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(71) Applicant: **KingClean Electric Co., Ltd.**
Suzhou New District
Suzhou
Jiangsu 215163 (CN)

(72) Inventor: **NI, Zugen**
Suzhou, Jiangsu 215163 (CN)

(74) Representative: **Boult Wade Tennant LLP**
Salisbury Square House
8 Salisbury Square
London EC4Y 8AP (GB)

(54) STRIKING-TYPE HEPA SELF-CLEANING APPARATUS AND VACUUM CLEANER HAVING APPARATUS

(57) A striking-type HEPA self-cleaning apparatus and a vacuum cleaner having the self-cleaning apparatus, said self-cleaning apparatus comprising: a mounting cover (15) an inner part of which is provided with a certain accommodation space and a bottom part of which is opened to form a ventilation opening, a HEPA filter (17) that is connected to the bottom part of the mounting cover (15) and that seals the ventilation opening, and a striking assembly (14) that is disposed within the accommodation space; the striking assembly (14) comprises a striking driver (141) and at least one set of striking hammers (143) that is in transmission connection with the driver (141); the striking hammers (143) are located directly above the HEPA filter (17), and under the drive of the driver (141), the striking hammers (143) periodically strike an upper surface of the HEPA filter (17); as such, the HEPA filter (17) of the vacuum cleaner is able to retain a sufficient degree of air permeability for a long period of time or be restored to a sufficient degree of air permeability, thus ensuring that the vacuum cleaner retains a stronger suction force. By means of a suitable spatial arrangement, the vacuum cleaner achieves the effects of enhancing heat dissipation and reducing noise; and by means of performing a manner of alternating wind blowing and wind suction for the HEPA filter (17), dust accumulated on a surface of the HEPA filter (17) may be blown off.

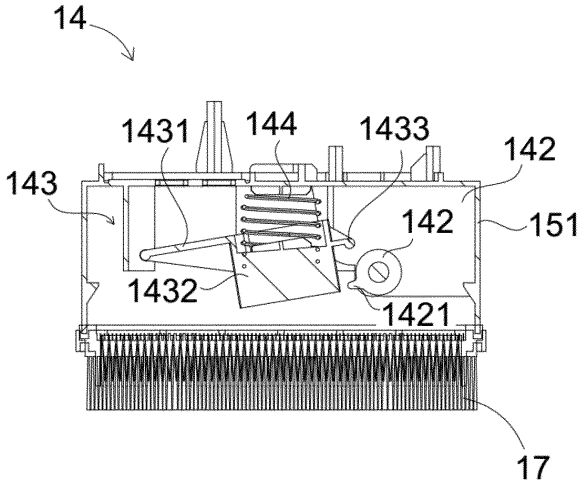

Figure 1

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Description

[0001] The present application claims the benefit of priorities to the following three Chinese patent applications, all of which are incorporated herein by reference in their entireties:

1) Chinese Patent Application No. 201810941461.7, titled "HEPA APPARATUS SELF-CLEANED BY STRIKING APPLICABLE TO VACUUM CLEANER", filed with the China National Intellectual Property Administration on August 17, 2018;
2) Chinese Patent Application No. 201810942168.2. titled "VACUUM CLEANER HAVING HEPA SELF-CLEANED BY STRIKING", filed with the China National Intellectual Property Administration on August 17, 2018; and
3) Chinese Patent Application No. 201810941449.6, titled "VACUUM CLEANER HAVING HEPA SELF-CLEANED BY STRIKING AND REVERSELY BLOWING", filed with the China National Intellectual Property Administration on August 17, 2018.

TECHNICAL FIELD

[0002] The present application relates to the technical field of vacuum cleaners, and in particular to an HEPA apparatus self-cleaned by striking and a vacuum cleaner having the HEPA apparatus.

BACKGROUND

[0003] The operating principle of the vacuum cleaner is that blades are driven by a motor to rotate at high speed, and negative pressure is generated in a hermetical shell to suck dust on carpets, floors, walls and other objects. After the dust is sucked into the dust-air separation assembly along with the air, the dust is filtered by the HEPA of the dust-air separation assembly and collected in the dust collector, and the filtered clean air is discharged out of a machine body of the vacuum cleaner.

[0004] Regarding to the vacuum cleaner, in the process of dust removal, whether dust-bag style filtering or cyclonic filtering is employed, dust will adhere onto a surface of an air inlet side of the HEPA filter. The longer the HEPA filter is used, the more the dust accumulated on the surface of the HEPA filter, which gradually weakens air permeability of the HEPA filter, leading to a reduction in airflow, and thereby reducing the dust removal performance of the vacuum cleaner. In view of this, it is necessary to provide an HEPA apparatus self-cleaned by striking applicable to a vacuum cleaner and a vacuum cleaner to address the problem.

[0005] In addition, the air duct assembly of the vacuum cleaner has the following problems. Firstly, the improper arrangement of an outlet of airflow for heat dissipation leads to poor heat dissipation and excessive noise when the motor works; secondly, the design of the air in-and-out chambers is improper, which leads to a small amount of inlet air and excessive noise caused by outlet air. In view of this, it is necessary to provide a vacuum cleaner to solve the problems.

SUMMARY

[0006] In view of the disadvantages in the prior art, an object of the present application is to provide an HEPA apparatus self-cleaned by striking. By continuously striking one side of the HEPA filter, dust accumulated on the surface of the HEPA filter can be shaken off when the vacuum cleaner having the HEPA apparatus self-cleaned by striking performs dust extraction, thereby solving the problem that the HEPA filter is blocked by dust too quickly. In this way, the HEPA filter can maintain enough air permeability for a long time or regain enough air permeability, which better ensures that the vacuum cleaner can maintain strong suction ability.

[0007] The HEPA apparatus self-cleaned by striking applicable to a vacuum cleaner includes:

a mounting cover, wherein the mounting cover is provided with an accommodation space therein and is opened at a bottom thereof to form an air vent;

an HEPA filter, wherein the HEPA filter is connected to the bottom of the mounting cover and closes the air vent; and

a striking assembly arranged in the accommodation space,

where, the striking assembly includes a strike driver and at least one set of striking hammer drivingly connected to the strike driver, the striking hammer is located right above the HEPA filter, and the striking hammer is configured to be driven by the strike driver to periodically strike an upper surface of the HEPA filter.

[0008] Preferably, a power output end of the strike driver is drivingly connected to a pushing wheel, and at least one pushing end protruding outward is provided on a side of the pushing wheel, and the pushing wheel is configured to be driven by the strike driver to periodically rotate in a vertical plane, so that the pushing end of the pushing wheel is capable to periodically push the striking hammer upward, and the pushing wheel corresponds to the striking hammer.

[0009] Preferably, the striking hammer includes:

a rotary arm, wherein one end of the rotary arm is rotationally connected with a top wall of the mounting cover; and

a striking portion, wherein the striking portion is integrated with another end of the rotary arm;

wherein, a restoring spring is elastically arranged between the striking portion and the top wall of the mounting cover, and a bottom surface of the striking portion is in continuous contact with the top surface of the HEPA filter under a restoring force of the restoring spring. A force-bearing end protruding outward is formed at a side, facing the pushing wheel, of an outer wall of the striking portion. When the pushing wheel rotates in the vertical plane, the pushing end thereof periodically pushes the force-bearing end upward so that the bottom surface of the striking portion is periodically lifted up by a certain distance relative to the top surface of the HEPA filter.

[0010] Preferably, a spring mounting groove is provided at an upper surface of the striking portion, and a bottom of the restoring spring is located in the spring mounting groove.

[0011] Preferably, a driver mounting chamber sunken vertically is formed at an upper surface of the mounting cover, and the strike driver is arranged in the driver mounting chamber.

[0012] Preferably, two sets of striking hammers are provided, and the two sets of striking hammers are symmetrically arranged with respect to the strike driver.

[0013] Preferably, multiple air extraction holes are provided at a top wall of the mounting cover, and the air extraction holes are configured for allowing an inside of the mounting cover to be in communication with an outside of the mounting cover.

[0014] Compared with the prior art, the HEPA apparatus self-cleaned by striking has the following beneficial effects. By continuously striking one side of the HEPA filter, dust accumulated on the surface of the HEPA filter can be shaken off when the vacuum cleaner having the HEPA apparatus self-cleaned by striking performs dust extraction, thereby solving the problem that the HEPA filter is blocked by dust too quickly. In this way, the HEPA filter can maintain enough air permeability for a long time or regain enough air permeability, which better ensures that the vacuum cleaner can maintain strong suction ability.

[0015] Another object of the present application is to provide a vacuum cleaner. In the vacuum cleaner, with the help of a proper space layout, the amount of the inlet air is increased and the noise caused by outlet air is reduced as well as the heat dissipation effect is improved and the noise is reduced. Moreover, by continuously striking one side of the HEPA filter, dust accumulated on the surface of the HEPA filter can be shaken off when the vacuum cleaner having the HEPA apparatus self-cleaned by striking performs dust extraction, thereby solving the problem that the HEPA filter is blocked by dust too quickly. In this way, the HEPA filter can maintain enough air permeability for a long time or regain enough air permeability, which better ensures that the vacuum cleaner can maintain strong suction ability.

[0016] The vacuum cleaner is a vacuum cleaner having the HEPA apparatus self-cleaned by striking, including:

a dust collector, wherein an upper portion of the dust collector is opened;

a cover plate, wherein the cover plate is connected to the upper portion of the dust collector and includes an opening for air extraction; and

the HEPA apparatus self-cleaned by striking according to any one of the above solutions, wherein the mounting cover of the HEPA apparatus self-cleaned by striking is arranged at the opening and closes the opening.

[0017] Preferably, an air duct assembly is provided at the cover plate, and the air duct assembly includes:

a front motor cover, wherein a rear side of the front motor cover is opened; and

a rear motor cover, wherein the rear motor cover is connected to the rear side of the front motor cover, and a motor accommodation chamber is formed between the rear motor cover and the front motor cover; and wherein

the motor accommodation chamber includes a left motor chamber and a right motor chamber which are arranged in parallel and in communication with each other, a left motor and a right motor are arranged in the left motor chamber and the right motor chamber, respectively; and the rear motor cover is provided with a left heat dissipation air outlet and a right heat dissipation air outlet corresponding to the left motor and the right motor, respectively.

[0018] Preferably, the front motor cover includes:

an air inlet chamber arranged at a front side of the motor accommodation chamber; and

at least one air filtering outlet pipe arranged at a bottom of the motor accommodation chamber; and wherein

the air inlet chamber and the air filtering outlet pipe are both in communication with the motor accommodation chamber.

[0019] Preferably, a top wall of the mounting cover is provided with a plurality of air suction holes configured for allowing an inside and an outside of the mounting cover to be in communication with each other; a bottom of the air inlet chamber is provided with a left air inlet and a right air inlet both configured to be in communication with an outside of the air inlet chamber. The left air inlet

and the right air inlet are arranged linearly along an X-axis direction, and both the left air inlet and the right air inlet are in communication with the air suction hole.

[0020] Compared with the prior art, the vacuum cleaner has the following beneficial effects. With the help of a proper space layout, the amount of the inlet air is increased and the noise caused by outlet air is reduced as well as the heat dissipation effect is improved and the noise is reduced. Moreover, by continuously striking one side of the HEPA filter, dust accumulated on the surface of the HEPA filter can be shaken off when the vacuum cleaner having the HEPA apparatus self-cleaned by striking performs dust extraction, thereby solving the problem that the HEPA filter is blocked by dust too quickly. In this way, the HEPA filter can maintain enough air permeability for a long time or regain enough air permeability, which better ensures that the vacuum cleaner can maintain strong suction ability.

[0021] Another object of the present application is to provide a vacuum cleaner. By alternately blowing and extracting air through the HEPA filter, dust accumulated on the surface of the HEPA filter can be blown off while the vacuum cleaner performs dust extraction. Moreover, by continuously striking one side of the HEPA filter, dust accumulated on the surface of the HEPA filter can be shaken off when the vacuum cleaner having the HEPA apparatus self-cleaned by striking performs dust extraction, thereby solving the problem that the HEPA filter is blocked by dust too quickly. In this way, the HEPA filter can maintain enough air permeability for a long time or regain enough air permeability, which better ensures that the vacuum cleaner can maintain strong suction ability.

[0022] The vacuum cleaner is a vacuum cleaner having an HEPA apparatus self-cleaned by striking and reversely blowing, which includes:

an HEPA apparatus self-cleaned by striking, wherein the HEPA apparatus self-cleaned by striking is the HEPA apparatus self-cleaned by striking according to any one of the above six solutions;

a dust collector, wherein an upper portion of the dust collector is opened;

a cover plate, wherein the cover plate is connected to the upper portion of the dust collector and includes an opening for air extraction, and the HEPA filter of the HEPA apparatus self-cleaned by striking is connected to the opening; and

a left air extraction port switching mechanism and a right air extraction port switching mechanism, both of which being arranged on the mounting cover of the HEPA apparatus self-cleaned by striking; and wherein

the mounting cover covers the HEPA filter, and the mounting cover is arranged at the opening and configured to seal the opening; an airflow in-and-out chamber is formed between a top wall of the mounting cover and the HEPA filter, and a striking assembly of the HEPA apparatus self-cleaned by striking is arranged in the airflow in-and-out chamber;

the top wall of the mounting cover is provided with a left air extraction port, a right air extraction port, a left air blow-in port and a right air blow-in port. The left air extraction port and the right air extraction port are symmetrically arranged in an X-axis direction, and the left air blow-in port and the right air blow-in port are also symmetrically arranged in the X-axis direction. The left air extraction port switching mechanism alternately blocks the left air extraction port and the left air blow-in port, and the right air extraction port switching mechanism alternately blocks the right air extraction port and the right air blow-in port, to allow that:

in a case that the left air extraction port is opened and the left air blow-in port is closed, the right air extraction port is closed and the right air blow-in port is opened; or

in a case that the left air extraction port is closed and the left air blow-in port is opened, the right air extraction port is opened and the right air blow-in port is closed.

[0023] Preferably, a partition plate extending along a Y-axis is arranged between the top wall of the mounting cover and the HEPA filter, and the partition plate divides the airflow in-and-out chamber into a left in-and-out chamber and a right in-and-out chamber, wherein the left air extraction port and the left air blow-in port are both in communication with the left in-and-out chamber, and the right air extraction port and the right air blow-in port are both in communication with the right in-and-out chamber.

[0024] Preferably, an air duct assembly is provided at the cover plate, and the air duct assembly includes:

a front motor cover, wherein a rear side of the front motor cover is opened; and

a rear motor cover, wherein the rear motor cover is connected to the rear side of the front motor cover, to be combined with the front motor cover to form a motor accommodation chamber therebetween; and wherein

the motor accommodation chamber includes a left motor chamber and a right motor chamber which are arranged in parallel and in communication with each other, a left motor and a right motor are arranged in the left motor chamber and the right motor chamber, respectively; and the rear motor cover is provided with a left heat dissipation air outlet and a right heat

dissipation air outlet corresponding to the left motor and the right motor, respectively.

[0025] Preferably, the front motor cover includes:

an air inlet chamber arranged at a front side of the motor accommodation chamber; and

at least one air filtering outlet pipe arranged at a bottom of the motor accommodation chamber; and wherein

the air inlet chamber and the air filtering outlet pipe are both in communication with the motor accommodation chamber.

[0026] Preferably, a bottom of the air inlet chamber is provided with a left air inlet and a right air inlet both configured to allow the air inlet chamber to be in communication with an outside. The left air inlet and the right air inlet are arranged linearly along the X-axis direction, the left air inlet and the right air inlet are in communication with the left air extraction port and the right air extraction port, respectively, and the left air blow-in port and the right air blow-in port are both in communication with outside atmosphere.

[0027] Preferably, the left air extraction port switching mechanism includes:

a left driver arranged on the top wall of the mounting cover; and

a left switching plate configured to slidably cover the left air extraction port and the left air blow-in port; and wherein

the left switching plate is arranged between the left air inlet and the top wall of the mounting cover. The left switching plate is provided with a left ventilation port, the left switching plate is in transmission connection with the left driver, so that the left switching plate is driven by the left driver to slide back and forth in the Y-axis direction, to allow the left ventilation port to be alternately in communication with the left air extraction port and the left air blow-in port.

[0028] Preferably, the right air extraction port switching mechanism includes:

a right driver arranged on the top wall of the mounting cover; and

a right switching plate configured to slidably cover the right air extraction port and the right air blow-in port; and wherein

the right switching plate is arranged between the right air inlet and the top wall of the mounting cover. The right switching plate is provided with a right ventilation port, and the right switching plate is in transmission connection with the right driver, so that the right switching plate is driven by the right driver to slide back and forth in the Y-axis direction, to allow the right ventilation port to be alternately in communication with the right air extraction port and the right air blow-in port.

[0029] Compared with the prior art, the vacuum cleaner has the following beneficial effects. By alternately blowing and extracting air through the HEPA filter, dust accumulated on the surface of the HEPA filter can be blown off while the vacuum cleaner performs dust extraction. Moreover, by continuously striking one side of the HEPA filter, dust accumulated on the surface of the HEPA filter can be shaken off when the vacuum cleaner having the HEPA apparatus self-cleaned by striking performs dust extraction, thereby solving the problem that the HEPA filter is blocked by dust too quickly. In this way, the HEPA filter can maintain enough air permeability for a long time or regain enough air permeability, which better ensures that the vacuum cleaner can maintain strong suction ability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030]

Figure 1 is a longitudinal cross-sectional view of an HEPA apparatus self-cleaned by striking according to the present application;

Figure 2 is an exploded view of the HEPA apparatus self-cleaned by striking according to the present application;

Figure 3 is a three-dimensional structural view of a striking assembly of the HEPA apparatus self-cleaned by striking according to the present application;

Figure 4 is a three-dimensional structural view of a vacuum cleaner having the HEPA apparatus self-cleaned by striking according to the present application;

Figure 5 is an exploded view of the vacuum cleaner having the HEPA apparatus self-cleaned by striking according to the present application;

Figure 6 is a three-dimensional structural view of an air duct assembly of the vacuum cleaner having the HEPA apparatus self-cleaned by striking according to the present application;

Figure 7 is a top view of the air duct assembly of the vacuum cleaner having the HEPA apparatus self-

cleaned by striking according to the present application;

Figure 8 is a cross-sectional view taken along a line B-B in Figure 7;

Figure 9 is a three-dimensional structural view of a vacuum cleaner having an HEPA apparatus self-cleaned by striking and reversely blowing according to the present application;

Figure 10 is an exploded view of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing according to the present application;

Figure 11 is a three-dimensional structural view of a mounting cover of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing according to the present application;

Figure 12 is a three-dimensional structural view of an air duct assembly of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing according to the present application;

Figure 13 is a top view of the air duct assembly of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing according to the present application; and

Figure 14 is a cross-sectional view taken along a line B-B in Figure 13.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0031] The present application will be further described in detail hereinafter in conjunction with the drawings, the foregoing and other objects, features, aspects and advantages of the present application will become more apparent, so that those skilled in the art can implement the present application according to the specification. In the drawings, the shape and size may be enlarged for clarity, and the same reference numerals in the drawings are used to indicate the same or similar parts. In the following description, terms such as "center", "thickness", "height", "length", "front", "back", "rear", "left", "right", "top", "bottom", "upper", "lower" or the like are based on the orientation or positional relationship shown in the drawings. In particular, "height" is the dimension from top to bottom, "width" is the dimension from left to right, and "depth" is the dimension from front to rear. These relative terms are for convenience of description and are generally not intended to require a specific orientation. Terms related to attachment, coupling, etc. (e.g., "connected" and "attached"), unless explicitly stated otherwise, refer to a relationship in which these structures are directly or indirectly fixed or attached to each other through intermediate structures, and a relationship in which they are movably or rigidly attached to each other.

[0032] Referring to Figures 1 to 3, an HEPA apparatus self-cleaned by striking includes:

a mounting cover 15, wherein the mounting cover 15 is provided with an accommodation space therein and is opened at a bottom thereof to form an air vent;

an HEPA filter 17, wherein the HEPA filter 17 is connected to the bottom of the mounting cover 15 and closes the air vent; and

a striking assembly 14 arranged in the accommodation space;

wherein, the striking assembly 14 includes a strike driver 141 and at least one set of striking hammer 143 drivingly connected to the driver 141, the striking hammer 143 is located right above the HEPA filter 17, and the striking hammer 143 is configured to be driven by the driver 141 to periodically strike an upper surface of the HEPA filter 17.

[0033] Referring to Figure 1, a power output end of the strike driver 141 is drivingly connected to a pushing wheel 142, and at least one pushing end 1421 protruding outward is provided on a side of the pushing wheel 142, and the pushing wheel 142 is driven by the driver 141 to periodically rotate in a vertical plane, so that the pushing end 1421 on the pushing wheel 142 is capable to periodically push the striking hammer 143 upward. The pushing wheel 142 corresponds to the striking hammer 143.

[0034] Further, the striking hammer 143 includes:

a rotary arm 1431, wherein one end of the rotary arm 1431 is rotationally connected with a top wall of the mounting cover 15; and

a striking portion 1432, wherein the striking portion 1432 is integrated with another end of the rotary arm 1431;

wherein, a restoring spring 144 is elastically arranged between the striking portion 1432 and the top wall of the mounting cover 15, and a bottom surface of the striking portion 1432 is in continuous contact with the top surface of the HEPA filter 17 under a restoring force of the restoring spring 144; a force-bearing end 1433 protruding outward is formed at a side, facing the pushing wheel 142, of an outer wall of the striking portion 1432, when the pushing wheel 142 rotates in the vertical plane, the pushing end 1421 thereof periodically pushes the force-bearing end 1433 upward, so that the bottom surface of the striking portion 1432 is periodically lifted up by a certain distance relative to the top surface of the HEPA filter 17.

[0035] In an embodiment, a spring mounting groove is provided at an upper surface of the striking portion 1432, and a bottom of the restoring spring 144 is arranged in the spring mounting groove.

[0036] Further, a driver mounting chamber 1511 sunken vertically is formed at an upper surface of the mounting cover 15, and the strike driver 141 is arranged in the driver mounting chamber 1511. In an embodiment, a side wall 151 of the mounting cover 15 extends vertically downward.

[0037] In a preferred embodiment, two sets of striking hammers 143 are provided, and the two sets of striking hammers 143 are symmetrically arranged with respect to the strike driver 141.

[0038] Further, a plurality of ventilation holes are provided at a top wall of the mounting cover 15, and the ventilation holes are configured for allowing an inside of the mounting cover 15 to be in communication with an outside of the mounting cover 15. In the illustrated embodiment, there are four ventilation holes, namely a first ventilation hole 1512, a second ventilation hole 1513, a third ventilation hole 1514, and a fourth ventilation hole 1515.

[0039] Referring to Figures 4 and 5, a vacuum cleaner having the HEPA apparatus self-cleaned by striking includes the above the HEPA apparatus self-cleaned by striking, and further includes:

a dust collector 11, wherein the dust collector 11 is opened at an upper portion thereof. In an embodiment, the dust collector 11 is provided with a dust suction pipe 111 configured to be connected with a dust suction head on a side wall thereof; and

a cover plate 13, wherein the cover plate 13 is connected to the upper portion of the dust collector 11 and includes an opening 131 for air extraction.

[0040] The mounting cover 15 of the HEPA apparatus self-cleaned by striking is arranged at the opening 131 and c closes the opening 131.

[0041] Referring to Figures 4 to 8, an air duct assembly 16 is provided at the cover plate 13 of the vacuum cleaner having the HEPA apparatus self-cleaned by striking, and the air duct assembly 16 includes:

a front motor cover 161, wherein the front motor cover 161 is opened at a rear side thereof; and

a rear motor cover, wherein the rear motor cover is connected to the rear side of the front motor cover 161, and a motor accommodation chamber is formed between the rear motor cover and the front motor cover 161; and wherein

the motor accommodation chamber includes a left motor and a right motor chamber which are arranged in parallel and in communication with each other, a left motor 167 and a right motor 168are arranged in the left motor chamber and the right motor chamber, respectively; and the rear motor cover is provided with a left heat dissipation air outlet 163 and a right heat dissipation air outlet 164 corresponding to the left motor 167 and the right motor 168, respectively.

[0042] Further, the front motor cover 161 of the vacuum cleaner having the HEPA apparatus self-cleaned by striking includes:

an air inlet chamber162 arranged at a front side of the motor accommodation chamber; and

at least one air filtering outlet pipe arranged at a bottom of the motor accommodation chamber; and wherein

the air inlet chamber 162 and the air filtering outlet pipe are both in communication with the motor accommodation chamber.

[0043] Further, the ventilation holes in the top wall of the mounting cover 15 of the vacuum cleaner having the HEPA apparatus self-cleaned by striking are air extraction holes. In the illustrated embodiment, the first ventilation hole 1512, the second ventilation hole 1513, the third ventilation hole 1514 and the fourth ventilation hole 1515 are all air extraction holes. In addition, a bottom of the air inlet chamber 162 of the vacuum cleaner having the HEPA apparatus self-cleaned by striking is provided with a left air inlet 1621 and a right air inlet 1622 both configured to allow the air inlet chamber 162 to be in communication with an outside. The left air inlet 1621 and the right air inlet 1622 are arranged linearly along an X-axis direction, and both the left air inlet 1621 and the right air inlet 1622 are in communication with the air extraction holes.

[0044] Referring to Figures 9 to 14, a vacuum cleaner having an HEPA apparatus self-cleaned by striking and reversely blowing includes the above HEPA apparatus self-cleaned by striking, and further includes:

a dust collector 11, wherein the dust collector 11 is opened at an upper portion thereof;

a cover plate 13, wherein the cover plate 13 is connected to the upper portion of the dust collector 11 and includes an opening 131 for air extraction, and the HEPA filter of the HEPA apparatus self-cleaned by striking is connected to the opening 131; and

a left air extraction port switching mechanism and a right air extraction port switching mechanism, both of which being arranged on the mounting cover 15 of the HEPA apparatus self-cleaned by striking; and wherein

the mounting cover 15 covers the HEPA filter 17, and the mounting cover 15 is arranged at the opening 131 and configured to seal the opening 131; an airflow in-and-out chamber is formed between a top wall of the mounting cover 15 and the HEPA filter 17; and a striking assembly 14 of the HEPA apparatus self-cleaned by striking is arranged in the airflow in-and-out chamber.

[0045] The ventilation holes on the top wall (that is, the mounting plate) of the mounting cover 15 includes a left air extraction port, a right air extraction port, a left air blow-in port, and a right air blow-in port. In the specific embodiment shown in the figures, the first ventilation hole 1512 is the left air extraction port, the second ventilation hole 1513 is the right air extraction port, the third ventilation hole 1514 is the left air blow-in port, and the fourth ventilation hole 1515 is the right air blow-in port. The left air extraction port and the right air extraction port are symmetrically arranged in the X-axis direction, and the left air blow-in port and the right air blow-in port are also symmetrically arranged in the X-axis direction. The left air extraction port switching mechanism alternately blocks the left air extraction port and the left air blow-in port, and the right air outlet switching mechanism alternately blocks the right air extraction port and the right air blow-in port, so that:

when the left air extraction port is opened and the left air blow-in port is closed, the right air extraction port is closed and the right air blow-in port is opened; or

when the left air extraction port is closed and the left air blow-in port is opened, the right air extraction port is opened and the right air blow-in port is closed.

[0046] Further, a partition plate extending along a Y-axis is arranged between the top wall of the mounting cover 15 and the HEPA filter of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing; the partition plate divides the airflow in-and-out chamber into a left in-and-out chamber and a right in-and-out chamber; wherein, the left air extraction port and the left air blow-in port are both in communication with the left in-and-out chamber, and the right air extraction port and the right air blow-in port are both in communication with the right in-and-out chamber.

[0047] Referring to Figures 9, 10, and 12 to 14, an air duct assembly 16 is provided at the cover plate 13 of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing, and the air duct assembly 16 includes:

a front motor cover 161, wherein the front motor cover 161 is opened at its rear side; and

a rear motor cover, wherein the rear motor cover is connected to the rear side of the front motor cover 161, and a motor accommodation chamber is formed between the rear motor cover and the front motor cover 161; and wherein

the motor accommodation chamber includes a left motor and a right motor chamber which are arranged in parallel and in communication with each other, a left motor 167 and a right motor 168are arranged in the left motor chamber and the right motor chamber, respectively; and the rear motor cover is provided with a left heat dissipation air outlet 163 and a right heat dissipation air outlet 164 corresponding to the left motor 167 and the right motor 168, respectively.

[0048] Further, the front motor cover 161 of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing includes:

an air inlet chamber 162 arranged at a front side of the motor accommodation chamber; and

at least one air filtering outlet pipe arranged at a bottom of the motor accommodation chamber; and wherein

the air inlet chamber 162 and the air filtering outlet pipe are both in communication with the motor accommodation chamber.

[0049] Referring to Figure 6 again, a bottom of the air inlet chamber 162 is provided with a left air inlet 1621 and a right air inlet 1622 both configured to be in communication with an outside of the air inlet chamber162. The left air inlet 1621 and the right air inlet 1622 are arranged linearly along the X-axis direction, the left air inlet 1621 and the right air inlet 1622 are in communication with the left air extraction port and the right air extraction port, respectively, and the left air blow-in port and the right air blow-in port are both in communication with outside atmosphere.

[0050] Referring to Figure 10, the left air extraction port switching mechanism of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing includes:

a left driver 153 arranged on the top wall (that is, the mounting plate) of the mounting cover 15; and

a left switching plate 154 configured to slidably cover the left air extraction port and the left air blow-in port; and wherein

the left switching plate 154 is arranged between the left air inlet 1621 and the top wall (that is, the mounting plate) of the mounting cover 15. The left switching plate 154 is provided with a left ventilation port 1541, the left switching plate 154 is drivingly connected

with the left driver 153, so that the left switching plate 154 is driven by the left driver 153 to slide back and forth in the Y-axis direction, which causes the left ventilation port 1541 to be alternately in communication with the left air extraction port and the left air blow-in port.

[0051] Further, the right air extraction port switching mechanism of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing includes:

a right driver 152 arranged on the top wall (that is, the mounting plate) of the mounting cover 15; and

a right switching plate 155 configured to slidably cover the right air extraction port and the right air blow-in port; and wherein

the right switching plate 155 is arranged between the right air inlet 1622 and the top wall (that is, the mounting plate) of the mounting cover 15. The right switching plate 155 is provided with a right ventilation port. The right switching plate 155 is drivingly connected with the right driver 152, so that the right switching plate 155 is driven by the right driver 152 to slide back and forth in the Y-axis direction, which causes the right ventilation port 1551 to be alternately in communication with the right air extraction port and the right air blow-in port.

[0052] The working principle of the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing is as follows.

[0053] Referring to Figure 10, in this case, the left air extraction port is closed and the left air blow-in port is opened, while the right air extraction port is opened and the right air blow-in port is closed. The right air inlet 1622 is in communication with the right air extraction port, while the left air inlet 1612 is isolated from the left air extraction port, and the left air blow-in port is in communication with the outside atmosphere. When the left motor 167 and the right motor 168 rotate to extract the air, negative pressure is formed in the air inlet chamber 162, and the air in the dust collector 11 flows through and is filtered by a right half of the HEPA filter 17, then enters the air inlet chamber 162 through the right air extraction port, and is finally discharged to the outside atmosphere. Since the air in the dust collector 11 is taken away, negative pressure is also formed inside the dust collector 11, which causes the outside air to enter the left in-and-out chamber through the left air blow-in port, and blow an upper surface of a left half of the HEPA filter 17. The dust accumulated on a lower surface of the left half of the HEPA filter 17 is therefore blown off and collected into the dust collector 11. After the vacuum cleaner works in this working state for a period of time, the left driver 153 and the right driver 152 respectively drive the left switching plate 154 and the right switching plate 155 to move to cause the left air extraction port to be opened, the left air blow-in port to be closed, the right air extraction port to be closed and the right air blow-in port to be opened. The flowing principle of the airflow in this state is similar to that in the previous state, and will not be repeated herein. At the same time that the HEPA is blown by the airflow reversely, the strike driver 141 continuously drives the striking hammer 143 to strike the upper surface of the HEPA filter 17, so that the dust accumulated on the HEPA filter 17 is removed more easily and thoroughly, and thus the effect and efficiency of dust removal is greatly improved.

[0054] The number of equipment and processing scale described herein are used to simplify the description of the present application. The implementation, modification and change of the present application are obvious to those skilled in the art.

[0055] Although the embodiments of the present application have been disclosed as above, they are not limited to the implementation listed in the description and embodiments. It can be applied to various fields suitable for the present application. For those skilled in the art, additional modifications may be easily made, so without departing from the general concept defined by the claims and equivalent scope, the present application is not limited to specific details and the illustrations shown and described herein.

Claims

1. An HEPA apparatus self-cleaned by striking applicable to a vacuum cleaner, comprising:

   a mounting cover (15), wherein the mounting cover (15) is provided with an accommodation space therein and is opened at a bottom thereof to form an air vent;
   an HEPA filter (17), wherein the HEPA filter (17) is connected to the bottom of the mounting cover (15) and closes the air vent; and
   a striking assembly (14) arranged in the accommodation space;
   wherein, the striking assembly (14) comprises a strike driver (141) and at least one set of striking hammer (143) drivingly connected to the strike driver (141), the striking hammer (143) is located right above the HEPA filter (17), and the striking hammer (143) is configured to be driven by the strike driver (141) to periodically strike an upper surface of the HEPA filter (17).

2. The HEPA apparatus self-cleaned by striking according to claim 1, wherein a power output end of the strike driver (141) is drivingly connected to a pushing wheel (142), and at least one pushing end (1421) protruding outward is provided on a side of

the pushing wheel (142), and the pushing wheel (142) is configured to be driven by the strike driver (141) to periodically rotate in a vertical plane, so that the pushing end (1421) of the pushing wheel (142) is capable to periodically push the striking hammer (143) upward, and the pushing wheel (142) corresponds to the striking hammer (143).

3. The HEPA apparatus self-cleaned by striking according to claim 2, wherein the striking hammer (143) comprises:

a rotary arm (1431), wherein one end of the rotary arm (1431) is rotationally connected with a top wall of the mounting cover (15); and
a striking portion (1432), wherein the striking portion (1432) is integrated with another end of the rotary arm (1431);
wherein, a restoring spring (144) is elastically arranged between the striking portion (1432) and the top wall of the mounting cover (15), and a bottom surface of the striking portion (1432) is in continuous contact with the top surface of the HEPA filter (17) under a restoring force of the restoring spring (144); a force-bearing end (1433) protruding outward is formed at a side, facing the pushing wheel (142), of an outer wall of the striking portion (1432); when the pushing wheel (142) rotates in the vertical plane, the pushing end (1421) on the pushing wheel (142) is configured to periodically push the force-bearing end (1433) upward to make the bottom surface of the striking portion (1432) periodically be lifted up by a certain distance relative to the top surface of the HEPA filter (17).

4. The HEPA apparatus self-cleaned by striking according to claim 3, wherein a spring mounting groove is provided at an upper surface of the striking portion (1432), and a bottom of the restoring spring (144) is located in the spring mounting groove.

5. The HEPA apparatus self-cleaned by striking according to claim 1, wherein a driver mounting chamber (1511) sunken vertically is formed at an upper surface of the mounting cover (15), and the strike driver (141) is arranged in the driver mounting chamber (1511).

6. The HEPA apparatus self-cleaned by striking according to claim 1, wherein two sets of striking hammers (143) are provided, and the two sets of striking hammers (143) are symmetrically arranged with respect to the strike driver (141).

7. The HEPA apparatus self-cleaned by striking according to claim 1, wherein a plurality of air extraction holes are provided at a top wall of the mounting cover (15), and the air extraction holes are configured for allowing an inside of the mounting cover (15) to be in communication with an outside of the mounting cover (15).

8. A vacuum cleaner, wherein the vacuum cleaner is a vacuum cleaner having an HEPA apparatus self-cleaned by striking, and the vacuum cleaner having the HEPA apparatus self-cleaned by striking comprises:

a dust collector (11), wherein the dust collector (11) is opened at an upper portion thereof;
a cover plate (13), wherein the cover plate (13) is connected to the upper portion of the dust collector (11) and comprises an opening (131) for air extraction; and
the HEPA apparatus self-cleaned by striking according to any one of claims 1 to 7, wherein the mounting cover (15) of the HEPA apparatus self-cleaned by striking is arranged at the opening (131) and closes the opening (131).

9. The vacuum cleaner according to claim 8, wherein an air duct assembly (16) is provided at the cover plate (13), and the air duct assembly (16) comprises:

a front motor cover (161), wherein the front motor cover (161) is opened at a rear side thereof; and
a rear motor cover, wherein the rear motor cover is connected to the rear side of the front motor cover (161), and a motor accommodation chamber is formed between the rear motor cover and the front motor cover (161); and wherein
the motor accommodation chamber comprises a left motor chamber and a right motor chamber which are arranged in parallel and in communication with each other; a left motor (167) and a right motor (168) are arranged in the left motor chamber and the right motor chamber, respectively; and the rear motor cover is provided with a left heat dissipation air outlet (163) and a right heat dissipation air outlet (164) corresponding to the left motor (167) and the right motor (168), respectively.

10. The vacuum cleaner according to claim 9, wherein the front motor cover (161) comprises an air inlet chamber (162) arranged at a front side of the motor accommodation chamber, and at least one air filtering outlet pipe arranged at a bottom of the motor accommodation chamber; wherein the air inlet chamber (162) and the air filtering outlet pipe are both in communication with the motor accommodation chamber.

11. The vacuum cleaner according to claim 10, wherein

a top wall of the mounting cover (15) is provided with a plurality of air extraction holes configured for allowing an inside and an outside of the mounting cover (15) to be in communication with each other; a bottom of the air inlet chamber (162) is provided with a left air inlet (1621) and a right air inlet (1622) both configured to allow the air inlet chamber (162) to be in communication with an outside; wherein the left air inlet (1621) and the right air inlet (1622) are arranged linearly along an X-axis direction, and both the left air inlet (1621) and the right air inlet (1622) are in communication with the air extraction holes.

12. A vacuum cleaner, wherein the vacuum cleaner is a vacuum cleaner having an HEPA apparatus self-cleaned by striking and reversely blowing, and the vacuum cleaner having the HEPA apparatus self-cleaned by striking and reversely blowing comprises:

the HEPA apparatus self-cleaned by striking according to any one of claims 1 to 6;
a dust collector (11), wherein the dust collector (11) is opened at an upper portion thereof;
a cover plate (13), wherein the cover plate (13) is connected to the upper portion of the dust collector (11) and comprises an opening (131) for air extraction, and the HEPA filter (17) of the HEPA apparatus self-cleaned by striking is connected to the opening (131); and
a left air extraction port switching mechanism and a right air extraction port switching mechanism, both of which being arranged on the mounting cover (15) of the HEPA apparatus self-cleaned by striking; and wherein
the mounting cover (15) covers the HEPA filter (17), and the mounting cover (15) is arranged at the opening (131) and configured to seal the opening (131); an airflow in-and-out chamber is formed between a top wall of the mounting cover (15) and the HEPA filter (17); and a striking assembly (14) of the HEPA apparatus self-cleaned by striking is arranged in the airflow in-and-out chamber;
the top wall of the mounting cover (15) is provided with a left air extraction port, a right air extraction port, a left air blow-in port and a right air blow-in port, the left air extraction port and the right air extraction port are symmetrically arranged in an X-axis direction, and the left air blow-in port and the right air blow-in port are also symmetrically arranged in the X-axis direction; the left air extraction port switching mechanism is configured to alternately block the left air extraction port and the left air blow-in port, and the right air extraction port switching mechanism is configured to alternately block the right air extraction port and the right air blow-in port, so that:

when the left air extraction port is opened and the left air blow-in port is closed, the right air extraction port is closed and the right air blow-in port is opened; or
when the left air extraction port is closed and the left air blow-in port is opened, the right air extraction port is opened and the right air blow-in port is closed.

13. The vacuum cleaner according to claim 12, wherein a partition plate extending along a Y-axis is arranged between the top wall of the mounting cover (15) and the HEPA filter (17); the partition plate is configured to divide the airflow in-and-out chamber into a left in-and-out chamber and a right in-and-out chamber; wherein the left air extraction port and the left air blow-in port are both in communication with the left in-and-out chamber, and the right air extraction port and the right air blow-in port are both in communication with the right in-and-out chamber.

14. The vacuum cleaner according to claim 13, wherein an air duct assembly (16) is provided at the cover plate (13), and the air duct assembly (16) comprises:

a front motor cover (161), wherein the front motor cover (161) is opened at a rear side thereof; and
a rear motor cover, wherein the rear motor cover is connected to the rear side of the front motor cover (161), and a motor accommodation chamber is formed between the rear motor cover and the front motor cover (161); and wherein
the motor accommodation chamber comprises a left motor chamber and a right motor chamber which are arranged in parallel and in communication with each other, a left motor (167) and a right motor (168) are arranged in the left motor chamber and the right motor chamber, respectively; and the rear motor cover is provided with a left heat dissipation air outlet (163) and a right heat dissipation air outlet (164) corresponding to the left motor (167) and the right motor (168), respectively.

15. The vacuum cleaner according to claim 13, wherein the front motor cover (161) comprises:

an air inlet chamber (162) arranged at a front side of the motor accommodation chamber; and at least one air filtering outlet pipe arranged at a bottom of the motor accommodation chamber; and wherein
the air inlet chamber (162) and the air filtering outlet pipe are both in communication with the motor accommodation chamber.

16. The vacuum cleaner according to claim 15, wherein

a bottom of the air inlet chamber (162) is provided with a left air inlet (1621) and a right air inlet (1622) both configured to be in communication with an outside of the air inlet chamber (162); and wherein
the left air inlet (1621) and the right air inlet (1622) are arranged linearly along an X-axis direction, the left air inlet (1621) and the right air inlet (1622) are in communication with the left air extraction port and the right air extraction port, respectively, and the left air blow-in port and the right air blow-in port are both in communication with outside atmosphere.

17. The vacuum cleaner according to claim 16, wherein the left air extraction port switching mechanism comprises:

a left driver (153) arranged on the top wall of the mounting cover (15); and
a left switching plate (154) configured to slidably cover the left air extraction port and the left air blow-in port; and wherein
the left switching plate (154) is arranged between the left air inlet (1621) and the top wall of the mounting cover (15), the left switching plate (154) is provided with a left ventilation port (1541); the left switching plate (154) is drivingly connected with the left driver (153), so that the left switching plate (154) is driven by the left driver (153) to slide back and forth in a Y-axis direction, which causes the left ventilation port (1541) to be alternately in communication with the left air extraction port and the left air blow-in port.

18. The vacuum cleaner according to claim 16, wherein the right air extraction port switching mechanism comprises:

a right driver (152) arranged on the top wall of the mounting cover (15); and
a right switching plate (155) configured to slidably cover the right air extraction port and the right air blow-in port; and wherein
the right switching plate (155) is arranged between the right air inlet (1622) and the top wall of the mounting cover (15), the right switching plate (155) is provided with a right ventilation port (1551), the right switching plate (155) is drivingly connected with the right driver (152), so that the right switching plate (155) is driven by the right driver (152) to slide back and forth in the Y-axis direction, which causes the right ventilation port (1551) to be alternately in communication with the right air extraction port and the right air blow-in port.

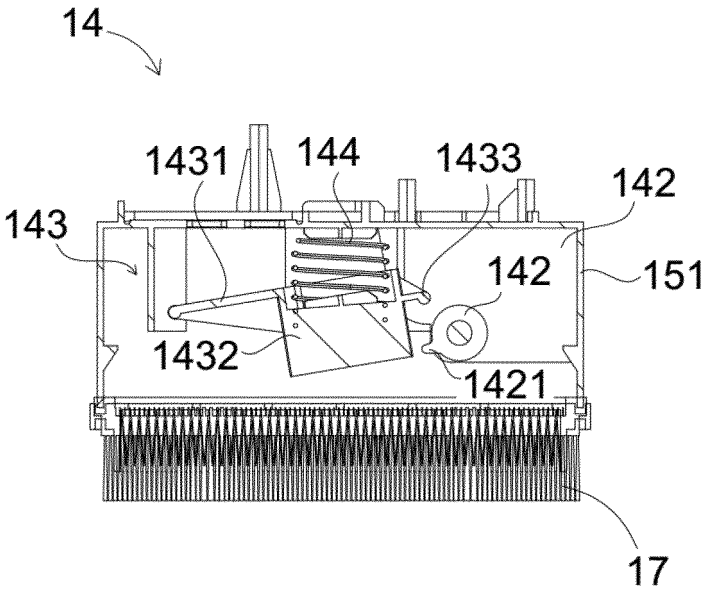

Figure 1

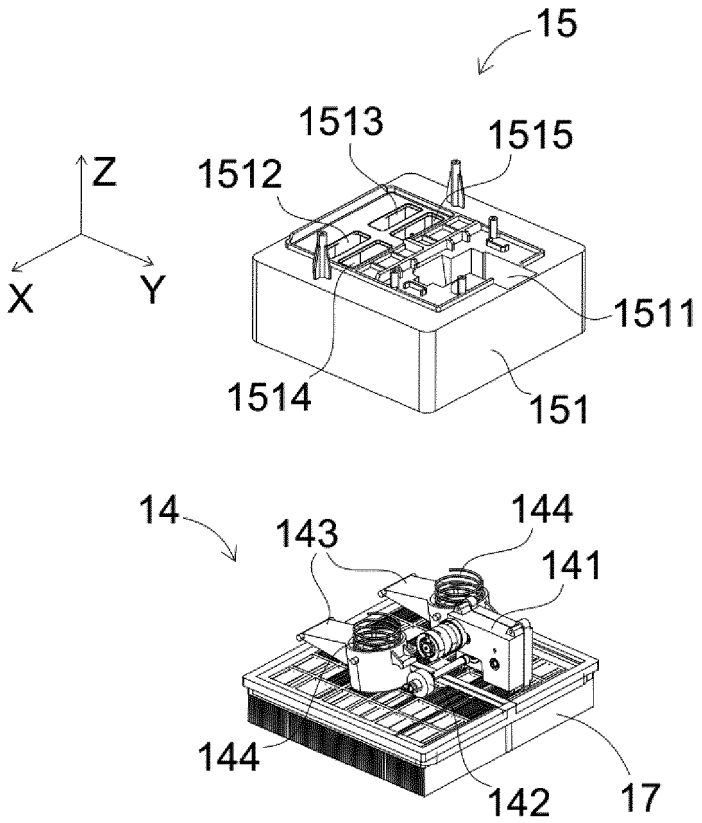

Figure 2

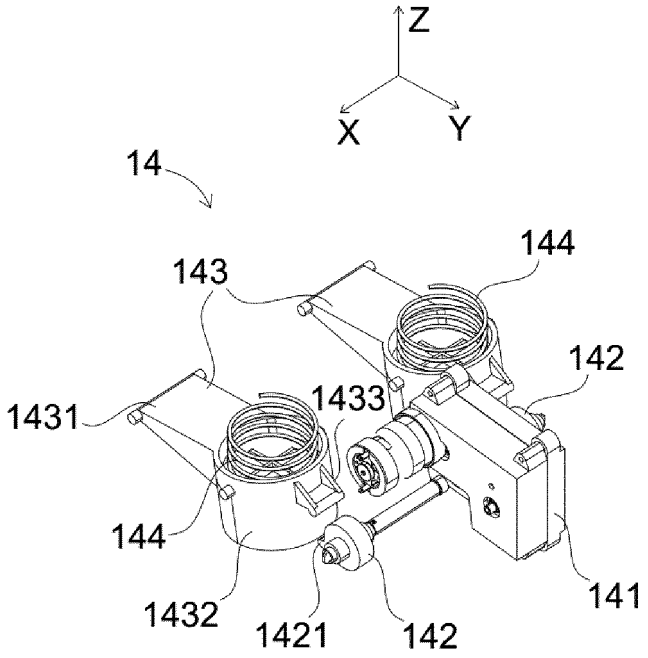

Figure 3

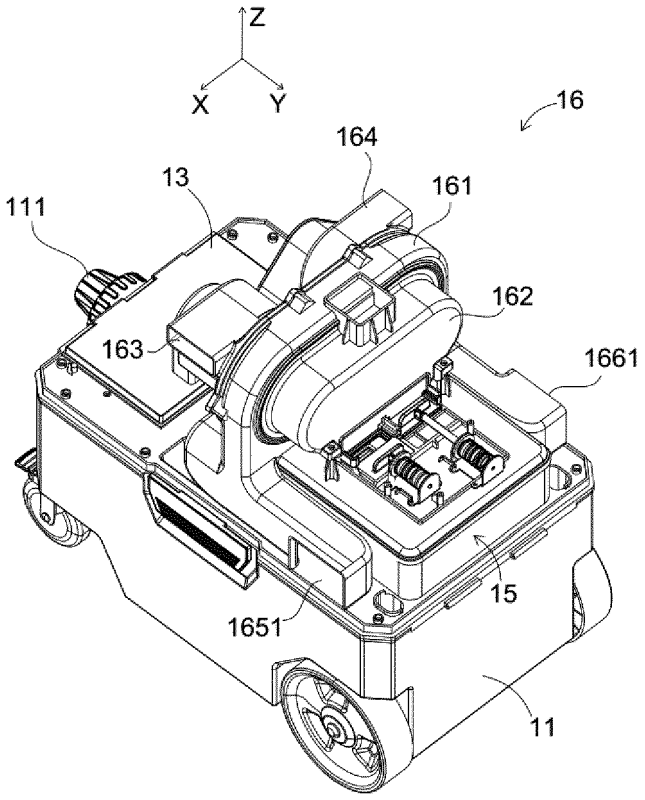

Figure 4

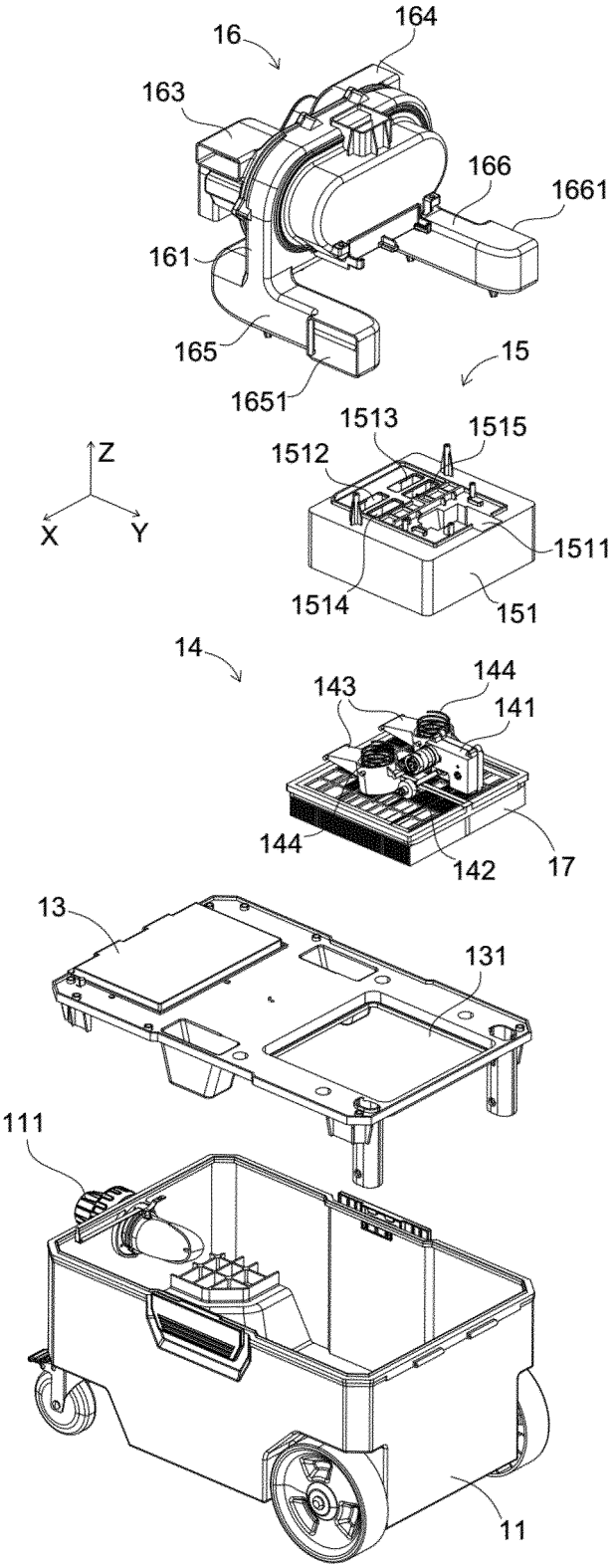
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Figure 5

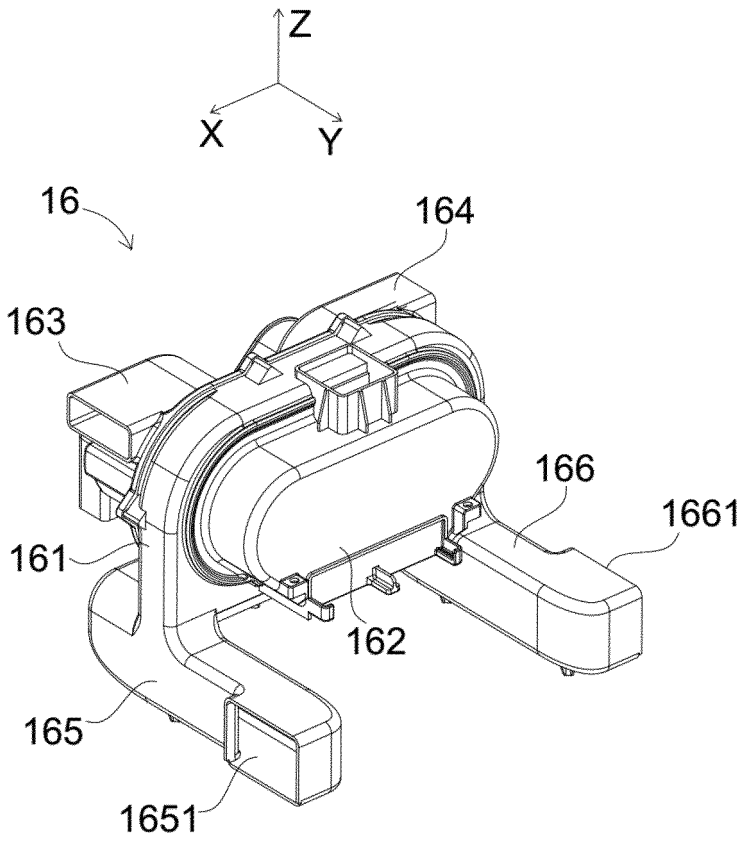

Figure 6

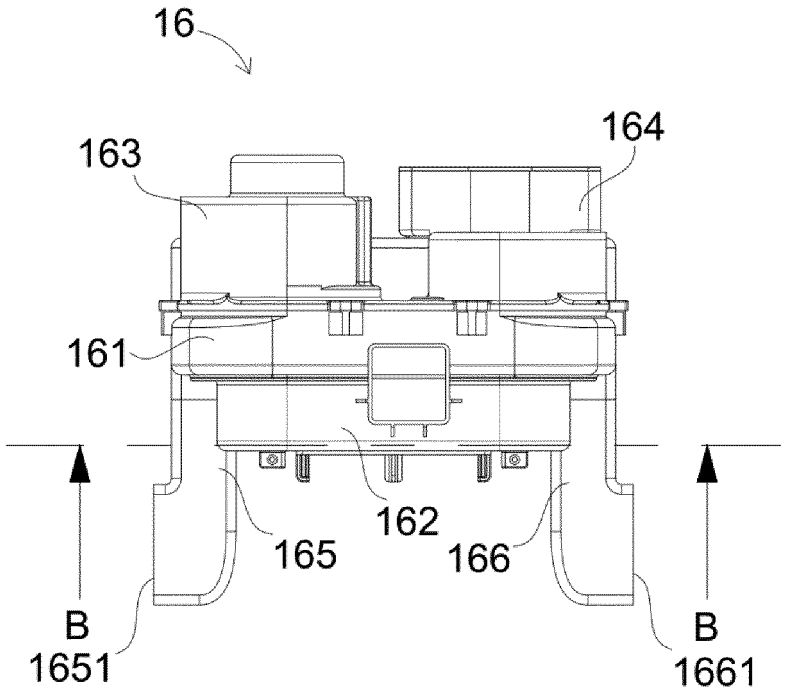

Figure 7

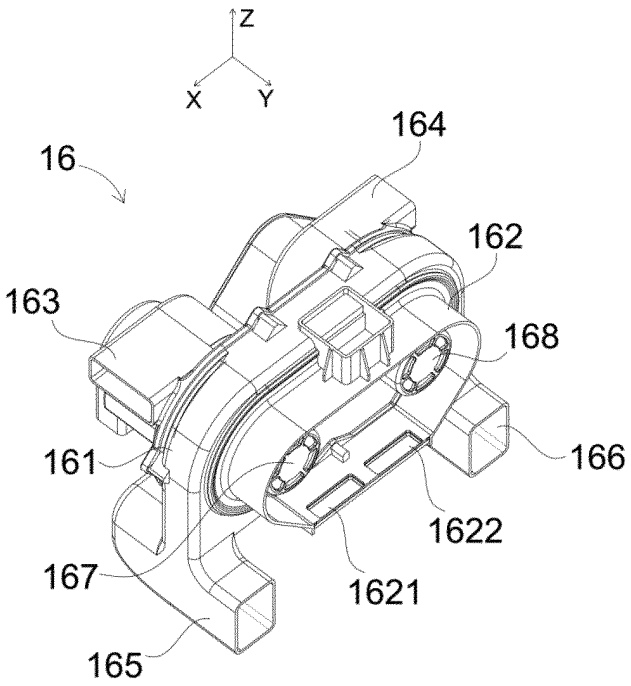

Figure 8

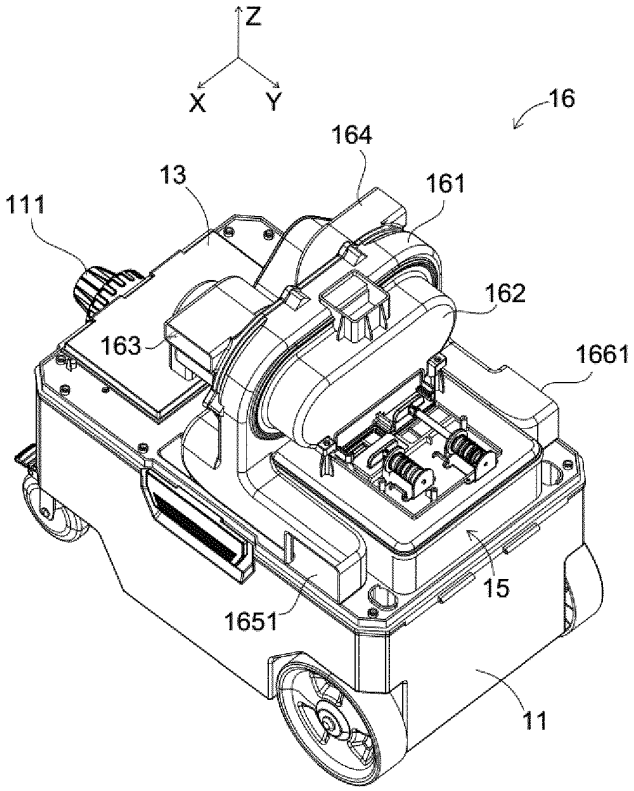

Figure 9

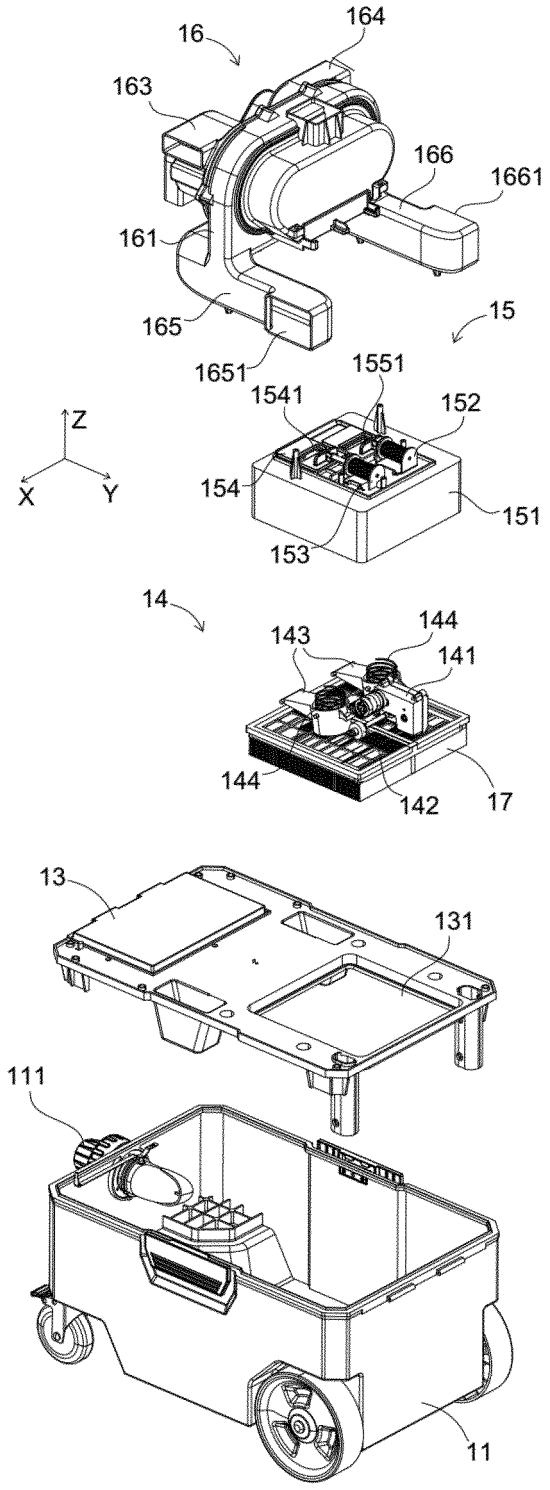
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Figure 10

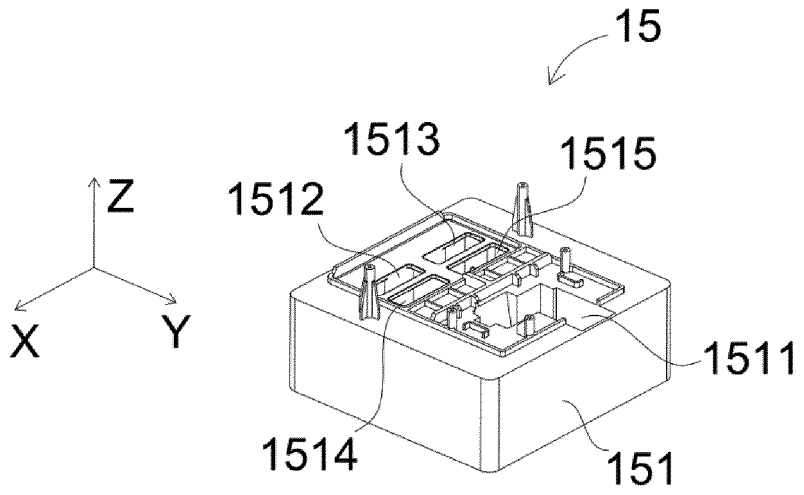

Figure 11

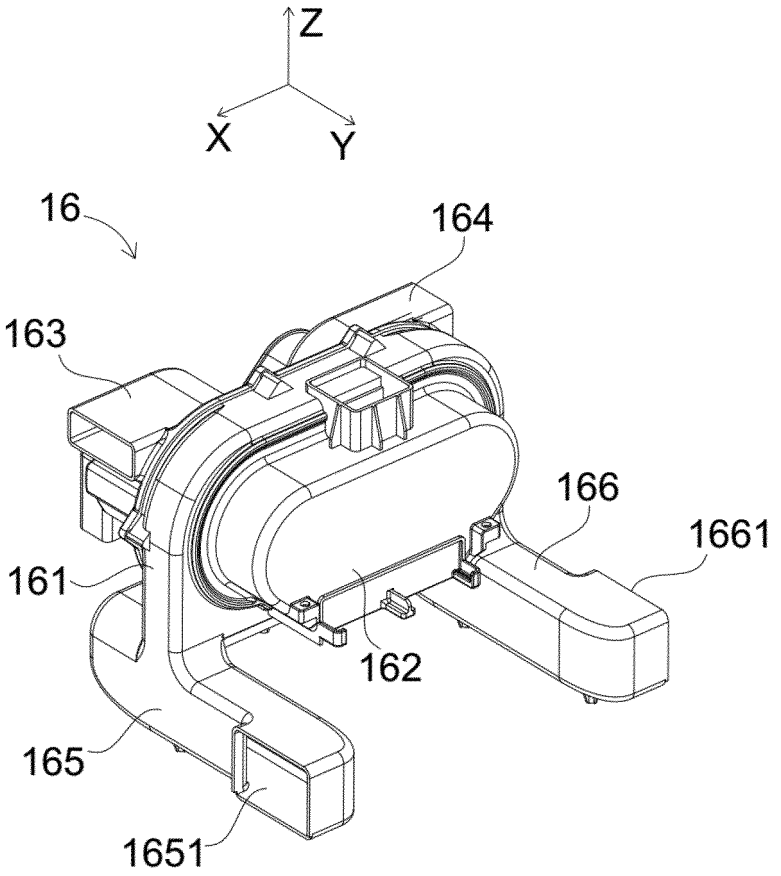

Figure 12

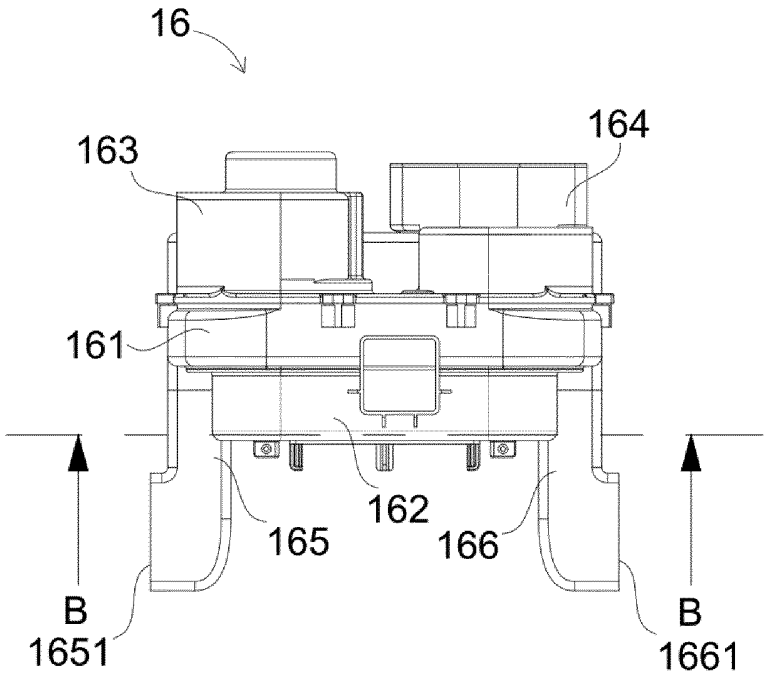

Figure 13

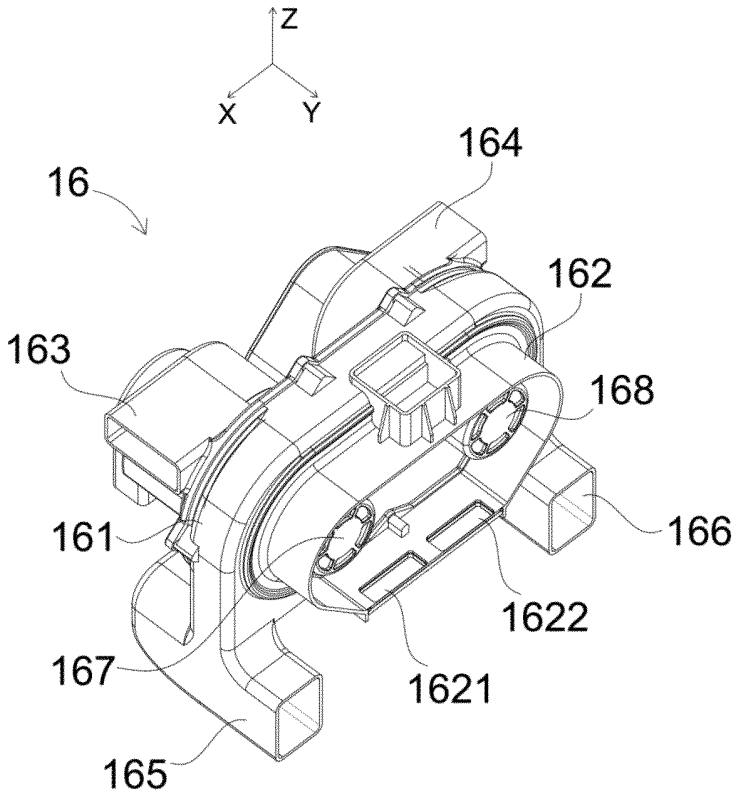

Figure 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/095942

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/10(2006.01)i; A47L 9/20(2006.01)i; A47L 9/12(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)

A47L9

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: 莱克电气股份有限公司, 吸尘器, 海帕, 过滤, 敲击, 敲打, 振动, 震动, 抖动, 拍打, 锤, 抽风, 吹风, 电机, 集尘, 进风口, 反向, 切换, 交替, hepa, vacuum w cleaner, beat+, knock+, pat+, dust, collector, gather+, vibrat+, filter+, motor?, switch+, reverse, alternate, intake, innlet, outtake, outlet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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PX	CN 108926289 A (KINGCLEAN ELECTRIC CO., LTD.) 04 December 2018 (2018-12-04) claims 1-4, description, paragraphs [0039]-[0062], and figures 1-7	8-11
PX	CN 109394070 A (KINGCLEAN ELECTRIC CO., LTD.) 01 March 2019 (2019-03-01) claims 1-7, description, paragraphs [0050]-[0087], and figures 1-8	12-18
X	CN 103566700 A (YAN, FANG) 12 February 2014 (2014-02-12) description, paragraphs [0003]-[0021], and figure 2	1, 5-11
A	CN 204618102 U (JIANGSU MIDEA CHUNHUA ELECTRIC APPLIANCE CO., LTD. ET AL.) 09 September 2015 (2015-09-09) entire document	1-18
A	CN 108125614 A (XIAOGOU ELECTRICAL APPLIANCE INTERNET TECHNOLOGY BEIJING CO., LTD.) 08 June 2018 (2018-06-08) entire document	1-18

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

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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 September 2019	**15 October 2019**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	CN 105595914 A (JIANGSU MIDEA CLEANING APPLIANCES CO., LTD.) 25 May 2016 (2016-05-25) entire document	1-18
A	CN 201192311 Y (YAO, YINGBIAO) 11 February 2009 (2009-02-11) entire document	1-18
A	JP 2007117174 A (TOSHIBA TEC. K.K.) 17 May 2007 (2007-05-17) entire document	1-18

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/095942

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CN 108125614 A	08 June 2018	None	
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Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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- CN 201810942168 **[0001]**
- CN 201810941449 **[0001]**