(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 446 605 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
27.02.2019 Bulletin 2019/09

(21) Application number: **16899071.1**

(22) Date of filing: **27.05.2016**

(51) Int Cl.:
A47L 5/24 *(2006.01)*

(86) International application number:
PCT/CN2016/083638

(87) International publication number:
WO 2017/181484 (26.10.2017 Gazette 2017/43)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **22.04.2016 CN 201610256377**

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(54) HAND-HOLD VACUUM CLEANER

(57) A hand-hold vacuum cleaner, comprising: a cyclone dust separator (10), a motor (30) and a battery (40). The motor (30) is disposed between the cyclone dust separator (10) and the battery (40). A handle (26) is disposed below the motor (30) and the battery (40). An air outlet filter (60) is disposed below the handle (26). The handle (26) is internally provided with an air flow passage (260), and serves both functions of a hand grip and an air passage. An air outlet passage has a significant length to achieve smooth air outflow and noise reduction. The vacuum cleaner of the present invention has a compact structure and can be used in a wide range of applications. The motor (30) and the battery (40) are adjacent to each other to provide a more reasonable wiring layout.

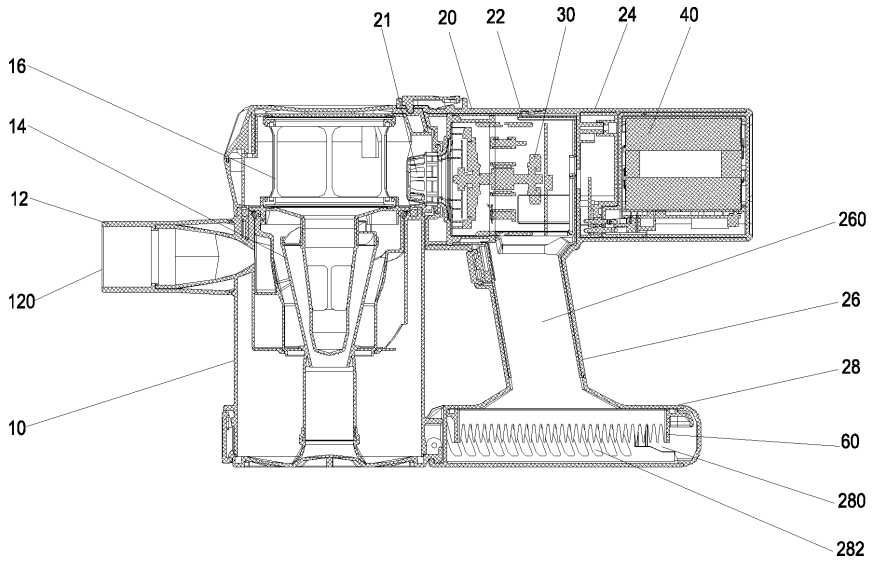

Figure 1

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Description

[0001] This application claims the priority to Chinese Patent Application No. 201610256377.2, titled "HAND-HOLD VACUUM CLEANER", filed with the Chinese State Intellectual Property Office on April 22, 2016, which is incorporated herein by reference in its entirety.

FIELD

[0002] The present application relates to a hand-hold vacuum cleaner.

BACKGROUND

[0003] A vacuum cleaner, as a domestic appliance, is widely used for indoor and outdoor cleaning. Current vacuum cleaners may be classified, according to shapes, into horizontal type, vertical type, hand-hold type, etc.. Hand-hold type vacuum cleaners are usually powered by built-in batteries to facilitate cleaning of cars or outdoor items, therefore more and more Chinese families begin to use hand-hold vacuum cleaners. In order to improve dust removal efficiency, a hand-hold vacuum cleaner generally includes a machine body provided with a handle, a cyclone dust separator mounted in the machine body, a telescopic tube connected to the cyclone dust separator, a motor and a battery mounted in the machine body, and an air-out filter device. In the conventional technology, these components are generally laid out as disclosed in the Chinese patent CN101489454B, that is, the motor and the battery are respectively arranged at an upper end and a lower end of the handle, and the air-out filter device is arranged at the rear of the motor. Since the air-out filter device is restrained by the shape of the motor, it has a small sectional area, poor filtering effect, and is required to be replaced frequently. Moreover, since the airflow first flows through the motor and then is discharged to the outside through the air-out filter device, the air-out passage is not smooth and is relatively short, and the noise reduction effect thereof is not significant. Moreover, since the motor is far from the battery, the wiring thereof is complicated. Since the center of gravity of the conventional vacuum cleaner is at the front part in usage, it is laborious to use the vacuum cleaner. Besides, the handle angle thereof does not conform to usage habits.

SUMMARY

[0004] An object of the present application is to provide a hand-hold vacuum cleaner, the motor and the battery of the hand-hold vacuum cleaner are adjacent to each other, which facilitates wiring, and enables the wiring to be more reasonable; a handle of the hand-hold vacuum cleaner also serves as an air passage, which further facilitates reducing noise and allows the air to be out smoothly, the structure of the hand-hold vacuum cleaner is compact and the hand-hold vacuum cleaner has a wide usage range.

[0005] In order to achieve the above object, a first technical solution is provided by the present application. A hand-hold vacuum cleaner includes a cyclone dust separator, a motor, and a battery. The motor is located between the cyclone dust separator and the battery. The hand-hold vacuum cleaner is further provided with a handle located below the motor and the battery, and an air-out filter device located under the handle.

[0006] On the basis of the first technical solution, the following subsidiary technical solutions are further included.

[0007] Preferably, the vacuum cleaner further includes a machine body configured to receive the battery, and an airflow passage, via which the motor is in communication with the air-out filter device, is provided in the handle.

[0008] Preferably, the motor is accommodated in the machine body.

[0009] Preferably, an extending direction of the handle intersects with an axial direction of the motor.

[0010] Preferably, a central-axis direction of the cyclone dust separator intersects with an axial direction of the motor, and the motor is a DC motor. More preferably, the central-axis direction of the cyclone dust separator perpendicularly intersects with the axial direction of the motor.

[0011] Preferably, the machine body includes a first machine body and a second machine body connected with the first machine body, and the handle consists of at least a part of the first machine body.

[0012] Preferably, the motor is received in the first machine body and the battery is received in the second machine body.

[0013] The present application provides a second technical solution: a hand-hold vacuum cleaner, which includes a machine body, a cyclone dust separator, a motor and a battery. The machine body is provided with a handle. During operation, the handle is held by a hand of an operator, and the motor and the battery are both located above the hand of the operator.

[0014] On the basis of the second technical solution, the following subsidiary technical solutions are further included.

[0015] Preferably, an airflow passage is provided inside the handle, one end of the airflow passage is in communication with the motor, and another end of the airflow passage is in communication with the air-out filter device, and the air-out filter device is located below the hand of the operator.

[0016] Due to the above technical solutions, the present application has the following advantages:

1. The battery and the motor are arranged side by side above the handle, and the motor and the battery are adjacent to each other, which is convenient for wiring, and the wiring is more reasonable.
2. The air inlet is provided with air inlet filter cotton, and the air outlet is provided with the air-out filter device, moreover, the air-out filter device has a large sectional area, therefore the filter effect is better, and the air-out filter device is not required to be replaced frequently.
3. The airflow passage is designed within the handle, the handle also serves as an air passage, the air-out passage is long, and the air-out filter device has a large sectional area, which is more favorable for reducing noise and smoother ventilation, and the vacuum cleaner has a compact structure and may have a wide range of applications.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The present application is described in detail in conjunction with drawings and embodiments hereinafter:

Figure 1 is a sectional view of the present application in an assembled state; and

Figure 2 is an exploded view of the present application.

Reference Numerals in the drawings:

10 cyclone dust separator,	12 main straw,
14 cyclone,	16 filter,
20 machine body,	21 air-in grid,
22 first machine body,	24 second machine body,
26 handle,	28 filter part,
29 filter cover,	30 motor,
32 circuit board,	40 battery,
50 motor cover,	52 cover part,
54 air-out tube,	60 air-out filter device,
120 suction port,	220 front receiving part,
222 front handle part,	240 rear receiving part,
242 rear handle part,	152 airflow passage,
280 filter chamber, and	282 air outlet.

DETAIL DESCRIPTION OF EMBODIMENTS

[0018] As shown in Figure 1 and Figure 2, a hand-hold vacuum cleaner is provided according to an embodiment of the present application, including: a machine body 20, a cyclone dust separator 10, a motor 30, a battery 40, and an air-out filter device 60. The motor 30 is located between the cyclone dust separator 10 and the battery 40. The hand-hold vacuum cleaner is further provided with a handle 26 which is located below the motor 30 and the battery 40, and an air-out filter device 60 which is located under the handle 26. The handle 26 is located on the machine body 20.

[0019] The cyclone dust separator 10 is arranged to be in communication with vacuum cleaner accessories and to separate dirt and dust from the airflow. The vacuum cleaner accessories include a flat suction, a brush, a telescopic tube, a hose, etc.. The cyclone dust separator 10 includes a barrel, a main straw 12 which is located on one side of the barrel and connected to the vacuum cleaner accessories, a cyclone 14 which is arranged in the barrel and located downstream of the main straw 12, and a filter 16 which is located downstream of the cyclone 14. The main straw 12 is connected to the vacuum cleaner accessories and is provided with a suction port 120. The cyclone 14 is preferably a one-stage or multi-stage cyclone. In this embodiment, a central-axis direction of the cyclone 14 intersects with an extending direction of the main straw 12, and also intersects with an axial direction of the motor 30, and the intersections are preferably perpendicular intersections, that is, the cyclone 14 is placed perpendicular to the horizontal plane and the motor 30 is placed in parallel with the horizontal plane. In other embodiments, the cyclone 14 may also be placed obliquely relative to the main straw 12. The filter 16 is preferably nonwoven fabric or sponge or a HEPA.

[0020] The machine body 20 is connected to a bottom end and a top end of the cyclone dust separator 10, and the machine body 20 includes: a first machine body 22 configured to accommodate the motor 30 and connected to a top end of the cyclone dust separator 10 in a front-rear direction; a second machine body 24 connected to the first machine

body 22 and configured to accommodate the battery 40; a handle 26 connected to the first machine body 22; and a filter part 28 connected to a bottom end of the handle 26 and connected to the bottom end of the cyclone dust separator 10 in a front-rear direction. The second machine body 24 is at the rear of the first machine body 22. Preferably, the machine body 20 further includes an air-in grid 21 which is located between the filter 16 and the motor 30. The first machine body 22 includes a front accommodating part 220 which accommodates the motor 30, and a front handle part 222 which extends downward from the front accommodating part 220. The second machine body 24 includes a rear receiving part 240 which accommodates the battery 40, and a rear handle part 242 which extends downward from the rear accommodating part 240. The handle 26 is provided with an airflow passage 260 via which the front accommodating part 220 is in communication with the filter part 28. The length of the airflow passage 260 is at least greater than 1/3 of the height of the cyclone dust separator 10 but less than the height of the cyclone dust separator 10. The handle 26 is formed by at least parts of the first machine body 22 and the second machine body 24, that is, the front handle part 222 and the rear handle part 242 are engaged to form the handle, or the handle 26 may also be formed only by the front accommodating part 220 of the first machine body 22 extending downward. Preferably, an extending direction of the handle 26 intersects with the axial direction of the motor 30 at an obtuse angle so as to conform to ergonomics. The handle 26 connects the first machine body 22 and the filter part 28. The air flow passage 260 may be provided with a sound attenuation material in order to reduce noise. A bottom end of the filter part 28, a bottom end of the cyclone dust separator 10 and a bottom end of the cyclone 14 are located on the same horizontal plane. The filter part 28 includes a filter chamber 280 therein, a detachable air-out filter device 60 accommodated in the filter chamber 280, and multiple air outlets 282 in communication with the filter chamber 280 and located downstream of the detachable air-out filter device 60. The air-out filter device 60 may preferably be a HEPA, or a nonwoven fabric or filter cotton, and may reciprocate along a track provided in the filter part 28 so as to be detachable. The sectional area of the air-out filter device 60 is much larger than the sectional area of the motor 30, preferably between 1.2 times and 2 times the sectional area of the motor 30, and the sectional area of the motor 30 is preferably a radial-sectional area.

[0021] The motor 30 is configured to generate a vacuum airflow, and is located at a top end of the handle 26, and is preferably a DC motor, or in particular a brushless DC motor. The motor 30 is located between the cyclone dust separator 10 and the battery 40. Preferably, the motor 30 is provided with a circuit board 32, and the circuit board 32 is located between the motor 30 and the battery 40 to simplify the wiring, therefore the layout is reasonable. In this embodiment, the motor 30 and the battery 40 are arranged adjacent to each other, and both are located on the top end of the handle 26. When the motor 30 is operated to vacummize, the vacuum airflow moves downward along the airflow passage 260, and then is filtered by the air-out filter device 60, which not only reduces noise but also improves filter effect.

[0022] The battery 40 is adjacent to and arranged coaxially with the motor 30, supplies power to the motor 30, and is preferably a lithium battery.

[0023] In order to reduce noise, the vacuum cleaner according to this embodiment further includes a motor cover 50 configured to cover the motor 30. The motor cover 50 has a shape matching with the shape of the first machine body 22, and further includes a cover part 52 configured to accommodate the motor 30, and an air-out tube 54 connected to the cover part 52. One end of the air-out tube is in communication with the motor 30 and another end thereof is inserted into the airflow passage 260. A sound attenuation material is provided within the air-out tube 54, and noise is further reduced by the double wall thicknesses of the air-out tube 54 and the airflow passage 260, and the sectional area of the air-out tube 54 is smaller than the sectional area of the filter chamber 280, thereby realizing airflow expansion and further reducing noise.

[0024] Due to the above solutions, the present application has the following advantages:

1. The battery and the motor are arranged side by side above the handle, and the motor and the battery are adjacent to each other, which is convenient for wiring, and the wiring is more reasonable.
2. The air inlet is provided with air inlet filter cotton, and the air outlet is provided with the air-out filter device, moreover, the air-out filter device has a large sectional area, therefore the filter effect is better, and the air-out filter device is not required to be replaced frequently; and
3. The airflow passage is provided within the handle, the handle also serves as an air passage, the air passage is long, and the air-out filter device has a large sectional area, which is more favorable for reducing noise and smoother ventilation, and the vacuum cleaner has a compact structure and may have a wide range of applications.

[0025] The embodiments described above are merely for explaining the technical concept and the features of the present application, and the object of the present application is to enable the person skilled in the art to understand the contents of the present application and implement them, but the scope of the present application is not limited thereto. Equivalent variations or modifications made in accordance with the spirit of the main technical solutions of the present application should fall in the scope of the present application.

Claims

1. A hand-hold vacuum cleaner, comprising:

   a cyclone dust separator,
   a motor, and
   a battery,
   wherein the motor is located between the cyclone dust separator and the battery, the hand-hold vacuum cleaner is further provided with a handle located below the motor and the battery, and an air-out filter device located under the handle.

2. The hand-hold vacuum cleaner according to claim 1, wherein an airflow passage, via which the motor is in communication with the air-out filter device, is provided in the handle.

3. The hand-hold vacuum cleaner according to claim 1, further comprising a machine body configured to accommodate the battery, wherein the motor is accommodated in the machine body.

4. The hand-hold vacuum cleaner according to claim 2, wherein an extending direction of the handle intersects with an axial direction of the motor.

5. The hand-hold vacuum cleaner according to claim 1, wherein a central-axis direction of the cyclone dust separator intersects with an axial direction of the motor, and the motor is a DC motor.

6. The hand-hold vacuum cleaner according to claim 3, wherein the machine body comprises a first machine body and a second machine body connected to the first machine body, and the handle is formed by at least a part of the first machine body.

7. The hand-hold vacuum cleaner according to claim 6, wherein the motor is accommodated in the first machine body and the battery is accommodated in the second machine body.

8. A hand-hold vacuum cleaner, comprising:

   a machine body,
   a cyclone dust separator,
   a motor and a battery, and
   the machine body being provided with a handle,
   wherein during operation, the handle is held by a hand of an operator, and the motor and the battery are both located above the hand of the operator.

9. The hand-hold vacuum cleaner according to claim 8, wherein an airflow passage is provided inside the handle, one end of the airflow passage is in communication with the motor, and another end of the airflow passage is in communication with the air-out filter device, and the air-out filter device is located below the hand of the operator.

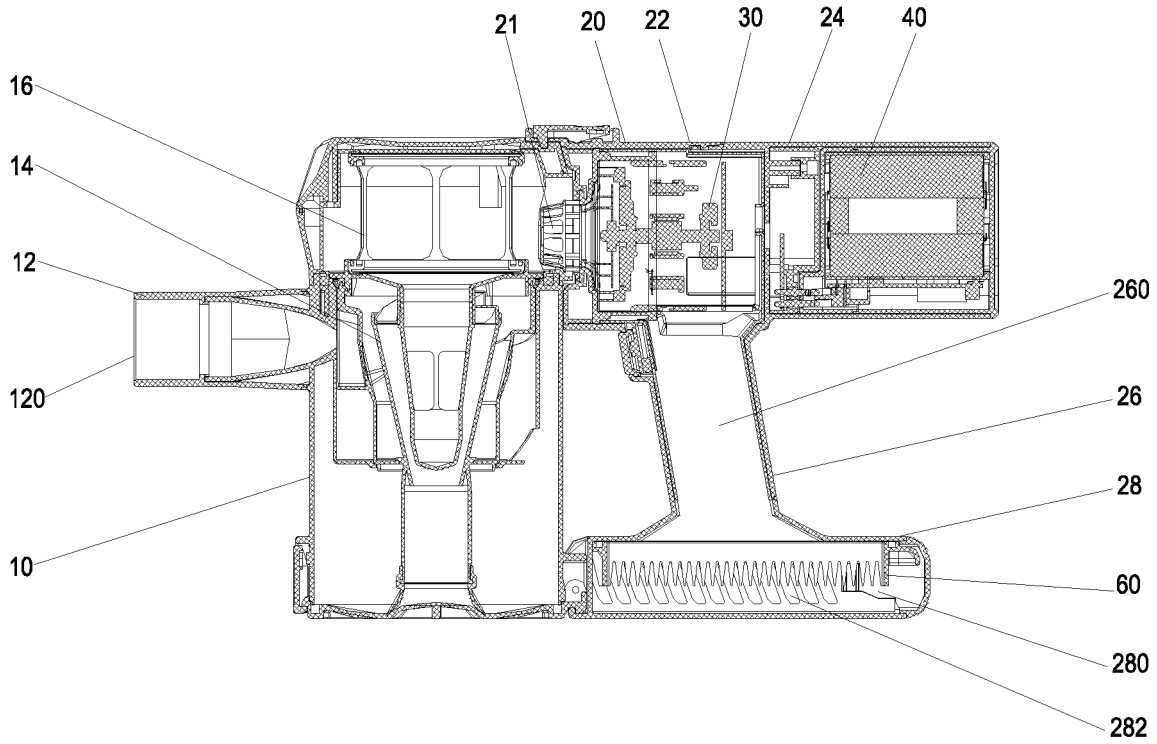

Figure 1

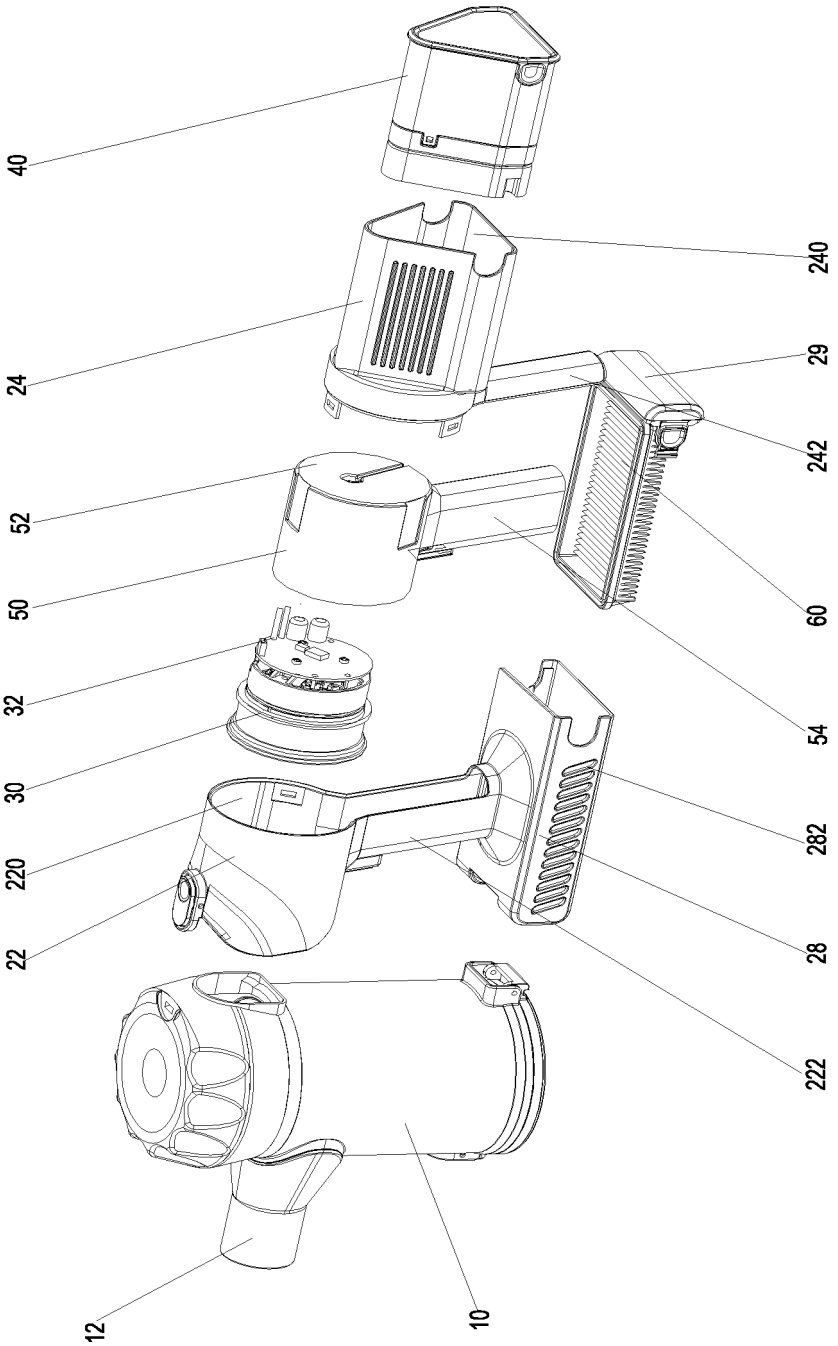

Figure 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/083638

A. CLASSIFICATION OF SUBJECT MATTER

A47L 5/24 (2006.01) 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)

A47L 5/-; A47L 9/-

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)

CNPAT, CNKI, WPI, EPODOC: power, battery, motor, dynamo, air+, gas+, outlet?, discharge+, exhaust+, ni zugen, lexy electric co. , ltd. , handle, dust absorption, deducting, air-out

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 104720687 A (YANG, Haiting) 24 June 2015 (24.06.2015) description, paragraphs [0009]-[0011], and figures 1 and 2	1-9
A	CN 101677727 A (WINDDROP SARL) 24 March 2010 (24.03.2010) the whole document	1-9
A	CN 202640155 U (CHU, Jianming) 02 January 2013 (02.01.2013) the whole document	1-9
A	EP 0413134 A1 (VORWERK & CO. INTERHOLDING G. M. B. H.) 20 February 1991 (20.02.1991) the whole document	1-9
A	CN 104172986 A (SUZHOU CLEANPLUS ELECTRIC APPLIANCE CO., LTD.) 03 December 2014 (03.12.2014) the whole document	1-9
A	CN 204274318 U (TIANJIN FEISI JIER TECHNOLOGY DEVELOPMENT CO., LTD.) 22 April 2015 (22.04.2015) the whole document	1-9
A	US 2006090290 A1 (LAU, YING WAI) 04 May 2006 (04.05.2006) the whole document	1-9

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

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"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

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"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
21 December 2016	03 January 2017
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, Xiaolin Telephone No. (86-10) 62413535

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/083638

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

REFERENCES CITED IN THE DESCRIPTION

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- CN 101489454 B **[0003]**