaft 15, and during operation of the impeller 10, the rotation of the impeller 10 may cause a follow-up of the spring, may produce abnormal noise and may cause an influence to the user experience. In an alternative embodiment, as shown in Fig. 8, the magnetic matching part 11 further includes a connecting cylinder 14 provided between the impeller shaft 15 and the reset spring 13. When the electromagnetic coil 12 applies a force to the impeller shaft 15 away from the direction of the elec-

tric motor 20, the connecting cylinder 14 also moves and compresses the reset spring 13 in a direction away from the motor 20, and a distance of the connecting cylinder moves is greater than that of the impeller shaft 15, an axial space for dismantling the impeller 10 is provided, when the electromagnetic coil 12 applies a force in the direction approaching the motor 20 to the impeller shaft 15, the connecting cylinder 14 is adapted to abut against the impeller shaft 15 under the action of the reset spring 13. As shown in Figs. 9 and 4, one end of the connecting cylinder 14 abuts against the reset spring 13, and the other end is supported in the shaft sleeve 16 for supporting the impeller shaft 15 at the same time, and the connecting cylinder 14 is movably supported in a shaft hole 18 of the shaft sleeve 16. The shaft sleeve 16 can achieve centering and lubrication of the impeller shaft 15.

[0032] A magnetic matching part provided at one end, away from the motor, of the impeller; and an electromagnetic coil disposed on an adjacent component adjacent to the magnetic matching part, the electromagnetic coil and the magnetic matching part generating a magnetic fitting for applying a force away from or toward the direction of the motor to the impeller. One end of the impeller can be automatically removed by controlling the electromagnetic coil, so that manual removal can be saved, and automatic separation between the impeller and the motor, automatic separation between the impeller and bottom shell can be realized. Thus, the efficiency of the air conditioner operation can be improved.

[0033] In an exemplary embodiment, as shown in Fig. 10, the air conditioner can further include a control mechanism. The control mechanism includes a memory 50 and a processor 60, the motor 20, the electromagnetic coil 12, the memory 50 and the processor 60 are connected to each other by a bus, a computer instruction is stored in the memory, and the processor 60 executes the computer instruction by using the control method of the impeller described in any one of the above embodiments with the disassemble and assemble structure described in any one of said air conditioners.

[0034] While embodiments of the present disclosure have been described in connection with the accompanying drawings, those skilled in the art may make various modifications and variations without departing from the spirit and scope of the present disclosure, such modifications and variations all fall within the scope defined by the appended claims.

Claims

1. A control method for disassembling and assembling an impeller of an air conditioner, comprising:

   controlling an electromagnetic coil to generate a biasing force on the impeller, the biasing force comprising: a force acting on the impeller to keep the impeller away from or toward a motor;

   controlling the motor to rotate according to the biasing force to separate or engage the impeller with the motor.

2. The control method for disassembling and assembling the impeller of the air conditioner according to claim 1, wherein:

   the biasing force is a force acting on the impeller in a direction away from the motor;
   the controlling the motor to rotate according to the bias force comprises:

   controlling the motor to rotate reversely according to the bias force to separate the impeller from the motor; or,
   the biasing force is a force acting on the impeller in a direction away from the motor;
   the controlling the motor to rotate according to the bias force comprises:
   controlling the motor to forward rotate according to the bias force to engage the impeller with the motor.

3. The control method for disassembling and assembling the impeller of the air conditioner according to claim 1 or 2, wherein the controlling the electromagnetic coil to generate the bias force on the impeller comprises:

   controlling the electromagnetic coil to be energized so that the electromagnetic coil applies a force in a direction away from the motor to the impeller; or
   controlling the electromagnetic coil to be de-energized so that a reset spring installed between the electromagnetic coil and the impeller applies a force in a direction close to the motor to the impeller.

4. The control method for disassembling and assembling the impeller of the air conditioner according to claim 1 or 2, wherein the controlling the electromagnetic coil to generate a bias force on the impeller comprises:

   controlling the electromagnetic coil to apply a first direction current so that the electromagnetic coil applies a force in a direction away from the motor to a magnetic matching part mounted on a side, close to the electromagnetic coil, of the impeller; or,
   controlling the electromagnetic coil to apply a second direction current so that the electromagnetic coil applies a force in a direction toward the motor to the magnetic matching part.

5. The control method for disassembling and assem-

bling the impeller of the air conditioner according to claim 1 or 2, wherein before the controlling the electromagnetic coil to generate a bias force on the impeller, the control method comprises:
acquiring a control signal, wherein the control signal comprises a disassembly control signal or an assembly control signal.

6. An air conditioner, comprising:

an impeller having an impeller shaft rotatably disposed on a bottom housing component, wherein
a disassemble and assemble structure is arranged at one end, away from the motor, of the impeller, and the disassemble and assemble structure comprises:

an electromagnetic coil, the electromagnetic coil generating a biasing force on the impeller, the biasing force comprising: a force acting on the impeller to keep the impeller away from or toward a motor, the electromagnetic coil being disposed on an adjacent part adjacent to the impeller;
and
a controller, the controller controlling the motor to rotate according to the biasing force to disengage or engage the impeller with the motor.

7. The air conditioner according to claim 6, wherein:

the biasing force is a force acting on the impeller to keep the impeller away from the motor;
the controller controls the motor to rotate reversely according to the biasing force, so as to separate the impeller from the motor; or,
the biasing force is a force acting on the impeller to keep the impeller away from the motor;
and the controller controls the motor to rotate forward according to the bias force, so as to engage the impeller with the motor.

8. The air conditioner according to claim 6 or 7, further comprising:
a reset spring disposed between the electromagnetic coil and the impeller, when the controller controls the electromagnetic coil to be energized, generating an acting force in a direction approaching the motor; releasing the acting force to the impeller shaft when the controller controls the electromagnetic coil to be powered off; a position for restoring the impeller shaft to dock with the motor.

9. The air conditioner according to claim 6 or 7, further comprising:
a magnetic matching part installed on a side, close to the electromagnetic coil, of the impeller, and when the controller controls the electromagnetic coil to apply the first direction current, applying a force in a direction away from the motor to the magnetic matching part, and when the controller controls the electromagnetic coil to apply the second direction current, applying a force in a direction approaching the motor to the magnetic matching part to restore the impeller shaft to a position docked with the motor.

10. The air conditioner according to claim 6 or 7, further comprising:
an acquisition module, configured to acquire a control signal, wherein the control signal comprises a disassembly control signal or an assembly control signal.

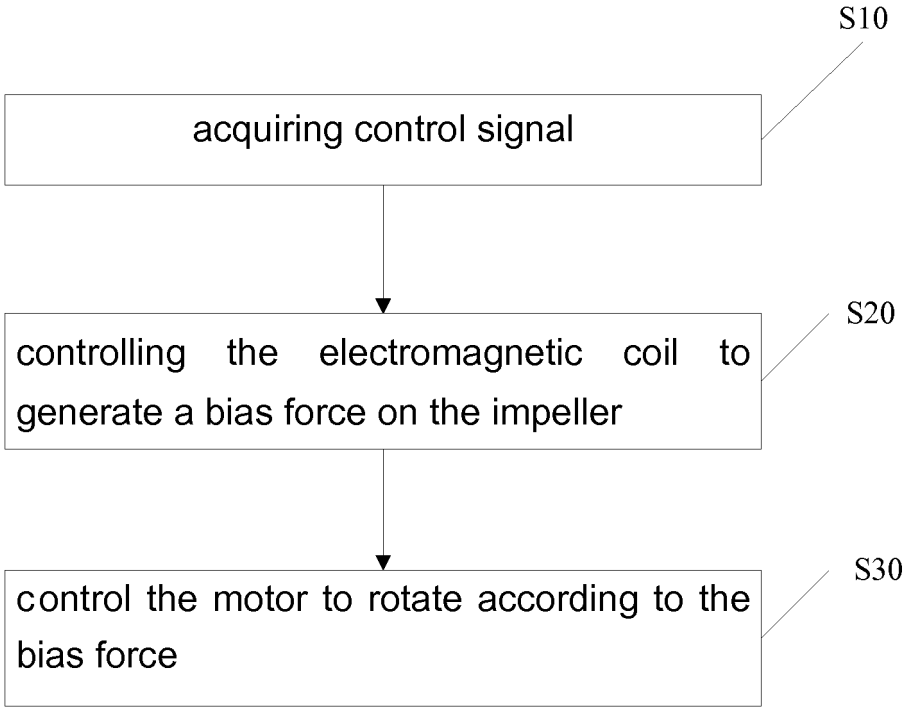
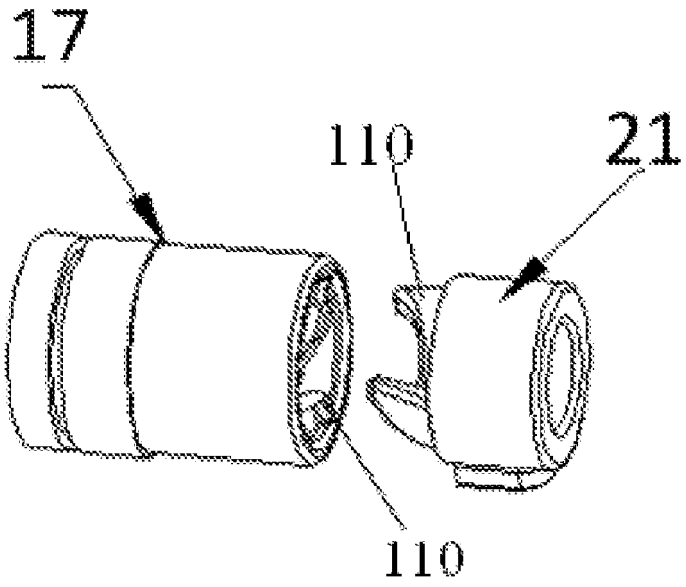

S10
acquiring control signal
S20
controlling the electromagnetic coil to generate a bias force on the impeller
S30
control the motor to rotate according to the bias force

Fig. 1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21
110

Fig. 2

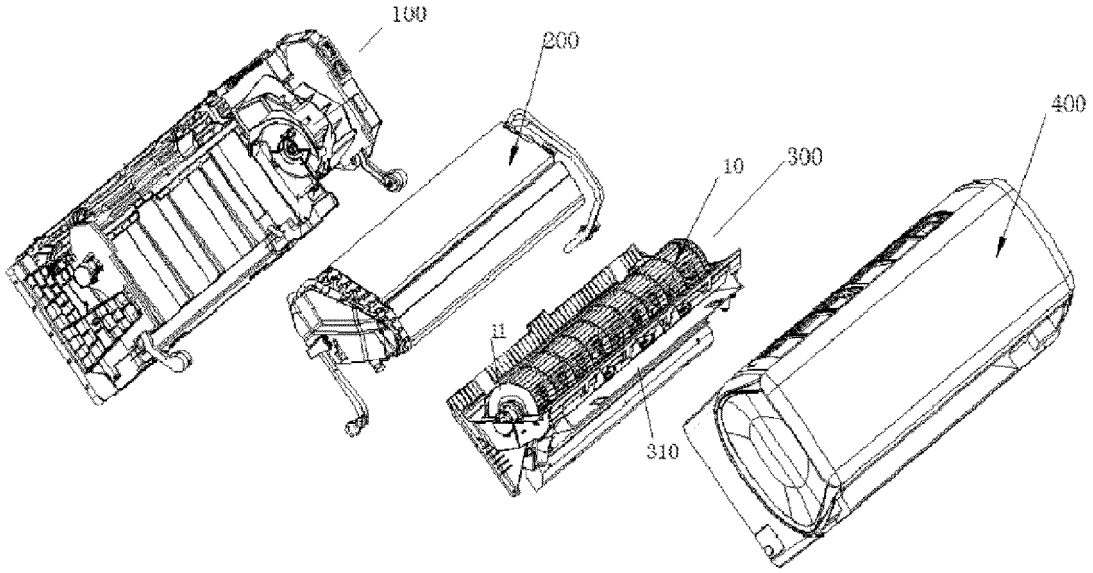

Fig. 3

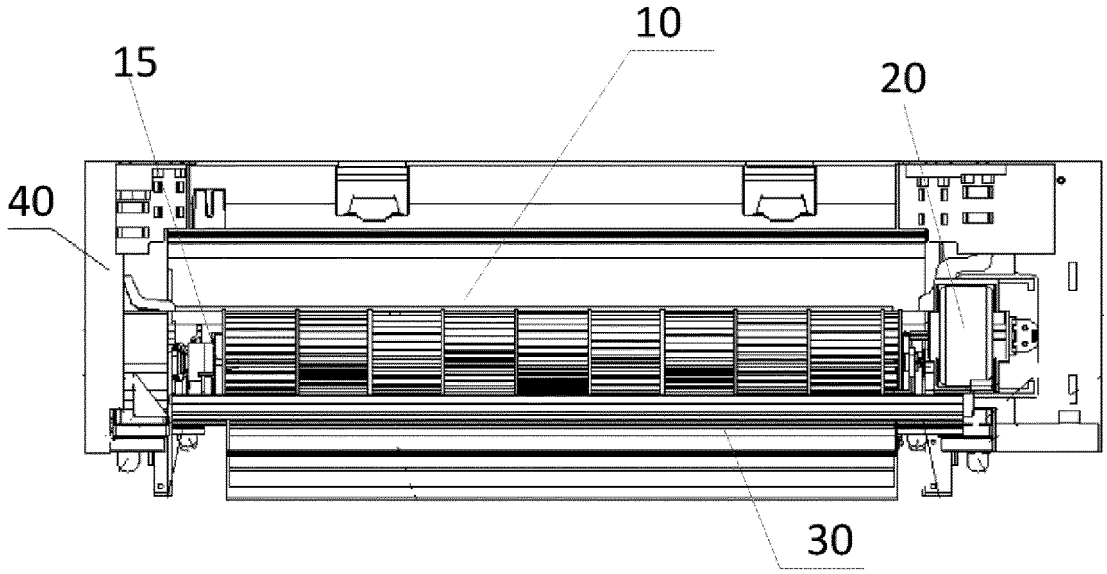

Fig. 4

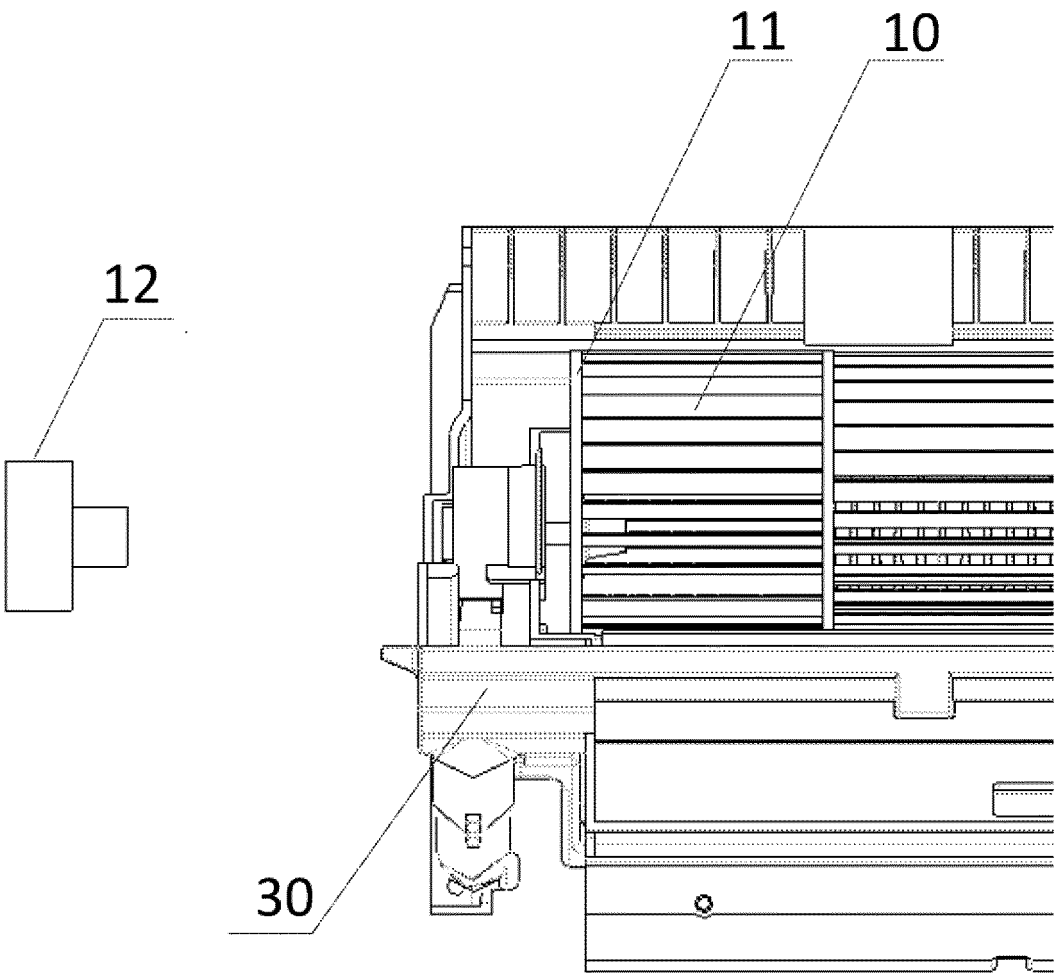

Fig. 5

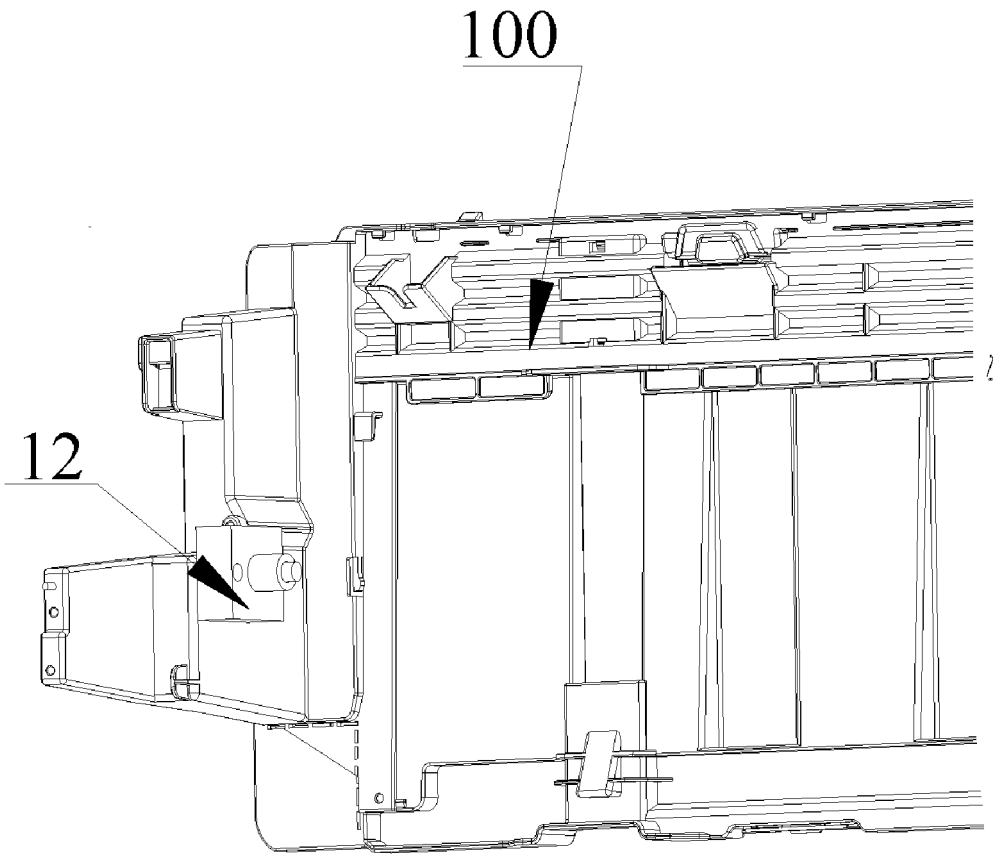

Fig 6

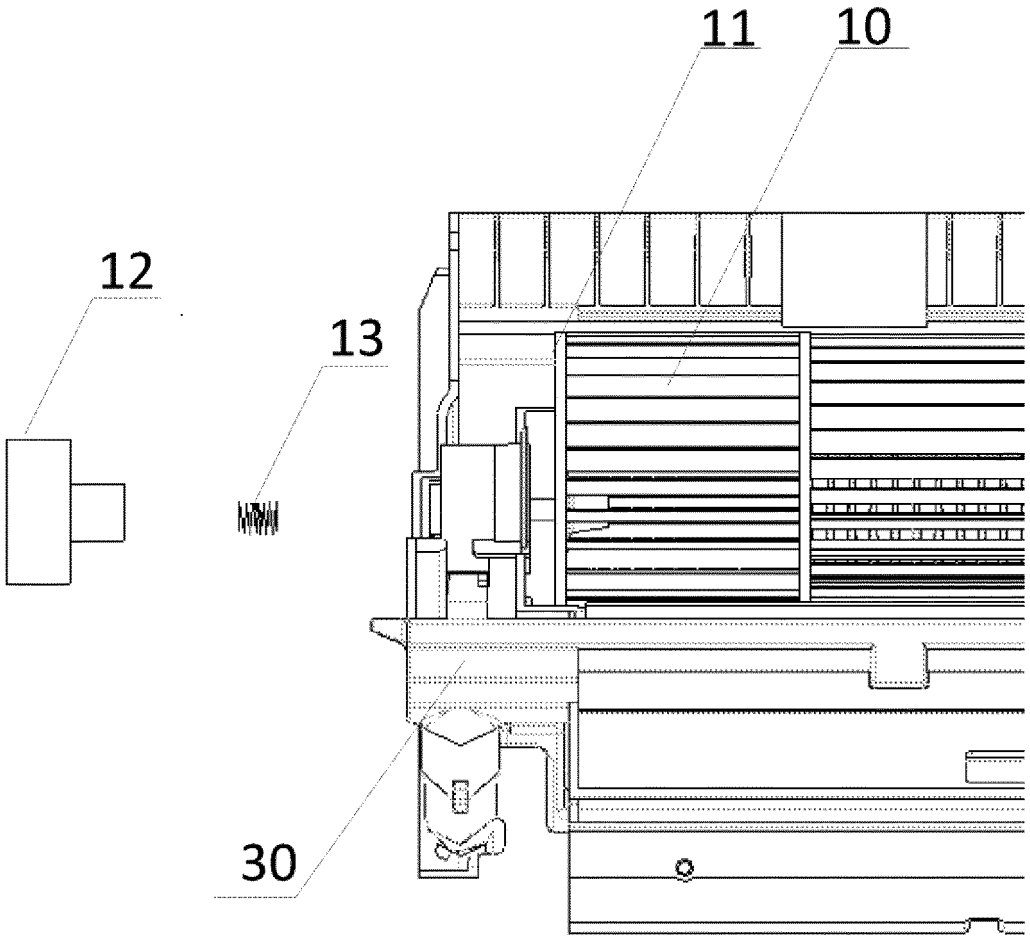

Fig 7

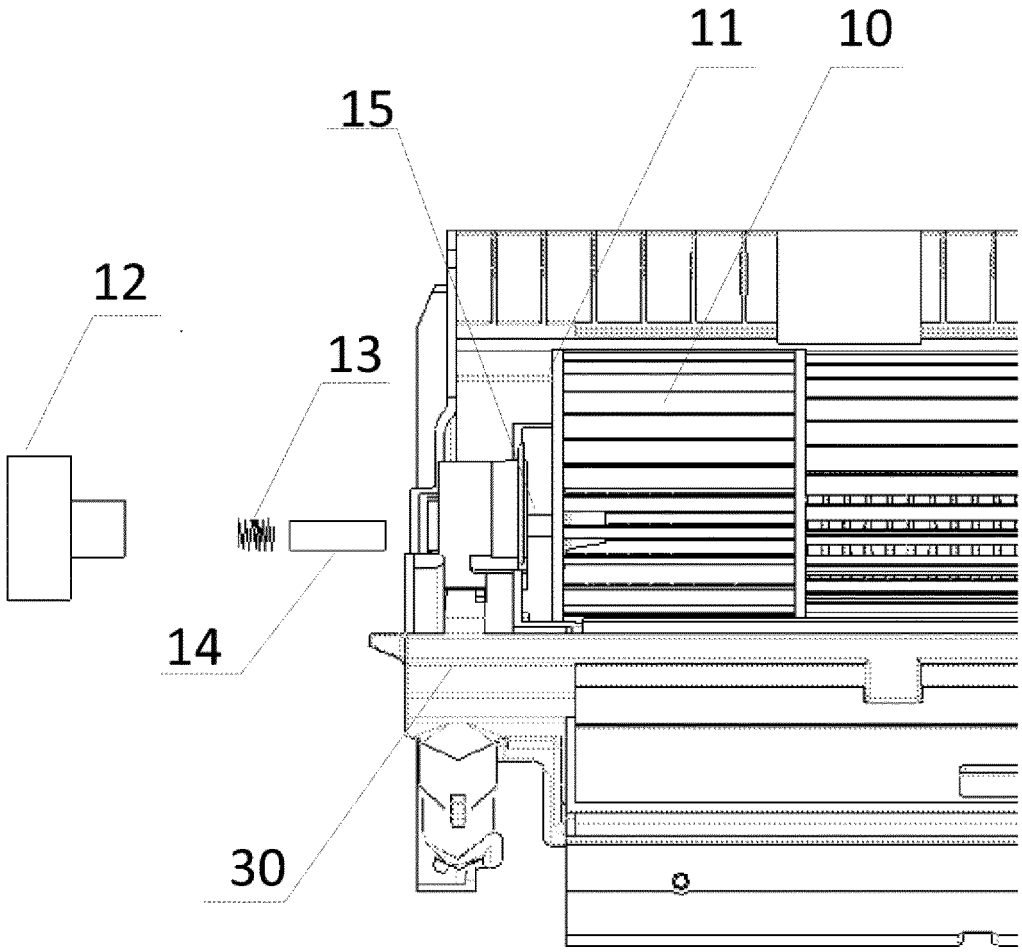

Fig 8

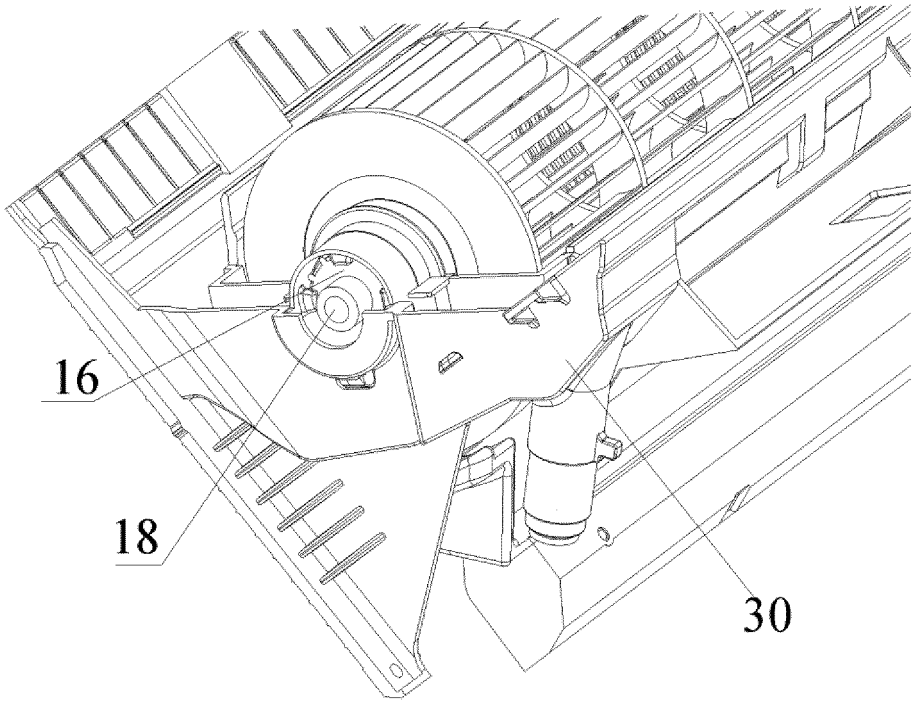
16
18
30

Fig 9

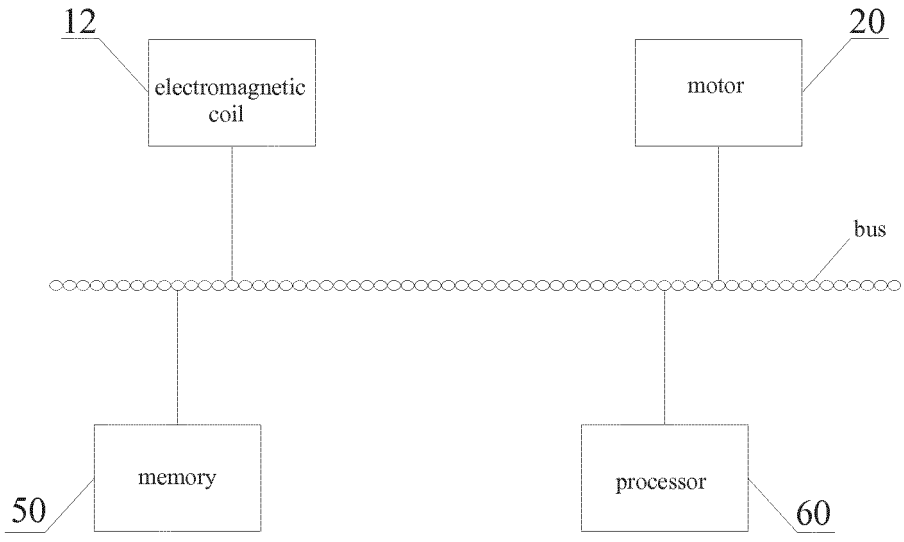
12
electromagnetic coil
20
motor
bus
memory
50
processor
60

Fig 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/118322

A. CLASSIFICATION OF SUBJECT MATTER

F04D 29/26 (2006.01) i; F04D 25/08 (2006.01) i; F24F 1/00 (2011.01) i
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F04D; F24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, SIPOABS, DWPI, CNKI: 风机, 叶轮, 叶片, 拆装, 拆卸, 磁, 正转, 反转, fan, wheel, vane, disassembly, dismount+, take down, magnet+, positive rotation, inversion, reversal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 2544877 Y (CHANGSHA HAISAI NEW TECHNOLOGY CO., LTD.), 16 April 2003 (16.04.2003), see description, page 3, lines 8-22, and figure 1	1-10
A	CN 205817716 U (TIANJIN PIPE GROUP CORPORATION), 21 December 2016 (21.12.2016), see entire document	1-10
A	CN 106194849 A (GUIZHOU PANJIANG MINING MACHINERY CO., LTD.), 07 December 2016 (07.12.2016), see entire document	1-10
A	CN 205714939 U (NINGBO FOTILE KITCHEN WARE CO., LTD.), 23 November 2016 (23.11.2016), see entire document	1-10
A	DE 102012018968 A1 (DAIMLER AG), 14 March 2013 (14.03.2013), see entire document	1-10
A	TW 201318889 A (DMP ELECTRONICS INC.), 16 May 2013 (16.05.2013), see entire document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 January 2018	24 January 2018
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer YANG, Guiquan Telephone No. (86-10) 62085242

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/118322

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 2544877 Y	16 April 2003	None	
CN 205817716 U	21 December 2016	None	
CN 106194849 A	07 December 2016	None	
CN 205714939 U	23 November 2016	None	
DE 102012018968 A1	14 March 2013	None	
TW 201318889 A	16 May 2013	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 2823621 Y **[0004]**