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(54) **DUST BOX, DUST BOX ASSEMBLY AND CLEANING DEVICE**

STAUBKASTEN, STAUBKASTENANORDNUNG UND REINIGUNGSVORRICHTUNG

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Description

[0001] This application relates to the technical field of a dust box assembly.

Background

[0002] With the improvement of people's living standards and the rapid development of intelligent equipment technology, intelligent cleaning equipment such as sweeping robots, dusters, vacuum cleaners, etc. are widely welcomed. The Internet of Things technology makes everything connected, and makes the market for intelligent cleaning equipment even broader. The cleaning efficiency and effectiveness of the current smart cleaning equipment needs to be improved.

[0003] In CN 204 379 163 U, a sweeping and vacuum cleaning robot is disclosed which has a dust suction port arranged at an air inlet end at a front part of a dust collection box. US 2005 / 015 920 A1 pertains to a dust receptacle comprises a receptacle body having an air inlet and an air outlet, and detachably mounted in a dust collecting chamber of a robot cleaner, a cover fit in the receptacle body to open and close the air outlet, and a dust outlet formed in the receptacle body. In US 2018 / 116 478 A1, a mobile cleaning robot is disclosed which has a chassis enabling evacuation of the bin through a bottom of the robot.

Summary

[0004] The technical problem solved by the current application is to provide a dust box assembly, which can effectively improve the cleaning efficiency and effectiveness.

[0005] A dust box assembly according to claim 1 is provided.

[0006] In an example, a dust box may be provided with a holding cavity, a dust suction port and at least two air outlets, the dust suction port is connected to the holding cavity, and at least two air outlets are connected to the holding cavity. Each air outlet is connected to a fan, so that the fan extracts air through the air outlet, thus forming an airflow through the dust suction port, the holding cavity and the air outlet in turn.

[0007] In another example, a cleaning device including a device body and the above mentioned dust box assembly may be provided in the device body.

[0008] Compared with the prior art, the beneficial effect of the present application is: by setting at least two fans corresponding to at least two air outlets, each fan connects to the air outlet for air extraction and forms two air ducts inside the dust box, so that two air streams can work together to enhance the suction power, thus the air in the holding cavity can be removed more quickly, and the suction port can generate a stronger suction to suck in garbage. Compared to cleaning device with a single fan and a single duct, this embodiment can suck in debris

with larger size, garbage with heavier mass, and can effectively improve the cleaning effect of cleaning device.

Detailed descriptions of drawings

[0009]

- Fig. 1 is a schematic diagram of the structure of the dust box assembly of an embodiment of the present application.
- Fig. 2 is an exploded diagram of the structure of the dust box assembly of an embodiment of the present application.
- Fig. 3 is a cross-sectional diagram along A-A direction of the dust box assembly of an embodiment of the present application.
- Fig. 4 is another exploded diagram of the structure of the dust box assembly of an embodiment of the present application.
- Fig. 5 is an exploded diagram of another structure of the dust box assembly of an embodiment of the present application.
- Fig. 6 is a schematic diagram of part of another structure of the dust box assembly of an embodiment of the present application.
- Fig. 7 is an exploded diagram of a third structure of the dust box assembly of an embodiment of the present application.
- Fig. 8 is another exploded diagram of the third structure of the dust box assembly of an embodiment of the present application.
- Fig. 9 is a schematic diagram of part of the third structure of the dust box assembly of an embodiment of the present application.
- Fig. 10 is a schematic diagram of a position of a connecting hole in the third structure of the dust box assembly of an embodiment of the present application.
- Fig. 11 is another schematic diagram of the position of the connecting hole in the third structure of the dust box assembly of an embodiment of the present application.
- Fig. 12 is a schematic diagram of a connector of the dust box assembly of an embodiment of the present application.
- Fig. 13 is another schematic diagram of a connector of the dust box assembly of an embodiment of the present application.
- Fig. 14 is a schematic diagram of the structure of a cleaning device of an embodiment of the present application.

Detailed description of embodiments

[0010] The technical solutions in the embodiments of this application will be clearly and completely described below in conjunction with the accompanying drawings in the embodiments of this application, and it is clear that

the embodiments described are only some of the embodiments of this application and not all of them. Based on the embodiments of this application described in this application, all other embodiments obtained by a person skilled in the art without creative labor shall fall within the scope of protection of this application.

[0011] The inventors discovered after a long period of research that cleaning devices such as vacuum cleaners or floor sweepers rely on negative pressure to suck up debris, garbage, dust, etc. To obtain stronger negative pressure and suction, the most common practice in the industry is to increase the volume of the fan or the fan speed, but increasing volume will significantly increase noise, and increasing the fan speed will decrease the life of the fan, while the obtained suction is very limited. To solve the above problems, the inventor provides following embodiments after a long period of research and development and testing.

[0012] Referring to Fig. 1, the dust box assembly 1 depicted in an embodiment of the present application includes dust box 10, fan 21, etc.

[0013] Referring to Fig. 2, the dust box 10 could be used to hold trash, such as debris and dust that are being sucked up. The dust box 10 has a holding cavity 100, sucked trash such as debris and dust are hold in the holding cavity. The dust box 10 also has a dust suction port 110 that connected to the holding cavity 100. The trash sucked by the holding cavity 100 through the dust suction port 110. The dust box 10 has at least two air outlets 120, the two air outlets 120 connected to the holding cavity 100. After the garbage enters the holding cavity 100 with air through the dust suction port 110, the air then flows out through the outlet port 120. In this way, with the function of the fan 21, the dust suction port 110, the holding cavity 100, and the air outlet 120 form a channel through which the air flows. The dust box 10 is also configured with at least two interspaced connecting holes 1211, and the holding cavity 100 is connected to the air outlets 120 through the two connecting holes 1211.

[0014] The number of fans 21 is at least one, corresponding to at least one air outlet 120. That is, the two fans 21 located at the two air outlets 120 correspondingly, fans 21 and air outlets 120 are correspond one by one. The fans 21 are used to extract air through the outlets 120, while creating airflow between the dust suction ports 110 to the outlets 120. The location and specific structure of the fans 21 and outlets 120 are not limited to the examples presented in Fig. 1 and Fig. 2.

[0015] As shown in Fig. 1 and Fig. 2, to make the fans 21 and the outlets 120 fit better, facilitate their connection, and better adapt to the structure of the dust box 10, the dust box assembly 1 further includes connectors 22. The number of connectors 22 is at least two. The fans 21, connectors 22 and air outlets 120 correspond to each other one by one. The fan 21 is connected to the corresponding connector 22, and is connected to the corresponding air outlet 120 through the corresponding connector 22. The fan 21 is connected to the corresponding

air outlet 120 through the corresponding connector 22, i.e., it is possible to extract air from the air outlet 120 inside the holding cavity 100 through the connector 22. A connector 22 and a fan 21 can be used as a set of dust suction assembly 20. The dust box assembly 1 of this embodiment can be provided with a plurality of air outlets 120 and a plurality of dust suction assembly 20 correspondingly.

[0016] By setting at least two fans 21 corresponding to at least two air outlets 120, each fan 21 connects to the air outlet 120 for air extraction and forms two air ducts inside the dust box 10, so that two air streams can work together to enhance the suction power, thus the air in the holding cavity 100 can be removed more quickly, and the suction port 110 can generate a stronger suction to suck in garbage. Compared to cleaning device with a single fan and a single duct, this embodiment can suck in debris with larger size, garbage with heavier mass, and can effectively improve the cleaning effect of cleaning device.

[0017] Further, connectors 22 are set with the fans 21 to connect the air outlets 120 to facilitate the installation of the fans 21 and the structural arrangement and design of the whole assembly. The connectors 22 can extend the length of the air ducts, which can make the airflow speed faster and can further enhance the suction power and cleaning effect of the dust suction port 110.

[0018] Referring to Fig. 2 and Fig. 3, the dust box 10 is further configured with an access cavity 101. The access cavity 101 and the holding cavity 100 are provided adjacent to each other in the thickness direction of the dust box 10, and the access cavity 101 is connected to the holding cavity 100. The access cavity 101 is connected to the air outlets 120. Therein, the access cavity 101 is located downstream of the airflow compared to the holding cavity 100 under the suction of the fan 21. In other words, when the fan 21 performs suction, air enters the holding cavity 100 from the dust suction port 110, then enters the access cavity 101 from the holding cavity 100, and is finally discharged through the connector 22 and the fan 21, which is located downstream of the holding cavity 100 in the direction of airflow.

[0019] By providing the access cavity 101 connected to the air outlet 120, the circulable space in the dust box 10 is increased. Further, it facilitates the arrangement and design of multiple air outlets 120, which in turn facilitates the setting of multiple fans 21 and connectors 22, which in turn form multiple air ducts. The fans 21 do not directly pump the air in the holding cavity 100, but through the access cavity 101, which is more conducive to the holding cavity 100 for waste deposition, further enhancing the suction power of air and cleaning effect.

[0020] As shown in Fig. 2 and 3, when the number of air outlets 120 is two, for example, the two air outlets 120 forms in two opposite sides of the dust box 10. For example, the two air outlets 120 are arranged in a direction perpendicular to the thickness direction of the dust box 10 and is aligned substantially with the length direction of the dust suction port 110. The dust suction port 110 is

spaced apart from the two air outlets 12. The dust suction port 110 located between the two air outlets 120 and not on the same side as the two air outlets 120. The suction port 110 and the two air outlets 120, respectively, is around the thickness direction of the dust box 10.

[0021] By setting two air outlets 120 located on the opposite sides of the dust box 10, the dust suction port 110 is located between the two air outlets 120, thus the air duct formed inside the dust box 10 is more balanced, and the effective synergy between the two fans 21 is ensured, while the noise generated by the airflow is reduced.

[0022] Referring to Fig. 4, an embodiment of a first exemplary structure of the dust box 10 is described below.

[0023] The dust box 10 may include a first housing 11, a second housing 12, and a cover body 13. One side of the second housing 12 is provided over the first housing 11 to form the holding cavity 100. A recess 1210 is formed on the other side of the second housing 12, and a cover 13 is provided on the other side of the second housing 12 to form a access cavity 101. That is, the direction of the thickness of the dust box 10 is in the direction from the first housing 11 to the cover 13 and in an opposite direction. The holding cavity 100 and the access cavity 101 is spaced apart by the second housing 12 and adjacent to each other.

[0024] The first housing 11 may, for example, be provided in a slotted structure, and may include, for example, a bottom wall 111 and a side wall 112 enclosed around the bottom wall 111, with the bottom wall 111 and the side wall 112 forming the slotted structure. When the second housing 12 is provided over the first housing 11, the slotted structure is capped to form the holding cavity 100. The dust suction port 110 can be opened on the side wall 112 of the first housing 11. The dust box 10 may also include a dust suction section 14 connected to the dust suction port 110 of the first housing 11. The dust suction section 14 is set at an angle on the side back from the dust suction port 110. For example, the angle between a plane on which the side of the suction section 14 is back from the suction port 110 and a plane on which the suction port 110 is located is greater than 0° and less than 90°, for example 45°. Of course, the dust suction port 110 may also be opened in the second housing 12, and it may also be that the first housing 11 and the second housing 12 are each partially opened with a dust suction port 110 to together form the dust suction port 110 when they are covered with each other.

[0025] As shown in Fig. 4, the second housing 12 includes, for example, a top wall 121 and an extension 122. The extension 122 is attached to an edge region of the top wall 121 and may, for example, extend in the direction of the top wall 121 toward the side of the first housing 11. The second housing 12 may include two extensions 122 opposite each other. When the second housing 12 is covered on the first housing 11 for assembly fit, the top wall 121 is covered on the side wall 112 of the first housing 11, the extension 122 is provided opposite to

the side wall 112 of the first housing 11, and part of the side wall 112 of the first housing 11 is sandwiched between the two extensions 122.

[0026] One side of the top wall 121 is provided over the side wall 112 of the first housing 11 so that the second housing 12 and the first housing 11 fit to form the holding cavity 100. As shown in Fig. 4, a recess 1210 is formed on the other side of the top wall 121. Each extension 122 has a space connecting to the recess 1210, and the side of the extension 122 back from the top wall 121 may form an air outlet 120, which is connected to the space. The cover 13 is provided on the other side of the top wall 121 so that the cover 13 and the second housing 12 cooperate to form the access cavity 101, and the air outlet 120 is connected to the access cavity 101. The air outlet 120 can also be opened on the first housing 11, or on both the first housing 11 and the second housing 12.

[0027] The first housing 11 and the second housing 12 can be connected by nesting, for example, with a nesting groove on the circumference of one side of the top wall 121 and a nesting edge on the circumference of the side wall 112 of the first housing 11. When the first housing 11 and the second housing 12 are closed, the nesting edge is embedded in the nesting groove for connection, so that the connection is tighter and can play a sealing role. The sealing effect can be strengthened by providing seals in the nesting grooves. In this embodiment, the second housing 12 and the cover 13 can be connected by nesting, for example by the fit of a nesting slot and a nesting edge.

[0028] As shown in Fig. 4, the second housing 12 may be provided with a connecting hole 1211, which runs through one side of the second housing 12 to the other side of the second housing 12. The connecting hole 1211 may be provided in and through the top wall 121 to allow connection between the access cavity 101 and the holding cavity 100.

[0029] The dust box assembly 1 of this embodiment may include a filter assembly, the screen assembly including a first filter 15 and a second filter 16. The filtration accuracy of the second filter 16 is less than that of the first filter 15. In other words, the second filter 16 can act as a coarse filter (primary filter) and the first filter 15 as a fine filter (high efficiency filter). For example, for both the first filter 15 and the second filter 16, the mesh size of the second filter 16 can be larger than the mesh size of the first filter 15. For example, the second filter 16 can have 4 holes, the first filter 15 can have 100 holes, the overall size of the second filter 16 and the overall size of the first filter 15 are comparable to the size of the connecting holes 1211, so that the size of holes of the second filter 16 is larger than the size of holes of the first filter 15. As shown in Fig. 2 and Fig. 3, the first filter 15 can be a folded filter, and the filter element of the first filter 15 is, for example, in a continuous Z-shaped folded shape.

[0030] The second filter 16 and the first filter 15 can be provided in the second housing 12 and cover the con-

necting holes 1211 in turn. The second housing 12 is provided with a cross-shaped bracket in the connecting hole 1211, but of course it can also be other shapes (as shown in Fig. 4, not labeled), the bracket can be used to carry the second filter 16 and the first filter 15 to stably support them. With the fans 21, objects such as garbage and debris enter the holding cavity 100 with the airflow from the dust suction port 110. The filtered air enters the access cavity 101 and is extracted through the outlet 120.

[0031] The combination setting the first housing 11, the second housing 12, and the cover 13 makes the dust box 10 stable in structure, and easy to disassemble, which facilitate the cleaning and maintenance of the dust box 10. The combination setting of the dust box 10 facilitates makes the first housing 11 and the second housing 12 cooperate to form the holding cavity 100, and the second housing 12 and the cover 13 cooperate to form the access cavity 101, thus making the holding cavity 100 better to hold debris, garbage and other objects, and at the same time making the passage cavity 101 more quickly to discharge the air from the holding cavity 100 and speed up the airflow rate.

[0032] Further, the multi-stage filter system consisted by the second filter 16 and the first filter 15 can realize multiple filters for airflow, so that debris, dust and other waste objects can be effectively filtered and stored in the holding cavity 100, to achieve good cleaning effect. The number of connecting holes 1211 can also be multiple, an example of which is given later in this embodiment.

[0033] As shown in Fig. 3, the cover 13 is used to cover the second housing 12 and mates with the second housing 12 to form the access cavity 101. In this embodiment, the cover 13 and the second housing 12 may be sealed together by a seal (shown in Fig. 4). As shown in Fig. 4, the cover 13 may include a body 131 and a top cover 132. The body 131 is formed with a mounting hole 130 corresponding to the location of the first filter 15, and the mounting hole 130 connects to the access cavity 101. When the body 131 is provided on the side wall 112 on the first housing 11, it allows the first filter 15 and the second filter 16 to be exposed. The upper cover 132 is attached to the body 131 in a rotatable manner. For example, one side of the upper cover 132 is rotated by a pivot to the inner wall of the mounting hole 130 enclosed by the body 131. The upper cover 132 can be closed by turning the mounting holes 130, or opening the mounting holes 130 so that the first filter 15 and the second filter 16 are exposed. The size of the mounting holes 130 is greater than or equal to the size of the connecting holes 1211. In other embodiments, the size of the mounting holes 130 can be smaller than the size of the connecting holes 1211.

[0034] Further, the top cover 132 can be fitted to the mounting holes 130 by a seal adapted to the shape of the mounting holes 130 to improve the sealing effect of the dust box 10 and to ensure effective suction of the dust suction port 110 and effective flow of airflow inside the dust box 10.

[0035] By providing a rotatable upper cover 132 with mounting holes 130, the second filter 16 and the first filter 15 can be easily removed or cleaned, and the mounting holes 130 can be easily observed inside the dust box 10 for inspection and repair.

[0036] For the first exemplary structure of the dust box 10 described above, the dust box 10 may be further provided with a snap assembly 30 to facilitate snap connection of the dust box 10 to other devices. One example of the snap assembly 30 of the dust box is described specifically below.

[0037] As shown in Fig. 4, the snap assembly 30 can be used to make snap connections to other devices, thereby allowing the dust box assembly 1 and other devices to be assembled for use. Other devices are, for example, the device body of the cleaning device.

[0038] The snap assembly 30 may include a press portion 31, a resilient portion 33, and a snap bar 32. The press portion 31 connects to the snap bar 32. For example, the snap bar 32 may be a single unit, with the press portion 31 attached to the central area between the two ends of the snap bar 32. The snap bar 32 is provided with snap sections 321 protruding from each end of the snap bar 32. As shown in Fig. 4, the number of snap bars 32 can be two, respectively connected to the press section 31 on the opposite sides, each snap bar 32 is connected to the press portion 31 at one end, and the other end extends in the direction away from the press section 31 and is provided with a snap section 321. When the dust box assembly 1 of this embodiment is snap-fitted with other devices, for example, there are snap slots correspondingly provided on the other devices, and the snap portion 321 is snap-connected to the corresponding snap slot.

[0039] The resilient portion 33 can be used to resiliently support the press portion 31. The press portion 31 is resiliently supported on the dust box 10 by the resilient portion 33. As shown in Fig. 4, the first housing 11 has a first placement slot 1110 corresponding to a notch 1213 of the second housing 12, the first placement slot 1110 extends in the same direction as the side wall 112 of the first housing 11, and the first placement slot 1110 may have a portion of the side wall 112 as its slot wall, i.e., the opening direction of the first placement slot 1110 faces the cover 13. The press portion 31 has a second placement slot 310, which extends in the opposite or substantially opposite direction to the projection of the snap portion 321. The resilient portion 33 may be a spring, one end of which extends into the first placement slot 1110 so as to be supported in the first placement slot 1110, and the other end of which may be exposed outside the first placement slot 1110. The other end of the resilient portion 33 is supported in the second placement slot 310. The second placement slot 310 may be configured to be sized to accommodate the press portion 31 to partially fit into the second placement slot 310 when the press portion 31 is pressed

[0040] As shown in Fig. 4, the other side of the second

housing 12 may be further formed with a bar-holding slot 1212 spaced from each other with a recess 1210. The snap bar 32 may be accommodated in the bar-holding slot 1212. When the snap bar 32 is accommodated in the bar-holding slot 1212, the second housing 12 has a notch 1213 corresponding to the position of the pressing portion 31. Wherein the snap bar 32 is accommodated in the bar-holding slot 1212 with the snap portion 321 extending toward the cover 13.

[0041] In this embodiment, when the second housing 12 and the cover 13 are closed, the bar-holding slot 1212 and the access cavity 101 may be isolated from each other and not connected to each other to ensure that the suction power of the dust suction port 110 makes it better to suck up garbages. Snap holes are provided on the body 131 corresponding to the location of the snap portion 321. When the pressing portion 31 is not pressed, the elastic portion 33 is resiliently supported between the first placement slot 1110 and the second placement slot 310, the snap bar 32 is held against the top, and the snap portion 321 can protrude out of the snap hole to allow snap connections to be made when assembled with other devices. When the pressing portion 31 is pressed, the elastic portion 33 is further elastically compressed, and the pressing part 31 can move toward a bottom wall 111, for example, into the first placement slot 1110, and the snap lever 32 then moves away from the cover 13 so that the snap portion 321 does not protrude from the snap hole of the cover 13, so that it can be decoupled. The snap bar 32 can be limited by the bar-holding slot 1212, thereby limiting the pressing portion 31 from being pressed and moving further.

[0042] Both the first placement slot 1110 and the second placement slot 310 can be provided with positioning posts to position and secure the resilient portion 33, for example, with the ends of the spring on each of the positioning posts.

[0043] Referring to Fig. 5 and Fig. 6, this embodiment also provides a second exemplary structure of dust box 10, described as follows.

[0044] The first housing 11a is provided in the form of a plate. The second housing 12a includes a top wall 121a and a side wall 122a enclosing the outer perimeter of the top wall 121a. A portion of the side wall 122a extends from the top wall 121a toward the first housing 11a, and that portion of the top wall 121a and the side wall 122a enclose a slotted structure. The other portion of the side wall 122a extends from the top wall 121a toward a cover 13a. When the second housing 12a is provided on the first housing 11a, the top wall 121a, the side walls 122a and the bottom wall 111a form the holding cavity 100. The first housing 11a and the second housing 12a can be hermetically closed by suitable seals.

[0045] The dust suction port 110 is opened on the side wall 122a of the second housing 12a. The dust box 10 may also include a dust suction section 14a, which may be provided on the side wall 122a of the second housing 12a to connect to the dust suction port 110 of the second

housing 12a, with the dust suction section 14a set at an angle on the side back from the dust suction port 110. For example, the angle between the plane on the side of the suction section 14a that is away from the suction port 110 and the plane on which the suction port 110 is located is greater than 0° and less than 90°, optionally 45°. Optionally, the dust suction port 14a is removably provided in the second housing 12a. The dust suction port 14a is rotatably provided in the second housing 12a, e.g. the dust suction port 14a is rotatably connected to the second housing 12a on one side of its length (e.g. it can be a rotational connection by a pivot), and the dust suction port 14a is snap connected to the second housing 12a on the other side of its length. The length direction of the dust suction section 14a is the same or substantially the same as the length direction of the dust suction port 110. After the dust suction section 14a and the second housing 12a are disconnected, the other side of the dust suction section 14a in its length direction can be rotated around the axis of rotation of the side of the dust suction section 14a in its length direction, so that the dust suction port 110 can be exposed for easy observation, cleaning, repair and other operations.

[0046] The side of the top wall 121a back from the first housing 11a is enclosed with another part of the side wall 122a to form a recess 1210a, and the recess 1210a and the slotted structure adjacent to the side of the first shell 11a are located on each side of the top wall 121a. The cover 13a is provided over the second housing 12a to cooperate to form the access cavity 101. The second housing 12a and the cover 13a can be hermetically closed by a suitable seal.

[0047] The second housing 12a further includes extensions 123a, the extensions 123a is located on opposite sides of the second housing 12a. The extension 123a has a space where a portion of the side wall 122a of the second housing 12a can serve as the outer wall of the extension 123a (toward the outside of the dust box 10), and of course as the inner wall of the extension 123a. When the first housing 11a and the second housing 12a are capped together, the space of the extension 123a is not directly connected to the holding cavity 100, but to the access cavity 101. The extension 123a is provided with an air outlet 120, and the air outlet 120, for example, is provided on the outer side wall of the extension 123a, for example, as part of the outer side wall 122a of the extension 123a is provided with this air outlet 120, connecting to the space of the extension 123a.

[0048] The second housing 12a may be provided with a connecting hole 1211a, and the connecting hole 1211a may run through the top wall 121a. In this embodiment, the number of connecting holes 1211a is multiple and the shape may be, for example, circular, oval or square, etc. The connecting hole 1211a is used to connect the access cavity 101 to the holding cavity 100.

[0049] The filter assembly includes a first filter 15a and a second filter 16a. The filtration accuracy of the second filter 16a is less than that of the first filter 15a. In other

words, the second filter 16a can be used as a coarse filter (primary filter) and the first filter 15a as a fine filter (high efficiency filter). For example, for both the first filter 16a and the second filter 15a, the mesh size of the second filter 16a can be larger than the mesh size of the first filter 15a. For example, the second filter 16a can have 4 holes, the first filter 15a can have 100 holes, the overall size of the second filter 16a and the overall size of the first filter 15a are comparable to the size of the connecting holes 1211, so that the size of holes of the second filter 16a is larger than the size of holes of the first filter 15a. Of course, as shown in Fig 5, the mesh surface of the first filter 15a can be a folded filter.

[0050] The second filter 16a is provided in the second housing 12a and can be located inside the connecting hole 1211a or outside the connecting hole 1211a while covering the connecting hole 1211a. The second filter 16a may be a monolithic and cover a plurality of connecting holes 1211a. The second filter 16a may also be more than one and correspondingly located in each connecting hole 1211a. The first filter 15a can be provided in the space of the extension 123a to cover the air outlet 120 and filter the airflow coming out of the air outlet 120. The number of second filters 16a is, for example, at least two, corresponding to at least two air outlets 120, i.e. one second filter 16a is provided for each air outlet 120.

[0051] By providing the first filter 15a in at least two air outlets 120 correspondingly to form a filter system with multiple high-efficiency filters, so that multiple first filters 15a can filter the airflow flowing through at least two air outlets 120 separately, which can improve the filtering effect and filtering efficiency and can further enhance the speed of airflow. Further, the plurality of connecting holes 1211a can increase the area through which the airflow passes and avoid the problem of poor airflow caused by the accumulation of debris in the holding cavity 100.

[0052] The second exemplary structure of the dust box 10 described above uses the same construction of the snap assembly 30 as the first exemplary structure of the dust box 10. Of course, the second embodiment of the dust box 10 can also be provided with a snap assembly 30 different from the embodiment, and the different structure of snap assembly 30 is described specifically below.

[0053] Referring to Fig. 5 and Fig. 6, the snap assembly 30 includes a pressing portion 31a, a snap bar 32a, and a resilient portion 33a, the pressing portion 31a connects to the snap bar 32a. For example, the snap bar 32a may be a single unit, such as the pressing portion 31a attached to the central area between the two ends of the snap bar 32a. The snap bar 32a is provided with snap sections 321a protruding from each end of the snap bar 32a. As shown in Fig. 5, the number of snap bars 32a can be two, respectively connected to the press section 31 on the opposite sides, each snap bar 32a is connected to the press portion 31a at one end, and the other end extends in the direction away from the press section 31a and is provided with a snap portion 321a. The resilient portion 33a is provided at the pressing portion 31a, and

the resilient portion 33a is able to rotate with respect to the dust box 10. The pressing portion 31a is able to rotate relative to the dust box 10 by means of the elastic portion 33a.

[0054] As shown in Fig. 5, the other side of the second housing 12a may be further formed with a rod-holding slot 1212a spaced from each other with the recess 1210a. When the second housing 12a and the cover 13a are closed, the bar-holding slot 1212a and the access cavity 101 may be isolated from each other and not connected to each other to ensure that the suction power of the dust suction port 110 makes it better to suck up garbages. As shown in Fig. 6, the snap bar 32a and the press portion 31a may be accommodated in the bar-holding slot 1212a. For example, part of the bar-holding slot 1212a corresponding to the snap bar 32a fits the profile of the snap bar 32a, and part of the bar-holding slot 1212a corresponding to the pressing portion 31a fits the profile of the pressing portion 31a. When the snap bar 32a and the pressing portion 31a are accommodated in the bar-holding slot 1212a, the elastic portion 33a deforms elastically as the pressings portion 31a is pressed.

[0055] The resilient portion 33a includes, for example, a rotating rod 331a, a torsion spring 332a, and an attachment body 333a, which is fixed to the pressing portion 31a. A torsion spring placement slot (not marked) is opened in the connection body 333a, for example in the central area with the connection body 333a. The rotating rod 331a is set along the length of the connection body 333a through the connection body 333a, specifically through one end of the connection body 333a, the torsion spring placement slot, and the other end of the connection body 333a, while protruding from both ends of the connection body 333a. The torsion spring 332a is provided on the portion of the rotating rod 331a that is located in the torsion spring placement slot.

[0056] Other springs can be used instead of torsion springs 332a.

[0057] The ends of the rotating rod 331a can be set directly rotating in the second housing 12a. The rotating rod 331a may also be provided indirectly rotating in the second housing 12a. For example, as shown in Fig. 5 and Fig. 6, the snap assembly 30 may also include a fixed portion 34a, which has a slot for the attachment body, and the fixed portion 34a has holes on each side of the wall of the attachment body, and the portion of the rotating rod 331a projecting from the ends of the attachment body 333a is inserted into the holes, enabling a rotating connection. With the pressing portion 31a and the snap bar 32a, placed in the bar-holding slot 1212a, the fixing portion 43a is fixedly connected to the second housing 12a, for example by screws. The ends of the torsion spring 332a can be limited by the second housing 12a and the connector 333a, respectively, to allow for elastic deformation during relative rotation.

[0058] When the snap rod 32a is accommodated in the bar-holding slot 1212a, the snap portion 321a extends toward the cover 13a. When the pressing portion 31a is

pressed in the direction of the bottom wall 111a, the pressing portion 31a rotates along the axis of the rotating rod 331a, and the torsion spring 332a can further undergo elastic deformation, so that the snap portion 321a can be displaced and move in the direction of the bottom wall 111a. When the pressure on the pressing portion 31a disappears, the torsion spring 332a causes the pressed portion 31a to rotate in the opposite direction (relative to the pressed state) due to the elastic return force, driving the snap portion 321a to move in the opposite direction away from the bottom wall 111a.

[0059] Snap holes can be provided in the body of the cover 13a corresponding to the location of the snap portion 321a. When the pressing portion 31a is not pressed, the snap portion 321a protrudes out of the snap hole, so that the snap connection can be made. When the pressing portion 31a is pressed and is subjected to pressure in the direction of the bottom wall 111a, the pressing portion 31a is rotated along the axis of the rotation rod 331a in the direction of the bottom wall 111a, causing the snap part 321a to be displaced in the direction of the bottom wall 111a, so that the snap hole of the cover 13a does not protrude out and the snap process is facilitated. As the pressed portion 31a is pressed further and rotated, the snap bar 32a can be limited by the bar-holding slot 1212a, thereby limiting the pressed portion 31a from being pressed and moving further.

[0060] The flexible rotating snap assembly 30 makes the snap easy connected and more stable, and its structure is further simplified compared to the previous structure.

[0061] Referring to Fig. 7 to Fig. 9, this embodiment describes a third embodiment of the dust box 10.

[0062] As shown in Fig. 9, the dust box 10 is provided with at least two connecting holes 1211b spaced from each other. There are two connecting holes 1211b in this embodiment, and a projection point D of a center C of the dust suction port 110 on the line connecting a center A of one connecting hole 1211b and a center B of another connecting hole 1211b is located between the centers A, B of those two connecting holes 1211b. Equivalently, a plumb line is made across the center C of the dust suction port 110 for the line connecting the centers A, B of the two connecting holes 1211b, and the intersection D where the plumb line intersects the lines connecting the centers A, B of the two connecting holes 1211b is located between the centers A, B of the two connecting holes 1211b. The center C of the dust suction port 110 is the geometric center of a geometric shape that is the same as and matches the shape of the dust suction port 110 or the center of gravity of a homogeneous object that is the same as and matches the shape of the dust suction port 110. Similarly, the centers A and B of the connecting holes 1211b are the geometric centers of geometric shapes that are identical and match the shape of the connecting holes 1211b, or the centers of gravity of homogeneous objects that are identical and match the shape of the connecting holes 1211b.

[0063] As shown in Fig. 7 and Fig. 8, the dust box 10 includes a first housing 11b, a second housing 12b, and a cover 13b. The second housing 12b is provided over the first housing 11b to enclose the holding cavity 100, and the cover 13b is provided over the second housing 12b to enclose the access cavity 101.

[0064] As shown in Fig. 8, the first housing 11b, for example, is provided in a slotted shape, and may specifically include a bottom wall 111b and a side wall 112b enclosed around the bottom wall 111b, with the bottom wall 111b and the side wall 112b enclosed in a slotted structure. When the second housing 12b is capped on the first housing 11b, the slotted structure of the first housing 11b can be capped into the holding cavity 100. The first housing 11b may, for example, form a dust suction port 110 on the side wall 112b, which is connected to the slotted structure, i.e. to the holding cavity 100.

[0065] The second housing 12b may be substantially plate shaped. At least two connecting holes 1211b may be provided in the second housing 12b, the connecting holes 1211b running through one side of the second housing 12b to the other side of the second housing 12b. The connecting hole 1211b connects to the holding cavity 100. The installation of at least two connecting holes 1211b enables the airflow entering the dust suction port 110 to form a plurality of flow directions, so that the inhaled waste does not accumulate only adjacent to the dust suction port 110, but can be scattered and accumulated with different air ducts, which can improve the space utilization of the dust box 10.

[0066] As shown in Fig. 9, the projection point D of the center C of the dust suction port 110 on the line connecting the center A of the one connecting hole 1211b and the center B of the other connecting hole 1211b is located between A and B, so that the airflow entering the dust suction port 110 can be diverted to both sides of the center C, for example, to one connecting hole 1211b and the other connecting hole 1211b and the other connecting hole 1211b. This improves the flow direction of the airflow and allows the inhaled objects to accumulate from both sides, improving the space utilization of the dust box 10.

[0067] In some implementations, as shown in Fig. 8, the two connecting holes 1211b may be arranged in a direction substantially along the length of the second housing 12b, so that the two connecting holes 1211b are spaced apart and located in the area adjacent to the two ends of the second housing 12b in its length direction (the direction of the line connecting the two ends is substantially the length direction of the second housing 12b), which enables the garbage objects to be drawn into the dust box 10. When the dust box 10 is sucked into the dust box, it will follow the airflow and accumulate on both sides, improving the situation that the dust objects are concentrated in the area adjacent to the dust suction port 110, reducing the phenomenon of blocking the dust suction port 110, and improving the space utilization of the dust box 10. Further, the two connecting holes 1211b may be positioned adjacent to the side of the first housing 11b oppo-

site the dust suction port 110 (the side away from the vacuum port 110), and the line between the centers of the two connecting holes 1211b and the center of the dust suction port 110 is triangular, such as an isosceles triangle. The second housing 12b can also be the one shown in the first embodiment of the dust box 10.

[0068] The setting position of the connecting holes 1211b can be adjusted by specifically designing the structure of the first housing 11b, the second housing 12b, and the third housing 13b.

[0069] As shown in Fig. 10, in one embodiment, the second housing 12b includes a top wall and a side wall, while the first housing 11b is provided in the form of a plate, the third housing 13b is provided over the first housing 11b, and the second housing 12b separates the holding cavity 100 from the access cavity 101. At least two of the connecting holes 1211b are partially opened in the top wall and partially opened in the side wall, both connecting to the holding cavity 100 and the access cavity 101. Of course, at least two connecting holes can also be opened on the opposite sides of the second housing 12b, respectively.

[0070] As shown in Fig. 11, in another embodiment, the first housing 11b includes a bottom wall and a side wall, and the second housing 12b is provided over the side wall of the first housing 11. The third housing 13b is provided on the bottom wall of the first housing 11b. The second housing 12b separates the holding cavity 100 from the access cavity 101. At least one of the at least two connecting holes 1211b is opened in the second housing 12b and at least the other is opened in the side wall of the first housing 11b, and both are connected to the holding cavity 100 and the access cavity 101. Of course, at least two connecting holes 1211b can also be opened on opposite sides of the wall of the first housing 11b, respectively.

[0071] Optionally, the dust box assembly 1 may include at least two filter assemblies, each for filtering the airflow from one connecting hole 1211b. Each screen assembly includes a first filter 15b, and the number of first filters 15b and connecting holes 1211b may correspond to each other. The first filter 15b may be provided within the connecting hole 1211b to allow for filtration of the airflow, for example, it may be partially accommodated within the connecting hole 1211b. Of course, the first filter 15b can be provided on the side of the second housing 12b toward the cover 13b and correspondingly cover the connecting holes 1211b so that the airflow can be filtered. Optionally, each filter assembly may also include a second filter 16b, with the first filter 15b having a greater filtration accuracy than the second filter 16b. The second filter 16b can be provided inside the connecting hole 1211b, and the first filter 15b covers the second screen 16b, with the first filter 15b being closer to the cover 13b than the second filter 16b. In other words, the first filter 15b is located downstream of the airflow compared to the second filter 16b, and the airflow passes through the second filter 16b and the first filter 15b in turn for double filtration.

[0072] By setting at least two connecting holes 1211b, corresponding to the setting of at least two first filters 15b, the airflow entering the holding cavity 100 through the dust suction port 110 can form at least two ducts, thus changing the duct flow direction and optimizing the flow of airflow, so that the garbage being sucked into the dust box 10 can be stored more effectively, thus being able to improve the space utilization of the dust box 10, making the filtering of the dust box 10 Better efficiency, higher cleaning efficiency, so as to enhance the suction power of the dust suction port 110.

[0073] The cover 13b is provided over the second housing 12b to enclose the access cavity 101. For example, the cover 13b is formed with a recess (not shown) on the side facing the second housing 12b, and the cover 13b and the second housing 12b close together and enclose the recess to form the access cavity 101. Of course, the structure of the cover 13b and the second housing 12b can also be as the cover 13 and the second housing 12 in the first embodiment of the dust box 10.

[0074] Optionally, the dust box 10 can also include a rotating member 17b, and the cover 13b can achieve a rotating connection with the first housing 11b through the rotating member 17b, so that the first housing 11b and the cover 13b can close or open with each other. When the first housing 11b and the cover 13b are opened to each other, they can make the second housing 12b exposed, which can facilitate the cleaning and maintenance of the first filter 15b and the second filter 16b, etc. The rotating member 17b includes a rotating shaft 171b, a first shaft receiving portion 172b provided in the first housing 11b, and a second shaft receiving portion 173b provided in the cover 13b, and the ends of the rotating shaft 171b are embedded in the first shaft receiving portion 172b and the second shaft receiving portion 173b, respectively, to enable relative rotation between the first housing 11b and the cover 13b.

[0075] The cover 13b includes a body 131b and an upper cover 132b. The body 131b is formed with a mounting hole 130b corresponding to the location of the first filter 15b, and the mounting hole 130b connects to the access cavity 101. When the body 131b is provided on the side wall 112b on the first housing 11b, the second filter 16b and the first filter 15b can be left exposed. The upper cover 132b is attached to the body 131b in a rotatable manner. For example, one side of the top cover 132b is rotated by a rotating axis to the inner wall of the mounting hole 130b enclosed by the body 131b. The upper cover 132b can be closed by turning the mounting holes 130b, or opening the mounting holes 130b so that the second filter 16b and the first filter 15b are exposed. The mounting holes 130b are provided opposite to the connecting holes 1211b and the size of the mounting holes 130b is greater than or equal to the size of the connecting holes 1211b. In other embodiments, the size of the mounting hole 130b can be smaller than the size of the connecting hole 1211b.

[0076] Further, the top cover 132b can be fitted to the

mounting holes 130b by means of a seal adapted to the shape of the mounting holes 130b (shown in Fig. 4, but not labeled) to improve the sealing effect of the dust box 10 and to ensure effective suction of the dust suction port 110 and effective airflow inside the dust box 10.

[0077] By providing a rotatable top cover 132b with mounting holes 130b, the second filter 16b and the first filter 15b can be easily removed or cleaned, and the mounting holes 130b can be easily observed inside the dust box 10 for inspection and repair.

[0078] The air outlet 120 can be opened in the cover 13b. When the second housing 12b is the one in the first embodiment of the dust box 10, the air outlet 120 can also be opened in the second housing 12. The cover 13 may also be provided with snap holes.

[0079] In one embodiment, as shown in Fig. 7, the first filter 15b is set at an angle when partially accommodated in the connecting hole 1211b. For example, the first filter 15b can be tilted in the direction of the air outlet 120, so that the airflow filtered by the first filter 15b can be quickly delivered to the air outlet 120. There is an angle between a side of the first filter 15b adjacent to the cover 13b and a side of the second housing 12b toward the cover 13b, such as an angle greater than 90° and less than 180°.

[0080] A notch 1213b is formed on one edge of the second housing 12b away from the dust suction port 110, and a side of the second housing 12b toward the cover 13b is provided with a projection 1212b, with the projection 1212b surrounding the notch 1213b. The cover 13b is formed with a mating slot (not shown) on the side toward the second housing 12b, and the shape of the mating slot is adapted to the shape of the projection 1212b, and when the cover 13b is capped to close the second housing 12b, the cover 13b projection 1212b can be embedded in the mating slot to allow the access cavity 101 and the notch 1213b to be spaced apart. As shown in Fig. 8, the first housing 11b has a first placement slot 1110b with the first placement slot 1110b opening oriented toward the cover 13b, corresponding to the notch 1213b of the second housing 12b. When the second housing 12b is provided on the first housing 11b, the holding cavity 100 and the first placement slot 1110b are spaced apart and not connected to each other.

[0081] In the third embodiment of the dust box 10 described above, the dust box 10 can be further provided with a snap assembly 30 to facilitate snap connection of the dust box 10 to other devices. A further example of the snap assembly 30 of the dust box assembly 1 is described specifically below.

[0082] The snap assembly 30 may include a pressing portion 31b, a snap portion 321b protruding from the pressing portion 31b, and a resilient portion 33b. Snap portion 321b is used for snap connection to the snap slot of the device body. The elastic portion 33b is used to support the pressing portion 31b. The pressing portion 31b is formed with a second placement slot 310b, and the shape of the pressing portion 31b is adapted to the shape of the notch 1213b, for example. The opening di-

rection of the second placement slot 310b is opposite to the projection direction of the snap portion 321b. The resilient portion 33b is, for example, a resilient member such as a spring, and one end of the resilient portion 33b extends into the second placement slot 310b and the other end extends into the first placement slot 1110b. When the first housing 11b, second housing 12b and cover 13b are composed together, the other end of the resilient portion 33b is positioned in the first placement slot 1110b to support the pressing portion 31b and the snap portion 321b. The snap portion 321b corresponds to the snap hole of the cover 13b. The first placement slot 1110b is provided with sliding slots on opposite sides of the wall 112b, and the corresponding sides of the pressing portion 31b are provided with sliding rails, and the sliding rails are embedded in the slots to enable the pressing portion 31b to slide in the first placement slot 1110b.

[0083] When the pressing portion 31b is not pressed, the resilient portion 33b is resiliently supported between the first placement slot 1110b and the second placement slot 310b, and the pressing portion 31b is held against the top so that the snap portion 321b can protrude out of the snap hole to allow for a snap connection with the device body when assembled. When the pressing portion 31b is not pressed, the elastic portion 33b is further elastically compressed, and the pressing portion 31b is able to move toward the first housing 11b, such as moving into the first placement slot 1110b, and the snap portion 321b moves away from the cover 13b so that the snap portion 321b does not protrude from the clamping hole of the cover 13b, so that it can be unclamped.

[0084] By way of example, in one embodiment, a sweeping robot comprises a device body and a dust box assembly 1, the device body is used to clean the floor.

[0085] The device body includes a housing, a brush set in the housing, and a drive motor that drives the brush to roll. The device body can be used in conjunction with the dust box assembly 1 of this embodiment, for example, the housing of the device body has a snap slot opened in the housing for snap connection with the snap portion 321 (321a, 321b). When pressure is applied to the pressing portions 31 (31a, 31b), the elastic deformation of the elastic portions 33 (33a, 33b) enables the pressing portions 31 (31a, 31b) to drive the snap portions 321 (321a, 321b) away from the snap slot to enable the snap portions 321 (321a, 321b) to be decoupled from the snap slot. When the pressing portions 31 (31a, 31b) is not pressed, the elastic recovery force of the elastic part 33 (33a, 33b) can cause the pressing portions 31 (31a, 31b) to drive the snap portions 321 (321a, 321b) to move close to the snap slot or remain close to the snap slot, so that the snap portions 321 (321a, 321b) can be snap connected to the snap slot.

[0086] This embodiment provides the snap assembly 30 to facilitate the connection of the device body and the dust box assembly. In some embodiments, the snap assembly 30 includes two snap portions 321 (321a), which

can make the snap connection between the dust box assembly 1 and the device body of this embodiment tighter and enhance the fixation effect of both structures, and the setting of two snap portions 321 (321a) can further limit the relative displacement of the dust box 10 and the shell of the device body to ensure the stability of the structure.

[0087] The connector 22 of the dust suction assembly 20 of this embodiment can be fixed to the housing of the device body. The good snap effect and limiting effect of the snap assembly 30 prevents the dust box 10 and the device body from shifting so that the sealing effect of the connector 22 and the air outlet 120 can be effectively ensured.

[0088] In order to further enhance the speed of airflow and to optimize the structure, this embodiment provides an embodiment of the connector 22 as follows.

[0089] Referring to Fig. 12, the profile of the connector 22 of this embodiment may be irregularly shaped. One side of each connector 22 may be formed with a first vent 221, which is used to connect to the air outlet 120 corresponding to the connector 22, and a second vent 222 connected to the first vent 221 is formed on the other side of the connector 22. The fan 21 corresponding to the connector 22 is provided on the other side of the connector 21 and is connected to the second vent 222. The shape of the first vent 221 can be adapted to the shape of the air outlet 120 or can be designed on a case-by-case basis. For example, the shape of the first vent 221 shown in Fig. 9 is adapted to the shape of the air outlet 120 shown in Fig. 1 to Fig. 6. The first vent 221 as shown in Fig. 9 can be shaped specifically according to the outlet 120 shown in Fig. 7 and Fig. 8 so that the two are adapted to each other. In this embodiment, it does not limit the shape of the connector 22, the first vent 221, and similarly the second vent 222.

[0090] For example, the first vent 221 on one side of the connector 22 and the second vent 222 on the other side of the connector 22 can be staggered, for example, after the connector 22 is assembled with the dust box 10, the projection of the first vent 221 on the plane where the air outlet 120 is located and the projection of the second vent 222 on the plane where the air outlet 120 is located can partially overlap or completely not overlap. The interior of the connector 22 has spaces which have a first vent 221 and a second vent 222, respectively. In this way, the path of the airflow within the connector 22 may be curved.

[0091] In this embodiment, the angle between the plane in which the first vent 221 is located and the plane in which the second vent 222 is located is greater than 0° and less than 180° . The angle between the plane in which the first vent 221 is located and the plane in which the second vent 222 is located is greater than or equal to 20° and less than 100° . The angle between the plane in which the first vent 221 is located and the plane in which the second vent 222 is located is greater than or equal to 30° and less than or equal to 90° . The angle

between the plane in which the first vent 221 is located and the plane in which the second vent 222 is located is greater than or equal to 40° and less than or equal to 60° . The angle between the plane in which the first vent 221 is located and the plane in which the second vent 222 is located is 46° .

[0092] Referring to Fig. 13, in another embodiment of the connector 22, the main difference from the above embodiments is the provision of a spacer 223 within the first vent 221 of the connector 22, which has one or more spaced through holes. The connector 22 is connected between the fan 21 and the air outlet 120, and the through hole can connect the second vent 222 to the air outlet 120. By further providing the spacer 223, it can be used to block foreign objects from entering the fan 21 through the first vent 221 and causing interference or damage to the fan 21.

[0093] The fan 21, for example, is an extractor fan or blower, both of which can achieve the role of extracting air. The fan 21 is provided on the other side of the corresponding connector 22 and is connected to the second vent 222. When the fan 21 is in operation, the airflow is pumped out by the fan 21 through the suction portion 110, the holding cavity 100, the access cavity 101, the space of the extension 122, the outlet 120, and the first and second vents 221 and 222, in that order.

[0094] In this embodiment, the connector 22, when connected to the corresponding air outlet 120, can be sealed by a seal 24, for example a sealing rubber ring. That is, the seal 24 may be provided at the connection of the first vent 221 and the outlet 120 to seal the connection.

[0095] This embodiment can optimize the air duct of the whole dust box assembly 1 by setting the ventilation structure of the connector 22 and the angle between the plane where the first vent 221 is located and the plane where the second vent 222 is located, so that the air flow is faster. Moreover, the angle between the plane where the first vent 221 is located and the plane where the second vent 222 is located can make the fan 21 have a certain inclination when installed (as shown in Fig. 1), which can effectively save the installation space of the fan 21.

[0096] As shown in Fig. 2, the dust suction assembly 20 of this embodiment may further include a vibration dampening pad 23, and the other side of the connector 22 with the second vent 222 is formed with a holding slot 223, the holding slot 223 is connected to the second vent 222, the shape of the holding slot 223 is adapted to the shape of the vibration dampening pad 23, the vibration dampening pad 23 is placed in the holding slot and located between the fan 21 and the connector 22.

[0097] By setting the housing slot 223 to accommodate the vibration dampening pad 23, the fan 21 through the vibration dampening pad 23 set on the connector 22, can make effective reduce the vibration of the fan 21, so as to avoid impact of vibration of the fan 21 on the connector 22 and ensure the sealing effect, thereby the air extraction effect of the fan 21 can be ensured.

[0098] The cleaning device 300 described in the cleaning device embodiment of this application is, for example, the aforementioned sweeping robot or vacuum cleaner, etc., but is not limited to sweeping robots and vacuum cleaners. Referring to Fig. 14, the cleaning device 300 of this embodiment includes: the device body 2 and the dust box assembly 1 described in the above embodiments.

[0099] For example, for a vacuum cleaner, the device body 2 includes, for example, a housing, a circuit board, etc. It can also include a floor brush, which is connected to the housing via an air duct. The dust box assembly 1 can be provided in the housing of the device body 2 for adsorbing debris, dust, etc. through the floor brush and air duct.

[0100] For a sweeping robot, the device body 2 includes, for example, a housing, a roller brush, and a motor to drive the roller brush to roll. The roller brush is used to sweep the trash, debris, dust, etc., and the dust box assembly 1 is used to adsorb the trash, debris, dust, etc., swept by the roller brush.

[0101] In summary, this application can provide greater suction power and more stable airflow through at least dual fan 21 and dual air duct design, effectively enhancing the cleaning effect. This application can optimize the airflow direction in the dust box 10, and air duct design to improve the filtering effect and cleaning effect of the dust box 10 by setting at least two connecting holes 1211 for setting the first filter 15 respectively.

[0102] The above is only an implementation of this application, and is not intended to limit the scope of this application. Any equivalent structure or equivalent process transformation using the contents of this application and the accompanying drawings, or any direct or indirect application in other related technical fields, is included in the scope of patent protection of this application.

Claims

1. A dust box assembly, comprising

- a dust box (10) having a holding cavity (100),
- a dust suction port (110), and
- at least two air outlets (120),

wherein

- the dust suction port (110) is connected to the holding cavity (100);
- the at least two air outlets (120) are respectively connected to the holding cavity (100) and formed in two opposite sides of the dust box (10);
- at least two fans (21) are provided corresponding to the at least two air outlets (120); and
- the fans (21) are configured to form an air stream passing through the dust suction port (110), the holding cavity (100), and the air outlets

(120) in turn.

2. The dust box assembly according to claim 1, further comprising at least two connection members (22), wherein the connection members (22), the fans (21), and the air outlets (120) are corresponded one by one, and the connection members (22) are provided between the corresponding fans (21) and air outlet (120).

3. The dust box assembly according to claim 2, further comprising

- a first vent (221) formed on one side of each connection member (22), the first vent (221) being configured to connect to the air outlet (120) corresponding to the connection member (22); and
- a second vent (222) connected to the first vent (221) and formed on the other side of the connection member (22);

wherein the fan (21) corresponding to the connection member (22) is set on the other side of the connection member (22) and connected to the second vent (222), and wherein the angle between the plane in which the first vent (221) is located and the plane in which the second vent (222) is located is greater than 0° and less than 180°.

4. The dust box assembly according to claim 3, further comprising a vibration dampening pad (23), wherein

- the connection member (22) is provided with a holding slot (223, 1212, 1212a) connected to the second vent (222);
- the holding slot (223, 1212, 1212a) has a shape adapted to the shape of the vibration dampening pad (23); and
- the vibration dampening pad (23) is placed in the holding slot (223, 1212, 1212a) and located between the fan (21) and the connection member (22).

5. The dust box assembly according to claim 3, wherein the connection member (22) comprises a spacer plate set in the first vent (221), the spacer plate being opened with one or more through holes.

6. The dust box assembly according to any one from claims 1 to 5, wherein the dust box (10) comprises an access cavity (101) adjacent to the holding cavity (100) in a thickness direction of the dust box (10), wherein

- the access cavity (101) is connected to the holding cavity (100) and the air outlet (120);
- the access cavity (101) is located downstream

- of the airflow as compared to the holding cavity (100); and
- the size of the access cavity (101) in the thickness direction of the dust box (10) is less than or equal to the size of the holding cavity (100) in the thickness direction of the dust box (10).
7. The dust box assembly according to claim 6, wherein the dust box (10) comprises a first housing (11, 11a, 11b), a second housing (12, 12a, 12b), and a cover (13, 13a, 13b), wherein
- the second housing (12, 12a, 12b) is covered on one side of the first housing (11, 11a, 11b) to form the holding cavity (100);
 - the cover (13, 13a, 13b) is covered on the other side of the second housing (12, 12a, 12b) to form the access cavity (101);
 - the dust suction ports (110) are opened on the first housing (11, 11a, 11b) or the second housing (12, 12a, 12b);
 - the at least two air outlets (120) are opened at intervals on the second housing (12, 12a, 12b);
 - the dust suction ports (110) are spaced from the at least the dust suction ports (110); and
 - the dust suction ports (110) and the at least two air outlets (120) are set around the thickness direction of the dust box (10).
8. The dust box assembly according to claim 7, wherein
- the second housing (12, 12a, 12b) is provided with a connecting hole (1211, 1211a, 1211b), the connecting hole (1211, 1211a, 1211b) running through one side of the second housing (12, 12a, 12b) to the other side of the second housing (12, 12a, 12b) to connect the access cavity (101) and the holding cavity (100);
 - the dust box assembly comprises a first filter (15, 15a, 15b) and a second filter (16, 16a, 16b);
 - the second filter (16, 16a, 16b) and the first filter (15, 15a, 15b) are provided in the second housing (12, 12a, 12b) and covering the connecting holes (1211, 1211a, 1211b) in turn, or the second filter (16, 16a, 16b) is provided in the second housing (12, 12a, 12b) and covering the connecting holes (1211, 1211a, 1211b);
 - a number of the first filters (15, 15a, 15b) is at least two, at least two of the first filters (15, 15a, 15b) being provided in the second housing (12, 12a, 12b) and covering the at least two air outlets (120) respectively; and
 - the filtration accuracy of the second filter (16, 16a, 16b) is less than the filtration accuracy of the first filter (15, 15a, 15b).
9. The dust box assembly according to claim 8, wherein the cover (13, 13a, 13b) comprises a body (131, 131b) and a top cover (132, 132b), wherein
- the body (131, 131b) is having a mounting hole (130, 130b) formed at a position corresponding to the first filter (15, 15a, 15b);
 - the mounting hole (130, 130b) is connected to the access cavity (101);
 - the top cover (132, 132b) is rotatably attached to the body (131, 131b) so as to close or open the mounting hole (130, 130b) by rotation; and
 - the size of the mounting hole (130, 130b) is greater than or equal to the size of the connecting hole (1211, 1211a, 1211b).
10. The dust box assembly according to claim 8, wherein the dust box (10) comprises a snap assembly (30) for snap connection to a device body of a cleaning device (300).

Patentansprüche

1. Staubkastenordnung, umfassend

- einen Staubkasten (10), der einen Aufnahmehohlraum (100) aufweist,
- eine Staubsaugöffnung (110), und
- mindestens zwei Luftauslässe (120),

wobei

- die Staubsaugöffnung (110) mit dem Aufnahmehohlraum (100) verbunden ist;
- die mindestens zwei Luftauslässe (120) jeweils mit dem Aufnahmehohlraum (100) verbunden sind und in zwei gegenüberliegenden Seiten des Staubkastens (10) gebildet sind;
- mindestens zwei Gebläse (21) bereitgestellt werden, die den mindestens zwei Luftauslässen (120) entsprechen; und
- die Gebläse (21) eingerichtet sind, einen Luftstrom zu bilden, welcher der Reihe nach durch die Staubsaugöffnung (110), den Aufnahmehohlraum (100) und die Luftauslässe (120) geht.

2. Staubkastenordnung nach Anspruch 1, ferner umfassend mindestens zwei Verbindungselemente (22), wobei die Verbindungselemente (22), die Gebläse (21) und die Luftauslässe (120) einander eins zu eins entsprechen, und die Verbindungselemente (22) zwischen den entsprechenden Gebläsen (21) und dem Luftauslass (120) bereitgestellt werden.

3. Staubkastenordnung nach Anspruch 2, ferner umfassend

ein erstes Luftloch (221), das auf einer Seite jedes Verbindungselements (22) gebildet ist, wo-

bei das erste Luftloch (221) eingerichtet ist, mit dem Luftauslass (120) verbunden zu sein, der dem Verbindungselement (22) entspricht; und

- ein zweites Luftloch (222), das mit dem ersten Luftloch (221) verbunden ist und auf der anderen Seite des Verbindungselements (22) gebildet ist;

wobei das Gebläse (21), das dem Verbindungselement (22) entspricht, auf der anderen Seite des Verbindungselements (22) eingesetzt ist und mit dem zweiten Luftloch (222) verbunden ist, und wobei der Winkel zwischen der Ebene, in der sich das erste Luftloch (221) befindet, und der Ebene, in der sich das zweite Luftloch (222) befindet, größer als 0° und kleiner als 180° ist.

4. Staubkastenordnung nach Anspruch 3, ferner umfassend eine Vibrationsdämpfungsunterlage (23), wobei

- das Verbindungselement (22) mit einem Halteschlitz (223, 1212, 1212a) versehen ist, der mit dem zweiten Luftloch (222) verbunden ist;
- der Halteschlitz (223, 1212, 1212a) eine Form aufweist, die an die Form der Vibrationsdämpfungsunterlage (23) angepasst ist; und
- die Vibrationsdämpfungsunterlage (23) in dem Halteschlitz (223, 1212, 1212a) angeordnet ist und sich zwischen dem Gebläse (21) und dem Verbindungselement (22) befindet.

5. Staubkastenordnung nach Anspruch 3, wobei das Verbindungselement (22) eine Abstandsplatte umfasst, die in das erste Luftloch (221) eingesetzt ist, wobei die Abstandsplatte an einem oder mehreren Durchgangslöchern geöffnet ist.

6. Staubkastenordnung nach einem der Ansprüche 1 bis 5, wobei der Staubkasten (10) einen Zugriffshohlraum (101) neben dem Aufnahmehohlraum (100) in einer Dickenrichtung des Staubkastens (10) umfasst, wobei

- der Zugriffshohlraum (101) mit dem Aufnahmehohlraum (100) und dem Luftauslass (120) verbunden ist;
- sich der Zugriffshohlraum (101) im Vergleich zu dem Aufnahmehohlraum stromabwärts von der Luftströmung befindet; und
- die Größe des Zugriffshohlraums (101) in der Dickenrichtung des Staubkastens (10) kleiner oder gleich der Größe des Aufnahmehohlraums (100) in der Dickenrichtung des Staubkastens (10) ist.

7. Staubkastenordnung nach Anspruch 6, wobei der

Staubkasten (10) ein erstes Gehäuse (11, 11a, 11b), ein zweites Gehäuse (12, 12a, 12b) und einen Deckel (13, 13a, 13b) umfasst, wobei

- das zweite Gehäuse (12, 12a, 12b) auf einer Seite des ersten Gehäuses (11, 11a, 11b) abgedeckt ist, um den Aufnahmehohlraum (100) zu bilden;
- der Deckel (13, 13a, 13b) auf der anderen Seite des zweiten Gehäuses (12, 12a, 12b) abgedeckt ist, um den Zugriffshohlraum (101) zu bilden;
- die Staubsaugöffnungen (110) an dem ersten Gehäuse (11, 11a, 11b) oder dem zweiten Gehäuse (12, 12a, 12b) geöffnet werden;
- die mindestens zwei Luftauslässe (120) in Intervallen an dem zweiten Gehäuse (12, 12a, 12b) geöffnet werden;
- die Staubsaugöffnungen (110) von der mindestens einen Staubsaugöffnung (110) beabstandet sind; und
- die Staubsaugöffnungen (110) und die mindestens zwei Luftauslässe (120) um die Dickenrichtung des Staubkastens (10) herum eingesetzt sind.

8. Staubkastenordnung nach Anspruch 7, wobei

- das zweite Gehäuse (12, 12a, 12b) mit einem Verbindungsloch (1211, 1211a, 1211b) versehen ist, wobei das Verbindungsloch (1211, 1211a, 1211b) durch eine Seite des zweiten Gehäuses (12, 12a, 12b) hindurch zu der anderen Seite des zweiten Gehäuses (12, 12a, 12b) verläuft, um den Zugriffshohlraum (101) und den Aufnahmehohlraum (100) zu verbinden;
- die Staubkastenordnung einen ersten Filter (15, 15a, 15b) und einen zweiten Filter (16, 16a, 16b) umfasst;
- der zweite Filter (16, 16a, 16b) und der erste Filter (15, 15a, 15b) in dem zweiten Gehäuse (12, 12a, 12b) bereitgestellt werden und der Reihe nach die Verbindungslöcher (1211, 1211a, 1211b) abdecken, oder der zweite (16, 16a, 16b) in dem zweiten Gehäuse (12, 12a, 12b) bereitgestellt wird und die Verbindungslöcher (1211, 1211a, 1211b) abdeckt;
- eine Anzahl der ersten Filter (15, 15a, 15b) mindestens zwei beträgt, wobei mindestens zwei der ersten Filter (15, 15a, 15b) in dem zweiten Gehäuse (12, 12a, 12b) bereitgestellt werden und jeweils die beiden Luftauslässe (120) abdecken; und
- die Filtrationsgenauigkeit des zweiten Filters (16, 16a, 16b) geringer als die Filtrationsgenauigkeit des ersten Filters (15, 15a, 15b) ist.

9. Staubkastenordnung nach Anspruch 8, wobei der

Deckel (13, 13a, 13b) einen Körper (131, 131b) und einen oberen Deckel (132, 132b) umfasst, wobei

- der Körper (131, 131b) ein Montageloch (130, 130b) aufweist, das in einer Position gebildet ist, die dem ersten Filter (15, 15a, 15b) entspricht; 5
- das Montageloch (130, 130b) mit dem Zugriffshohlraum (101) verbunden ist;
- der obere Deckel (132, 132b) drehbar an dem Körper (131, 131b) angebracht ist, um das Montageloch (130, 130b) durch Drehung zu schließen oder zu öffnen; und 10
- die Größe des Montagelochs (130, 130b) größer oder gleich der Größe des Verbindungslochs (1211, 1211a, 1211b) ist. 15

10. Staubkastenordnung nach Anspruch 8, wobei der Staubkasten (10) eine Einrastanordnung (30) zur Einrastverbindung mit einem Vorrichtungskörper einer Reinigungsvorrichtung (300) aufweist. 20

Revendications

1. Ensemble boîte à poussière, comprenant 25

- une boîte à poussière (10) comportant une cavité de retenue (100),
- un orifice d'aspiration de poussière (110), et
- au moins deux sorties d'air (120), 30

dans lequel

- l'orifice d'aspiration de poussière (110) est relié à la cavité de retenue (100) ; 35
- les au moins deux sorties d'air (120) sont reliées respectivement à la cavité de retenue (100) et formées dans deux côtés opposés de la boîte à poussière (10) ;

- au moins deux ventilateurs (21) sont prévus en correspondance avec les au moins deux sorties d'air (120) ; et
- les ventilateurs (21) sont configurés pour former un flux d'air passant à travers l'orifice d'aspiration de poussière (110), la cavité de retenue (100) et les sorties d'air (120) l'un après l'autre. 45

2. Ensemble boîte à poussière selon la revendication 1, comprenant en outre au moins deux éléments de liaison (22), dans lequel les éléments de liaison (22), les ventilateurs (21) et les sorties d'air (120) sont en correspondance biunivoque, et les éléments de liaison (22) sont prévus entre les ventilateurs (21) et la sortie d'air (120) correspondants. 50 55

3. Ensemble boîte à poussière selon la revendication

2, comprenant en outre

- un premier événement (221) formé sur un côté de chaque élément de liaison (22), le premier événement (221) étant configuré pour être relié à la sortie d'air (120) correspondant à l'élément de liaison (22) ; et
- un deuxième événement (222) relié au premier événement (221) et formé sur l'autre côté de l'élément de liaison (22) ;

dans lequel le ventilateur (21) correspondant à l'élément de liaison (22) est disposé sur l'autre côté de l'élément de liaison (22) et relié au deuxième événement (222), et dans lequel l'angle entre le plan dans lequel le premier événement (221) est situé et le plan dans lequel le deuxième événement (222) est situé est supérieur à 0° et inférieur à 180°.

4. Ensemble boîte à poussière selon la revendication 3, comprenant en outre un tampon amortisseur de vibrations (23), dans lequel

- l'élément de liaison (22) est pourvu d'une fente de retenue (223, 1212, 1212a) reliée au deuxième événement (222) ;
- la fente de retenue (223, 1212, 1212a) présente une forme adaptée à la forme du tampon amortisseur de vibrations (23) ; et
- le tampon amortisseur de vibrations (23) est placé dans la fente de retenue (223, 1212, 1212a) et situé entre le ventilateur (21) et l'élément de liaison (22). 40

5. Ensemble boîte à poussière selon la revendication 3, dans lequel l'élément de liaison (22) comprend une plaque d'entretoise disposée dans le premier événement (221), la plaque d'entretoise étant ouverte avec un ou plusieurs trous traversants. 45

6. Ensemble boîte à poussière selon l'une quelconque des revendications 1 à 5, dans lequel la boîte à poussière (10) comprend une cavité d'accès (101) adjacente à la cavité de retenue (100) dans une direction d'épaisseur de la boîte à poussière (10), dans lequel

- la cavité d'accès (101) est reliée à la cavité de retenue (100) et à la sortie d'air (120) ;
- la cavité d'accès (101) est située en aval du flux d'air par rapport à la cavité de retenue (100) ; et
- la taille de la cavité d'accès (101) dans la direction d'épaisseur de la boîte à poussière (10) est inférieure ou égale à la taille de la cavité de retenue (100) dans la direction d'épaisseur de la boîte à poussière (10).

7. Ensemble boîte à poussière selon la revendication

6, dans lequel la boîte à poussière (10) comprend un premier logement (11, 11a, 11b), un deuxième logement (12, 12a, 12b) et un couvercle (13, 13a, 13b), dans lequel

- le deuxième logement (12, 12a, 12b) est recouvert sur un côté du premier logement (11, 11a, 11b) pour former la cavité de retenue (100) ;
- le couvercle (13, 13a, 13b) est recouvert sur l'autre côté du deuxième logement (12, 12a, 12b) pour former la cavité d'accès (101) ;
- les orifices d'aspiration de poussière (110) sont ouverts sur le premier logement (11, 11a, 11b) ou le deuxième logement (12, 12a, 12b) ;
- les au moins deux sorties d'air (120) sont ouvertes à des intervalles sur le deuxième logement (12, 12a, 12b) ;
- les orifices d'aspiration de poussière (110) sont espacés d'au moins les orifices d'aspiration de poussière (110) ; et
- les orifices d'aspiration de poussière (110) et les au moins deux sorties d'air (120) sont disposés autour de la direction d'épaisseur de la boîte à poussière (10).

8. Ensemble boîte à poussière selon la revendication 7, dans lequel

- le deuxième logement (12, 12a, 12b) est pourvu d'un trou de liaison (1211, 1211a, 1211b), le trou de liaison (1211, 1211a, 1211b) s'étendant à travers un côté du deuxième logement (12, 12a, 12b) jusqu'à l'autre côté du deuxième logement (12, 12a, 12b) pour relier la cavité d'accès (101) et la cavité de retenue (100) ;
- l'ensemble boîte à poussière comprend un premier filtre (15, 15a, 15b) et un deuxième filtre (16, 16a, 16b) ;
- le deuxième filtre (16, 16a, 16b) et le premier filtre (15, 15a, 15b) sont prévus dans le deuxième logement (12, 12a, 12b) et recouvrent les trous de liaison (1211, 1211a, 1211b) l'un après l'autre, ou le deuxième filtre (16, 16a, 16b) est prévu dans le deuxième logement (12, 12a, 12b) et recouvre les trous de liaison (1211, 1211a, 1211b) ;
- un nombre des premiers filtres (15, 15a, 15b) est au moins deux, au moins deux des premiers filtres (15, 15a, 15b) étant prévus dans le deuxième logement (12, 12a, 12b) et recouvrant respectivement les au moins deux sorties d'air (120) ; et
- la précision de filtration du deuxième filtre (16, 16a, 16b) est inférieure à la précision de filtration du premier filtre (15, 15a, 15b).

9. Ensemble boîte à poussière selon la revendication

8, dans lequel le couvercle (13, 13a, 13b) comprend un corps (131, 131b) et un couvercle supérieur (132, 132b), dans lequel

- le corps (131, 131b) comporte un trou de montage (130, 130b) formé à une position correspondant au premier filtre (15, 15a, 15b) ;
- le trou de montage (130, 130b) est relié à la cavité d'accès (101) ;
- le couvercle supérieur (132, 132b) est fixé de manière rotative au corps (131, 131b) afin de fermer ou d'ouvrir le trou de montage (130, 130b) par rotation ; et
- la taille du trou de montage (130, 130b) est supérieure ou égale à la taille du trou de liaison (1211, 1211a, 1211b).

10. Ensemble boîte à poussière selon la revendication 8, dans lequel la boîte à poussière (10) comprend un ensemble d'encliquetage (30) pour une liaison par encliquetage à un corps de dispositif d'un dispositif de nettoyage (300).

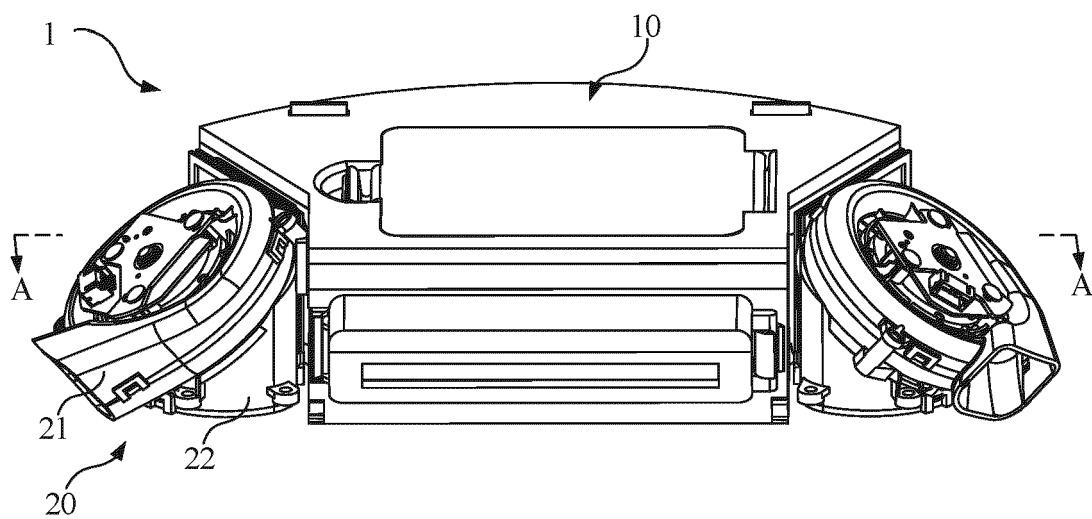


FIG. 1

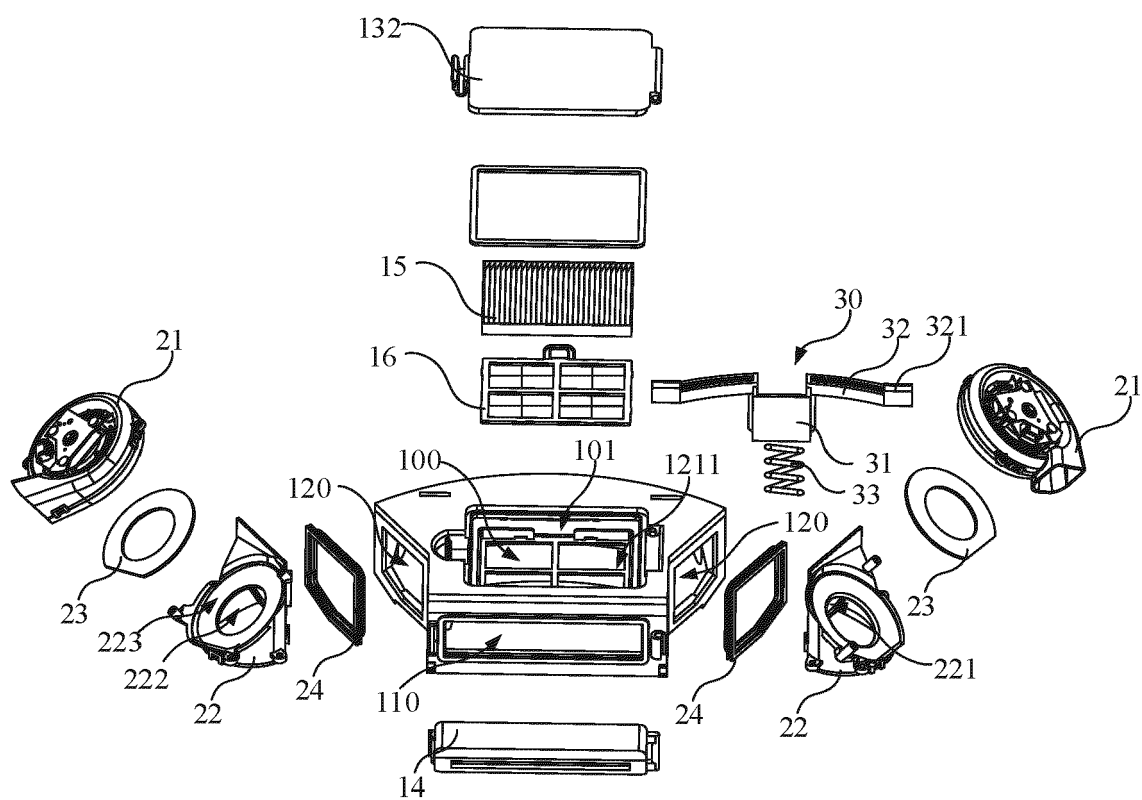


FIG. 2

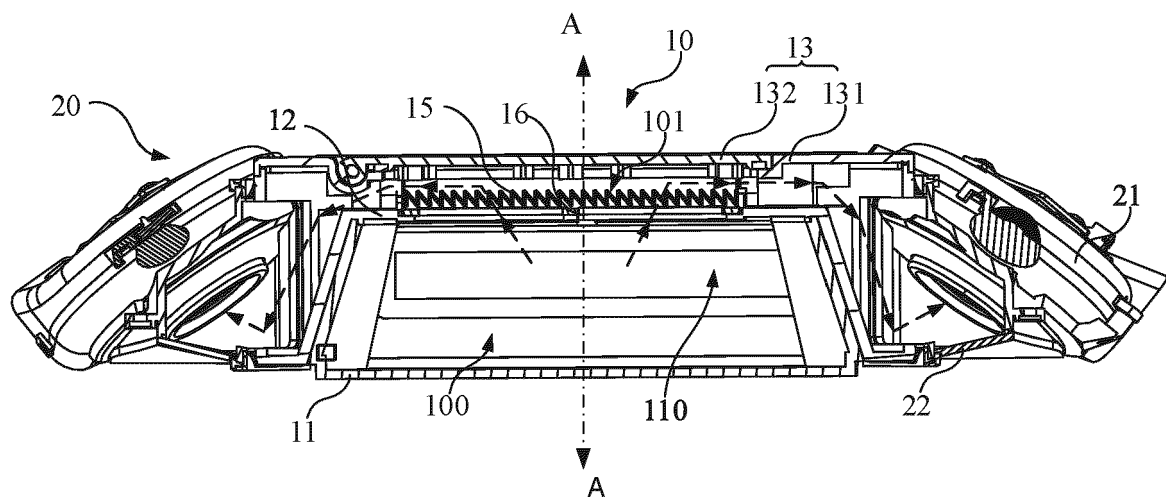


FIG. 3

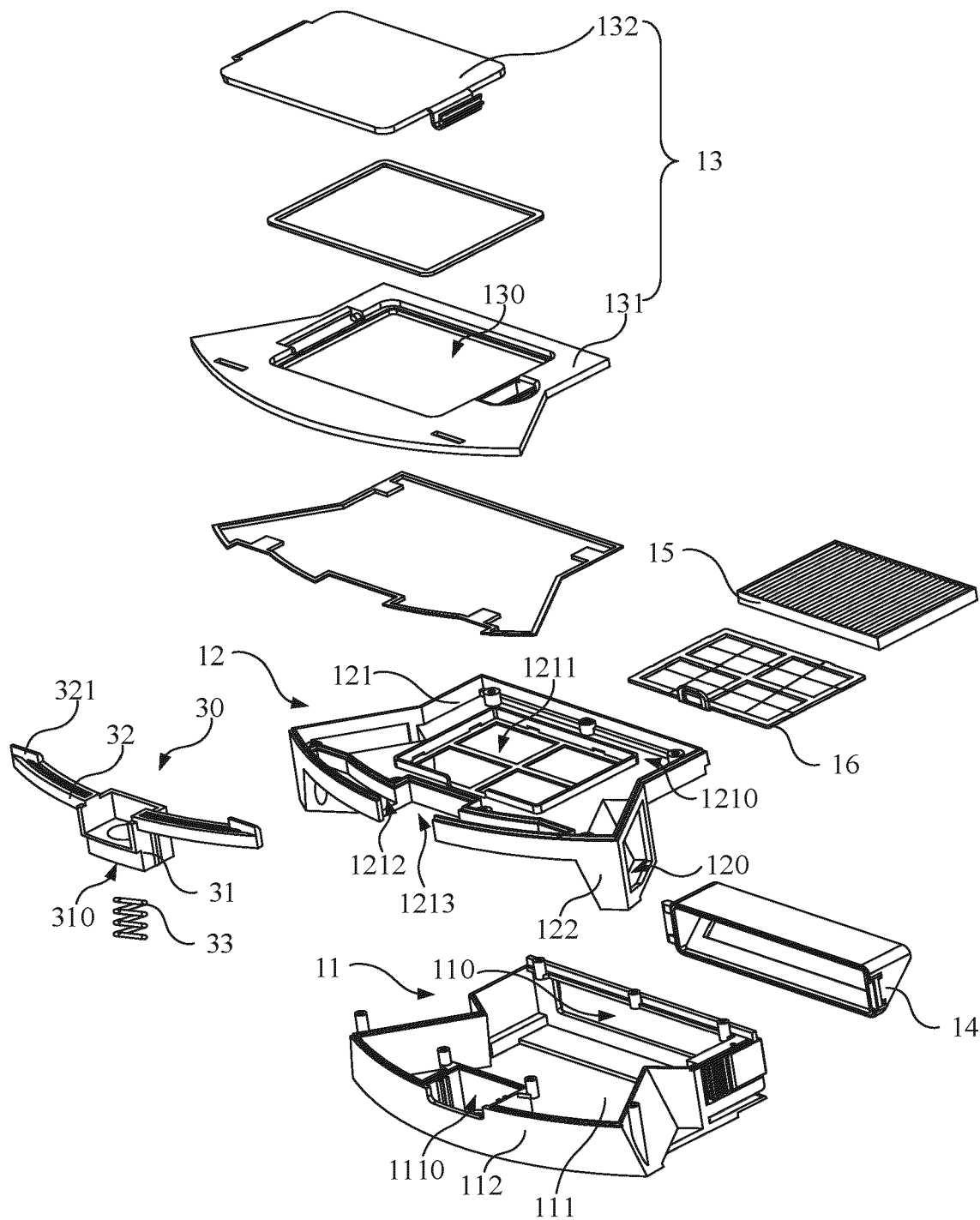


FIG. 4

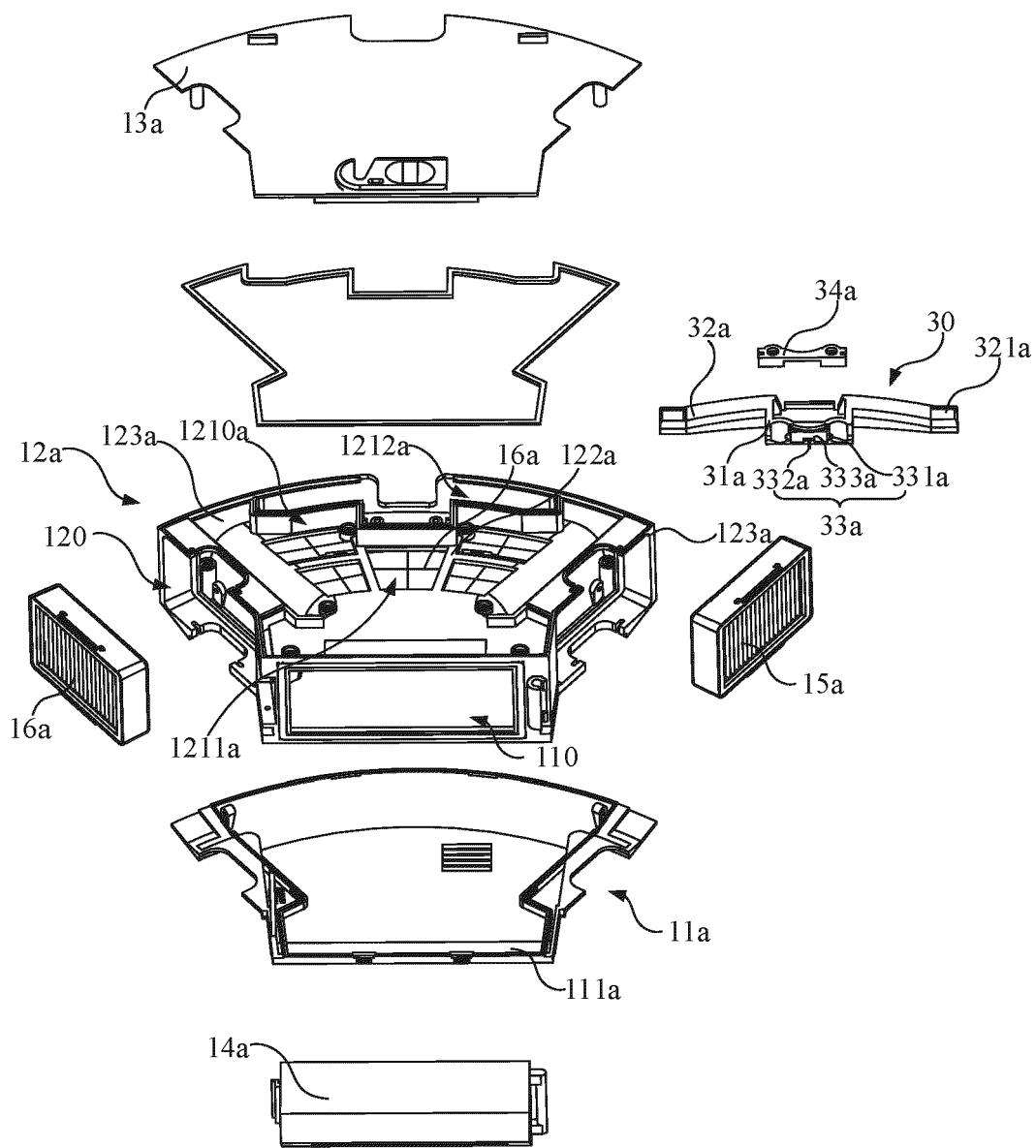


FIG. 5

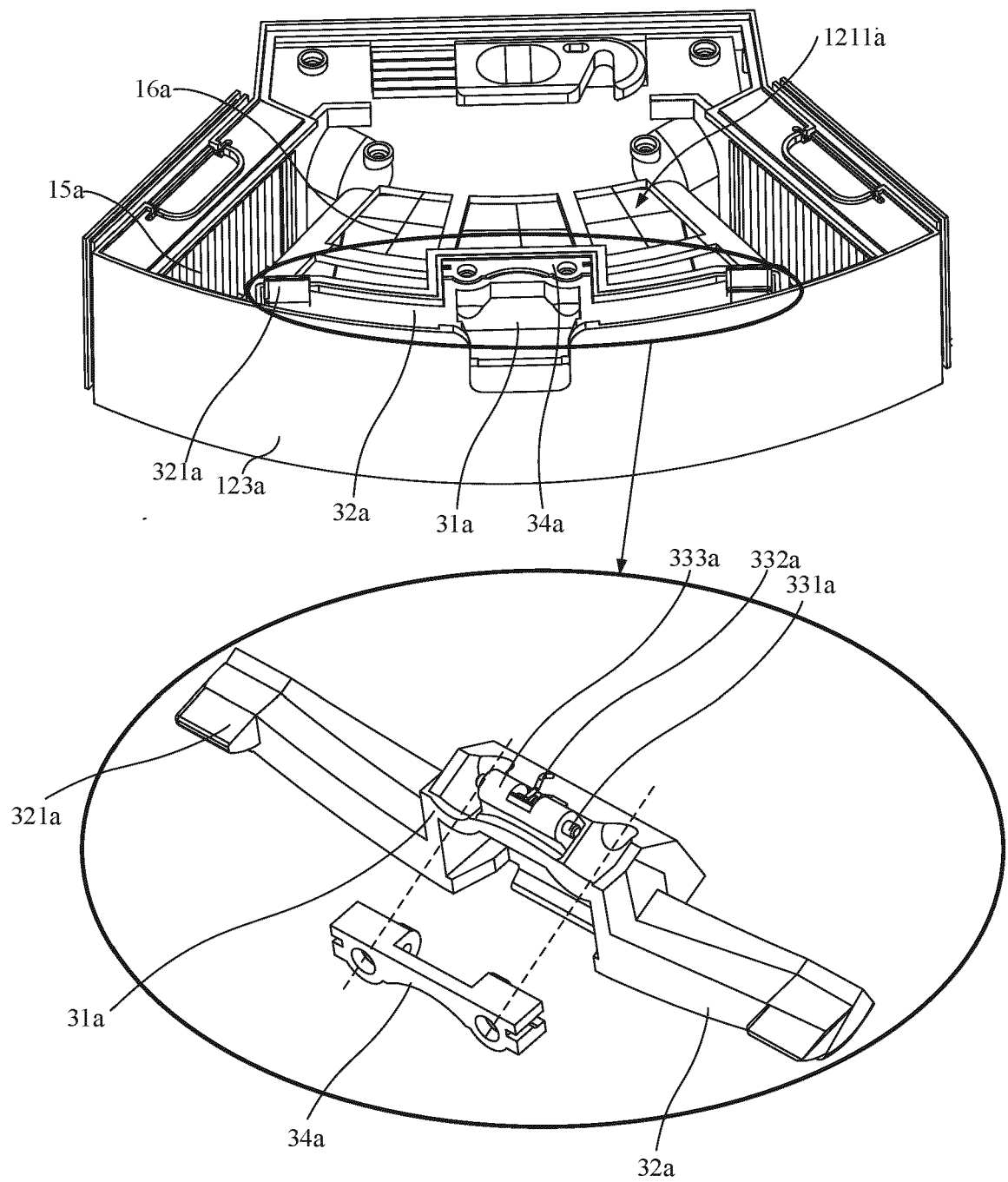


FIG. 6

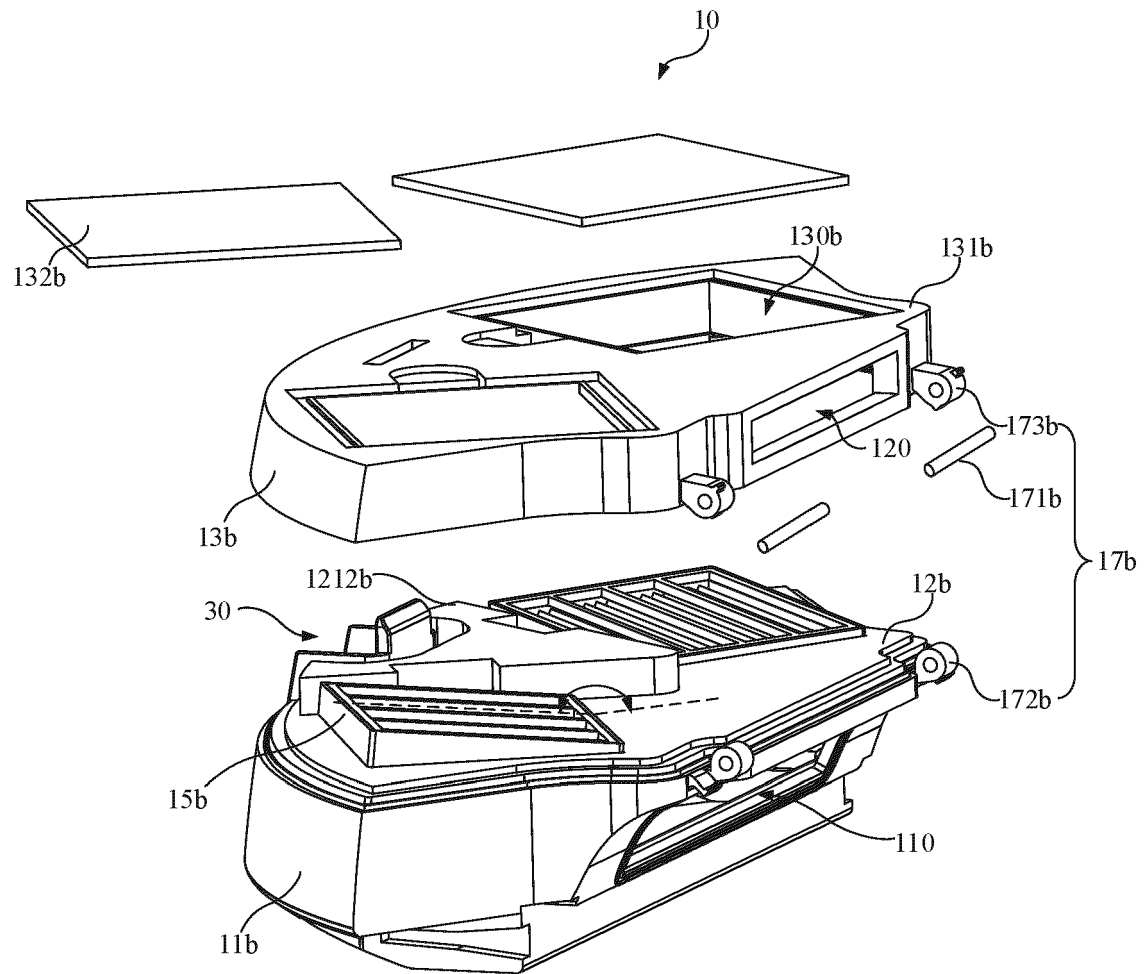


FIG. 7

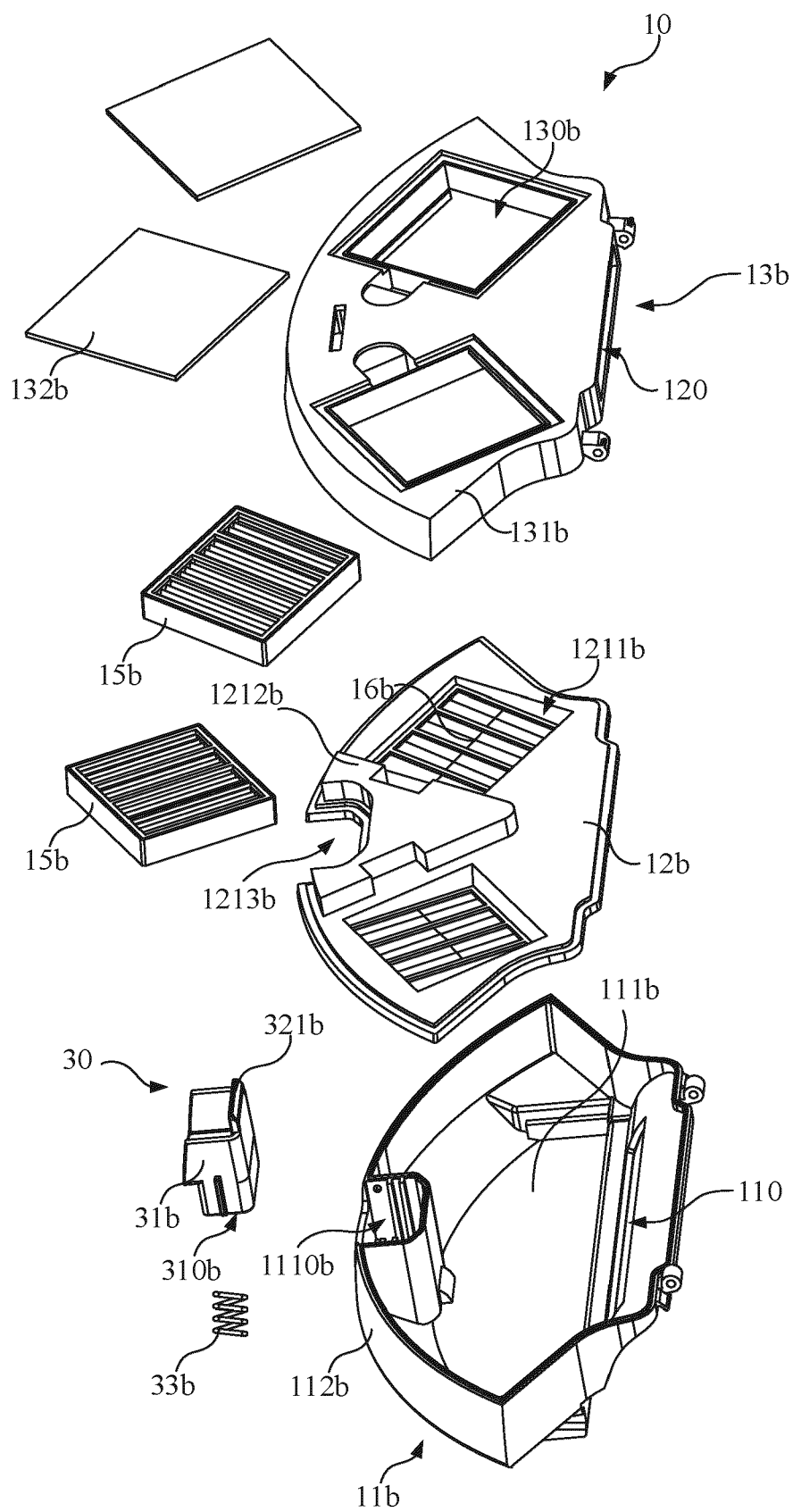


FIG. 8

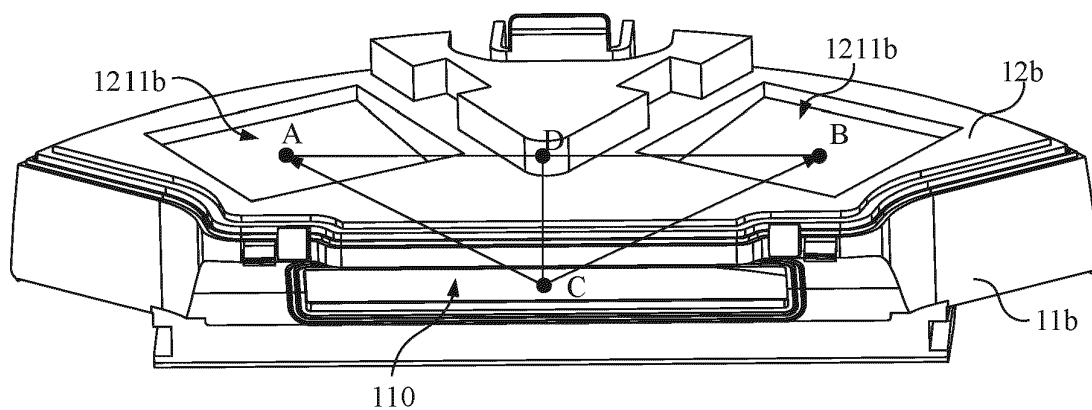


FIG. 9

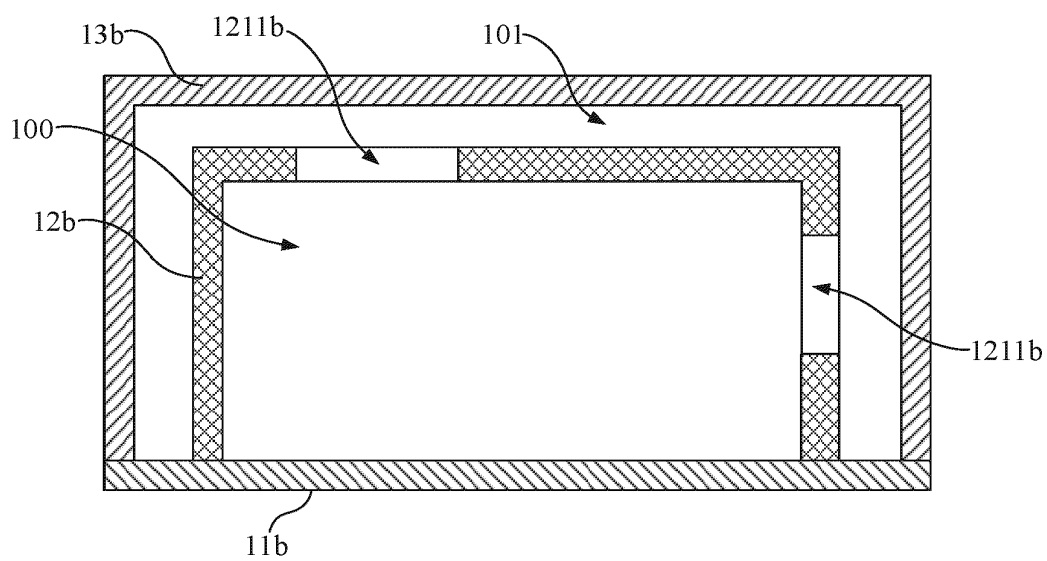


FIG. 10

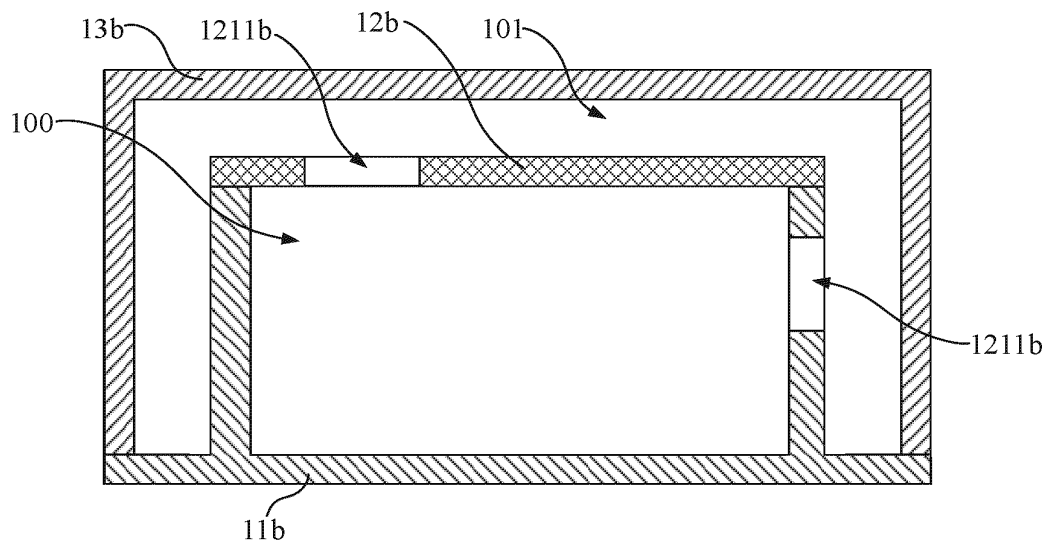


FIG. 11

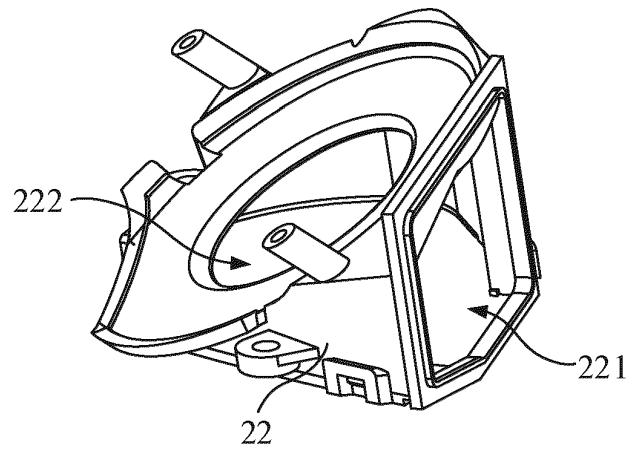


FIG. 12

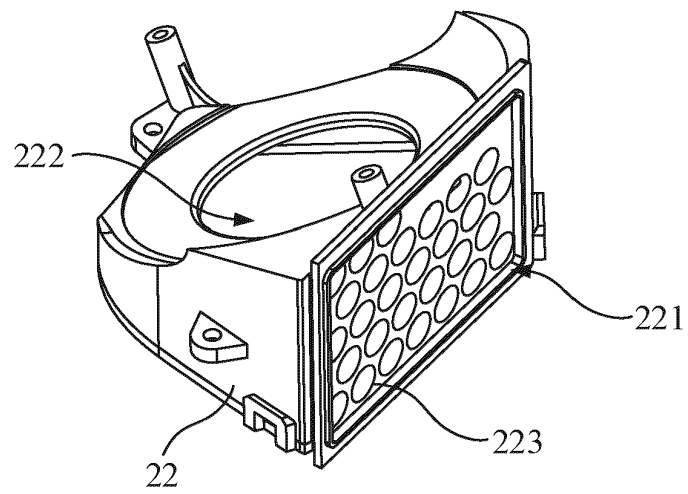


FIG. 13

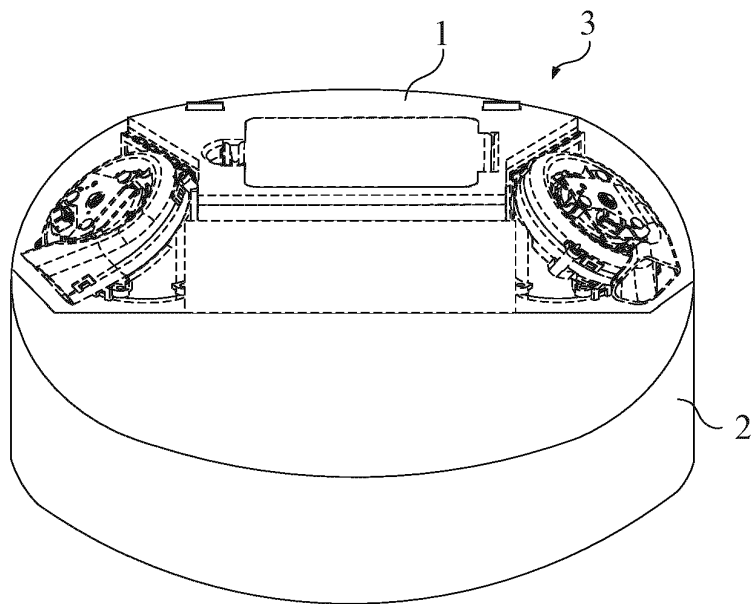


FIG. 14

REFERENCES CITED IN THE DESCRIPTION

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