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(85) Entrée phase nationale/National Entry: 2017/06/19	(71) Demandeur/Applicant: JIANGSU MIDEA CLEANING APPLIANCES CO., LTD., CN
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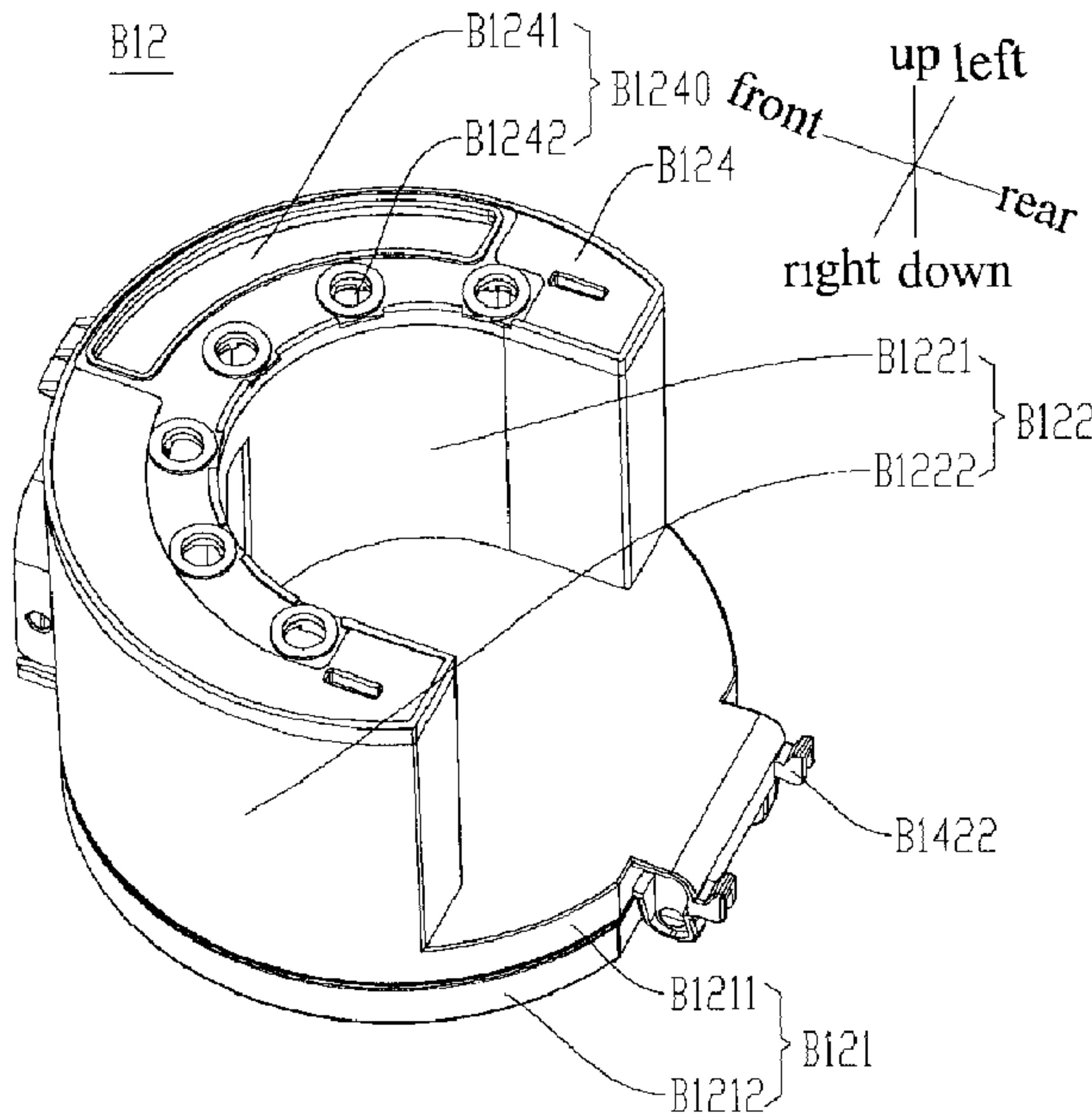


Fig. 24

(57) Abrégé/Abstract:
A dust cup, a dust cup assemble and a handheld cleaner are provided and the dust cup for the cleaner having the negative pressure device comprises a base and a cup casing, wherein the cup casing has a non-closed annular cross section with an

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opening so as to define a dust collecting chamber having a non-closed annular cross section in the cup casing, the cup casing is disposed at a top of the base, a mounting space located outside the dust collecting chamber is defined between an inner-ring wall face of the cup casing and a top wall of the base, a top of the mounting space is directly opened, and a side of the mounting space is opened by an opening, and the negative pressure device is mounted to the mounting space via an opened portion of the mounting space.

1 **ABSTRACT**

2 A dust cup, a dust cup assemble and a handheld cleaner are provided and the dust cup for the cleaner
3 having the negative pressure device comprises a base and a cup casing, wherein the cup casing has a
4 non-closed annular cross section with an opening so as to define a dust collecting chamber having a
5 non-closed annular cross section in the cup casing, the cup casing is disposed at a top of the base, a
6 mounting space located outside the dust collecting chamber is defined between an inner-ring wall face of
7 the cup casing and a top wall of the base, a top of the mounting space is directly opened, and a side of the
8 mounting space is opened by an opening, and the negative pressure device is mounted to the mounting
9 space via an opened portion of the mounting space.

DUST CUP, DUST CUP ASSEMBLY AND HANDHELD CLEANER

FIELD

The present disclosure relates to a field of cleaning equipment, and more particularly to a dust cup, a dust assembly and a handheld cleaner.

BACKGROUND

For a handheld cleaner in the related art, a negative pressure device is generally provided inside a handle, such that the handle has a large volume and weight, which is not only inconvenient for a user to hold the handle but also troublesome and uncomfortable for handholding. In addition, for some other handheld cleaners in the related art, although the negative pressure device is provided in a cup casing, it is encircled or surrounded by a dust collecting chamber in an entire circumference thereof, such that the negative pressure device is difficult to be disassembled and maintained

SUMMARY

Embodiments of the present disclosure seek to solve at least one of the problems existing in the related art. Thus, embodiments of the present disclosure provide a dust cup that has a simple structure and facilitates disassembly of a negative pressure device.

The present disclosure further provides a dust cup assembly having the above-described dust cup.

The present disclosure further provides a handheld cleaner having the above-described dust cup assembly.

The dust cup according to a first aspect of the present disclosure is used for the cleaner having the negative pressure device, the dust cup includes a base and a cup casing, in which the cup casing has a non-closed annular cross section with an opening so as to define a dust collecting chamber having a non-closed annular cross section in the cup casing, the cup casing is disposed at a top of the base, a mounting space located outside the dust collecting chamber is defined between an inner-ring wall face of the cup casing and a top wall of the base, a top of the mounting space is directly opened, and a side of the mounting space is opened by an opening, and the negative pressure device is mounted to the mounting space via an opened portion of the mounting space.

The dust cup according to the present disclosure has the simple structure and facilitates disassembly of the negative pressure device.

In some embodiments of the present invention, the inner-ring wall face of the cup casing is configured as an arc-shaped plate formed by vertically stretching an arc-shaped curve.

In some embodiments of the present invention, the base is configured to have a flat cylindrical shape, and an outer-ring wall face of the cup casing is configured as an arc-shaped plate formed by vertically

1 stretching an arc of a base edge.

2 In some embodiments of the present invention, a central angle of the above-described arc is
3 $180^{\circ}\sim 200^{\circ}$.

4 In some embodiments of the present invention, the cup casing is provided with a chamber-partition
5 wall, the chamber-partition wall is disposed between the inner-ring wall face and an outer-ring wall face
6 and divides the dust collecting chamber into a first dust collecting chamber and a second dust collecting
7 chamber located at two sides of the chamber-partition wall and isolated mutually, top ends of the first dust
8 collecting chamber and the second dust collecting chamber are both opened as inlets, and bottom ends of
9 the first dust collecting chamber and the second dust collecting chamber are both opened as outlets.

10 In some embodiments of the present invention, a bottom wall of the second dust collecting chamber is
11 configured as an inclined wall with a high center and two low ends, and the two ends of the inclined wall
12 are opened as outlets of the second dust collecting chamber.

13 In some embodiments of the present invention, the chamber-partition wall includes a vertical wall, in
14 which, the vertical wall is vertically disposed between the inner-ring wall face and the outer-ring wall face,
15 and a top end of the vertical wall is flush with a top end of the dust collecting chamber; and a horizontal
16 wall connected between a bottom end of the vertical wall and the inner-ring wall face to define the second
17 dust collecting chamber among the horizontal wall, the vertical wall and the inner-ring wall face.

18 In some embodiments of the present invention, a buffering chamber in communication with the dust
19 collecting chamber is provided in the base.

20 In some embodiments of the present invention, the base includes a base body and a base bottom cover,
21 the base bottom cover is connected to a bottom of the base body and capable of being opened and closed to
22 define the buffering chamber between the base bottom cover and the base body, a top wall of the base body
23 has a communication hole, a bottom end edge of the outer-ring wall face is connected to an edge of the
24 communication hole in a butt joint, so as to communicate the first dust collecting chamber with the
25 buffering chamber, bottom end edges of the inner-ring wall face and the chamber-partition wall are inserted
26 in the communication hole while being fitted therewith and abut against the base bottom cover, so as to
27 isolate the second dust collecting chamber from the first dust collecting chamber and the buffering chamber.

28 In some embodiments of the present invention, the dust cup further includes a cup cover, the cup cover
29 is disposed at the top of cup casing, covered on the dust collecting chamber, and provided with a dust inlet
30 in communication with the dust collecting chamber.

31 A dust cup assembly according to a second aspect of the present disclosure includes an
32 above-described dust cup; a cabinet detachably mounted to the dust cup; a dedusting device provided in the
33 cabinet and used to remove dust from the airflow sucked into the cabinet; a negative pressure device
34 provided in the cabinet and used to suck airflow from the environment into the cabinet.

35 A handheld cleaner according to a third aspect of the present disclosure includes an above-described

dust cup assembly; and a handle assembly disposed on the dust cup assembly and used for handholding.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects and advantages of embodiments of the present disclosure will become apparent and more readily appreciated from the following descriptions made with reference to the drawings, in which:

Fig. 1 is a sectional view of a handheld cleaner according to an embodiment of the present disclosure;

Fig. 2 is a schematic view showing a working principle of the handheld cleaner shown in Fig. 1;

Fig. 3 is a sectional view of a dust cup assembly of a handheld cleaner according to another embodiment of the present disclosure;

Fig. 4 is a schematic view showing a working principle of the handheld cleaner shown in Fig. 3;

Fig. 5 is a schematic view of a part of a casing shown in Fig. 4;

Fig. 6 is a schematic view of a rest part of the casing shown in Fig. 4;

Fig. 7 is a schematic view showing a cyclone separating device and a device housing in Fig. 5, in which the device housing and the cyclone separating device are in one piece;

Fig. 8 is a bottom view of the device housing and the cyclone separating device shown in Fig. 7;

Fig. 9 is a sectional view of the device housing and the cyclone separating device shown in Fig. 7;

Fig. 10 is a schematic view showing a device housing and a cyclone separating device of a handheld cleaner according to another embodiment of the present disclosure, in which the device housing and the cyclone separating device are in one piece;

Fig. 11 is a schematic view of an extension pipe according to an embodiment of the present disclosure;

Fig. 12 is a partially enlarged view of the extension pipe shown in Fig. 11;

Fig. 13 is a partially enlarged view of the extension pipe of Fig. 12 in a use state;

Fig. 14 is an assembling view of an extension pipe and a dust cup assembly according to some embodiments of the present disclosure;

Fig. 15 is an assembling view of an extension pipe and a dust cup assembly according to some other embodiments of the present disclosure;

Fig. 16 is a working state diagram of a handheld cleaner according to an embodiment of the present disclosure, in which a detection device is exploded;

Fig. 17 is another working state diagram of a handheld cleaner according to the embodiment of the present disclosure;

Fig. 18 is another working state diagram of a handheld cleaner according to the embodiment of the present disclosure; and

Fig. 19 is a schematic view of a handheld cleaner according to some embodiments of the present disclosure;

Fig. 20 is an exploded view of a handheld cleaner according to an embodiment of the present disclosure;

Fig. 21 is an exploded view of the handheld cleaner shown in Fig. 20, in which a power supply device is removed from the handheld cleaner;

Fig. 22 is a perspective view of a handheld cleaner according to an embodiment of the present disclosure;

Fig. 23 is a partially exploded view of the handheld cleaner shown in Fig. 22;

Fig. 24 is a schematic view of a dust cup assembly shown in Fig. 23;

Fig. 25 is a schematic view of the dust cup assembly shown in Fig. 24, in which a cup cover is removed from the dust cup assembly;

Fig. 26 is a sectional view of a dust cup shown in Fig. 25;

Fig. 27 is another sectional view of the dust cup shown in Fig. 25;

Fig. 28 is a partially exploded view of the handheld cleaner shown in Fig. 23;

Fig. 29 is a partially exploded view of the handheld cleaner shown in Fig. 23;

Fig. 30 is a side sectional view of the handheld cleaner shown in Fig. 22;

Fig. 31 is another side sectional view of the handheld cleaner shown in Fig. 22;

Fig. 32 is a bottom sectional view of the handheld cleaner shown in Fig. 22;

Fig. 33 is a front sectional view of a handheld cleaner according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

Embodiments of the present disclosure will be described in detail and examples of the embodiments will be illustrated in the drawings, where same or similar reference numerals are used to indicate same or similar members or members with same or similar functions. The embodiments described herein with reference to drawings are illustrative, which are used to illustrate the present disclosure, but shall not be construed to limit the present disclosure.

The following disclosure provides many different embodiments or examples to realize different structures of the present disclosure. To simplify the disclosure of the present disclosure, components and configurations in particular examples are elaborated. Of course, they are illustrative, and are not intended to limit the present disclosure. Moreover, reference numbers and/or letters may be repeated in different examples of the present disclosure for the purpose of simplicity and clarity, which shall not be constructed to indicate the relationships among various embodiments and/or configurations. In addition, the present disclosure provides examples of various specific processes and materials, but applicability of other processes and/or utilization of other materials are conceivable for those skilled in the art.

A handheld cleaner according to some specific embodiments of the present disclosure will be

1 **described below.**

2 In some embodiments of the present disclosure, the handheld cleaner includes a dust cup assembly,
3 including: a casing, a negative pressure device disposed in the casing and configured to suck an airflow
4 from an environment into the casing, and a dedusting device disposed in the casing and configured to
5 remove dust from the sucked airflow; and a handle assembly, including: a handle casing disposed to the
6 casing and having a holding portion for user handholding, and a power supply device disposed at a top of
7 the holding portion, and/or in the holding portion, and/or at a position in the handle casing opposite to the
8 holding portion and electrically connected to the negative pressure device.

9 In some embodiments of the present disclosure, the handle casing has a finger gripping portion and a
10 mounting portion configured to be connected to the dust cup assembly, the holding portion and the
11 mounting portion are located at two sides of the finger gripping portion, and the power supply device is
12 disposed in the mounting portion and/or in the holding portion.

13 In some embodiments of the present disclosure, a length direction of the power supply device disposed
14 in the holding portion is identical to a length direction of the holding portion.

15 In some embodiments of the present disclosure, a length direction of the power supply device disposed
16 in the mounting portion is identical to a length direction of the mounting portion.

17 In some embodiments of the present disclosure, the casing has an upright tube shape, a length
18 direction of the mounting portion is identical to an axial direction of the casing, and the mounting portion is
19 connected to a radial side of the casing.

20 In some embodiments of the present disclosure, the mounting portion is detachably connected to the
21 dust cup assembly.

22 In some embodiments of the present disclosure, the finger gripping portion is configured as a gripping
23 hole, the handle casing is configured as an annular casing, and the gripping hole is defined by an inner ring
24 of the handle casing.

25 In some embodiments of the present disclosure, the handle casing further includes a handle top and a
26 handle bottom connected between the mounting portion and the holding portion and disposed opposite to
27 each other, and an electric control board connected to the power supply device is disposed in the handle top
28 and/or the handle bottom.

29 In some embodiments of the present disclosure, the handle casing includes: the holding portion spaced
30 apart from the casing; an upper arm portion between an upper end of the holding portion and the casing;
31 and a lower arm portion connected between a lower end of the holding portion and the casing, in which the
32 power supply device is disposed to an inner top of the upper arm portion or an outer top of the upper arm
33 portion.

34 In some embodiments of the present disclosure, the upper end of the holding portion is connected to a
35 center of a bottom of the upper arm portion, and the lower end of the holding portion extends in a direction

1 running away from the casing.

2 In some embodiments of the present disclosure, the upper arm portion is a rectangle shell disposed
3 horizontally, and the power supply device is disposed in the upper arm portion.

4 In some embodiments of the present disclosure, the casing has an electrical connection port, and the
5 power supply device is disposed to the outer top of the upper arm portion and electrically plugged in the
6 electrical connection port.

7 In some embodiments of the present disclosure, the lower arm portion obliquely extends upwards in a
8 direction from the casing to the holding portion.

9 In some embodiments of the present disclosure, at least part of the upper arm portion, at least part of
10 the lower arm portion and at least part of the casing are integrally molded.

11 In some embodiments of the present disclosure, at least part of the holding portion, at least part of the
12 upper arm portion and at least part of the lower arm portion are integrally molded.

13 In some embodiments of the present disclosure, an outer surface of the casing has an upright tube
14 shape, the upper arm portion is connected to a top end of a circumferential surface of the casing, and the
15 lower arm portion is connected to a bottom end of the circumferential surface of the casing.

16 In some embodiments of the present disclosure, an outer surface of the casing has the upright tube
17 shape, a center line of the holding portion, a center line of the upper arm portion, a center line of the lower
18 arm portion and an axis of the casing are located in a same plane.

19 In some embodiments of the present disclosure, a central chamber, a dedusting chamber and a dust
20 collecting chamber are provided in the casing; the central chamber has an upright columnar shape and
21 includes an air exhaust chamber and a mounting chamber in communication with each other in an
22 up-and-down direction; the dedusting chamber has a closed annular cross section and surrounds the air
23 exhaust chamber by one circle; the dust collecting chamber is located below the dedusting chamber, and the
24 dust collecting chamber has a non-closed annular cross section and surrounds the mounting chamber by less
25 than one circle, in which the dedusting device is disposed in the dedusting chamber, and the negative
26 pressure device is disposed in the mounting chamber and is in communication with the air exhaust chamber.

27 In some embodiments of the present disclosure, the casing includes: a dust cup defining the dust
28 collecting chamber, and a cabinet mounted on the dust cup and defining the central chamber and the
29 dedusting chamber; the dust cup includes a base and a cup casing, and the cup casing has a non-closed
30 annular cross section with an opening so as to define the dust collecting chamber whose cross section has
31 the non-closed annular shape in the cup casing; the cup casing is disposed on a top of the base, and a
32 mounting space located outside the dust collecting chamber is defined between an inner-ring wall face of
33 the cup casing and a top wall of the base, in which a top portion of the mounting space is directly opened,
34 and a side portion of the mounting portion is opened by the opening.

35 In some embodiments of the present disclosure, the central chamber, the dedusting chamber and the

1 dust collecting chamber are provided in the casing; the central chamber has an upright columnar shape and
2 includes an air exhaust chamber and a mounting chamber in communication with each other in an
3 up-and-down direction; the dedusting chamber has a closed annular cross section and surrounds the air
4 exhaust chamber by one circle; the dust collecting chamber is located below the dedusting chamber, and the
5 dust collecting chamber has a closed annular cross section and surrounds the mounting chamber by one
6 circle, in which the dedusting device is disposed in the dedusting chamber, and the negative pressure device
7 is disposed in the mounting chamber and is in communication with the air exhaust chamber.

8 In some embodiments of the present disclosure, a device housing having a tube shape is provided in
9 the casing, an outer end surface of the device housing at an axial side thereof abuts against or extends
10 beyond a part of an inner surface of the casing, the dedusting chamber is defined between the inner surface
11 of the casing and an outer circumferential surface of the device housing and surrounds the device housing
12 in a circumferential direction of the device housing, and the central chamber is defined in the device
13 housing.

14 In some embodiments of the present disclosure, the casing includes: a mounting frame, in which the
15 dedusting device is supported on a top of the mounting frame, and the negative pressure device is mounted
16 to a bottom of the mounting frame; and a dust collecting cup covered outside the negative pressure device
17 and detachably connected to the mounting frame.

18 **The handheld cleaner according to some specific embodiments of the present disclosure will be**
19 **described below.**

20 In some embodiments of the present disclosure, the dust cup assembly includes a casing including a
21 cup body with an open top, and a cleaner cover disposed at a top of the cup body and capable of being
22 opened and closed; a negative pressure device provided in the cup body and used to suck airflow from the
23 environment into the casing; and a dedusting device provided in the cup body, located above the negative
24 pressure device and withdrawable from the top of the cup body when the cleaner cover is opened.

25 In some embodiments of the present disclosure, the cleaner cover is a circular cleaner cover and has a
26 first end and a second end located at two ends thereof in a diameter direction, in which, the first end is
27 articulated with an upper end edge of the cup body, and the second end is connected to the upper end edge
28 of the cup body by a snap connection.

29 In some embodiments of the present disclosure, the cleaner cover is detachably mounted on the cup
30 body by a snap connection or a threaded connection.

31 In some embodiments of the present disclosure, a central chamber and a dedusting chamber
32 surrounding the central chamber are provided in the cup body, the negative pressure device is provided in
33 the central chamber, the dedusting device is provided in the dedusting chamber, a communicating chamber
34 is provided in the cleaner cover, an end surface at a side of the cleaner cover facing towards the cup body
35 has an air inlet communicating the communicating chamber with the dedusting chamber and an air outlet

1 communicating the communicating chamber with the central chamber.

2 In some embodiments of the present disclosure, the cleaner cover includes an inner cover disposed at
3 the top of the cup body, an outer cover disposed at the top of the cup body and covering over the inner
4 cover, and an in-cover air passage member detachably provided between the inner cover and the outer cover
5 or integrally formed in an inner surface of the outer cover, and the communicating chamber is defined
6 between the inner cover and the in-cover air passage member.

7 In some embodiments of the present disclosure, the cleaner cover further includes an in-cover filter
8 detachably provided in the communicating chamber to filter the airflow flowing into the communicating
9 chamber.

10 In some embodiments of the present disclosure, the end face at the side of the cleaner cover is
11 provided with a detachable filter covering on the air inlet.

12 In some embodiments of the present disclosure, a central chamber, a dedusting chamber and a dust
13 collecting chamber are provided in the cup body, the central chamber is configured to have an upright
14 columnar shape and includes an air exhaust chamber and a mounting chamber in communication with each
15 other in an up-and-down direction, the dedusting chamber has a closed annular cross section and surrounds
16 the air exhaust chamber by one circle, the dust collecting chamber is located below the dedusting chamber,
17 has a non-closed annular cross section, and surrounds the mounting chamber by less than one circle, in
18 which, the dedusting device is provided in the dedusting chamber, and the negative pressure device is
19 provided in the mounting chamber and is in communication with the air exhaust chamber.

20 In some embodiments of the present disclosure, the cup body includes a dust cup defining the dust
21 collecting chamber and a cabinet disposed on the dust cup and defining the central chamber and the
22 dedusting chamber, in which, the dust cup includes a base and a cup casing, the cup casing is configured to
23 have the non-closed annular cross section with an opening so as to define the dust collecting chamber
24 having the non-closed annular cross section in the cup casing, the cup casing is disposed at a top of the base,
25 a mounting space located outside the dust collecting chamber is defined between an inner-ring wall face of
26 the cup casing and a top wall of the base, a top of the mounting space is directly opened, and a side of the
27 mounting space is opened by the opening.

28 In some embodiments of the present disclosure, the cabinet includes an upper body and a lower body
29 disposed at a bottom of the upper body, in which, the dedusting chamber and the air exhaust chamber are
30 both formed in the upper body, the mounting chamber is formed in the lower body, the lower body is
31 mounted at the mounting space via an opened portion of the mounting space, and the upper body is
32 supported on the top of the cup casing.

33 In some embodiments of the present disclosure, the upper body includes a tube casing and an air
34 exhaust pipe, in which, the air exhaust pipe is provided in the tube casing and the dedusting chamber is
35 defined between the air exhaust pipe and the tube casing, a bottom of the air exhaust pipe penetrates

1 through a bottom wall of the tube casing and the air exhaust chamber in communication with the mounting
2 chamber is defined in the air exhaust pipe.

3 In some embodiments of the present disclosure, a lower portion of the air exhaust pipe is configured as
4 an expansion pipe segment, and an upper end of the negative pressure device extends into the expansion
5 pipe segment.

6 In some embodiments of the present disclosure, a central chamber, a dedusting chamber and a dust
7 collecting chamber are provided in the cup body, the central chamber is configured to have an upright
8 columnar shape and includes an air exhaust chamber and a mounting chamber in communication with each
9 other in an up-and-down direction, the dedusting chamber has a closed annular cross section and surrounds
10 the air exhaust chamber by one circle, the dust collecting chamber is located below the dedusting chamber,
11 has a closed annular cross section and surrounds the mounting chamber by one circle, in which, the
12 dedusting device is provided in the dedusting chamber, and the negative pressure device is provided in the
13 mounting chamber and is in communication with the air exhaust chamber.

14 In some embodiments of the present disclosure, a tube-shaped device housing is provided in the cup
15 body, an axial outer end face of the device housing abuts against or penetrates through a partial inner
16 surface of the cup body, the dedusting chamber is defined between the inner surface of the cup body and an
17 outer circumferential surface of the device housing and surrounds the device housing in a circumferential
18 direction of the device housing, and the central chamber is defined in the device housing.

19 In some embodiments of the present disclosure, the cup body includes a mounting frame, in which, the
20 dedusting device is supported at a top of the mounting frame, and the negative pressure device is mounted
21 to a bottom of the mounting frame; and a dust collecting cup covering over the negative pressure device
22 and detachably connected to the mounting frame.

23 In some embodiments of the present disclosure, the mounting frame includes a ring, a top end cup ring
24 of the dust collecting cup is connected to the ring in a butt connection; a limiting and supporting portion
25 provided in the ring and fitted with the dedusting device to limit a displacement of the dedusting device in
26 directions other than an upward direction; and a fixed mounting portion provided in the ring and used to
27 fixedly mount the negative pressure device.

28 In some embodiments of the present disclosure, the dedusting device has a limiting hole penetrating
29 therethrough in an up-and-down direction and a support groove with an open bottom, the support groove
30 includes two support sub-grooves disposed at two radial sides of the limiting hole, the limiting and
31 supporting portion includes a limiting post and a support beam, in which, the limiting post is provided in
32 the ring and fitted in the limiting hole in an insertion manner, the support beam includes two support
33 sub-beams disposed at two radial sides of the limiting post respectively, and the two support sub-beams are
34 correspondingly provided in the two support sub-grooves respectively and support top walls of the
35 corresponding support sub-grooves.

1 In some embodiments of the present disclosure, the handheld cleaner includes a above-described dust
2 cup assembly, and a handle assembly disposed on the dust cup assembly and used for handholding.

3 **The handheld cleaner according to some specific embodiments of the present disclosure will be**
4 **described below.**

5 In some embodiments of the present invention, the dust cup is used for the cleaner having the negative
6 pressure device, the dust cup includes a base and a cup casing, in which the cup casing has a non-closed
7 annular cross section with an opening so as to define a dust collecting chamber having a non-closed annular
8 cross section in the cup casing, the cup casing is disposed at a top of the base, a mounting space located
9 outside the dust collecting chamber is defined between an inner-ring wall face of the cup casing and a top
10 wall of the base, a top of the mounting space is directly opened, and a side of the mounting space is opened
11 by an opening, and the negative pressure device is mounted to the mounting space via an opened portion of
12 the mounting space.

13 In some embodiments of the present invention, the inner-ring wall face of the cup casing is configured
14 as an arc-shaped plate formed by vertically stretching an arc-shaped curve.

15 In some embodiments of the present invention, the base is configured to have a flat cylindrical shape,
16 and an outer-ring wall face of the cup casing is configured as an arc-shaped plate formed by vertically
17 stretching an arc of a base edge.

18 In some embodiments of the present invention, a central angle of the above-described arc is
19 $180^{\circ}\sim 200^{\circ}$.

20 In some embodiments of the present invention, the cup casing is provided with a chamber-partition
21 wall, the chamber-partition wall is disposed between the inner-ring wall face and an outer-ring wall face
22 and divides the dust collecting chamber into a first dust collecting chamber and a second dust collecting
23 chamber located at two sides of the chamber-partition wall and isolated mutually, top ends of the first dust
24 collecting chamber and the second dust collecting chamber are both opened as inlets, and bottom ends of
25 the first dust collecting chamber and the second dust collecting chamber are both opened as outlets.

26 In some embodiments of the present invention, a bottom wall of the second dust collecting chamber is
27 configured as an inclined wall with a high center and two low ends, and the two ends of the inclined wall
28 are opened as outlets of the second dust collecting chamber.

29 In some embodiments of the present invention, the chamber-partition wall includes a vertical wall, in
30 which, the vertical wall is vertically disposed between the inner-ring wall face and the outer-ring wall face,
31 and a top end of the vertical wall is flush with a top end of the dust collecting chamber; and a horizontal
32 wall connected between a bottom end of the vertical wall and the inner-ring wall face to define the second
33 dust collecting chamber among the horizontal wall, the vertical wall and the inner-ring wall face.

34 In some embodiments of the present invention, a buffering chamber in communication with the dust
35 collecting chamber is provided in the base.

1 In some embodiments of the present invention, the base includes a base body and a base bottom cover,
2 the base bottom cover is connected to a bottom of the base body and capable of being opened and closed to
3 define the buffering chamber between the base bottom cover and the base body, a top wall of the base body
4 has a communication hole, a bottom end edge of the outer-ring wall face is connected to an edge of the
5 communication hole in a butt joint, so as to communicate the first dust collecting chamber with the
6 buffering chamber, bottom end edges of the inner-ring wall face and the chamber-partition wall are inserted
7 in the communication hole while being fitted therewith and abut against the base bottom cover, so as to
8 isolate the second dust collecting chamber from the first dust collecting chamber and the buffering chamber.

9 In some embodiments of the present invention, the dust cup further includes a cup cover, the cup cover
10 is disposed at the top of cup casing, covered on the dust collecting chamber, and provided with a dust inlet
11 in communication with the dust collecting chamber.

12 In some embodiments of the present invention, a dust cup assembly includes an above-described dust
13 cup; a cabinet detachably mounted to the dust cup; a dedusting device provided in the cabinet and used to
14 remove dust from the airflow sucked into the cabinet; a negative pressure device provided in the cabinet
15 and used to suck airflow from the environment into the cabinet.

16 In some embodiments of the present invention, a handheld cleaner includes an above-described dust
17 cup assembly; and a handle assembly disposed on the dust cup assembly and used for handholding.

18 **The handheld cleaner according to some specific embodiments of the present disclosure will be**
19 **described below.**

20 In some embodiments of the present disclosure, the dust cup assembly includes a casing having a
21 central chamber, a dedusting chamber and a dust collecting chamber, wherein the central chamber is
22 configured to have an upright columnar shape and comprises an air exhaust chamber and a mounting
23 chamber in communication with each other in an up-and-down direction, the dedusting chamber has a
24 closed annular cross section and surrounds the air exhaust chamber by one circle, the dust collecting
25 chamber is located below the dedusting chamber, has a non-closed annular cross section, and surrounds the
26 mounting chamber by less than a circle; a negative pressure device, in which at least a majority of the
27 negative pressure device is provided in the mounting chamber and used to suck airflow from the
28 environment into the casing; and a dedusting device provided in the dedusting chamber to remove dust
29 from the sucked airflow.

30 In some embodiments of the present disclosure, a lower portion of the air exhaust chamber is
31 configured as an expansion pipe segment, and an upper end of the negative pressure device extends into the
32 expansion pipe segment.

33 In some embodiments of the present disclosure, the dedusting device includes a plurality of cyclones
34 provided around the air exhaust chamber and located directly above the dust collecting chamber, in which,
35 each cyclone is configured as a conical tube having a tangential inlet in a side wall thereof and a tapered

1 bottom.

2 In some embodiments of the present disclosure, the dedusting device further includes a filtration tube
3 fitted over the plurality of cyclones, the filtration tube has a filtration hole and divides the dedusting
4 chamber into a second cyclone chamber and a first cyclone chamber located at an inner side and an outer
5 side of the filtration tube respectively, and the plurality of cyclones are located in the second cyclone
6 chamber.

7 In some embodiments of the present disclosure, the dust collecting chamber includes a first dust
8 collecting chamber located directly below the first cyclone chamber and in communication with the first
9 cyclone chamber, and a second dust collecting chamber located directly below the second cyclone chamber
10 and in communication with the plurality of cyclones, and the first dust collecting chamber and the second
11 dust collecting chamber are not in communication with each other.

12 In some embodiments of the present disclosure, top ends of the first dust collecting chamber and the
13 second dust collecting chamber are both opened to serve as inlets, and bottom ends of the first dust
14 collecting chamber and the second dust collecting chamber are both opened to serve as outlets.

15 In some embodiments of the present disclosure, a bottom wall of the second dust collecting chamber is
16 configured as an inclined wall with a high center and two low ends, and the two ends of the inclined wall
17 are opened to serve as outlets of the second dust collecting chamber.

18 In some embodiments of the present disclosure, the casing includes a dust cup including a base and a
19 cup casing, in which, the cup casing is configured to have a non-closed annular across section with an
20 opening so as to define the dust collecting chamber having the non-closed annular cross section in the cup
21 casing, the cup casing is disposed at a top of the base and a mounting space located outside the dust
22 collecting chamber is defined between an inner-ring wall face of the cup casing and a top wall of the base, a
23 top of the mounting space is directly opened, and a side of the mounting space is opened by the opening;
24 and a cabinet, in which, the central chamber and the dedusting chamber are both formed in the cabinet and
25 a portion of the cabinet for containing the negative pressure device is mounted at the mounting space via an
26 opened portion of the mounting space.

27 In some embodiments of the present disclosure, the dust cup further includes the cup cover, the cup
28 cover is disposed at a top of the cup casing and covers on the dust collecting chamber, the cup cover has a
29 dust inlet in communication with the dust collecting chamber, the dust inlet includes a first dust inlet
30 communicating the first dust collecting chamber with the first cyclone chamber, and a second dust inlet
31 communicating the second dust collecting chamber with the plurality of cyclones, and a lower end of each
32 cyclone penetrates through a bottom wall of the tube casing and is inserted in the corresponding second
33 dust inlet while being fitted therewith.

34 In some embodiments of the present disclosure, the base includes a base body and a base bottom cover,
35 the base bottom cover is connected to a bottom of the base body and capable of being opened and closed to

1 define a buffering chamber between the base bottom cover and the base body, a top wall of the base body
2 has the communication hole, a bottom end edge of an outer-ring wall face is connected to an edge of the
3 communication hole in a butt joint to communicate the first dust collecting chamber with the buffering
4 chamber, the inner-ring wall face and a bottom end edge of a chamber-partition wall are inserted in the
5 communication hole while being fitted therewith and abut against the base bottom cover to isolate the
6 second dust collecting chamber from the first dust collecting chamber and the buffering chamber.

7 In some embodiments of the present disclosure, the cabinet includes an upper body and a lower body
8 disposed at a bottom of the upper body, in which, the dedusting chamber and the air exhaust chamber are
9 both formed in the upper body, the mounting chamber is formed in the lower body, the lower body is
10 mounted at the mounting space via the opened portion of the mounting space, and the upper body is
11 supported on the top of the cup casing.

12 In some embodiments of the present disclosure, the lower body includes a protection casing plate and
13 an appearance casing plate, the protection casing plate is disposed adjacent to the inner-ring wall face and
14 matched with a shape of the inner-ring wall face, the appearance casing plate is located at a side of the
15 protection casing plate far away from the inner-ring wall face, and the mounting space is defined between
16 the appearance casing plate and the protection casing plate.

17 In some embodiments of the present disclosure, two side edges of the protection casing plate extend to
18 be connected to two side edges of the cup casing in a ring length direction thereof respectively and
19 correspondingly.

20 In some embodiments of the present disclosure, the mounting space is further provided with an
21 air-exhaust filtration device, the air-exhaust filtration device is located between the negative pressure device
22 and the appearance casing plate and an air exhaust space is defined between the air-exhaust filtration device
23 and the appearance casing plate, in which, and the base is supported at a bottom of the lower body and
24 avoids a bottom of the air exhaust space.

25 In some embodiments of the present disclosure, at least one of the protection casing plate and the
26 appearance casing plate has a sliding groove extending in an up-and-down direction, the air-exhaust
27 filtration device has an elastic sliding sheet, and the elastic sliding sheet is slidably fitted in the sliding
28 groove and the elastic sliding sheet and has an interference fit with the sliding groove.

29 In some embodiments of the present disclosure, an isolating screen is provided in the cabinet and
30 interposed between the negative pressure device and the air-exhaust filtration device.

31 In some embodiments of the present disclosure, the cabinet is detachably connected to the dust cup via
32 a quick release assembly.

33 In some embodiments of the present disclosure, the cup casing is disposed in front of a top of the base,
34 and the quick release assembly includes a first assembly disposed at a front top of the dust cup and a second
35 assembly disposed at a rear bottom of the dust cup.

1 In some embodiments of the present disclosure, the first assembly includes a snap plate disposed at a
2 front bottom of the cabinet, extending downwards and having a snap hole; and a snap piece disposed at the
3 front top of the dust cup and extending forward into the snap hole to limit a detachment of the dust cup and
4 the cabinet in a direction other than a front-and-rear direction.

5 In some embodiments of the present disclosure, the second assembly includes a first snap hook
6 disposed at a rear bottom of the cabinet and having a front end bent downward to define a hooking groove;
7 a second snap hook disposed at the rear bottom of the dust cup and having a rear end bent upward to extend
8 into the hooking groove so as to limit a detachment of the dust cup and the cabinet in a front-rear direction;
9 a movable latch disposed at the rear bottom of the cabinet, movable in a front-rear direction and having a
10 front end abutting against a bottom of the second snap hook to prevent the second snap hook from moving
11 downward out of the hooking groove; and an unlocking button capable of being pressed and disposed to the
12 cabinet and fitted with the movable latch, and the movable latch moves backward to release the position
13 limit for the second snap hook when the unlocking button is pressed.

14 In some embodiments of the present disclosure, the upper body includes a tube casing and an air
15 exhaust pipe, in which, the air exhaust pipe is provided in the tube casing and the dedusting chamber is
16 defined between the air exhaust pipe and the tube casing, a bottom of the air exhaust pipe penetrates
17 through a bottom wall of the tube casing and the air exhaust chamber in communication with the mounting
18 chamber is defined in the air exhaust pipe.

19 In some embodiments of the present disclosure, a handheld cleaner includes an above-described dust
20 cup assembly, and a handle assembly disposed on the dust cup assembly and used for handholding.

21 In some embodiments of the present disclosure, the handheld cleaner further includes an extension
22 pipe including a pipe body member, in which, the pipe body member is configured as a hollow pipe with
23 two open ends and has one end connected to the dust suction inlet of the casing; and a rotating member, in
24 which, the rotating member is disposed at the other end of the pipe body member and integrally formed
25 with the pipe body member, the rotating member is provided with an inlet hole in communication with an
26 interior of the pipe body member to make the dust enter the pipe body member via the inlet hole, and then
27 enter the dust suction inlet along the pipe body member; the rotating member is rotatable with respect to the
28 pipe body member and changes an orientation of the inlet hole with respect to the pipe body member during
29 rotating.

30 In some embodiments of the present disclosure, the rotating member is connected to the pipe body
31 member via a pivoting shaft, or the pipe body member is connected to the rotating member through a
32 spherical fit.

33 In some embodiments of the present disclosure, the handheld cleaner further includes an extension
34 pipe, the extension pipe is configured as a hollow pipe with two open ends, one end of the extension pipe is
35 detachably communicated with the dust suction inlet of the casing and the other end thereof has a cleaning

1 member integrally formed with the extension pipe.

2 In some embodiments of the present disclosure, the handheld cleaner further includes a telescopic hose
3 having a first end extending into and fixed in the extension pipe and a second end detachably connected to
4 the dust suction inlet, the first end of the extension pipe is detachably connected to the casing and the
5 telescopic hose is accommodated in an interior of the extension pipe when the extension pipe is connected
6 to the casing.

7 In some embodiments of the present disclosure, the handheld cleaner further includes a first detection
8 device, in which, the first detection device is disposed to the casing and used to detect a motion state of the
9 casing; a control device, in which, the control device is connected to the first detection device and the
10 negative pressure device and configured to control a working state of the handheld cleaner according to
11 information detected by the detection device.

12 In some embodiments of the present disclosure, the control device is configured to control the negative
13 pressure device to increase a suction strength if the first detection device detects that a motion speed of the
14 casing rises, and control the negative pressure device to decrease the suction strength if the first detection
15 device detects that the motion speed of the casing drops.

16 In some embodiments of the present disclosure, the control device is configured to control the negative
17 pressure device to shut down if the first detection device detects that the casing has never moved in a first
18 predetermined duration, the control device is configured to control the negative pressure device to turn on if
19 the first detection device detects displacement of the casing in a second predetermined duration after a
20 shutdown of the negative pressure device, and the control device is configured to control the handheld
21 cleaner to turn off if the first detection device detects no displacement of the casing in the second
22 predetermined duration after the shutdown of the negative pressure device.

23 In some embodiments of the present disclosure, the casing has an air intake passage in communication
24 with the dedusting chamber, the handheld cleaner further includes a second detection device used to detect
25 a dust concentration in the air intake passage; and the control device connected to the second detection
26 device and the negative pressure device and configured to control the working state of the handheld cleaner
27 according to the information detected by the second detection device.

28 In some embodiments of the present disclosure, the control device is configured to control the negative
29 pressure device to increase the suction strength thereof if the second detection device detects that the dust
30 concentration rises, and control the negative pressure device to decrease the suction strength thereof if the
31 second detection device detects that the dust concentration drops.

32 **The handheld cleaner according to some specific embodiments of the present disclosure will be**
33 **described below.**

34 In some embodiments of the present disclosure, the dust cup assembly includes: a negative pressure
35 device configured to suck and blow an airflow; a dedusting device configured to remove dust from the

1 airflow; and a casing including a cup body with an open top and a cleaner cover disposed at the top of the
2 cup body, in which the cup body includes a mounting frame and a dust collecting cup, the dedusting device
3 is supported on a top of the mounting frame, the negative pressure device is mounted to a bottom of the
4 mounting frame, and the dust collecting cup is covered outside the negative pressure device and connected
5 to the mounting frame.

6 In some embodiments of the present disclosure, the dust collecting cup is detachably connected to the
7 mounting frame via a button-hook or an internal-external-thread structure.

8 In some embodiments of the present disclosure, the mounting frame includes: a ring connected to a top
9 cup ring of the dust collecting cup in a butt connection; a limiting and supporting portion provided in the
10 ring and fitted with the dedusting device to limit a displacement of the dedusting device in directions other
11 than an upward direction; and a fixed mounting portion provided in the ring and configured to fix and
12 mount the negative pressure device.

13 In some embodiments of the present disclosure, the dedusting device includes a limiting hole
14 penetrating therethrough in an up-and-down direction, and a support groove having an open bottom; the
15 support groove includes two support sub-grooves disposed at two radial sides of the limiting hole; the
16 limiting and supporting portion includes a limiting post and a support beam, in which the limiting post is
17 disposed in the ring and inserted in the limiting hole while being fitted therewith, the support beam includes
18 two support sub-beams disposed at two radial sides of the limiting post respectively, and the two support
19 sub-beams are correspondingly disposed in the two support sub-grooves respectively and configured to
20 support top walls of the corresponding support sub-grooves.

21 In some embodiments of the present disclosure, each support sub-beam has one splicing plate
22 extending downwards, and the dedusting device includes: a split-type filtration tube, in which the split-type
23 filtration tube includes two arc filters respectively disposed at two sides of the support beam in a width
24 direction thereof, and two splicing plates are connected between side edges of the two arc filters adjacent to
25 each other so as to make up a continuous filtration tube together with the two arc filters; and a filtration
26 tube cover plate covered on a top of the split-type filtration tube, in which the limiting hole is formed in a
27 center of the filtration tube cover plate, and the support groove is formed in a bottom wall of the filtration
28 tube cover plate.

29 In some embodiments of the present disclosure, the dedusting device further includes a cyclone
30 assembly disposed in the split-type filtration tube, two cyclone assemblies are provided and located at two
31 sides of the support groove in a width direction thereof, each cyclone assembly is connected to the
32 corresponding arc filter and includes a plurality of cyclones arranged in a circumferential direction of the
33 split-type filtration tube, and the filtration tube cover plate has an air outlet pipe correspondingly extending
34 into each cyclone.

35 In some embodiments of the present disclosure, the mounting frame is integrally molded.

1 In some embodiments of the present disclosure, the cup body further includes a suction nozzle fixed to
2 the mounting frame or integrally molded with the mounting frame.

3 In some embodiments of the present disclosure, the handheld cleaner includes the dust cup assembly
4 according to embodiments of the first aspect of the present disclosure, and a handle assembly disposed to
5 the dust cup assembly and configured for handholding.

6 In some embodiments of the present disclosure, the handheld cleaner further includes an extension
7 pipe, and the extension pipe includes: a pipe body member configured as a hollow pipe with two open ends
8 and a first end of the pipe body member being connected with a dust suction inlet in the casing; and a
9 rotating member disposed at a second end of the pipe body member, integrally formed with the pipe body
10 member, and provided with an inlet hole in communication with an interior of the pipe body member, so as
11 to allow dust to enter the pipe body member via the inlet hole and then enter the dust suction inlet along the
12 pipe body member, in which the rotating member is rotatable with respect to the pipe body member and
13 configured to change orientation of the inlet hole with respect to the pipe body member during rotation of
14 the rotating member.

15 In some embodiments of the present disclosure, the rotating member is connected to the pipe body
16 member via a pivoting shaft, or the pipe body member is connected to the rotating member through a
17 spherical fit.

18 In some embodiments of the present disclosure, the handheld cleaner further includes an extension
19 pipe, the extension pipe is configured as a hollow pipe having two open ends, a first end of the extension
20 pipe is detachably communicated with a dust suction inlet in the casing and a second end thereof has a
21 cleaning member formed in one piece with the extension pipe.

22 In some embodiments of the present disclosure, the handheld cleaner further includes a telescopic hose
23 having a first end extending into and fixed in the extension pipe and a second end detachably connected to
24 the dust suction inlet; the first end of the extension pipe is detachably connected to the casing, and the
25 telescopic hose is accommodated within the extension pipe when the extension pipe is connected to the
26 casing.

27 In some embodiments of the present disclosure, the handheld cleaner further includes: a first detection
28 device disposed to the casing and configured to detect a motion state of the casing; and a control device
29 connected to the first detection device and the negative pressure device, and configured to control a
30 working state of the handheld cleaner according to information detected by the first detection device.

31 In some embodiments of the present disclosure, the control device is configured to control the negative
32 pressure device to increase a suction strength thereof if the first detection device detects that a motion speed
33 of the casing rises, and to control the negative pressure device to decrease the suction strength thereof if the
34 first detection device detects that the motion speed of the casing drops.

35 In some embodiments of the present disclosure, the control device is configured to control the negative

1 pressure device to shut down, if the first detection device detects that the casing has never moved in a first
2 predetermined duration during operation of the negative pressure device; the control device is configured to
3 control the negative pressure device to turn on, if the first detection device detects a displacement of the
4 casing in a second predetermined duration after the shutdown of the negative pressure device; and the
5 control device is configured to control the handheld cleaner to turn off, if the first detection device detects
6 no displacement of the casing in the second predetermined duration after the shutdown of the negative
7 pressure device.

8 In some embodiments of the present disclosure, the casing includes an air intake passage in
9 communication with a dedusting chamber, and the handheld cleaner further includes: a second detection
10 device configured to detect a dust concentration in the air intake passage; and a control device connected to
11 the second detection device and the negative pressure device, and configured to control the working state of
12 the negative pressure device according to information detected by the second detection device.

13 In some embodiments of the present disclosure, the control device is configured to control the negative
14 pressure device to increase a suction strength thereof if the second detection device detects that the dust
15 concentration rises, and to control the negative pressure device to decrease the suction strength thereof if
16 the second detection device detects that the dust concentration drops.

17 **The handheld cleaner according to some specific embodiments of the present disclosure will be**
18 **described below.**

19 **Embodiment 1**

20 A handheld cleaner 1000 according to embodiments of the present disclosure will be described with
21 reference to the drawings.

22 As shown in Fig. 1, the handheld cleaner 1000 according to embodiments of the present disclosure
23 includes a dust cup assembly 100, an extension pipe 300 and a holding assembly. The dust cup assembly
24 100 may suck dusty air in the environment through the extension pipe 300, filter dust out from the dusty air,
25 and blow a purified airstream back to the environment, which functions as absorption of dust in the
26 environment. The holding assembly is mounted to the dust cup assembly 100 and configured for handheld
27 use. For example, the holding assembly may be a lift handle or a handle assembly 200 shown in Fig. 1,
28 such that a user may move the dust cup assembly 100 through the holding assembly to clean a target area
29 (such as a sofa surface and a ceiling) in the environment.

30 As shown in Fig. 1, the dust cup assembly 100 includes a casing 1, a device housing 2 and a negative
31 pressure device 3, in which the device housing 2 is disposed within the casing 1 and the negative pressure
32 device 3 is disposed within the device housing 2. That is, the casing 1 encloses the device housing 2 and the
33 device housing 2 encloses the negative pressure device 3, such that the negative pressure device 3 is
34 accommodated in the casing 1, thereby improving structural compactness of the dust cup assembly 100,
35 making the dust cup assembly 100 small and lightweight, facilitating handheld use and realizing aesthetic

1 appearance. Preferably, the casing 1 and the device housing 2 are detachably connected to facilitate
2 cleaning, maintenance and replacement.

3 It should be noted herein that the term “the device housing 2 disposed within the casing 1” should be
4 interpreted broadly, i.e. interpreted in this way that other parts of the device housing 2 are disposed within
5 the casing 1, except a part thereof disposed at an opening 111 and described in the following paragraph, and
6 the part of the device housing 2 may be disposed within the casing 1 or extend out of an inner chamber of
7 the casing 1 via the opening 111.

8 Referring to Fig. 1, the casing 1 has the opening 111, and the part of the device housing 2 has an air
9 exhaust port 220 and is disposed at the opening 111 and exposed from the opening 111. That is, the part of
10 the device housing 2 is disposed at the opening 111 and exposed from the opening 111, and has the air
11 exhaust port 220 that is also exposed from the opening 111, such that an airstream in the device housing 2
12 may flow to the outside of the casing 1 through the air exhaust port 220 and the opening 111.

13 The term “the part of the device housing 2 disposed at the opening 111” means that the part of the
14 device housing 2 closely covers the opening 111 to make the opening 111 only in communication with the
15 air exhaust port 220 of the part. The part may at least partially extend out of the inner chamber of the casing
16 1, as shown in Figs. 1 and 3, so as to exhaust the airstream reliably and effectively, and improve accuracy of
17 positioning the part of the device housing 2 with the opening to raise reliability of the dust cup assembly
18 100 during work.

19 Referring to Fig. 2, the casing 1 has a dust suction inlet 112; a dedusting chamber A1 is defined
20 between the device housing 2 and the casing 1 and communicates with the dust suction inlet 112; the
21 dedusting chamber A1 may be defined by an outer surface of the device housing 2 and an inner surface of
22 the casing 1 together; and the device housing 2 defines an air exhaust chamber A3 therein that
23 communicates the air exhaust port 220 with the dedusting chamber A1. In such a way, the dedusting
24 chamber A1 surrounds the air exhaust chamber A3 because the dedusting chamber A1 is defined between
25 the device housing 2 and the casing 1 and the air exhaust chamber A3 is defined in the device housing 2.

26 The negative pressure device 3 is configured to supply negative pressure to the air exhaust chamber
27 A3, such that the dusty air in the environment may be sucked into the dedusting chamber A1 through the
28 dust suction inlet 112 for dust and air separation, and the purified airstream separated from the dedusting
29 chamber A1 enters the device housing 2, i.e. enters the air exhaust chamber A3 to be exhausted to the
30 outside of the casing 1 through the air exhaust port 220 and the opening 111. In short, the dusty air in the
31 environment passes through air passages (like an air passage from the dedusting chamber A1 to the air
32 exhaust chamber A3) in the dust cup assembly 100 and hence dust in the dusty air may be filtered out and
33 stored in the dust cup assembly 100, while the purified airstream may flow back to the environment.

34 Therefore, in terms of a layout of air passages in the dust cup assembly 100, the dedusting chamber A1
35 surrounds the air exhaust chamber A3, so the layout is more compact, which reduces suction power loss and

1 improves energy efficiency. Moreover, since the air exhaust port 220 is formed in the device housing 2 and
2 may directly exhaust the airstream to the outside environment via the opening 111 in the casing 1, an air
3 exhaust path is shortened effectively and energy consumption is further reduced to improve the energy
4 efficiency. Additionally, the dust suction inlet 112 is formed in the casing 1 and communicates with the
5 dedusting chamber A1 defined between the casing 1 and the device housing 2, and the air exhaust port 220
6 is formed in the device housing 2 and communicates with the air exhaust chamber A3 in the device housing
7 2, such that the air passages have a simple layout, and are convenient to process and free of a problem of
8 airflow short circuit, thus having high reliability of dust filtration and a good dust filtration effect.

9 Certainly, the present disclosure is not limited thereby. In other embodiments of the present disclosure,
10 the air exhaust port 220 may be formed in the casing 1 instead of the device housing 2, and the air exhaust
11 chamber A3 may be in communication with the air exhaust port 220 through a connecting passage, in
12 which case the casing 1 may not necessarily have the opening 111 and the part of the device housing 2 may
13 not be located at the opening 110 and exposed therefrom.

14 In some preferable embodiments of the present disclosure, the device housing 2 has a tube shape and
15 is disposed in the casing 1; an outer end face (e.g. a lower end face shown in Fig. 1) of the device housing 2
16 at an axial side thereof abuts against or extends beyond a partial inner surface of the casing 1 (e.g. a lower
17 surface shown in Fig. 1); and the dedusting chamber A1 is defined between the inner surface of the casing 1
18 and an outer circumferential surface of the device housing 2 and surrounds the device housing 2 along a
19 circumferential direction of the device housing 2. Thus, the layout of air passages in the dust cup assembly
20 100 is more compact, the air exhaust path is shorter, the energy consumption is lower and the energy
21 efficiency is higher.

22 Preferably, as shown in Figs. 1 and 3, the casing 1 and the device housing 2 both have a tube shape, an
23 axis of the casing 1 is in parallel to an axis of the device housing 2, and an outer bottom wall of the device
24 housing 2 abuts against or penetrates through an inner bottom wall of the casing 1, in which case the
25 dedusting chamber A1 may be a hollow annular-columnar chamber defined between an inner
26 circumferential wall of the casing 1 and an outer circumferential wall of the device housing 2, such that
27 when the dust suction inlet 112 is formed along a tangential direction of the dedusting chamber A1, the
28 dedusting chamber A1 may be used as a cyclone separating chamber for cyclonic dust and air separation, so
29 as to improve a purifying effect. Further preferably, the casing 1 and the device housing 2 are arranged
30 coaxially, i.e. the axis of the tube-shaped casing 1 and that of the tube-shaped device housing 2 coincide
31 with each other, and hence the dedusting chamber A1 may be a hollow annular-columnar chamber, which
32 has a better dust and air separation effect and is conducive to mounting a dedusting device 4 described
33 hereinafter.

34 In conclusion, the handheld cleaner 1000 according to the embodiments of the present disclosure is
35 small and lightweight with a compact structure and effortless for handheld use, and the handheld cleaner

1 1000 has compact air passages, low energy consumption and high energy efficiency.

2 The extension pipe 300 according to some embodiments of the present disclosure will be described
3 with reference to Figs. 11 to 15.

4 Specifically, the extension pipe 300 is configured to be connected with the dust suction inlet 112 of the
5 dust cup assembly 100. That is, when the dust cup assembly 100 needs the extension pipe 300 to suck dust,
6 the extension pipe 300 may be assembled to the dust suction inlet 112; when the dust cup assembly 100
7 does not need the extension pipe 300 but another component (such as a gap nozzle a mite-killing nozzle,
8 etc.) for dust suction, the extension pipe 300 may be detached from the dust suction inlet 112 and the other
9 component required actually may be assembled to the dust suction inlet 112.

10 In some specific examples of the present disclosure, referring to Fig. 14, a first end of the extension
11 pipe 300 is directly and detachably connected with the dust suction inlet 112. For example, the extension
12 pipe 300 may be mounted to and dismounted from the dust suction inlet 112 through a quick release snap
13 structure, thus facilitating the mounting and dismounting thereof.

14 In some other specific examples of the present disclosure, referring to Fig. 15, the first end of the
15 extension pipe 300 is indirectly and detachably connected with the dust suction inlet 112 through a
16 telescopic hose 400. For example, the extension pipe 300 may be mounted to and dismounted from the
17 telescopic hose 400 through a first quick release structure, and the telescopic hose 400 may be mounted to
18 and dismounted from the dust suction inlet 112 through a second quick release structure, such that the
19 extension pipe 300 may be stretched and retracted through adjustment of the telescopic hose 400. The
20 mounting, dismounting and connecting are convenient, and a dust suction range of the handheld cleaner
21 1000 can be enlarged. It should be noted herein that the concept “the telescopic hose 400” is well known to
22 those skilled in the art and hence will not be illustrated.

23 In some more specific examples of the present disclosure, referring to Fig. 15, the first end of the
24 extension pipe 300 is in communication with the dust suction inlet 112 through the telescopic hose 400. For
25 example, a first end of the telescopic hose 400 may extend into and be fixed in the extension pipe 300, and
26 a second end thereof is detachably connected with the dust suction inlet 112. Thus, during assembling, the
27 first end of the telescopic hose 400 may extend into an inner bore of the extension pipe 300 and fixed inside
28 the extension pipe 300. Preferably, the dust cup assembly 100 has a first connecting structure, the first end
29 of the extension pipe 300 has a second connecting structure, and the second connecting structure and the
30 first connecting structure are detachably fitted with each other, such that when the first connecting structure
31 and the second connecting structure are assembled together, the first end of the extension pipe 300 may be
32 fixed to the dust cup assembly 100, and when the first connecting structure is disassembled from the second
33 connecting structure, the extension pipe 300 may be removed from the dust cup assembly 100. For example,
34 the first connecting structure may be a snap hook, and the second connecting structure may be a snap block.

35 Therefore, when the extension pipe 300 is used for cleaning, the second end of the telescopic hose 400

1 may be connected to the dust suction inlet 112 of the dust cup assembly 100, such that in the process of
2 using the handheld cleaner 1000, the first end of the extension pipe 300 may be connected to a cup body 11,
3 for example, through the quick release snap structure, if the extension pipe 300 does not need to be
4 stretched, and at this time the telescopic hose 400 may be completely accommodated in the extension pipe
5 300, but if the extension pipe 300 needs to be stretched to a long length, the extension pipe 300 may be
6 separated from the cup body 11, and at this time the second end of the telescopic hose 400 may be pulled
7 out and exposed from the extension pipe 300 to realize a lengthening effect.

8 In some embodiments of the present disclosure, as shown in Fig. 11, the extension pipe 300 includes a
9 pipe body member 61 and a rotating member 62; the pipe body member 61 is a hollow pipe with two open
10 ends and a first end thereof is configured to be connected with the dust suction inlet 112; and the rotating
11 member 62 is provided at a second end of the pipe body member 61 and rotatably connected with the pipe
12 body member 61, that is, the rotating member 62 may rotate freely around the second end of the pipe body
13 member 61; the rotating member 62 is provided with an inlet hole 622 in communication with an interior of
14 the pipe body member 61, and dust in the environment may enter the pipe body member 61 through the
15 inlet hole 622 and enter the dust suction inlet 112 along the pipe body member 61. Hence, when the rotating
16 member 62 rotates relative to the pipe body member 61, orientation of the inlet hole 622 may be changed
17 with respect to the pipe body member 61. Therefore, when an inclination angle of the pipe body member 61
18 is constant, an entrance (i.e. the orientation) of the inlet hole 622 in the rotating member 62 may be directed
19 to a place to be cleaned by rotating the rotating member 62, such that the extension pipe 300 may clean
20 different positions effectively, which improves an angle range of dust suction of the extension pipe 300.

21 Therefore, when the user adopts the extension pipe 300 for cleaning different positions via dust suction,
22 the dust cup assembly 100 no longer needs to be lifted, lowered or inclined to adjust the inclination angle of
23 the whole extension pipe 300; instead, only the rotating member 62 needs to be pivoted to adjust the
24 orientation of the inlet hole 622 for targeted cleaning of different positions, so as to achieve a better dust
25 suction effect, reduce labor intensity of the user and facilitate the use of the cleaner 1000.

26 For example, in a specific example of the present disclosure, as shown in Figs. 12 and 13, when the
27 extension pipe 300 is used for cleaning, the rotating member 62 may be rotated, for example, along a
28 direction from A1 to A2 in Fig. 13, to rotate the inlet hole 622 to a position perpendicular to a surface to
29 be cleaned (as a state shown in Fig. 13), so as to improve the cleaning effect. When the extension pipe 300
30 is not needed for cleaning, the rotating member 62 may be rotated, for example, along a direction from A2
31 to A1 in Fig. 13, to rotate the inlet hole 622 to a position parallel to a central axis of the pipe body member
32 61 (as a state shown in Fig. 12), so as to facilitate storage thereof.

33 Specifically, the rotating member 62 and the pipe body member 61 are in one piece, that is, the
34 rotating member 62 and the pipe body member 61 are connected together, regardless that the extension pipe
35 300 is in a use state or an unused state, so the user cannot take down the rotating member 62 from the pipe

1 body member 61 or replace it with other components freely. Or, the second end of the pipe body member 61
2 has no structure configured to assemble other components, so the second end of the pipe body member 61
3 cannot be assembled with other components even if the rotating member 62 is disassembled from the
4 second end of the pipe body member 61 forcibly. Thus, a problem that working flexibility of the rotating
5 member 62 is reduced for forcible disassembling of the rotating member 62 may be avoided effectively. It
6 should be noted herein that when the extension pipe 300 needs maintenance, a professional may forcibly
7 detach the rotating member 62 from the pipe body member 61, which should be still understood as the
8 technical solution where the rotating member 62 and the pipe body member 61 are in one piece.

9 It should be noted herein that some handheld cleaners in the related art have an extension pipe, to
10 which various components may be mounted based on practical requirements, but the components can no
11 longer be connected with the extension pipe firmly for repeated disassembling and assembling, thereby
12 resulting in loose and insecure connection and decreasing service reliability and service life. However, in
13 the present disclosure, the rotating member 62 and the pipe body member 61 are processed as a
14 non-detachable one-piece structure, so as to solve the technical problem reliably and effectively.

15 In conclusion, as to the extension pipe 300 for the handheld cleaner 1000 according to the
16 embodiments of the present disclosure, since the rotatable rotating member 62 is provided at the second end
17 of the pipe body member 61 away from the dust suction inlet 112, suction orientation of the extension pipe
18 300 may be adjusted by pivoting the rotating member 62, so as to improve the angle range of dust suction
19 of the extension pipe 300, and moreover, since the pipe body member 61 and the rotating member 62
20 cannot be detached from each other, operational reliability, flexibility and service life of the whole
21 extension pipe 300 are enhanced effectively.

22 In the embodiments of the present disclosure, the rotating member 62 and the pipe body member 61
23 may be pivotably connected in various ways. In a first example described below, the pipe body member 61
24 and the rotating member 62 may be connected via a pivoting shaft 64. In a second example described below,
25 the pipe body member 61 and the rotating member 62 are connected through spherical fit. Thus, the
26 pivotable connection is reliable with high flexibility and is easy to realize.

27 Example I

28 Referring to Figs. 12 and 13, the rotating member 62 includes a semi-annular portion 621, that is, the
29 rotating member 62 has a substantially semicircular tube shape; the semi-annular portion 621 defines the
30 inlet hole 622 extending along its axial direction and is fitted over the second end of the pipe body member
31 61; and two ends of the semi-annular portion 621 in its circumferential direction are connected with the
32 pipe body member 61 through the pivoting shaft 64. Thus, the pipe body member 61 will not interfere with
33 the rotation of the rotating member 62, which guarantees free and flexible pivoting of the rotating member
34 62.

35 Example II

1 This example is not shown in the drawings. The second end of the pipe body member 61 has an outer
2 surface formed as an outer spherical surface, and the rotating member 62 has an inner surface formed as an
3 inner spherical surface. For example, the rotating member 62 may be formed as a spherical casing and the
4 inlet hole 622 may penetrate through the rotating member 62 along a radial direction of the rotating
5 member 62, such that the rotating member 62 is fitted over the second end of the pipe body member 61 to
6 make the inner spherical surface in fitted connection with the outer spherical surface. Thus, the pipe body
7 member 61 will not interfere with the rotation of the rotating member 62, which guarantees free and
8 flexible pivot of the rotating member 62.

9 Preferably, a damping member is provided between the pipe body member 61 and the rotating member
10 62. For example, in the first example, the damping member is provided between the semi-annular portion
11 621 and the pivoting shaft 64. For example, in the second example, the damping member is provided
12 between the inner spherical surface and the outer spherical surface. Therefore, after the user pivots the
13 rotating member 62, the rotating member 62 may stop at an angle reliably without further automatic
14 rotation, such that the extension pipe 300 may suck dust stably and reliably towards a direction adjusted by
15 the user, thereby further improving the dust suction effect. It should be noted herein that the damping
16 member is a medium for increasing friction, and a specific product thereof is well known to those skilled in
17 the art and hence will not be elaborated.

18 In some embodiments of the present disclosure, the rotating member 62 may have a cleaning member
19 63, such as a rag, a sponge or a bristle portion described below, such that the extension pipe 300 may do
20 cleaning by the cleaning member 63 in the process of dust suction, so as to achieve a better cleaning effect.
21 The cleaning member 63 may be fixed to the rotating member 62, i.e. non-detachable and irreplaceable, or
22 may be detachably fixed to the rotating member 62, i.e. replaceable and detachable. Thus, if a second end
23 of the extension pipe 300 has the cleaning member 63, it is more convenient for the user to clean with a
24 higher cleaning efficiency.

25 In a specific example of the present disclosure, the rotating member 62 has the bristle portion 631
26 located at an edge of the inlet hole 622. Referring to Figs. 12 and 13, the bristle portion 631 may be
27 connected to an axial end of the semi-annular portion 621 and extend along a circumferential direction of
28 the semi-annular portion 621, that is, a plurality of bristles are provided at an axial end face of the
29 semi-annular portion 621, extend out along the axial direction of the semi-annular portion 621 and are
30 spaced apart evenly in the circumferential direction of the semi-annular portion 621. Therefore, the bristle
31 portion 631 is arranged in a simple way and easy to realize, and the bristle portion 631 is arranged on a
32 periphery of the inlet hole 622 and thus will not interfere with dust suction of the inlet hole 622.

33 In some extended embodiments of the present disclosure, the extension pipe 300 may be a hollow pipe
34 with two open ends, the first end of the extension pipe 300 is detachably connected with the dust suction
35 inlet 112, and the second end thereof has the cleaning member 63 integrally formed with the extension pipe

1 300, such that when the extension pipe 300 is dismounted from the dust cup assembly 100, the user may
2 use the extension pipe 300 with the cleaning member 63 separately to do cleaning, which makes the
3 cleaning member 63 possess an independent function from the dust cup assembly 100.

4 In some specific examples of the present disclosure, the extension pipe 300 includes the pipe body
5 member 61 and the cleaning member 63, the cleaning member 63 is directly mounted to the second end of
6 the pipe body member 61, and the cleaning member 63 and the pipe body member 61 are in one piece. That
7 is, the cleaning member 63 and the pipe body member 61 are connected together, regardless that the
8 extension pipe 300 is in the use state or the unused state, so the user cannot take down the cleaning member
9 63 from the pipe body member 61 or replace it with other components freely, thus avoiding a problem that
10 service life of the cleaning member 63 is reduced due to frequent dismounting and replacement thereof. It
11 should be noted herein that when the extension pipe 300 needs maintenance, the professional may forcibly
12 detach the cleaning member 63 from the pipe body member 61, which should be still understood as the
13 technical solution where the cleaning member 63 and the pipe body member 61 are in one piece.

14 In some other specific examples of the present disclosure, the extension pipe 300 includes the pipe
15 body member 61, the rotating member 62 and the cleaning member 63, the cleaning member 63 is directly
16 mounted to the rotating member 62 so as to be indirectly mounted to the second end of the pipe body
17 member 61, and at this time the cleaning member 63, the rotating member 62 and the pipe body member 61
18 are in one piece. That is, the cleaning member 63, the rotating member 62 and the pipe body member 61 are
19 connected together, regardless that the extension pipe 300 is in the use state or the unused state, so the user
20 cannot take down the rotating member 62 from the pipe body member 61 or take down the cleaning
21 member 63 from the rotating member 62, or replace them with other components freely, thus avoiding the
22 problem that the service lives of the cleaning member 63 and the rotating member 62 are reduced due to
23 frequent dismounting and replacement thereof. It should be noted herein that when the extension pipe 300
24 needs maintenance, the professional may forcibly dismount the cleaning member 63 and the rotating
25 member 62 from the pipe body member 61, which should be still understood as the technical solution
26 where the cleaning member 63, the rotating member 62 and the pipe body member 61 are in one piece.

27 In some embodiments of the present disclosure, the extension pipe 300 is a telescopic pipe. Thus, the
28 extension pipe 300 may be stretched and shortened based on practical requirements, i.e. its length may be
29 adjusted adaptively according to a distance from the place to be cleaned, which is user-friendly. It should be
30 noted herein that a specific implementation of the telescopic pipe is well known to those skilled in the art,
31 such as an umbrella handle and a clothes-hanging rod, both of which are telescopic pipes, and no more
32 elaboration is provided herein.

33 In conclusion, according to the extended embodiments of the present disclosure, when the extension
34 pipe 300 is the telescopic pipe per se, or is connected with the dust cup assembly 100 through the telescopic
35 hose 400, the extension pipe 300 may be stretched and shortened freely and the length thereof can be

1 adjusted, which is user-friendly; moreover, when the extension pipe 300 is connected with the dust cup
2 assembly 100 through the telescopic hose 400, dust suction may be implemented through transition
3 connection of the telescopic hose 400 even if the extension pipe 300 is separated from the dust cup
4 assembly 100. Additionally, since the second end of the extension pipe 300 is provided with the cleaning
5 member 63, the extension pipe 300 may be used separately, for example, as a broom, when it is completely
6 dismantled from the dust cup assembly 100, thereby improving versatility of the extension pipe 300.

7 The dust cup assembly 100 according to some embodiments of the present disclosure will be described
8 with reference to Figs. 1 to 10.

9 As shown in Figs. 1 and 2, the casing 1 may have a communicating chamber A2 that communicates
10 the dedusting chamber A1 with the air exhaust chamber A3, such that the airstream separated from the
11 dedusting chamber A1 may enter the device housing 2 through the communicating chamber A2, i.e.
12 entering the air exhaust chamber A3. Thus, the dedusting chamber A1 and the air exhaust chamber A3 are
13 communicated by providing the communicating chamber A2 in the casing 1, such that the layout of air
14 passages in the dust cup assembly 100 is more compact, the suction power consumption is lower and the
15 energy efficiency is higher. Certainly, the present disclosure is not limited thereby, i.e. the dedusting
16 chamber A1 and the air exhaust chamber A3 may be communicated in other manners, for example, by
17 providing a connecting pipe to communicate the dedusting chamber A1 with the air exhaust chamber A3.

18 Referring to Fig. 1, the casing 1 includes the cup body 11 and a cleaner cover 12, in which the cup
19 body 11 has an open end and the cleaner cover 12 is covered on the open end of the cup body 11, such that
20 the casing 1 has a simple structure and is convenient to process and assemble. Preferably, the cleaner cover
21 12 is detachably covered on the open end of the cup body 11. That is, the cleaner cover 12 is detachably
22 connected with the cup body 11, so it is convenient to dismount the cleaner cover 12 from the cup body 11
23 and clean the cup body 11 and the cleaner cover 12. For example, the cup body 11 and the cleaner cover 12
24 may be detachably connected through a thread structure or a snap structure.

25 In addition, in some embodiments of the present disclosure, the cup body 11 may further include a
26 main body portion and a bottom cover portion, the main body portion has a tube shape with two open ends,
27 and the bottom cover portion is connected to one open end of the main body portion in such a manner that
28 the bottom cover portion may be opened or closed. Thus, when the bottom cover portion is opened, dust
29 accumulating in the main body portion may be poured out, which is convenient for use.

30 Referring to Fig. 2, the dust suction inlet 112 and the opening 111 both may be formed in the cup body
31 11, and the communicating chamber A2 may be defined in the cleaner cover 12. That is, the cup body 11
32 has the opening 111 and the dust suction inlet 112, the cleaner cover 12 has the communicating chamber A2,
33 such that the communicating chamber A2 is convenient to process, and when the communicating chamber
34 A2 is defined in the cleaner cover 12, the communicating chamber A2 may be located at the same side of
35 the device housing 2 and the dedusting chamber A1 (e.g. an upper side shown in Fig. 1), so as to further

1 simplify the layout of air passages and improve working reliability. For example, in a preferable example of
2 the present disclosure, the cup body 11 has an upright tube shape, i.e. a vertically disposed tube, a top end
3 of the cup body 11 is open to be configured as the open end, the cleaner cover 12 is covered on the top end
4 of the cup body 11, the dust suction inlet 112 may be formed in a side wall of the cup body 11, and the
5 opening 111 may be formed in a bottom wall of the cup body 11. Thus, the casing 1 has an overall simple
6 structure, and is convenient to process, assemble and disassemble.

7 It should be noted herein that the term “tube shape” is interpreted broadly, that is, a cross section of the
8 tube shape is not limited to be circular, and sizes of various cross sections thereof may be equal or not.
9 Additionally, the term “vertically disposed” means that an axis of the tube shape extends substantially along
10 an up-and-down direction shown in Fig. 1, but the cup body 11 may not keep a vertical state any longer
11 according to a change of handheld angle of the user when the handheld cleaner 1000 is used. For example,
12 the cup body 11 may be in an oblique state or a horizontal state.

13 Further, the device housing 2 is disposed in the cup body 11, the dedusting chamber A1 is defined
14 among the cleaner cover 12, the cup body 11 and the device housing 2, and the communicating chamber A2
15 is defined in the cleaner cover 12. Hence, the dedusting chamber A1 may be communicated with the
16 communicating chamber A2 naturally and easily, and positions of the dedusting chamber A1 and the
17 communicating chamber A2 are arranged reasonably, such that the air passages in the dust cup assembly
18 100 have high non-obstruction, and the problem of airflow short circuit may be avoided.

19 As shown in Figs. 1 and 2, the cleaner cover 12 includes an inner cover 121 and an outer cover 122,
20 the inner cover 121 and the outer cover 122 both are covered on the open end of the cup body 11 and the
21 outer cover 122 is covered on the inner cover 121, the communicating chamber A2 is defined between the
22 outer cover 122 and the inner cover 121, the dedusting chamber A1 is defined among the device housing 2,
23 the inner cover 121 and the cup body 11, and the inner cover 121 has an inflow communication hole 12110
24 that communicates the communicating chamber A2 with the dedusting chamber A1, that is, the dedusting
25 chamber A1 is in communication with the communicating chamber A2 through the inflow communication
26 hole 12110 in the inner cover 121, such that the airstream separated from the dedusting chamber A1 may
27 enter the communicating chamber A2 through the inflow communication hole 12110. Hence, the structure
28 of the cleaner cover 12 is simple, and the communicating chamber A2 is convenient to process.

29 Preferably, the inner cover 121 has an extension segment 1211 extending towards an interior of the cup
30 body 11, and the inflow communication hole 12110 is defined by the extension segment 1211. In an
31 example shown in Fig. 1, the inner cover 121 may be horizontally disposed at the top of the cup body 11,
32 and the extension segment 1211 may extend downwards from the inner cover 121 into the cup body 11.
33 Thus, the inflow communication hole 12110 has a better communicating effect, and the airstream separated
34 from the dedusting chamber A1 may enter the communicating chamber A2 stably and reliably through the
35 extension segment 1211.

1 Preferably, the inner cover 121 further has an air outlet ring 1212 extending towards the interior of the
2 cup body 11, and the air outlet ring 1212 is fitted in or over an open end of the device housing 2 and defines
3 an outflow communication hole 12120 that communicates the communicating chamber A2 with an interior
4 of the device housing 2, i.e. communicates the communicating chamber A2 with the air exhaust chamber
5 A3. In examples shown in Figs. 1 and 2, the inner cover 121 may be horizontally disposed at the top of the
6 cup body 11, and the air outlet ring 1212 may extend downwards from the inner cover 121 into the cup
7 body 11 and be fitted with the open end (i.e. an air inlet end, like a top end of the device housing 2 shown
8 in Fig. 1) of the device housing 2 through sleeve connection. Thus, the outflow communication hole 12120
9 has a better air outflow effect, and the airstream separated from the communicating chamber A2 may enter
10 the air exhaust chamber A3 more stably and reliably through the air outlet ring 1212 without the problem of
11 airflow short circuit.

12 In an alternative example of the present disclosure, the inner cover 121 and the outer cover 122 are
13 separately and detachably mounted to the cup body 11. That is, the inner cover 121 is detachably and
14 directly connected with the cup body 11, the outer cover 122 is also detachably and directly connected with
15 the cup body 11, and the inner cover 121 and the outer cover 122 are not directly connected with each other.
16 Thus, the inner cover 121 and the outer cover 122 may be directly detached from the cup body 11, so as to
17 clean the inner cover 121 and the outer cover 122 conveniently.

18 In the example shown in Fig. 1, part of the inner cover 121 is embedded in the cup body 11 and an
19 edge thereof abuts against the open end of the cup body 11 to prevent the inner cover 121 from falling into
20 the cup body 11; the outer cover 122 is connected with an outer wall of the open end of the cup body 11
21 through snap connection or threaded connection. Thus, the outer cover 122 may be detached from the cup
22 body 11 easily, and then the inner cover 121 may be taken out of the cup body 11, so as to complete the
23 disassembling. Hence, the structure is simple, and the dismounting and cleaning processes are convenient to
24 implement.

25 In another alternative example of the present disclosure, which is not shown in the drawings, the inner
26 cover 121 is detachably mounted to the outer cover 122, and one of the inner cover 121 and the outer cover
27 122 is detachably mounted to the cup body 11. That is, the inner cover 121 and the outer cover 122 are
28 detachably and directly connected with each other, and one of the inner cover 121 and the outer cover 122
29 is detachably and directly mounted to the cup body 11. Thus, the cleaner cover 12 may be detached from
30 the cup body 11 directly, and then the inner cover 121 and the outer cover 122 are detached from each other,
31 so as to clean the inner cover 121 and the outer cover 122 conveniently.

32 Referring to Figs. 1 and 2, the cleaner cover 12 further includes an in-cover filter 1221 that is
33 detachably disposed between the inner cover 121 and the outer cover 122 and located in the communicating
34 chamber A2, such that the airstream may be further filtered by the in-cover filter 1221 after entering the
35 communicating chamber A2 from the dedusting chamber A1, so as to improve a dedusting effect, make

1 cleaner air enter the air exhaust chamber A3, and ensure reliable operation of the negative pressure device 3
2 and provide longer service life therewith.

3 Preferably, the in-cover filter 1221 is detachably disposed in the communicating chamber A2. That is,
4 the in-cover filter 1221 may be dismounted from the communicating chamber A2, thereby facilitating the
5 cleaning and replacement of the in-cover filter 1221 and thus improving dust suction and filtration effects.
6 In the example shown in Fig. 1, the in-cover filter 1221 may be clamped and positioned between an
7 in-cover air passage member 1222 described below and the inner cover 121, and also, in an example shown
8 in Fig. 3, the in-cover filter 1221 may be clamped and positioned between the inner cover 121 and the outer
9 cover 122. Thus, after the inner cover 121 is separated from the outer cover 122, the in-cover filter 1221
10 may be taken out directly, so as to further improve the dismounting efficiency.

11 Referring to Figs. 1 to 4, the cleaner cover 12 further includes the in-cover air passage member 1222
12 that defines, together with the inner cover 121, the communicating chamber A2, so as to facilitate formation
13 of the communicating chamber A2. In the example shown in Fig. 3, the in-cover air passage member 1222
14 is integrally formed to an internal wall of the outer cover 122, that is, the internal wall of the outer cover
15 122 may be configured as the in-cover air passage member 1222, which is convenient to process. In the
16 example shown in Fig. 1, the in-cover air passage member 1222 is detachably disposed between the inner
17 cover 121 and the outer cover 122, so that it is convenient to dismount and clean the in-cover air passage
18 member 1222.

19 Preferably, referring to Figs. 3 and 4, the communicating chamber A2 includes a plurality of
20 independent communication air passages A20. That is, the in-cover air passage member 1222 may be
21 provided with a plurality of communicating grooves therein, each communicating groove and the inner
22 cover 121 define one communication air passage A20 therebetween, and the plurality of communication air
23 passages A20 constitute the communicating chamber A2. A plurality of inflow communication holes 12110
24 are provided and communicate with the plurality of communication air passages A20 correspondingly. That
25 is, each inflow communication hole 12110 corresponds to one communication air passage A20, so the
26 plurality of inflow communication holes 12110 may transport airstreams into the plurality of
27 communication air passages A20 in one-to-one correspondence. Thus, the filtration effect is better.

28 Preferably, as shown in Figs. 1 and 2, a plurality of in-cover filters 1221 are provided and disposed in
29 the plurality of communication air passages A20 correspondingly, that is, the airstream entering each
30 communication air passage A20 may be filtered by one in-cover filter 1221, so as to improve the filtration
31 effect effectively. Certainly, the present disclosure is not limited thereby, because it is possible to provide
32 only one in-cover filter 1221 having an annular shape, in which case part of the in-cover filter 1221 may be
33 provided in each communication air passage A20, thus enhancing the filtration effect and facilitating the
34 mounting and dismounting process.

35 In some embodiments of the present disclosure, the negative pressure device 3 in the device housing 2

1 may be mounted to the device housing 2, such that it is convenient to mount the negative pressure device 3
2 and a simple overall structure is provided. Certainly, the present disclosure is not limited thereby, and the
3 negative pressure device 3 may be mounted to the casing 1.

4 In the example shown in Fig. 1, the negative pressure device 3 is mounted to the device housing 2 by a
5 bracket 26. For example, the bracket 26 may include an upholding portion 261 and a connecting portion
6 262, a bottom of the negative pressure device 3 is supported on the upholding portion 261, and the
7 connecting portion 262 is connected with the upholding portion 261 and also connected to the device
8 housing 2. Thus, the bracket 26 has a simple structure and may fix the negative pressure device 3 in the
9 device housing 2 stably and reliably.

10 Preferably, the connecting portion 262 is detachably connected with the device housing 2, so the
11 negative pressure device 3 may be taken out from the device housing 2 by dismounting the bracket 26 from
12 the device housing 2, so as to facilitate the maintenance and replacement of the negative pressure device 3.
13 For example, in some preferable examples of the present disclosure, the connecting portion 262 and the
14 device housing 2 both have a tube shape, and an outer circumferential wall of the connecting portion 262
15 and an inner circumferential wall of the device housing 2 are detachably connected through a snap structure
16 or a thread structure, which is convenient to process and provides a better mounting and dismounting effect.
17 It should be noted herein that in the description of the present disclosure, both technical solutions of the
18 threaded connection and the snap connection are well known to those skilled in the art, which will not be
19 elaborated.

20 Further, referring to Fig. 1, the bracket 26 may further include a position limiting portion 263 that is
21 annular, fitted over the negative pressure device 3, and connected to the connecting portion 262 and/or the
22 upholding portion 261. That is, the position limiting portion 263 is fitted with the negative pressure device
23 3 while limiting a position thereof on the one hand, and is connected to the connecting portion 262, or
24 connected to the upholding portion 261, or connected to both of the connecting portion 262 and the
25 upholding portion 261 on the other hand. In the example shown in Fig. 1, the position limiting portion 263
26 and the upholding portion 261 may be in one piece. Thus, the bracket 26 may fix the device housing 2 in
27 the casing 1 more stably and reliably.

28 Referring to Fig. 1, a vibration absorbing member 264 is provided between the bracket 26 and the
29 negative pressure device 3. Thus, even if vibration is generated in the working process of the negative
30 pressure device 3, the vibration may be absorbed by the vibration absorbing member 264 and will not be
31 fully transmitted to the bracket 26, so as to strengthen reliability of connection between the bracket 26 and
32 the device housing 2. Moreover, the vibration absorbing member 264 is provided to reduce vibration noise
33 effectively and improve comfort of using the handheld cleaner 1000.

34 Preferably, a part of a side surface of the vibration absorbing member 264 facing the negative pressure
35 device 3 is spaced apart from the negative pressure device 3. In the example shown in Fig. 1, the vibration

1 absorbing member 264 is provided with a protrusion 2641, and the negative pressure device 3 is supported
2 on the protrusion 2641, such that part of the side surface of the vibration absorbing member 264 that does
3 not have the protrusion 2641 may keep a certain gap with the negative pressure device 3, thereby improving
4 a vibration absorbing effect of the vibration absorbing member 264.

5 As shown in Fig. 1, the device housing 2 further has a positioning member 23 for preventing an
6 upward displacement of the negative pressure device 3. Hence, the negative pressure device 3 is subject to
7 an upholding force exerted by the bracket 26 to prevent the negative pressure device 3 from falling down
8 on one hand, and also subject to a force exerted by the positioning member 23 to prevent the negative
9 pressure device 3 from moving upwards on the other hand. Thus, the negative pressure device 3 may be
10 disposed in the device housing 2 more stably and reliably to improve the working reliability of the negative
11 pressure device 3.

12 Preferably, the positioning member 23 has a tube shape, and has a first axial end (e.g. an upper end
13 shown in Fig. 1) in communication with the air inlet end of the device housing 2 and a second axial end (e.g.
14 a lower end shown in Fig. 1) in communication with an air inlet end of the negative pressure device 3, such
15 that the positioning member 23 may serve to guide the airstream and make the airstream entering the device
16 housing 2 better blown away by the negative pressure device 3, so as to reduce resistance on air suction and
17 exhaust, lower the energy consumption and raise the energy efficiency. Preferably, a sealing member 24 is
18 provided at connection of the second axial end (e.g. the lower end shown in Fig. 1) of the positioning
19 member 23 and the negative pressure device 3, so as to improve air suction capacity of the negative
20 pressure device 3 and lower the energy consumption.

21 Referring to Figs. 1 and 2, the opening 111 may be formed in the bottom wall of the casing 1. In such a
22 case, a bottom of the device housing 2 is disposed at the opening 111, and the air exhaust port 220 is
23 formed at the bottom of the device housing 2, for example, in a bottom wall of the device housing 2. That is,
24 the bottom wall of the casing 1 has the opening 111, the bottom of the device housing 2 has the air exhaust
25 port 220, and the air exhaust port 220 is disposed at and exposed from the opening 111. Thus, the airstream
26 in the device housing 2 may be exhausted in an up-to-down direction via the air exhaust port 220 and the
27 opening 111. That is, the airstream purified by the handheld cleaner 1000 is exhausted downwards instead
28 of upwards or laterally, which prevents the airstream from being blown to the user, improves user
29 experience, and hence raises comfort of using the handheld cleaner 1000.

30 Preferably, a plurality of air exhaust ports 220 are provided and evenly disposed in the bottom wall of
31 the device housing 2. Thus, the handheld cleaner 1000 may exhaust the purified air more efficiently, rapidly
32 and smoothly, so as to decrease the resistance on air suction and exhaust, lower the energy consumption and
33 raise the overall energy efficiency of the handheld cleaner 1000.

34 Referring to Figs. 1 and 2, when the device housing 2 has an upright tube shape, the device housing 2
35 may include a housing body 21 and a housing bottom 22, the housing body 21 has an upright tube shape,

1 the housing bottom 22 is shaped as a bowl and connected to a bottom of the housing body 21, and the air
2 exhaust port 220 is formed in the housing bottom 22. Thus, the device housing 2 has a simple structure, and
3 is convenient to assemble, disassemble and process. Moreover, due to the convenient assembling and
4 disassembling of the device housing 2, the interior of the device housing 2 may be cleaned conveniently on
5 one hand, and the negative pressure device 3 may be maintained and replaced conveniently by the
6 professional on the other hand.

7 Certainly, the present disclosure is not limited thereby. When the device housing 2 only has the tube
8 shape but not vertically disposed, the device housing 2 may also include the housing body 21 and the
9 housing bottom 22, but the housing body 21 only has the tube shape rather than the vertically disposed tube
10 shape, and the housing bottom 22 is shaped as a bowl and connected to an axial end of the housing body 21.
11 A case where the device housing 2 has the upright tube shape will be taken an example for explanation in
12 the following, and those skilled in the art may understand a technical solution where the device housing 2
13 only has the tube shape but not vertically disposed, after reading the following technical solution.

14 Preferably, the housing body 21 is located in the casing 1 and the bottom of the housing body 21 abuts
15 against an inner bottom wall 110 of the casing 1, in which case the dedusting chamber A1 only surrounds
16 the housing body 21 rather than the housing bottom 22 along a circumferential direction of the housing
17 body 21, so as to further enhance compactness of the layout of air passages in the dust cup assembly 100 to
18 reduce the energy consumption for air suction and exhaust and improve the energy efficiency, and
19 meanwhile guarantee the small and lightweight structure of the dust cup assembly 100. Additionally, the
20 housing body 21 and the casing 1 are positioned in that way, thereby improving reliability of positioning
21 the device housing 2 and the casing 1 effectively and facilitating the mounting and dismounting processes.

22 In a preferable example of the present disclosure, which is not shown in the drawings, the housing
23 body 21 and the housing bottom 22 both are located in the casing 1, an outer bottom wall of the housing
24 bottom 22 is fitted with the inner bottom wall 110 of the casing 1, and a position where the housing bottom
25 22 is provided with the air exhaust port 220 is opposite the opening 111, which facilitates the mounting
26 process.

27 In another preferable example of the present disclosure, referring to Figs. 1 and 3, the housing body 21
28 is located in the casing 1, the housing bottom 22 has an upper portion extending into the casing 1 to be
29 fitted with the housing body 21 and a lower portion extending downwards out of the inner bottom wall 110
30 of the casing 1 via the opening 111, and the air exhaust port 220 in the housing bottom 22 also extends
31 downwards out of the inner bottom wall 110 of the casing 1 via the opening 111, in which case the bottom
32 of the device housing 2 extends downwards out of the inner bottom wall 110 of the casing 1 via the opening
33 111. Thus, the mounting process is convenient to implement and the positioning effect is good. Preferably, a
34 snap connection or a threaded connection is provided between an outer circumferential wall of the housing
35 bottom 22 and an inner circumferential wall of the housing body 21. Thus, it is convenient to assemble and

1 disassemble the housing body 21 and the housing bottom 22.

2 Further, referring to Fig. 1, the dust cup assembly 100 further includes an in-housing filter 25 that is
3 disposed in the device housing 2 and located between the air exhaust port 220 and the negative pressure
4 device 3. That is, the airstream in the air exhaust chamber A3 is exhausted through the air exhaust port 220
5 after being filtered by the in-housing filter 25. Thus, the effect of purifying the exhausted air of the
6 handheld cleaner 1000 is further improved.

7 In some embodiments of the present disclosure, referring to Fig. 3, the dust cup assembly 100 further
8 includes the dedusting device 4 that is disposed in the dedusting chamber A1 and defines a cyclone
9 separating chamber in the dedusting chamber A1. Thus, dust in the dusty air entering the dedusting chamber
10 A1 may be thrown out in a cyclone manner in the cyclone separating chamber, so as to further improve the
11 dedusting effect.

12 Preferably, in a flow direction of the airstream, the cyclone separating chamber includes multiple
13 stages of cyclone chambers communicated successively, so the dusty air entering the dedusting chamber A1
14 may go through the multiple stages of cyclone chambers successively for multi-stage dust and air
15 separations, thereby improving the dedusting effect. A two-stage cyclone separating chamber and a
16 three-stage cyclone separating chamber will be taken as examples for explanation in the following, and
17 after reading the following technical solution, those skilled in the art may understand a technical solution
18 having more stages of cyclone chambers, which is not elaborated herein.

19 In an example shown in Fig. 4, the two-stage cyclone separating chamber includes a first-stage
20 cyclone chamber A11 and a second-stage cyclone chamber A12, and the first-stage cyclone chamber A11 is
21 communicated with the second-stage cyclone chamber A12 and located at the upstream of the second-stage
22 cyclone chamber A12, such that the dusty air entering the dedusting chamber A1 first enters the first-stage
23 cyclone chamber A11 for dust and air separation and then enters the second-stage cyclone chamber A12 for
24 further dust and air separation. For another example, which is not shown in the drawings, the three-stage
25 cyclone separating chamber includes a first-stage cyclone chamber, a second-stage cyclone chamber and a
26 third-stage cyclone chamber, the first-stage cyclone chamber is communicated with the second-stage
27 cyclone chamber and located at the upstream of the second-stage cyclone chamber, and the second-stage
28 cyclone chamber is communicated with the third-stage cyclone chamber and located at the upstream of the
29 third-stage cyclone chamber, such that the dusty air entering the dedusting chamber A1 first enters the
30 first-stage cyclone chamber for dust and air separation, then enters the second-stage cyclone chamber for
31 dust and air separation, and finally enters the third-stage cyclone chamber for dust and air separation.

32 Preferably, the device housing 2 has the tube shape, each stage of cyclone chamber is configured to be
33 a hollow annular-columnar chamber, and in the flow direction of the airstream, an upstream stage of
34 cyclone chamber surrounds a downstream stage of cyclone chamber along the circumferential direction of
35 the device housing 2. For example, the first-stage cyclone chamber surrounds the second-stage cyclone

1 chamber along the circumferential direction of the device housing 2, the second-stage cyclone chamber
2 surrounds the third-stage cyclone chamber along the circumferential direction of the device housing 2, and
3 so on. Further preferably, the most downstream stage of cyclone chamber surrounds the device housing 2
4 along the circumferential direction of the device housing 2. For example, as to the two-stage cyclone
5 separating chamber, the second-stage cyclone chamber A12 surrounds the device housing 2 along the
6 circumferential direction of the device housing 2, and as to the three-stage cyclone separating chamber, the
7 third-stage cyclone chamber surrounds the device housing 2 along the circumferential direction of the
8 device housing 2. Thus, the overall layout of the cyclone chambers may be compact, thereby reducing the
9 energy consumption for air suction of the negative pressure device 3.

10 The dedusting device 4 according to some embodiments of the present disclosure will be described
11 briefly in the following.

12 As shown in Figs. 1 and 2, the dedusting device 4 defines the two-stage cyclone separating chamber
13 and hence includes a first cyclone separating member 41 and a second cyclone separating member 42. The
14 first cyclone separating member 41 defines the second-stage cyclone chamber A12 and hence may be called
15 a second-stage cyclone separating member, and the second cyclone separating member 42 defines the
16 first-stage cyclone chamber A11 and hence may be called a first-stage cyclone separating member.

17 Certainly, the present disclosure is not limited thereby. The dedusting device 4 may only include the
18 first cyclone separating member 41 or the second cyclone separating member 42, in which case the
19 dedusting device 4 defines an one-stage cyclone separating chamber. A case where the dedusting device 4
20 includes the first cyclone separating member 41 and the second cyclone separating member 42
21 simultaneously will be taken an example for explanation in the following, and after reading the following
22 technical solution, those skilled in the art may understand a technical solution where the dedusting device 4
23 only includes the first cyclone separating member 41 or the second cyclone separating member 42.

24 Referring to Figs. 3 and 4, when the device housing 2 is tube-shaped, the first cyclone separating
25 member 41 is disposed in the dedusting chamber A1 and surrounds the device housing 2 along the
26 circumferential direction of the device housing 2, and the negative pressure device 3 makes the dusty air
27 enter the dedusting chamber A1 and undergo dust and air separation by the first cyclone separating member
28 41. Thus, when the first cyclone separating member 41 surrounds the device housing 2 along the
29 circumferential direction of the device housing 2, the first cyclone separating member 41 may make full use
30 of space in the dedusting chamber A1 to improve the dust and air separation effect, and the structure of the
31 dust cup assembly 100 becomes more compact, small and lightweight.

32 Referring to Figs. 3 and 4, when the device housing 2 is tube-shaped, the second cyclone separating
33 member 42 has a tube shape and sleeved between the device housing 2 and the casing 1, for example,
34 coaxially fitted over the device housing 2, and the negative pressure device 3 makes the dusty air enter the
35 dedusting chamber A1 and undergo dust and air separation by the second cyclone separating member 42.

1 Thus, when the second cyclone separating member 42 surrounds the device housing 2 along the
2 circumferential direction of the device housing 2, the second cyclone separating member 42 may make full
3 use of the space in the dedusting chamber A1 to improve the dust and air separation effect, and the structure
4 of the dust cup assembly 100 becomes more compact, small and lightweight. In this embodiment, when the
5 dust cup assembly 100 also includes the first cyclone separating member 41, the first cyclone separating
6 member 41 may be located between the second cyclone separating member 42 and the device housing 2,
7 that is, the second cyclone separating member 42 may be located between the first cyclone separating
8 member 41 and the casing 1, such that the dusty air entering the dedusting chamber A1 may first undergo
9 the dust and air separation by the second cyclone separating member 42 and then undergo the dust and air
10 separation by the first cyclone separating member 41.

11 In some embodiments of the present disclosure, as shown in Figs. 2 and 4, at least one stage of cyclone
12 chamber includes a plurality of cyclone air passages A10 of the same stage, and the plurality of cyclone air
13 passages A10 of the same stage are successively arranged along the circumferential direction of the device
14 housing 2, such that the airstream separated from an upper stage of cyclone chamber may enter the plurality
15 of cyclone air passages A10 to undergo independent dust and air separations, so as to further improve the
16 dust and air separation effect and the purifying effect.

17 Preferably, the most downstream stage of cyclone chamber includes a plurality of cyclone air passages
18 A10 of the most downstream stage, that are arranged successively along the circumferential direction of the
19 device housing 2, the communicating chamber A2 includes the plurality of communication air passages
20 A20, and the plurality of communication air passages A20 are in corresponding communication with the
21 plurality of cyclone air passages A10 of the most downstream stage. In the example shown in Fig. 4, for the
22 two-stage cyclone separating chamber, the second-stage cyclone chamber A12 includes the plurality of
23 cyclone air passages A10, and for the three-stage cyclone separating chamber which is not shown in the
24 drawings, the third-stage cyclone chamber includes the plurality of cyclone air passages A10.

25 The plurality of cyclone air passages A10 are in communication with the plurality of communication
26 air passages A20 in one-to-one correspondence. In the examples shown in Fig. 3 and Fig. 4, a plurality of
27 extension segments 1211 may be fitted in the plurality of communication air passages A20 in one-to-one
28 correspondence, such that a plurality of inflow communication holes 12110 may communicate the plurality
29 of cyclone air passages A10 with the plurality of communication air passages A20 in one-to-one
30 correspondence. Hence, the filtration effect is better.

31 In some specific examples of the present disclosure, referring to Figs. 3, 4 and 7, the first cyclone
32 separating member 41 includes a plurality of cyclones 410 surrounding the device housing 2, and each
33 cyclone 410 defines one cyclone air passage A10, such that the dusty air entering the dedusting chamber A1
34 may respectively enter the plurality of cyclones 410 to undergo independent dust and air separations in the
35 cyclone manner, thereby improving the dust and air separation effect and the dust suction effect of the

1 handheld cleaner 1000.

2 Preferably, as shown in Figs. 3, 4 and 7, the cyclone 410 may have an upright tube shape, a side wall
3 of the cyclone 410 may be opened to form an air inlet that extends along a tangential direction of the
4 cyclone 410, a top end of the cyclone 410 may be opened to form an air outlet, a bottom end of the cyclone
5 410 may be opened to form a dust outlet, and the top ends of the cyclones 410 may abut against a bottom
6 wall of the inner cover 121 and be fitted over the plurality of extension segments 1211 in one-to-one
7 correspondence. That is, the plurality of extension segments 1211 extend into the plurality of cyclones 410
8 in one-to-one correspondence.

9 Therefore, referring to Figs. 4 and 9, the dusty air entering the cyclone 410 from the air inlet may flow
10 in a cyclone manner to separate dust from air, the separated dust may be exhausted from the dust outlet at
11 the bottom end of the cyclone 410 and deposited at the bottom of the dedusting chamber A1 (for example,
12 deposited in a secondary dust accumulating chamber A13 described hereinafter and defined between a
13 second tube segment 213 of the device housing 2 and a separating tube portion 421 of the second cyclone
14 separating member 42), and the separated air may be exhausted from the air outlet at the top end of the
15 cyclone 410 and flow into the communicating chamber A2 of the cleaner cover 12.

16 Preferably, as shown in Figs. 3 and 4, the first cyclone separating member 41 includes a straight tube
17 segment 411 and a tapered tube segment 412. For example, when the device housing 2 has the upright tube
18 shape, the straight tube segment 411 is connected to a top of the tapered tube segment 412, and the tapered
19 tube segment 412 has a cross section area decreased gradually in the up-to-down direction. Thus, the dusty
20 air entering the cyclone 410 may undergo the dust and air separation more effectively and reliably while
21 flowing in the cyclone 410 in the cyclone manner, thus improving the dust and air separation effect.

22 Preferably, as shown in Figs. 3 and 7, the first cyclone separating member 41 and the device housing 2
23 are in one piece, which raises processing efficiency, spares a procedure of assembling the first cyclone
24 separating member 41 with the device housing 2 to raise assembling efficiency, and lowers assembling
25 difficulty due to high modularity, that is, the dust cup assembly 100 may be assembled easily after the user
26 disassembles it for cleaning. Additionally, when the first cyclone separating member 41 and the device
27 housing 2 are in one piece, the structural compactness of the dust cup assembly 100 may be enhanced to
28 make the dust cup assembly 100 small and lightweight, dust capacity of the dedusting chamber A1 may be
29 improved, and strength of the device housing 2 may be strengthened without increasing cost.

30 In an example shown in Fig. 7, the first cyclone separating member 41 may include the plurality of
31 cyclones 410 integrally molded to the outer circumferential wall of the device housing 2 and surrounding
32 the device housing 2, thus reducing the assembling difficulty more effectively, that is, the user may
33 complete the assembling and disassembling of the dust cup assembly 100 very easily. It should be noted
34 herein that “two components being in one piece” means two components are non-detachable, and that “two
35 components being integrally molded” means that two components are molded simultaneously and

1 configured as a whole non-detachable part.

2 Preferably, as shown in Figs. 1 and 3, when the device housing 2 is tube-shaped, in an axial direction
3 of the device housing 2, the negative pressure device 3 is at least partially located at a side of the first
4 cyclone separating member 41. Thus, the negative pressure device 3 may make full use of space inside the
5 device housing 2, while the first cyclone separating member 41 may make full use of space outside the
6 device housing 2, thereby making the structure of the dust cup assembly 100 more compact. It should be
7 noted herein that the first cyclone separating member 41 is not shown in Figs. 1 and 2.

8 Alternatively, referring to Fig. 1, the negative pressure device 3 includes a fan 31 and a motor 32
9 connected successively along the axial direction of the device housing 2, and the motor 32 is spaced apart
10 from the first cyclone separating member 41 in the axial direction of the device housing 2, that is, the motor
11 32 is completely located at the side of the first cyclone separating member 41, so as to make better use of
12 space. Moreover, since the negative pressure device 3 is constituted by the fan 31 and the motor 32, such
13 that the negative pressure device 3 has a simple structure and is convenient to obtain. Certainly, the present
14 disclosure is not limited thereby, and the negative pressure device 3 may include other components, for
15 example, a vacuum pump.

16 Referring to Figs. 1 to 4, the device housing 2 includes a first tube segment 211, a transition tube
17 segment 212 and a second tube segment 213, in which a maximum diameter of the first tube segment 211 is
18 smaller than a minimum diameter of the second tube segment 213. Thus, when the device housing 2 and the
19 casing 1 have the tube shape and coaxially disposed, and the dedusting chamber A1 is defined between the
20 inner circumferential wall of the casing 1 and the outer circumferential wall of the device housing 2, a first
21 portion of the dedusting chamber A1 radially opposite to the first tube segment 211 has a larger capacity
22 than a second portion of the dedusting chamber A1 radially opposite to the second tube segment 213, and a
23 first portion of the air exhaust chamber A3 radially opposite to the second tube segment 213 has a larger
24 capacity than a second portion of the air exhaust chamber A3 radially opposite to the first tube segment
25 211.

26 Therefore, in a radial direction of the housing device 2, when the first cyclone separating member 41 is
27 opposite to the first tube segment 211, or opposite to the first tube segment 211 and the transition tube
28 segment 212, the first cyclone separating member 41 may make full use of space of the dedusting chamber
29 A1 to improve the filtration effect on the dusty air. Meanwhile, in the radial direction of the housing device
30 2, when the negative pressure device 3 is opposite to the second tube segment 213, or opposite to the
31 second tube segment 213 and the transition tube segment 212, the negative pressure device 3 may make full
32 use of space of the air exhaust chamber A3 to improve the filtration effect on the dusty air.

33 Preferably, an axial length of the second tube segment 213 is greater than an axial length of the
34 transition tube segment 212, for example, more than twice the axial length of the transition tube segment
35 212, but an axial length of the first tube segment 211 may be greater than or equal to the axial length of the

1 transition tube segment 212. Thus, the first cyclone separating member 41 and the negative pressure device
2 3 may make better use of space, and the overall dust suction effect of the handheld cleaner 1000 may be
3 improved.

4 Preferably, referring to Fig. 3, the first tube segment 211 and the second tube segment 213 both are
5 configured as straight tube segments, and the transition tube segment 212 is a divergent tube segment,
6 which is convenient for processing and assembling. Thus, when the first cyclone separating member 41 is
7 integrally molded to an outer circumferential wall of the first tube segment 211 and an outer circumferential
8 wall of the transition tube segment 212, the first cyclone separating member 41 may be naturally molded as
9 the plurality of cyclones 410 spliced by a plurality of straight tube segments 411 and a plurality of tapered
10 tube segments 412, which not only makes full use of the space, but also improves the dust and air
11 separation effect.

12 In the example shown in Fig. 3, the housing body 21 has the upright tube shape and includes the first
13 tube segment 211, the transition tube segment 212 and the second tube segment 213 successively in the
14 up-to-down direction, and along this direction, a cross section area of the first tube segment 211 is equal
15 everywhere, a cross section area of the transition tube segment 212 increases gradually, and a cross section
16 area of the second tube segment 213 is equal everywhere. Thus, the processing is convenient, and the
17 plurality of cyclones 410 is easy to mold.

18 In some embodiments of the present disclosure, the device housing 2 and the second cyclone
19 separating member 42 are vertically disposed, and two axial ends of the second cyclone separating member
20 42 abut against an internal wall of the casing 1. In the examples shown in Figs. 1 and 3, a top end the
21 second cyclone separating member 42 abuts against a lower surface of the inner cover 121 and a bottom
22 end thereof abuts against the inner bottom wall 110 of the casing 1.

23 Therefore, a primary annular-columnar dedusting chamber may be defined between an outer
24 circumferential wall of the second cyclone separating member 42 and the inner circumferential wall of the
25 casing 1, a secondary annular-columnar dedusting chamber may be defined between an inner
26 circumferential wall of the second cyclone separating member 42 and the outer circumferential wall of the
27 device housing 2, and the primary dedusting chamber surrounds the secondary dedusting chamber to
28 defines the whole dedusting chamber together with the secondary dedusting chamber. Since the primary
29 dedusting chamber and the secondary dedusting chamber are located outside and inside of the second
30 cyclone separating member 42 respectively and both configured to have annular-columnar space, the layout
31 of the dedusting chamber becomes more compact, and volumes of the primary dedusting chamber and the
32 secondary dedusting chamber are increased to make dust and air more fully separated.

33 Referring to Figs. 3 and 4, the whole primary dedusting chamber may be configured as the first-stage
34 cyclone chamber A11, and the first cyclone separating member 41 may be disposed in the secondary
35 dedusting chamber, i.e. between the inner circumferential wall of the second cyclone separating member 42

1 and the outer circumferential wall of the device housing 2, to define the second-stage cyclone chamber A12
2 in the secondary dedusting chamber. In such a case, rest of the secondary dedusting chamber except the
3 second-stage cyclone chamber A12 is configured as the secondary dust accumulating chamber A13.

4 Preferably, referring to Figs. 1 and 2, the second cyclone separating member 42 is vertically disposed
5 and includes a separating tube portion 421 and a filtration tube portion 422 axially connected with the
6 separating tube portion 421. The filtration tube portion 422 may be detachably connected to a top end of the
7 separating tube portion 421 and define a filtration hole 4221 communicating the first-stage cyclone
8 chamber A11 with the second-stage cyclone chamber A12. A bottom end of the separating tube portion 421
9 may abut against the inner bottom wall 110 of the casing 1 and a top end of the filtration tube portion 422
10 may abut against the lower surface of the inner cover 121. Hence, the second cyclone separating member
11 42 is formed by connecting a tube-shaped member having holes (i.e. the filtration tube portion 422) therein
12 with a tube-shaped member having no hole (i.e. the separating tube portion 421) therein in series, such that
13 the second cyclone separating member 42 has a simple structure and is convenient to process and
14 manufacture.

15 Certainly, the present disclosure is not limited thereby, and the second cyclone separating member 42
16 may be constituted by other components, for example, by a separating tube with a plurality of notches and
17 filter discs embedded in the plurality of notches, which will not be described in detail.

18 Preferably, the second cyclone separating member 42 is at least partially in one piece with the first
19 cyclone separating member 41. That is, the second cyclone separating member 42 may be completely in
20 one piece with the first cyclone separating member 41, or only a part of the second cyclone separating
21 member 42 is in one piece with the first cyclone separating member 41. For example, only the separating
22 tube portion 421 and the first cyclone separating member 41 are in one piece, while the filtration tube
23 portion 422 and the separating tube portion 421 are detachably connected with each other. Thus, when the
24 second cyclone separating member 42 is at least partially in one piece with the first cyclone separating
25 member 41, the assembling and disassembling difficulty may be further lowered and the user may
26 conveniently disassemble the dust cup assembly 100 for cleaning.

27 In some embodiments of the present disclosure, the dedusting device 4 is disposed in the dedusting
28 chamber A1 and defines at least one stage of annular or columnar cyclone chamber. For example, when the
29 dedusting device 4 includes the plurality of cyclones 410, the cyclone 410 may defines the columnar
30 cyclone chamber, but when the dedusting device 4 includes the second cyclone separating member 42, the
31 annular cyclone chamber may be defined between the second cyclone separating member 42 and the casing
32 1.

33 The dedusting device 4 further defines a dust collecting groove 4210 in the dedusting chamber A1 and
34 the dust collecting groove 4210 is in communication with the cyclone chamber. Thus, when the dusty air
35 flows in the cyclone chamber in a cyclone manner, the separated dust may accumulate in the dust collecting

1 groove 4210 rather than be rolled up again by the flowing airstream, so as to improve the dust and air
2 separation effect effectively.

3 In some preferable embodiments (not shown in the drawings) of the present disclosure, the dust
4 collecting groove 4210 is defined by the dedusting device 4, and thus is convenient to process and realize.
5 In a specific example, the dedusting device 4 includes a continuous tube-shaped filter that has a tube shape
6 and only has the filtration hole 4221 therein (for example, the separating tube portion 421 and the filtration
7 tube portion 422 axially connected may make up the continuous tube-shaped filter, and the filtration hole
8 4221 may be formed in the filtration tube portion 422). The continuous tube-shaped filter is sleeved
9 between the device housing 2 and the casing 1 to define the first-stage cyclone chamber A11 together with
10 the casing 1. The dust collecting groove 4210 is formed by recessing an outer circumferential surface of the
11 continuous tube-shaped filter inwards and communicates with the first-stage cyclone chamber A11, that is,
12 the outer circumferential surface of the continuous tube-shaped filter has a groove recessed towards its
13 central axis and the groove may be used as the dust collecting groove 4210.

14 In some other preferable embodiments of the present disclosure, the dust collecting groove 4210 is
15 defined by the dedusting device 4 and the device housing 2 together, so as to further improve the structural
16 compactness and save space. In a specific example, referring to Figs. 7 and 8, the dedusting device 4
17 includes a split tube-shaped filter that is sleeved between the device housing 2 and the casing 1 to define the
18 first-stage cyclone chamber A11 together with the casing 1. The split tube-shaped filter is tube-shaped, and
19 has the filtration hole 4221 and a plurality of splits formed by recessing a first axial end face of the split
20 tube-shaped filter to a second axial end face thereof (i.e., the split is formed in a surface of the split
21 tube-shaped filter and extends from an axial end of the split tube-shaped filter to another axial end thereof),
22 such that at least part of the split tube-shaped filter is split into pieces (for example, the separating tube
23 portion 421 and the filtration tube portion 422 axially connected may make up the split tube-shaped filter,
24 in which the filtration hole 4221 may be formed in the filtration tube portion 422 and the separating tube
25 portion 421 may be split into pieces). An edge of each piece that forms the split is bent and extends towards
26 the device housing 2, and abuts against the outer circumferential surface of the device housing 2. The dust
27 collecting groove 4210 is defined by the split of the split tube-shaped filter and the outer circumferential
28 surface of the device housing 2, and communicates with the first-stage cyclone chamber A11. Specifically,
29 the dust collecting groove 4210 is defined by opposite bent edges of two adjacent pieces and the outer
30 circumferential surface of the device housing 2.

31 Certainly, the present disclosure is not limited thereby, and in other embodiments of the present
32 disclosure, as shown in Fig. 10, the second cyclone separating member 42 may have no dust collecting
33 groove 4210 and at this time the separating tube portion 421 may be configured to be cylindrical.

34 Referring to Fig. 4, preferably, the dust collecting groove 4210 extends along the axial direction of the
35 device housing 2, and two axial ends of the dust collecting groove 4210 may be flush with two axial ends of

1 the separating tube portion 421 respectively, that is, upper and lower ends of the dust collecting groove
2 4210 are flush with upper and lower ends of the separating tube portion 421 respectively, which may
3 further improve the dust and air separation effect. Certainly, the present disclosure is not limited thereby,
4 and the two axial ends of the dust collecting groove 4210 may not be flush with the two axial ends of the
5 separating tube portion 421, in which case an axial length of the dust collecting groove 4210 is smaller than
6 an axial length of the separating tube portion 421.

7 Preferably, referring to Fig. 7, a plurality of dust collecting grooves 4210 are provided and spaced
8 apart from one another in the circumferential direction of the device housing 2, for example, three to eight
9 dust collecting grooves 4210 being provided, so as to further improve the dust and air separation effect.
10 Preferably, a depth L1 of the dust collecting groove 4210 in a radial direction of the first-stage cyclone
11 separating member ranges from 8 mm to 25 mm, thus improving the dust and air separation effect.
12 Preferably, a width L2 of the dust collecting groove 4210 in a circumferential direction of the first-stage
13 cyclone separating member ranges from 15 mm to 35 mm, thus improving the dust and air separation
14 effect.

15 Further, referring to Fig. 7, the second cyclone separating member 42 further includes an eaves ring
16 portion 423, and the eaves ring portion 423 has an inner ring wall connected between the separating tube
17 portion 421 and the filtration tube portion 422, and an outer ring wall obliquely extending away from an
18 outer circumferential surface of the separating tube portion 421 along a direction from the filtration tube
19 portion 422 to the separating tube portion 421. Therefore, referring to Figs. 2 and 4, the dusty air entering
20 the first-stage cyclone chamber A11 may undergo the dust and air separation better under guidance of the
21 eaves ring portion 423. Moreover, the separated air may enter the second-stage cyclone chamber A12 more
22 smoothly through the filtration tube portion 422. Furthermore, the separated dust can hardly cross the eaves
23 ring portion 423 to enter the second-stage cyclone chamber A12 through the filtration tube portion 422, thus
24 improving the dust and air separation effect.

25 In an embodiment of the present disclosure, referring to Figs. 3 and 5, when the casing 1 is
26 tube-shaped, the inner circumferential wall of the casing 1 (i.e. a part of the whole inner surface of the
27 casing 1 that is not run through by its axis) is provided with a first dust-blocking sheet 113 extending
28 towards an interior of the casing 1. Thus, when the dust moves in the first-stage cyclone chamber A11 in a
29 cyclone manner, the dust may be blocked by the first dust-blocking sheet 113 rather than be rolled up
30 repeatedly by the airstream to obstruct the filtration hole 4221 or enter the second-stage cyclone chamber
31 A12, thus improving the dust and air separation effect.

32 Preferably, the first dust-blocking sheet 113 extends along an axial direction of the casing 1. Therefore,
33 when the casing 1 is vertically disposed, the blocked dust may flow downwards along the first
34 dust-blocking sheet 113 to the bottom of the casing 1 to prevent the dust from being rolled up repeatedly to
35 obstruct the filtration hole 4221 or enter the second-stage cyclone chamber A12, so as to further improve

1 the dust and air separation effect. Preferably, a plurality of first dust-blocking sheets 113 are provided and
2 spaced apart from one another in a circumferential direction of the casing 1. Thus, in the whole
3 circumferential direction of the casing 1, the first dust-blocking sheets 113 may serve to block the dust
4 effectively, so as to further improve the dust and air separation effect.

5 In an embodiment of the present disclosure, referring to Figs. 1 and 6, the casing 1 is tube-shaped, and
6 an inner end wall of the casing 1 (i.e. one of two surfaces in the whole inner surface of the casing 1 that are
7 run through by its axis) is provided with a second dust-blocking sheet 114 extending towards the interior of
8 the casing 1. For example, when the casing 1 is vertically disposed, the second dust-blocking sheet 114 may
9 extend upwards from the inner bottom wall 110 of the casing 1. Thus, when the dust moves in the
10 first-stage cyclone chamber A11 in a cyclone manner, the dust may be blocked by the second dust-blocking
11 sheet 114 rather than be rolled up repeatedly by the airstream to obstruct the filtration hole 4221 or enter the
12 second-stage cyclone chamber A12, thus improving the dust and air separation effect.

13 Preferably, the second dust-blocking sheet 114 extends along a radial direction of the casing 1.
14 Therefore, in the whole radial direction of the casing 1, the second dust-blocking sheet 114 may serve to
15 block the dust effectively, so as to further improve the dust and air separation effect. Preferably, a plurality
16 of second dust-blocking sheets 114 are provided and spaced apart from one another in the circumferential
17 direction of the casing 1. Thus, in the whole circumferential direction of the casing 1, the second
18 dust-blocking sheets 114 may serve to block the dust effectively, so as to further improve the dust and air
19 separation effect.

20 A working principle of the dust cup assembly 100 according to an embodiment of the present
21 disclosure will be described with reference to the drawings.

22 Referring to Fig. 2, in combination with Figs. 4 and 9, the dusty air enters the first-stage cyclone
23 chamber A11 from the dust suction inlet 112 along a tangential direction to undergo the cyclone dust and air
24 separation. In this process, part of the separated dust enters and accumulates in the dust collecting groove
25 4210, rest of the separated dust falls down and accumulates at the bottom of the first-stage cyclone chamber
26 A11, and the separated airstream enters the second-stage cyclone chamber A12 from the filtration hole 4221
27 in a tangential direction to undergo the cyclone dust and air separation. In this process, the separated dust
28 falls down and accumulates in the secondary dust accumulating chamber A13, the separated airstream
29 enters the communicating chamber A2 through the inflow communication hole 12110 and is filtered by the
30 in-cover filter 1221, and the filtered airstream enters the air exhaust chamber A3 through the outflow
31 communication hole 12120 and is exhausted from the air exhaust port 220 and the opening 111 after being
32 filtered by the in-housing filter 25.

33 The handle assembly 200 according to some embodiments of the present disclosure will be described
34 with reference to Fig. 1.

35 Specifically, the holding assembly has a user-friendly handheld feature, and may be, for example, a lift

1 handle or a handle assembly 200. When the holding assembly is configured as the handle assembly 200, the
2 user may control orientation of the dust cup assembly 100 conveniently. For example, it is convenient for
3 the user to make the dust suction inlet 112 of the dust cup assembly 100 face upwards or downwards, so as
4 to facilitate dust suction. Only the handle assembly 200 used as the holding assembly will be taken as an
5 example for explanation in the following. Additionally, it should be noted that the structure of the lift
6 handle is well known to those skilled in the art and hence will not be described in detail.

7 As shown in Fig. 1, the handle assembly 200 includes a handle casing 51 and a power supply device
8 52. The handle casing 51 includes a holding portion 512 for user handholding, and the power supply device
9 52 may be disposed in the holding portion 512, or may be disposed at a position in the handle casing 51
10 opposite to the holding portion 512, for example in a mounting portion 511 to be described below, such that
11 a center of gravity of the handle assembly 200 may be optimized, i.e. close to a handheld position, and
12 hence the user may hold the handle assembly 200 more effortlessly, which improves comfort and
13 convenience of using the handheld cleaner 1000.

14 The power supply device 52 may be a battery, for example, a rechargeable battery, which is easy to
15 realize at a low cost and convenient to use.

16 As shown in Fig. 1, the handle casing 51 has a finger gripping portion 510, and the mounting portion
17 511 and the holding portion 512 located at two sides of the finger gripping portion 510. The mounting
18 portion 511 is used to be connected with the dust cup assembly 100 and the holding portion 512 is used for
19 holding by hand. The power supply device 52 is disposed in the mounting portion 511 and/or in the holding
20 portion 512. Thus, the handle casing 51 has a simple structure and is convenient to process and manufacture.
21 Alternatively, the finger gripping portion 510 is a gripping hole to be penetrated through and gripped by
22 fingers, the handle casing 51 is an annular housing, and the gripping hole is defined by an inner ring of the
23 handle casing 51. Thus, it is convenient for holding, and the power supply device 52 may be mounted
24 conveniently.

25 Preferably, the power supply device 52 is mounted in the mounting portion 511 and has a same length
26 direction as the mounting portion 511. Thus, the power supply device 52 makes full use of space in the
27 mounting portion 511 to make the handle assembly 200 miniaturized and allow the user to hold the handle
28 assembly 200 with less effort.

29 Preferably, the power supply device 52 is mounted in the holding portion 512 and has a same length
30 direction as the holding portion 512. Thus, the power supply device 52 makes full use of space in the
31 holding portion 512 to make the handle assembly 200 miniaturized and allow the user to hold the handle
32 assembly 200 with less effort.

33 Preferably, the dust cup assembly 100 is tube-shaped, the length direction of the mounting portion 511
34 is identical to an axial direction of the dust cup assembly 100, and the mounting portion 511 is connected to
35 a radial side of the handle assembly 200, so as to increase a connection area between the mounting portion

1 511 and the dust cup assembly 100, enhance connection reliability between the handle assembly 200 and
2 the dust cup assembly 100, and save effort for holding. Alternatively, the mounting portion 511 is
3 detachably connected to the dust cup assembly 100. That is, the handle assembly 200 is detachably
4 connected to the dust cup assembly 100, and thus it is convenient for mounting, dismounting, cleaning and
5 replacement.

6 Further, as shown in Fig. 1, the handle casing 51 further includes a handle top 513 and a handle bottom
7 514 connected between the mounting portion 511 and the holding portion 512 and arranged opposite to
8 each other. That is, the mounting portion 511, the handle top 513, the holding portion 512 and the handle
9 bottom 514 are successively connected end to end to form the handle casing 51, such that the structure of
10 the handle casing 51 has high reliability. Certainly, the present disclosure is not limited thereby. The handle
11 casing 51 may not be annular, i.e. not include the handle top 513 and the handle bottom 514. Instead, the
12 handle casing 51 may be I-shaped and constituted by the mounting portion 511 and the holding portion 512
13 arranged opposite to each other, and a bridging portion connected between the mounting portion 511 and
14 the holding portion 512, and this example is not shown in the drawings.

15 Preferably, an electric control board 53 connected with the power supply device 52 may be provided in
16 the handle top 513, the electric control board 53 connected with the power supply device 52 may be
17 provided in the handle bottom 514, or the electric control board 53 connected with the power supply device
18 52 may be provided in each of the handle top 513 and the handle bottom 514 simultaneously. Thus, space in
19 the handle casing 51 may be fully utilized.

20 The handheld cleaner 1000 according to some embodiments of the present disclosure will be described
21 with reference to Figs. 16 to 18, in combination with Figs. 1 to 10.

22 As shown in the drawings, the handheld cleaner 1000 according to the embodiments of the present
23 disclosure includes a casing 1, the negative pressure device 3, a first detection device 500A and a control
24 device.

25 The casing 1 may have an air intake passage that refers to a passage through which the dusty air in the
26 environment flows after entering the casing 1 but before being filtered. The negative pressure device 3 is
27 disposed in the casing 1 and used to make the dusty air outside the casing 1 enter the air intake passage. For
28 example, in a specific example of the present disclosure, the casing 1 may include the casing 1 and the
29 handle casing 51 in this description, the casing 1 has the dust suction inlet 112, and an inner hole of the dust
30 suction inlet 112 defines the air intake passage. The negative pressure device 3 may include the fan 31 and
31 the motor 323 connected with the fan 31, and suction strength of the negative pressure device 3 depends on
32 an operating power of the motor 32. That is, the higher the operating power of the motor 32 is, the faster the
33 fan 31 rotates and the greater the suction strength of the negative pressure device 3 is; the lower the
34 operating power of the motor 32 is, the more slowly the fan 31 rotates and the smaller the suction strength
35 of the negative pressure device 3 is.

1 The first detection device 500A is disposed to the casing 1 and used to detect a motion state of the
2 casing 1, i.e. to detect whether the casing 1 is moving and how fast the casing 1 moves. For example, the
3 first detection device 500A may be an acceleration sensor or a speed sensor. The control device is
4 connected with the first detection device 500A and the negative pressure device 3. For example, the control
5 device may be a printed circuit board (PCB) of the handheld cleaner 1000, and configured to control a
6 working state of the handheld cleaner 1000 according to information detected by the first detection device
7 500A, for example, controlling the handheld cleaner 1000 to switch to a turn-on state, a turn-off state, a
8 standby state, a high-suction state and a lower-suction state to be described below.

9 Therefore, the handheld cleaner 1000 according to the embodiments of the present disclosure may
10 switch to a corresponding working state automatically and intelligently according to a change of its motion
11 state, so as to achieve the dust suction effect and an energy saving effect simultaneously.

12 In some specific examples of the present disclosure, the control device may be configured to control
13 the negative pressure device 3 to increase the suction strength if the first detection device 500A detects that
14 a motion speed of the casing 1 rises. That is, when the first detection device 500A detects that the user
15 moves the handheld cleaner 1000 faster, i.e., with an increasing speed, the control device increases the
16 suction strength of the negative pressure device 3 to guarantee the dust suction effect.

17 In some specific examples of the present disclosure, the control device may be configured to control the
18 negative pressure device 3 to decrease the suction strength if the first detection device 500A detects that the
19 motion speed of the casing 1 drops. That is, when the first detection device 500A detects that the user
20 moves the handheld cleaner 1000 more slowly, i.e., with a decreasing speed, the control device decreases
21 the suction strength of the negative pressure device 3 to reduce the energy consumption.

22 In some specific examples of the present disclosure, the control device may be configured to control
23 the negative pressure device 3 to operate with a first suction strength if the first detection device 500A
24 detects that the motion speed of the casing 1 is higher than a first predetermined value, and control the
25 negative pressure device 3 to operate with a second suction strength if the first detection device 500A
26 detects that the motion speed of the casing 1 is lower than a second predetermined value, in which the first
27 predetermined value is greater than or equal to the second predetermined value, and the first suction
28 strength is greater than or equal to the second suction strength. That is, when the first detection device 500A
29 detects that the motion speed of the handheld cleaner 1000 is relatively great, the handheld cleaner 1000
30 may switch to the high-suction state automatically and intelligently; and when the first detection device
31 500A detects that the motion speed of the handheld cleaner 1000 is relatively small, the handheld cleaner
32 1000 may switch to the low-suction state automatically and intelligently.

33 Therefore, when the first detection device 500A detects that the user moves the handheld cleaner 1000
34 in a relatively high speed, the control device may control the negative pressure device 3 to suck dust with a
35 relatively great suction strength, so as to guarantee the dust suction effect; when the first detection device

1 500A detects that the user moves the handheld cleaner 1000 in a relatively low speed, the control device
2 may control the negative pressure device 3 to suck dust with a relatively small suction strength, so as to
3 reduce the energy consumption.

4 In some specific examples of the present disclosure, the control device may be configured to control
5 the negative pressure device 3 to shut down, if the first detection device 500A detects that the casing 1 has
6 never moved in a first predetermined duration (like one second). That is, when the handheld cleaner 1000 is
7 at the turn-on state, if the user does not move the handheld cleaner 1000 in the first predetermined duration,
8 i.e. no displacement of the handheld cleaner 1000 is detected by the first detection device 500A, the control
9 device controls the handheld cleaner 1000 to enter the standby state where the negative pressure device 3
10 stops working but the first detection device 500A keeps working. Thus, when the user puts aside the
11 handheld cleaner 1000 temporarily to do something else, the handheld cleaner 1000 may enter the standby
12 state automatically and intelligently, so as to save unnecessary energy consumption and make it convenient
13 for the user to continue to use the handheld cleaner 1000.

14 Further, the control device may be configured to control the negative pressure device 3 to turn on, if
15 the first detection device 500A detects displacement of the casing 1 in a second predetermined duration
16 (like ten minutes) after a shutdown of the negative pressure device 3. That is, after the handheld cleaner
17 1000 enters the standby state, if the user moves the handheld cleaner 1000 in the second predetermined
18 duration, i.e. the first detection device 500A detects displacement of the handheld cleaner 1000 in the
19 second predetermined duration, the control device controls the handheld cleaner 1000 to enter the turn-on
20 state where the negative pressure device 3 starts to work, the first detection device 500A keeps working,
21 and the control device controls the working state of the handheld cleaner 1000 according to the information
22 detected by the first detection device 500A. Therefore, when the user continues to use the handheld cleaner
23 1000, the handheld cleaner 1000 may turn on automatically and intelligently, which is user-friendly.

24 Further, the control device may be configured to control the handheld cleaner 1000 to turn off, if the
25 first detection device 500A detects no displacement of the casing 1 in the second predetermined duration
26 (like ten minutes) after the shutdown of the negative pressure device 3. That is, after the handheld cleaner
27 1000 enters the standby state, if the user does not move the handheld cleaner 1000 in the second
28 predetermined duration, i.e. no displacement of the handheld cleaner 1000 is detected by the first detection
29 device 500A, the control device controls the handheld cleaner 1000 to enter the turn-off state where the
30 negative pressure device 3 stops working, the first detection device 500A stops working, and the control
31 device no longer controls the working state of the handheld cleaner 1000 according to the information
32 detected by the first detection device 500A. Therefore, when the user leaves the handheld cleaner 1000 and
33 forgets to turn it off, the handheld cleaner 1000 may turn off automatically and intelligently, thus saving the
34 unnecessary energy consumption.

35 It should be noted herein that the first predetermined value and the second predetermined value may

1 be set according to practical requirements, for example, preset by a designer before the handheld cleaner
2 1000 leaves the factory, or set and adjusted by the user after the handheld cleaner 1000 leaves the factory.
3 Meanwhile, the first suction strength and the second suction strength may be set according to practical
4 requirements, for example, preset by the designer before the handheld cleaner 1000 leaves the factory, or
5 set and adjusted by the user after the handheld cleaner 1000 leaves the factory.

6 It should be noted herein that the first predetermined duration and the second predetermined duration
7 may be set according to practical requirements, for example, preset by a designer before the handheld
8 cleaner 1000 leaves the factory, or set and adjusted by the user after the handheld cleaner 1000 leaves the
9 factory.

10 It should be noted herein that “the turn-on state” means that the handheld cleaner 1000 may conduct
11 dust suction and switch to a corresponding working state by detecting the motion state thereof; “the standby
12 state” means that the handheld cleaner 1000 cannot conduct dust suction; and “the turn-off state” means
13 that the handheld cleaner 1000 can neither conduct dust suction nor switch to the corresponding working
14 state by detecting the motion state thereof.

15 In some embodiments of the present disclosure, the handheld cleaner 1000 includes a control key
16 connected with the control device. The control key is configured to control the control device to start
17 controlling the working state of the handheld cleaner 1000 according to the information detected by the first
18 detection device 500A after being triggered by an odd number of times (like the first time, the third time, the
19 fifth time, etc.), and configured to control the control device to stop controlling the working state of the
20 handheld cleaner 1000 according to the information detected by the first detection device 500A after being
21 triggered by an even number of times (like the second time, the fourth time, the sixth time, etc.). The control
22 key may be disposed to the casing 1 or other positions, for example, being configured as a virtual key of a
23 phone application.

24 That is, only after the user triggers the control key by the odd number of times, can the control device
25 start controlling the working state of the handheld cleaner 1000 according to the information detected by
26 the first detection device 500A, i.e. entering an energy-saving mode. Before the user triggers the control
27 key or when the user triggers the control key by the even number of times, the control device will not
28 control the working state of the handheld cleaner 1000 according to the information detected by the first
29 detection device 500A, i.e. stopping the energy-saving mode, even if the first detection device 500A
30 performs the detection. Thus, the user is offered more options and enjoys using the handheld cleaner 1000.
31 Moreover, the switching between entering the energy-saving mode and stopping the energy-saving mode
32 can be realized by triggering one control key different times, which saves space occupied by the control key
33 and improves simplicity.

34 In some other embodiments of the present disclosure, the handheld cleaner 1000 further includes a
35 turn-on control key and a turn-off control key. The turn-on control key is connected with the control device

1 and configured to control the control device to start controlling the working state of the handheld cleaner
2 1000 according to the information detected by the first detection device 500A after being triggered. The
3 turn-off control key is connected with the control device and configured to control the control device to
4 stop controlling the working state of the handheld cleaner 1000 according to the information detected by
5 the first detection device 500A after being triggered. The turn-on control key and the turn-off control key may
6 be disposed to the casing 1 and other positions, for example, be configured as virtual keys of a phone
7 application.

8 That is, only after the user triggers the turn-on control key, can the control device start controlling the
9 working state of the handheld cleaner 1000 according to the information detected by the first detection
10 device 500A, i.e. entering the energy-saving mode. After the user triggers the turn-off control key, the
11 control device will not control the working state of the handheld cleaner 1000 according to the information
12 detected by the first detection device 500A, i.e. stopping the energy-saving mode, even if the first detection
13 device 500A performs the detection. Thus, the user is offered more options and enjoys using the handheld
14 cleaner 1000. Moreover, the switching between entering the energy-saving mode and stopping the
15 energy-saving mode can be realized by the turn-on control key and the turn-off control key, which improves
16 accuracy and reliability of operations and reduces the probability of misoperations.

17 In conclusion, in some specific embodiments of the present disclosure, by providing the handheld
18 cleaner 1000 with a sensor chip for detecting displacement, speed or acceleration, a main PCB may
19 automatically control the motor 32 to work with a small power when the handheld cleaner 1000 moves at a
20 low motion speed for cleaning, so as to reduce an output power of the handheld cleaner 1000, and the main
21 PCB may also automatically control the motor 32 to work with a large power when the handheld cleaner
22 1000 moves at a high motion speed for cleaning, so as to increase the output power of the handheld cleaner
23 1000, thus improving dust suction capacity and efficiency and saving energy. Meanwhile, if the handheld
24 cleaner 1000 has no displacement in a preset duration (like one second), the handheld cleaner 1000 may
25 enter the standby state automatically; when the handheld cleaner 1000 is in the standby state, if the
26 displacement thereof happens, the handheld cleaner 1000 may switch to the turn-on state, but if no
27 displacement thereof happens during a certain period of time (like ten minutes), the handheld cleaner 1000
28 may turn off automatically, i.e. entering the turn-off state, so as to achieve the energy-saving effect. Thus,
29 the handheld cleaner 1000 according to embodiments of the present disclosure may provide the improved
30 dust suction efficiency and the energy-saving effect.

31 A method for controlling the handheld cleaner 1000 according to some extended embodiments of the
32 present disclosure will be described in detail.

33 Specifically, the method may include the following steps.

34 First, (step A) the motion state of the handheld cleaner 1000 is detected, i.e. it is detected whether the
35 handheld cleaner 1000 is moving and how fast the handheld cleaner 1000 moves. Then, (step B) the

1 working state of the handheld cleaner 1000 is controlled according to the detected motion state. For
2 example, the handheld cleaner 1000 is controlled to switch to the turn-on state, the turn-off state, the
3 standby state, the high-suction state and the lower-suction state described above. Thus, with the method for
4 controlling the handheld cleaner 1000 according to the embodiments of the present disclosure, it is possible
5 to make the handheld cleaner 1000 switch to the corresponding working state by detecting the motion state
6 of the handheld cleaner 1000, so as to combine the dust suction effect and the energy-saving effect.

7 It should be noted herein that step A may be realized by the first detection device 500A described
8 above, and certainly may be realized in other manners. For example, the handheld cleaner 1000 may be
9 provided with a GPS, and the motion state of the handheld cleaner 1000 is detected by a terminal connected
10 with the GPS. Certainly, the present disclosure is not limited thereby, and for example, a camera device
11 may be provided indoors to shoot the handheld cleaner 1000, and the motion state of the handheld cleaner
12 1000 may be detected by a terminal connected with the camera device. Step B may be realized by the
13 control device described above, and certainly may be realized in other manners. For example, the control in
14 step B may be realized by a remote terminal or a remote control device.

15 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
16 may further include: controlling the handheld cleaner 1000 to increase the suction strength when it is
17 detected that the motion speed of the handheld cleaner 1000 rises. That is, when it is detected that the user
18 moves the handheld cleaner 1000 faster, i.e., with an increasing speed, the handheld cleaner 1000 is
19 controlled to increase the suction strength, so as to guarantee the dust suction effect.

20 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
21 may further include: controlling the handheld cleaner 1000 to decrease the suction strength when it is
22 detected that the motion speed of the handheld cleaner 1000 drops. That is, when it is detected that the user
23 moves the handheld cleaner 1000 more slowly, i.e., with a decreasing speed, the handheld cleaner 1000 is
24 controlled to decrease the suction strength, so as to reduce the energy consumption.

25 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
26 may further include: controlling the handheld cleaner 1000 to operate with the first suction strength when it
27 is detected that the motion speed of the handheld cleaner 1000 is higher than the first predetermined value.
28 That is, when it is detected that the user moves the handheld cleaner 1000 at a relatively high speed, the
29 handheld cleaner 1000 is controlled to switch to the high-suction state, and thus the handheld cleaner 1000
30 may suck dust with a relatively great suction strength, so as to guarantee the dust suction effect.

31 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
32 may further include: controlling the handheld cleaner 1000 to operate with the second suction strength
33 when it is detected that the motion speed of the handheld cleaner 1000 is lower than the second
34 predetermined value. That is, when it is detected that the user moves the handheld cleaner 1000 at a
35 relatively low speed, the handheld cleaner 1000 is controlled to switch to the low-suction state, and thus the

1 handheld cleaner 1000 may suck dust with a relatively small suction strength to reduce the energy
2 consumption.

3 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
4 may further include: controlling the handheld cleaner 1000 to enter the standby state, if no displacement of
5 the handheld cleaner 1000 is detected in the first predetermined duration (like one second), when the
6 handheld cleaner 1000 is in the turn-on state.

7 That is, when the handheld cleaner 1000 is in the turn-on state, if it is detected that the user has never
8 moved the handheld cleaner 1000 in the first predetermined duration (for example, the user puts aside the
9 handheld cleaner 1000 to do something else), the handheld cleaner 1000 may be controlled to enter the
10 standby state, so as to save unnecessary energy consumption and make it convenient for the user to
11 continue to use the handheld cleaner 1000.

12 Further, the method for controlling the handheld cleaner 1000 may further include: controlling the
13 handheld cleaner 1000 to enter the turn-on state, if it is detected that the handheld cleaner 1000 has a
14 displacement in the second predetermined duration, when the handheld cleaner 1000 is in the standby state.
15 That is, when the handheld cleaner 1000 is in the standby state, if it is detected that the user moves the
16 handheld cleaner 1000 in the second predetermined duration (for example, the user continues to use the
17 handheld cleaner 1000), the handheld cleaner 1000 may be controlled to enter the turn-on state again,
18 which is user-friendly.

19 Further, the method for controlling the handheld cleaner 1000 may further include: controlling the
20 handheld cleaner 1000 to enter the turn-off state, if no displacement of the handheld cleaner 1000 is
21 detected in the second predetermined duration, when the handheld cleaner 1000 is in the standby state. That
22 is, when the handheld cleaner 1000 is in the standby state, if it is detected that the user has never moved the
23 handheld cleaner 1000 in the second predetermined duration (for example, the user leaves the handheld
24 cleaner 1000 and forgets to turn it off), the handheld cleaner 1000 may be controlled to enter the turn-off
25 state, so as to save the unnecessary energy consumption.

26 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
27 may further include: receiving an instruction of turning on the energy-saving mode, and starting to control
28 the working state of the handheld cleaner 1000 according to the detected motion state thereof after
29 receiving the instruction. That is, only after the instruction of turning on the energy-saving mode is received,
30 can the working state of the handheld cleaner 1000 be controlled according to the detected information, i.e.
31 entering the energy-saving mode. Thus, the user may be offered more options and enjoy using the handheld
32 cleaner 1000.

33 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
34 may further include: receiving an instruction of turning off the energy-saving mode, and stopping
35 controlling the working state of the handheld cleaner 1000 according to the detected motion state thereof

1 after receiving the instruction. That is, after the instruction of turning off the energy-saving mode is
2 received, the handheld cleaner 1000 cannot be controlled to switch the working state thereof, i.e. cannot
3 enter the energy-saving mode, even if the information is detected. Thus, actual requirements of the user
4 may be satisfied better.

5 In some specific examples of the present disclosure, reception of the instruction of turning on the
6 energy-saving mode and reception of the instruction of turning off the energy-saving mode may be
7 integrated into one key, for example, into the control key described above. When the control key is
8 triggered by the odd number of times (like the first time, the third time, the fifth time, etc.), the instruction
9 of turning on the energy-saving mode is received to make the handheld cleaner 1000 enter the
10 energy-saving mode; when the control key is triggered by the even number of times (like the second time,
11 the fourth time, the sixth time, etc.), the instruction of turning off the energy-saving mode is received to
12 make the handheld cleaner 1000 stop the energy-saving mode.

13 In some specific examples of the present disclosure, the reception of the instruction of turning on the
14 energy-saving mode and the reception of the instruction of turning off the energy-saving mode may be
15 integrated into two keys respectively, for example into the turn-on control key and the turn-off control key
16 described above. When the turn-on control key is triggered, the instruction of turning on the energy-saving
17 mode is received to make the handheld cleaner 1000 enter the energy-saving mode; when the turn-off
18 control key is triggered, the instruction of turning off the energy-saving mode is received to make the
19 handheld cleaner 1000 stop the energy-saving mode.

20 The handheld cleaner 1000 according to some embodiments of the present disclosure will be described
21 with reference to Fig. 19, in combination with Figs. 1 to 10.

22 As shown in the drawings, the handheld cleaner 1000 according to the embodiments of the present
23 disclosure includes the casing 1, the negative pressure device 3, a second detection device 500B and a
24 control device.

25 The casing 1 may have the air intake passage that refers to a passage through which the dusty air in the
26 environment flows after entering the casing 1 but before being filtered. The negative pressure device 3 is
27 disposed in the casing 1 and used to make the dusty air outside the casing 1 enter the air intake passage. For
28 example, in a specific example of the present disclosure, the casing 1 may include the casing 1 and the
29 handle casing 51 in this description, the casing 1 has the dust suction inlet 112, and the inner hole of the
30 dust suction inlet 112 defines the air intake passage. The negative pressure device 3 may include the fan 31
31 and the motor 323 connected with the fan 31, suction strength of the negative pressure device 3 depends on
32 an operating power of the motor 32. That is, the higher the operating power of the motor 32 is, the faster the
33 fan 31 rotates and the greater the suction strength of the negative pressure device 3 is; the lower the
34 operating power of the motor 32 is, the more slowly the fan 31 rotates and the smaller the suction strength
35 of the negative pressure device 3 is.

1 The second detection device 500B is disposed to the casing 1 and used to detect a dust concentration
2 in the air intake passage, in which the term “dust concentration in the air intake passage” refers to a dust
3 concentration at a certain section of the air intake passage, or an average dust concentration in a certain
4 segment of sections of the air intake passage, or an average dust concentration in the whole air intake
5 passage. “The dust concentration at the certain section” refers to a ratio of an area occupied by the dust
6 contained in the dusty air within the certain section to an area of the certain section.

7 In a specific example of the present disclosure, the second detection device 500B may include an
8 emitter 501B and a receiver 502B, and the emitter 501B is disposed opposite to the receiver 502B, such that
9 the dust entering the air intake passage may go through a space between the emitter 501B and the receiver
10 502B. The emitter 501B and the receiver 502B may be disposed at two sides in the air intake passage
11 respectively, for example, disposed in the dust suction inlet 112 and located at two diametrical ends of the
12 dust suction inlet 112 respectively.

13 The emitter 501B may be used to emit light to the receiver 502B, and the receiver 502B may be used
14 to receive the light emitted by the emitter 501B. When the dusty airstream flows through the space between
15 the emitter 501B and the receiver 502B, the dust may block some light from being received by the receiver
16 502B, so the amount of light received by the receiver 502B decreases. In such a way, when a large amount
17 of dust flows through the space between the emitter 501B and the receiver 502B, i.e., the dust centration of
18 the dusty air that flows through the space between the emitter 501B and the receiver 502B is relatively high,
19 the amount of light received by the receiver 502B is small; when a small amount of dust flows through the
20 space between the emitter 501B and the receiver 502B, i.e., the dust centration of the dusty air that flows
21 through the space between the emitter 501B and the receiver 502B is relatively low, the amount of light
22 received by the receiver 502B is large. Thus, the dust centration of the dusty air that flows through the
23 space between the emitter 501B and the receiver 502B may be judged simply and reliably according to the
24 amount of light received by the receiver 502B. It should be noted that structures of the emitter 501B and the
25 receiver 502B are well known to those skilled in the art and hence will not be described in detail.

26 Certainly, the present disclosure is not limited thereby, and the second detection device 500B may be
27 configured as other devices. In another specific example of the present disclosure, the second detection
28 device 500B may be an image detection system, for example, including a camera and a data terminal. The
29 camera may shoot a dust condition in the air intake passage, and the data terminal may obtain the dust
30 concentration in the air intake passage through computation and analysis according to image information
31 shot by the camera. In one more specific example of the present disclosure, the second detection device
32 500B may be a weight detection system, for example, including a sensitive scale and a data terminal, and
33 the sensitive scale may be disposed at a bottom of the air intake passage to monitor a weight change in the
34 air intake passage. Since dust is heavier than air, the weight change in the air intake passage mainly reflects
35 a dust weight change, and then the data terminal may obtain the dust concentration in the air intake passage

1 through computation and analysis according to weight information measured by the sensitive scale.

2 The control device is connected with the second detection device 500B and the negative pressure
3 device 3. For example, the control device may be the PCB of the handheld cleaner 1000, and configured to
4 control the working state of the handheld cleaner 1000 according to the information detected by the second
5 detection device 500B, for example, controlling the handheld cleaner 1000 to switch to the high-suction
6 state or the lower-suction state. Therefore, the handheld cleaner 1000 according to the embodiments of the
7 present disclosure may switch to the corresponding working state automatically and intelligently according
8 to changes of the dust concentration in the air intake passage, so as to achieve the dust suction effect and
9 the energy-saving effect simultaneously.

10 In some specific examples of the present disclosure, the control device may be configured to control
11 the negative pressure device 3 to increase the suction strength thereof if the second detection device 500B
12 detects that the dust concentration rises. That is, when the second detection device 500B detects that the
13 dust concentration in the air intake passage becomes high, the control device increases the suction strength
14 of the negative pressure device 3 to guarantee the dust suction effect.

15 In some specific examples of the present disclosure, the control device may be configured to control
16 the negative pressure device 3 to decrease the suction strength thereof if the second detection device 500B
17 detects that the dust concentration drops. That is, when the second detection device 500B detects that the
18 dust concentration in the air intake passage becomes low, the control device decreases the suction strength
19 of the negative pressure device 3 to reduce the energy consumption.

20 In some specific examples of the present disclosure, the control device may be configured to control
21 the negative pressure device 3 to operate with a first suction strength if the second detection device 500B
22 detects that the dust concentration is higher than a first preset value, and control the negative pressure
23 device 3 to operate with a second suction strength if the second detection device 500B detects that the dust
24 concentration is lower than a second preset value, in which the first preset value is greater than or equal to
25 the second preset value, and the first suction strength is greater than or equal to the second suction strength.
26 That is, when the second detection device 500B detects that the dust concentration in the air intake passage
27 is relatively high, the handheld cleaner 1000 may switch to the high-suction state automatically and
28 intelligently; and when the second detection device 500B detects that the dust concentration in the air
29 intake passage is relatively low, the handheld cleaner 1000 may switch to the low-suction state
30 automatically and intelligently.

31 Therefore, when there is much dust on the surface to be cleaned, i.e. when the second detection device
32 500B detects that the dust concentration in the air intake passage is relatively high, the control device may
33 control the negative pressure device 3 to suck dust with relatively great suction strength, so as to guarantee
34 the dust suction effect; when there is little dust on the surface to be cleaned, i.e. when the second detection
35 device 500B detects that the dust concentration in the air intake passage is relatively low, the control device

1 may control the negative pressure device 3 to suck dust with relatively small suction strength, so as to
2 reduce the energy consumption.

3 It should be noted herein that the first preset value and the second preset value may be set according to
4 practical requirements, for example, preset by the designer before the handheld cleaner 1000 leaves the
5 factory, or set and adjusted by the user after the handheld cleaner 1000 leaves the factory. Meanwhile, the
6 first suction strength and the second suction strength may be set according to practical requirements, for
7 example, predetermined by the designer before the handheld cleaner 1000 leaves the factory, or set and
8 adjusted by the user after the handheld cleaner 1000 leaves the factory.

9 In some embodiments of the present disclosure, the handheld cleaner 1000 includes a control key
10 connected with the control device. The control key is configured to control the control device to start
11 controlling the working state of the handheld cleaner 1000 according to the information detected by the
12 second detection device 500B after being triggered by an odd number of times (like the first time, the third
13 time, the fifth time, etc.), and configured to control the control device to stop controlling the working state
14 of the handheld cleaner 1000 according to the information detected by the second detection device 500B
15 after being triggered by an even number of times (like the second time, the fourth time, the sixth time, etc.).
16 The control key may be disposed to the casing 1 or other positions, for example, being configured as a
17 virtual key of a phone application.

18 That is, only after the user triggers the control key by the odd number of times, can the control device
19 start controlling the working state of the handheld cleaner 1000 according to the information detected by
20 the second detection device 500B, i.e. entering the energy-saving mode. Before the user triggers the control
21 key or when the user triggers the control key by the even number of times, the control device will not
22 control the working state of the handheld cleaner 1000 according to the information detected by the second
23 detection device 500B, i.e. stopping the energy-saving mode, even if the second detection device 500B
24 performs the detection. Thus, the user is offered more options and enjoys using the handheld cleaner 1000.
25 Moreover, the switching between entering the energy-saving mode and stopping the energy-saving mode
26 can be realized by triggering one control key different times, which saves space occupied by the control key
27 and improves simplicity.

28 In some other embodiments of the present disclosure, the handheld cleaner 1000 further includes a
29 turn-on control key and a turn-off control key. The turn-on control key is connected with the control device
30 and configured to control the control device to start controlling the working state of the handheld cleaner
31 1000 according to the information detected by the second detection device 500B after being triggered. The
32 turn-off control key is connected with the control device and configured to control the control device to
33 stop controlling the working state of the handheld cleaner 1000 according to the information detected by
34 the second detection device 500B after being triggered. The turn-on control key and the turn-off control key
35 may be disposed to the casing 1 and other positions, for example, being configured as virtual keys of a

1 phone application.

2 That is, only after the user triggers the turn-on control key, can the control device start controlling the
3 working state of the handheld cleaner 1000 according to the information detected by the second detection
4 device 500B, i.e. entering the energy-saving mode; after the user triggers the turn-off control key, the
5 control device will not control the working state of the handheld cleaner 1000 according to the information
6 detected by the second detection device 500B, i.e. stopping the energy-saving mode, even if the second
7 detection device 500B performs the detection. Thus, the user is offered more options and enjoys using the
8 handheld cleaner 1000. Moreover, the switch between entering the energy-saving mode and stopping the
9 energy-saving mode can be realized by the turn-on control key and the turn-off control key, which improves
10 accuracy and reliability of operations and reduce the probability of misuse.

11 In conclusion, in the handheld cleaner 1000 according to some specific embodiments of the present
12 disclosure, an emitting sensor and a receiving sensor are respectively provided at two sides of an air
13 passage, through which the sucked dust passes, so that when the dust passes through the air passage
14 between the two sensors, the sensors may perceive the amount of dust and transmit a signal indicating the
15 amount of dust to the main PCB, and thus the main PCB adjusts the power output by the motor 32
16 according to the signal, thereby improving the dust suction efficiency and saving energy.

17 Another method for controlling the handheld cleaner 1000 according to some extended embodiments
18 of the present disclosure will be described in detail.

19 Specifically, the method may include the following steps.

20 First, (step A) a concentration of dust sucked into the handheld cleaner 1000 is detected, i.e. the dust
21 concentration in the air intake passage of the handheld cleaner 1000 is detected. Then, (step B) the working
22 state of the handheld cleaner 1000 is controlled according to the detected dust concentration. For example,
23 the handheld cleaner 1000 is controlled to switch to the high-suction state or the low-suction state described
24 above. Thus, according to the method for controlling the handheld cleaner 1000 according to the
25 embodiments of the present disclosure, it is possible to make the handheld cleaner 1000 switch to the
26 corresponding working state according to changes of the dust concentration in the air intake passage, so as
27 to combine the dust suction effect and the energy-saving effect.

28 It should be noted herein that step A may be realized by the second detection device 500B described
29 above, and certainly may be realized in other manners. For example, the handheld cleaner 1000 may be
30 provided with a camera device for shooting a dust condition on the surface to be cleaned, and the
31 concentration of dust sucked into the handheld cleaner 1000 may be judged by a terminal connected with
32 the camera device. Step B may be realized by the control device described above, and certainly may be
33 realized in other manners. For example, the control in step B may be realized by a remote terminal or a
34 remote control device.

35 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000

1 may further include: controlling the handheld cleaner 1000 to increase the suction strength when it is
2 detected that the concentration of dust sucked into the handheld cleaner 1000 rises. That is, when it is
3 detected that the concentration of dust sucked into the handheld cleaner 1000 becomes high, the handheld
4 cleaner 1000 is controlled to increase the suction strength, so as to guarantee the dust suction effect.

5 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
6 may further include: controlling the handheld cleaner 1000 to decrease the suction strength when it is
7 detected that the concentration of dust sucked into the handheld cleaner 1000 drops. That is, when it is
8 detected that the concentration of dust sucked into the handheld cleaner 1000 becomes low, the handheld
9 cleaner 1000 is controlled to decrease the suction strength, so as to reduce the energy consumption.

10 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000 may
11 further include: controlling the negative pressure device 3 to operate with the first suction strength when it
12 is detected that the dust concentration is higher than the first preset value. That is, when it is detected that
13 the dust concentration is relatively high, i.e. there is much dust on the surface to be cleaned, the handheld
14 cleaner 1000 is controlled to switch to the high-suction state, and thus the handheld cleaner 1000 may suck
15 dust with a relatively great suction strength, so as to guarantee the dust suction effect.

16 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
17 may further include: controlling the negative pressure device 3 to operate with the second suction strength
18 when it is detected that the dust concentration is lower than the second preset value. That is, when it is
19 detected that the dust concentration is relatively low, i.e. there is little dust on the surface to be cleaned, the
20 handheld cleaner 1000 is controlled to switch to the low-suction state, and thus the handheld cleaner 1000
21 may suck dust with a relatively small suction strength, so as to reduce the energy consumption.

22 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
23 may further include: receiving an instruction of turning on the energy-saving mode, and starting to control
24 the working state of the handheld cleaner 1000 according to the detected dust concentration after receiving
25 the instruction. That is, only after the instruction of turning on the energy-saving mode is received, can the
26 working state of the handheld cleaner 1000 be controlled according to the detected information, i.e.
27 entering the energy-saving mode. Thus, the user may be offered more options and enjoy using the handheld
28 cleaner 1000.

29 In some embodiments of the present disclosure, the method for controlling the handheld cleaner 1000
30 may further include: receiving an instruction of turning off the energy-saving mode, and stopping
31 controlling the working state of the handheld cleaner 1000 according to the detected dust concentration
32 after receiving the instruction. That is, after the instruction of turning off the energy-saving mode is
33 received, the handheld cleaner 1000 cannot be controlled to switch the working state, i.e. stopping the
34 energy-saving mode, even if the information is detected. Thus, actual requirements of the user may be
35 satisfied better.

1 In some specific examples of the present disclosure, reception of the instruction of turning on the
2 energy-saving mode and reception of the instruction of turning off the energy-saving mode may be
3 integrated into one key, for example, into the control key described above. When the control key is
4 triggered by the odd number of times (like the first time, the third time, the fifth time, etc.), the instruction
5 of turning on the energy-saving mode is received to make the handheld cleaner 1000 enter the
6 energy-saving mode; when the control key is triggered by the even number of times (like the second time,
7 the fourth time, the sixth time, etc.), the instruction of turning off the energy-saving mode is received to
8 make the handheld cleaner 1000 stop the energy-saving mode.

9 In some specific examples of the present disclosure, the reception of the instruction of turning on the
10 energy-saving mode and the reception of the instruction of turning off the energy-saving mode may be
11 integrated into two keys, for example into the turn-on control key and the turn-off control key respectively.
12 When the turn-on control key is triggered, the instruction of turning on the energy-saving mode is received
13 to make the handheld cleaner 1000 enter the energy-saving mode; when the turn-off control key is triggered,
14 the instruction of turning off the energy-saving mode is received to make the handheld cleaner 1000 stop
15 the energy-saving mode.

16 In conclusion, the handheld cleaner 1000 according to some specific embodiments of the present
17 disclosure has the following advantages.

18 a. The negative pressure device 3 is disposed in the casing 1, such that the dust cup assembly 100 may
19 enjoy a compact, small and lightweight overall structure and be used with high comfort, and the air
20 passages in the dust cup assembly 100 have a compact layout and thus result in less suction power loss and
21 higher energy efficiency.

22 b. The cyclone separating device is provided in the casing 1, thus improving the cleaning effect of the
23 handheld cleaner 1000, and when the dedusting device 4 surrounds the negative pressure device 3, the
24 working noise of the handheld cleaner 1000 may be reduced, thus improving environmental friendliness of
25 the handheld cleaner 1000.

26 c. When the negative pressure device 3 and the device housing 2 are in one piece, space may be saved
27 effectively to further improve the structural compactness of the handheld cleaner 1000, the dust capacity
28 may be improved, and the strength of the device housing 2 may be strengthened without increasing cost,
29 such that the device housing 2 may protect the negative pressure device 3 better to prolong the service life
30 of the negative pressure device 3.

31 d. Other components in the dust cup assembly 100, except some components in one piece, may be
32 connected in a detachable manner, such that the dust cup assembly 100 is convenient to assemble and
33 disassemble and also may be selectively assembled and disassembled, which facilitates targeted cleaning of
34 internal components of the handheld cleaner 1000 and improves the cleaning effect of the handheld cleaner
35 1000.

1 e. The motor 32 and the cyclone 410 are axially spaced apart from each other, so as to make better use
2 of the space in the casing 1 and improve the dust suction effect.

3 f. The air exhaust port 220 is disposed at the bottom of the dust cup assembly 100, the airstream
4 purified by the handheld cleaner 1000 is exhausted downwards, which prevents the dust cup assembly 100
5 from blowing air to the user, improves the comfort of using the handheld cleaner 1000, and hence raises the
6 user's willingness to use the handheld cleaner 1000.

7 g. The dust collecting groove 4210 is provided, such that the dust accumulates in dust collecting
8 groove 4210 may be kept away from the airstream flowing in the casing 1 and hence will not be rolled up
9 easily to block the filter or enter the next stage of cyclone chamber, and moreover, after the dust in dust
10 collecting groove 4210 accumulates to a certain amount, dust outside the dust collecting groove 4210 may
11 be adhered to, thereby preventing the dust from being blown up and improving the cleaning effect.
12 Additionally, the first dust-blocking sheet 113 and the second dust-blocking sheet 114 are provided in the
13 casing 1 to further prevent the dust from being blown repeatedly to block the filter or enter the next stage of
14 cyclone chamber, which improves the cleaning effect.

15 h. The center of gravity of the handle assembly 200 is raised, such that the whole handheld cleaner
16 1000 may be held more effortlessly.

17 i. The extension pipe 300 may enlarge the whole angle range of dust suction of the handheld cleaner
18 1000 on one hand, and also may be detached from the dust cup assembly 100 to be used separately on the
19 other hand.

20 j. The first detection device 500A is provided, such that the handheld cleaner 1000 may adjust the
21 working state thereof automatically according to its own motion state, thus achieving the dust suction effect
22 and the energy-saving effect simultaneously.

23 k. The second detection device 500B is provided, such that the handheld cleaner 1000 may adjust the
24 working state thereof automatically according to the dust concentration, thus achieving the dust suction
25 effect and the energy-saving effect simultaneously.

26 **Embodiment 2**

27 **Hereinafter, a handheld cleaner W according to embodiments of the present disclosure will be**
28 **described with reference to Figs. 20 and 21.**

29 As shown in Figs. 20 and 21, the handheld cleaner W includes a dust cup assembly WD and a handle
30 assembly WE, in which, the dust cup assembly WD includes a casing D1, a dedusting device D2 and a
31 negative pressure device D3. The casing D1 may have an air suction port and an air exhaust port, the
32 negative pressure device D3 is disposed in an interior of the casing D1 and used to suck dusty air from
33 environment into the interior of the casing D1 via the air suction port, the dedusting device D2 is disposed
34 in the interior of the casing D1 and used to perform dust and air separation for the airflow sucked into the
35 casing D1. The separated airflow may be exhausted out of the casing D1 via the air exhaust port by the

1 negative pressure device D3, and the separated dust matter may be retained in the interior of the casing D1.
2 It should be noted herein that the handheld cleaner refer to a cleaner that a user may pick up the whole
3 machine by handholding motion, which differs from a cleaner in the prior art that the whole machine needs
4 to be pushed to move on a support surface.

5 Referring to Figs. 20 and 21, the handle assembly WE is mounted to the dust cup assembly WD, for
6 example, the handle assembly WE may be mounted to the casing D1 and used for handholding, that is to
7 say, the user may pick up the dust cup assembly WD by holding the handle assembly WE so as to perform
8 cleaning work. In addition, optionally, the handle assembly WE may include a handle casing E1 and a
9 power supply device E2, in which, the handle casing E1 is disposed to the casing D1 and used for
10 handholding, the power supply device E2 is mounted to the handle casing E1 and is electrically connected
11 to the negative pressure device D3, thus, the power supply device E2 may supply power to the negative
12 pressure device D3, furthermore, since the power supply device E2 is mounted to the handle casing E1 of
13 the handle assembly WE and the negative pressure device D3 is mounted in the casing D1 of the dust cup
14 assembly WD, an overall gravity center of the handheld cleaner W is optimized, such that the user may
15 hold the handheld cleaner W more easily and effortlessly.

16 **Hereinafter, the dust cup assembly WD according to embodiments of the present disclosure will**
17 **be described with reference to Figs. 20 and 21.**

18 Referring to Figs. 20 and 21, the dust cup assembly WD includes the casing D1, the negative pressure
19 device D3 and the dedusting device D2, in which, the casing D1 includes a cup body D11 and a cleaner
20 cover D12, an accommodating space with an open top is defined in the cup body D11, the negative pressure
21 device D3 and the dedusting device D2 are both mounted in the accommodating space in the interior of the
22 cup body D11 and the dedusting device D2 is located above the negative pressure device D3.

23 As examples shown in Figs. 20 and 21, an air exhaust chamber D101, a dedusting chamber D102 and
24 a dust collecting chamber D103 are provided in the cup body D11, in which, the air exhaust chamber D101
25 is configured to have an upright columnar shape (a cross section thereof is not limited to have regular
26 shapes such as a circular shape, a polygonal shape, etc.), the dedusting chamber D102 (a cross section
27 thereof is not limited to be in the shape of a closed circular ring, a closed polygonal ring, may also be an
28 irregular ring) surrounds the air exhaust chamber D101 by one circle, the dust collecting chamber D103 is
29 located below the dedusting device D2 and the air exhaust chamber D101, the dedusting device D2 is
30 provided in the dedusting chamber D102, the negative pressure device D3 is provided in the dust collecting
31 chamber D103 and in communication with the air exhaust chamber D101.

32 As shown in Figs. 20 and 21, the cleaner cover D12 capable of being opened and closed is disposed on
33 the cup body D11 to open and close the accommodating space, the dedusting device D2 is designed to be
34 withdrawable, that is to say, the dedusting device D2 is detachably provided in the casing D1. Thus, when
35 the handheld cleaner W needs to be cleaned, the user may open the cleaner cover D12 by himself and

1 withdraw the dedusting device D2 located above upwardly from the interior of the casing D1, and clean it,
2 which is convenient for the user to perform the cleaning, and improves the cleaning effect of the handheld
3 cleaner W. Furthermore, when the user needs to perform a dust collection work using the handheld cleaner
4 W, the user may mount the dedusting device D2 back into the cup body D11 by himself, and then cover the
5 cleaner cover D12 on the top of the cup body D11, i.e. close the cleaner cover D12, such that the handheld
6 cleaner W may operate normally.

7 Preferably, referring to Figs. 20 and 21, a first end and a second end opposite to each other are
8 provided on edges of the cleaner cover D12 (for example, when the cleaner cover D12 is circular, the first
9 end and the second end are located at two sides of the cleaner cover D12 in a diameter direction thereof),
10 the first end is articulated with the casing D1, and the second end is connected to the casing D1 by a snap
11 connection. Thus, after the snap connection is released, the user may lift the second end of the cleaner cover
12 D12 to open the cleaner cover D12, which is convenient for the user to open the cleaner cover D12, and
13 avoids problems of being lost when the cleaner cover D12 is removed completely and being hard to be
14 assembled back to the casing D1 after the cleaner cover D12 is removed completely. It should be noted
15 herein that, the snap structure for connecting the casing D1 and the cleaner cover D12 is well known by
16 those skilled in the art, for example, it may be a snap structure for opening a cover of a rice cooker, which
17 will not be described in detail herein. Of course, the present disclosure is not limited thereto, the cleaner
18 cover D12 may be designed as a structure completely withdrawable from the cup body D11, which will not
19 be described in detail herein.

20 Further, as shown in Figs. 20 and 21, a communicating chamber is provided in the cleaner cover D12,
21 an end face at a side of the cleaner cover D12 facing towards the cup body D11 has an air inlet
22 communicating the communicating chamber with the dedusting chamber D102 and an air outlet
23 communicating the communicating chamber with the air exhaust chamber D101, the end face at the side of
24 the cleaner cover D12 is provided with a filter D121 which is detachable and seals the air inlet. Thus, the
25 airflow separated from the dedusting chamber D102 may enter the communicating chamber after passing
26 through the filter D121 and the air inlet, and then the airflow entering the communicating chamber is
27 exhausted into the air exhaust chamber D101 via the air outlet. Thus, the communicating chamber and the
28 filter D121 are disposed to the cleaner cover D12, which may further improve the cleaning effect of the
29 handheld cleaner W. Furthermore, since the cleaner cover D12 is disposed at a position that the user may
30 take it directly and a side surface of the filter D121 used for filtrating faces outward, the user may clearly
31 see that whether the filter D121 needs to be cleaned, and when the filter D121 needs to be cleaned, the user
32 may easily remove the filter D121 and then mount it back after cleaning.

33 Further, referring to Figs. 20 and 21, the cup body D11 includes a mounting frame D111 and a dust
34 collecting cup D112, the dedusting device D2 is supported on a top of the mounting frame D111, the
35 negative pressure device D3 is mounted to a bottom of the mounting frame D111. That is to say, on one

1 hand, the mounting frame D111 may support the dedusting device D2, such that the dedusting device D2
2 may be taken out of the cup body D11 when the user lifts the dedusting device D2 upwardly, on the other
3 hand, the mounting frame D111 may be used for mounting and fixing the negative pressure device D3, such
4 that the negative pressure device D3 is located below the dedusting device D2 so as to avoid affecting the
5 negative pressure device D3 being taken out upwardly.

6 As shown in Figs. 20 and 21, the dust collecting cup D112 is a casing that at least a top thereof is
7 opened, and covers over the negative pressure device D3, and the dust collecting cup D112 is detachably
8 connected to the mounting frame D111. That is to say, the dust collecting cup D112 is detachably fixed
9 together with the mounting frame D111. So that, when the user removes the dust collecting cup D112 from
10 the mounting frame D111, the negative pressure device D3 is still mounted to the mounting frame D111 and
11 does not move, such that the user may pour the dust in the dust collecting cup D112 and clean it, after
12 cleaning the dust collecting cup D112, the user may fit it over the negative pressure device D3 from bottom
13 to top and connect the dust collecting cup D112 to the mounting frame D111, thereafter, the dust collecting
14 cup D112 may continue to collecting the dust.

15 Thus, with the dust cup assembly WD according to embodiments of the present disclosure, the cleaner
16 cover D12 is openable, the dust collecting cup D112, the dedusting device D2 and the filter D121 are all
17 detachable components, such that the user may selectively withdraw an component to be cleaned for
18 cleaning, which is convenient for the user to use.

19 For example, in some optional embodiments of the present disclosure, the dust collecting cup D112
20 may be detachably connected to the mounting frame D111 by a button-hook structure, in which, the
21 button-hook structure includes a hook for connecting the dust collecting cup D112 and the mounting frame
22 D111 together, and a button for unlocking the hook, that is to say, when the button is pressed, the hook may
23 perform a release motion, such that the dust collecting cup D112 and the mounting frame D111 are
24 disconnected, thus the dust collecting cup D112 may be removed from the mounting frame D111. In which,
25 specific structures and motion principles of the hook that locks two components together and the button
26 unlocks the hook are well known by those skilled in the art, which will not be described in detail herein.

27 For example, in other optional embodiments of the present disclosure, the dust collecting cup D112 is
28 detachably connected to the mounting frame D111 by an internal-external-thread structure. For example, an
29 outer circumferential surface of a top end of the dust collecting cup D112 may have an external thread, the
30 mounting frame D111 is annular and an inner circumferential surface thereof has an internal thread. Thus,
31 when the dust collecting cup D112 is rotated, the external thread may be threaded into the internal thread,
32 such that the internal thread and the external thread are in a threaded fit, thus the dust collecting cup D112
33 may be mounted to the mounting frame D111.

34 In some embodiments of the present disclosure, referring to Figs. 20 and 21, the mounting frame D111
35 includes a ring D1111, a limiting and supporting portion D1112 and a fixed mounting portion D1113. A top

1 cup ring D1121 of the dust collecting cup D112 is connected to the ring D1111 in a butt connection, that is
2 to say, the top cup ring D1121 of the dust collecting cup D112 may be fitted over the ring D1111, the top
3 cup ring D1121 of the dust collecting cup D112 may also be fitted in the ring D1111, a lower end of the ring
4 D1111 may also be connected to a upper end face of the casing D1 in a butt connection, so as to achieve
5 that the dust collecting cup D112 may be detachably connected to the ring D1111. Thus, since a shape of
6 the ring D1111 may be easily matched to a shape of the top cup ring D1121 of the dust collecting cup D112,
7 such that the dust collecting cup D112 may be simply mounted to the mounting frame D111, furthermore,
8 sealing between the ring D1111 and the dust collecting cup D112 may be easily ensured, and an overall
9 operation performance of the handheld cleaner W is ensured.

10 Referring to Figs. 20 and 21, the fixed mounting portion D1113 is provided in the ring D1111, that is
11 to say, the fixed mounting portion D1113 may be directly or indirectly fixed in the ring D1111, and the
12 fixed mounting portion D1113 is used to fix the negative pressure device D3, that is to say, the negative
13 pressure device D3 may be fixedly mounted to the fixed mounting portion D1113. The limiting and
14 supporting portion D1112 is provided in the ring D1111, that is to say, the limiting and supporting portion
15 D1112 may be directly or indirectly fixed in the ring D1111, the limiting and supporting portion D1112 is
16 fitted with the dedusting device D2 to limit a displacement of the dedusting device D2 in directions other
17 than an upward direction, that is to say, the limiting and supporting portion D1112 is fitted with the
18 dedusting device D2, such that the dedusting device D2 may only be moved upward and taken out, but may
19 not fall downward or traverse in a horizontal plane. Thus, with the limiting and supporting portion D1112,
20 on one hand, the dedusting device D2 can be mounted to operate normally, and on the other hand, the
21 dedusting device D2 may be conveniently taken out. It should be noted herein that the wording “provided
22 in the ring D1111” in the present paragraph means that an axial projection of the ring D1111 is located
23 inside an inner ring of the ring D1111.

24 Thus, a structure of the mounting frame D111 including the ring D1111, the limiting and supporting
25 portion D1112 and the fixed mounting portion D1113 is simple, the one mounting frame D111 has multiple
26 functions of mounting the dedusting device D2, the negative pressure device D3 and the dust collecting cup
27 D112, such that the mounting frame D111 has a powerful function.

28 Preferably, referring to Fig. 20, the mounting frame D111 is formed in one piece, that is to say, the
29 mounting frame D111 is one non-detachable integral component (unless it is damaged intentionally), for
30 example, the ring D1111, the limiting and supporting portion D1112 and the fixed mounting portion D1113
31 may be processed into one integral component by an injection molding process. Thus, the mounting frame
32 D111 has a simpler structure for easy production, and is more modularized for convenient assembly,
33 furthermore, the structure of the dust cup assembly WD is more clearly and simpler, which is not easy to
34 cause failure and has a high reliability.

35 In embodiments of the present disclosure, referring to Fig. 20, the cup body D11 may further include a

1 suction nozzle D113, the suction nozzle D113 communicates an external environment of the handheld
2 cleaner W with the interior of the dedusting chamber D102 to serve as an air suction port and to introduce
3 the airflow from the external environment into the dedusting chamber D102. The suction nozzle D113 is
4 fixed to the mounting frame D111, or the suction nozzle D113 and the mounting frame D111 are integrally
5 formed (that is to say, the mounting frame D111 and the suction nozzle D113 are non-detachable unless it is
6 damaged intentionally, i.e. the mounting frame D111 and the suction nozzle D113 are formed as one
7 integral component). Thus, the mounting frame D111 has a powerful function and is more modularized,
8 such that the structure of the dust cup assembly WD is more concise and clearer, which is not easy to cause
9 failure and has a high reliability.

10 In addition, in embodiments of the present disclosure, referring to Fig. 20, at least part of the handle
11 casing E1 described herein and the mounting frame D111 are also integrally formed (that is to say, the
12 mounting frame D111 and at least part of the handle casing E1 are non-detachable unless it is damaged
13 intentionally, i.e. the mounting frame D111 and the at least part of the handle casing E1 are formed as one
14 integral component). Thus, the mounting frame D111 has a powerful function and is more modularized,
15 such that the structure of the dust cup assembly WD is more concise and clearer, which is not easy to cause
16 failure and has a high reliability.

17 Preferably, referring to Fig. 20, the suction nozzle D113, the at least part of the handle casing E1 and
18 the mounting frame D111 are integrally formed (that is to say, the mounting frame D111, the at least part of
19 the handle casing E1 and the suction nozzle D113 are non-detachable unless it is damaged intentionally, i.e.
20 the mounting frame D111, the at least part of the handle casing E1 and the suction nozzle D113 are formed
21 as one integral component). Thus, the mounting frame D111 has a powerful function and is more
22 modularized, such that the structure of the dust cup assembly WD is more concise and clearer, which is not
23 easy to cause failure and has a high reliability.

24 In embodiments of the present disclosure, the dedusting device D2 has a limiting hole D210
25 penetrating therethrough in an up-and-down direction and a support groove D211 with an open bottom, and
26 the support groove D211 includes two support sub-grooves D2111 disposed at two radial sides of the
27 limiting hole D210. The limiting and supporting portion D1112 includes a limiting post Da and a support
28 beam Db, the limiting post Da is provided in the ring D1111 and fitted in the limiting hole D210 in an
29 insertion manner, the support beam Db includes two support sub-beams Db1 disposed at two radial sides of
30 the limiting post Da respectively, and the two support sub-beams Db1 are correspondingly provided in the
31 two support sub-grooves D2111 and support top walls of the corresponding support sub-grooves D2111. It
32 should be noted herein that, since the bottom of the support groove D211 is open, the support groove D211
33 has the top wall, and if a top wall of the support groove D211 is open, the support groove D211 may have a
34 bottom wall.

35 Thus, the limiting hole D210 is fitted with the limiting post Da in an insertion manner, which

1 effectively avoids a movement of the dedusting device D2 in a horizontal plane with respect to the
2 mounting frame D111. The support groove D211 is supported by the support beam Db, such that the
3 mounting frame D111 may effectively support the dedusting device D2 to prevent the dedusting device D2
4 from falling, and may effectively prevent the dedusting device D2 from rotating in the horizontal plane with
5 respect to the mounting frame D111. Furthermore, structures of the dedusting device D2 and the limiting
6 and supporting portion D1112 are simple, and may be processed and assembled conveniently, and the
7 supporting effect and the limiting effect on the dedusting device D2 performed by the limiting and
8 supporting portion D1112 are excellent.

9 It should be noted herein that, the wording “the limiting post Da is fitted in the limiting hole D210 in
10 an insertion manner” means that shapes of the limiting post Da and the limiting hole D210 are matched to
11 each other, after the limiting post Da is coaxially inserted into the limiting hole D210, the limiting post Da
12 is in a clearance fit with the limiting hole D210 and the clearance is uniform. Preferably, a cross section of
13 the limiting post Da is circular, but it is not limited thereto, the cross section of the limiting post Da may
14 also be polygonal or irregular, in which, when the cross section of the limiting post Da is circular, a radial
15 direction of the limiting post Da refers to a diameter direction thereof, and when the cross section of the
16 limiting post Da is not circular, the radial direction of the limiting post Da refers to a length direction of the
17 cross section thereof.

18 In one optional embodiment of the present disclosure, referring to Figs. 20 and 21, each support
19 sub-beam Db1 has one splicing plate Dc extending downward. The dedusting device D2 includes a
20 split-type filtration tube D22 (the split-type filtration tube D22 refers to a filtration tube having a
21 non-closed ring-like or an interrupted ring-like cross section) and a filtration tube cover plate D21, the
22 split-type filtration tube D22 includes two arc filters D221 respectively disposed at two sides of the support
23 groove D211, two splicing plates Dc are connected between side edges of the two arc filters D221 adjacent
24 to each other so as to make up a continuous filtration tube (the continuous filtration tube refers to a
25 filtration tube having a closed-ring-like cross section) together with the two arc-shaped filters D221, the
26 filtration tube cover plate D21 is covered on a top of the continuous filtration tube, and the limiting hole
27 D210 is formed in a center of the filtration tube cover plate D21 and the support groove D211 is formed in
28 a bottom wall of the filtration tube cover plate D21. Thus, the dedusting device D2 has a simple structure,
29 and may be assembled to the mounting frame D111 conveniently. Furthermore, by forming the continuous
30 filtration tube, a first stage cyclone separation may be performed between an outer circumferential surface
31 of the continuous filtration tube and the inner circumferential surface of the cup body D11, so as to obtain a
32 good dedusting effect.

33 Optionally, the dedusting device D2 further includes a cyclone assembly, the cyclone assembly is
34 provided in the split-type filtration tube D22, two cyclone assemblies are included and located at two sides
35 of the support groove D211, each cyclone assembly is connected to the corresponding arc filter D221 and

1 includes a plurality of cyclones arranged in a circumferential direction of the split-type filtration tube D22,
2 the filtration tube cover plate D21 has air outlet pipes D212 correspondingly extending into each cyclone,
3 in which, each cyclone is configured as a conical tube having a tapered bottom and a tangential inlet in a
4 side wall thereof. Thus, the airflow separated by the first stage cyclone separation outside the continuous
5 filtration tube may enter an interior of the continuous filtration tube via a filtration hole D220 of the arc
6 filter D221, and then enters the plurality of cyclones to be subject to a second stage cyclone separation. The
7 airflow separated by the second stage cyclone separation may output upward via the air outlet pipe D212,
8 such that the dedusting effect of the dust cup assembly WD may be further improved. A plurality of air
9 inlets of the above-described cleaner cover D12 are included and directly opposite to upper ends of the
10 plurality of air outlet pipes D212 one to one, thus, the dedusting chamber D102 may conveniently introduce
11 the air into the communicating chamber, which has a high efficiency for dust absorbing.

12 Preferably, the limiting post Da is a hollow cylinder and the air exhaust chamber D101 is defined
13 therein, a bottom of the air exhaust chamber D101 is in communication with the negative pressure device
14 D3, for example, the fixed mounting portion D1113 may be a cover body in a butt connection with and in
15 communication with the limiting post Da in an up-and-down direction, and the negative pressure device D3
16 is disposed in the cover body. Thus, when the negative pressure device D3 is started, a negative pressure
17 may be produced in the cover body, a negative pressure may also be produced in the limiting post Da in
18 communication with the cover body, meanwhile, a negative pressure may also be produced in the
19 communicating chamber in the cleaner cover 12 in communication with the air exhaust chamber D101 in
20 the limiting post Da, a negative pressure may also be produced in the dedusting chamber D102 in
21 communication with the communicating chamber, such that the dedusting chamber D102 may suck airflow
22 from the outer environment via the suction nozzle D113.

23 **Hereinafter, referring to Figs. 20 and 21, the handle assembly WE according to embodiments of**
24 **the present disclosure will be described.**

25 Referring to Figs. 20 and 21, the power supply device E2 is disposed to an inner top of the handle
26 casing E1 or an outer top of the handle casing E1, for example, the power supply device E2 may be a
27 battery assembly embedded in the handle casing D1, or the power supply device E2 may also be a battery
28 pack detachably connected to the handle casing E1. Thus, by disposing the power supply device E2 to the
29 top of the handle casing E1, an overall gravity center of the handheld cleaner W is optimized, such that the
30 user may hold the handheld cleaner W more effortlessly.

31 Optionally, referring to Figs. 20 and 21, the handle casing E1 includes an holding portion E11, and
32 upper arm portion E12 and a lower arm portion E13, in which, the holding portion E11 is vertically
33 provided and is spaced apart from the casing D1, the upper arm portion E12 is connected between an upper
34 end of the holding portion E11 and the casing D1, the lower arm portion E13 is connected between a lower
35 end of the holding portion E11 and the casing D1, in which, the power supply device E2 is provided to an

1 inner or an outer top of the upper arm portion E12, so as to ensure that the power supply device E2 is
2 located at the top of the handle casing E1. Thus, by providing the upper arm portion E12 and the lower arm
3 portion E13, the holding portion E11 may be reliably mounted to the casing D1, furthermore, by providing
4 the holding portion E11, the user may firmly grasp the handle assembly WE. Of course, the present
5 disclosure is not limited thereto, in other embodiments of the present disclosure, the handle casing E1 may
6 also have other shapes, for example, and the handle casing E1 may also do not include the lower arm
7 portion E13 etc., which will not be described herein.

8 Preferably, referring to Figs. 20 and 21, the upper end of the holding portion E11 is connected to a
9 center of a bottom of the upper arm portion E12, the lower end thereof extends towards a direction far away
10 from the casing D1, that is to say, the holding portion E11 obliquely extends towards the direction far away
11 from the casing D1 along a direction from top to bottom, such that the user may hold the holding portion
12 E11 more effortlessly, and the user may adjust an operation angle of the handheld cleaner W more easily. In
13 addition, the upper end of the holding portion E11 is connected to the center of the bottom of the upper arm
14 portion E12, such that a support reliability of the holding portion E11 may be improved and a force to the
15 holding portion E11 is reduced. Optionally, the lower arm portion E13 obliquely extends upward in a
16 direction from the casing D1 to the holding portion E11, thus, a grasping space for the user increases, such
17 that the user may conveniently grasp the holding portion E11.

18 In one optional example of the present disclosure, referring to Fig. 20, the casing D1 has an electrical
19 connection port, the power supply device E2 is mounted to the outer top of the upper arm portion E12 and
20 is electrically inserted in the electrical connection port, thus, the power supply device E2 may be
21 conveniently removed for charging. It should be understood herein that, the electrical connection port may
22 be electrically connected to the negative pressure device D3 via a wire penetrating the handle casing E1 and
23 the casing D1, which is not limited thereto.

24 Preferably, the holding portion E11 may include an inner holding casing and an outer holding casing,
25 the upper arm portion E12 may include an upper-arm upper casing and an upper-arm lower casing, and the
26 lower arm portion E13 may include a lower-arm lower casing and a lower-arm upper casing, in which, the
27 inner holding casing, the upper-arm lower casing, the lower-arm upper casing and the casing D1 are formed
28 in one piece, the outer holding casing may be detachably mounted to an outer side of the inner holding
29 casing, the upper-arm upper casing may be detachably mounted to a top of the upper-arm lower casing, and
30 the lower-arm lower casing may be detachably mounted to a bottom of the lower-arm upper casing.

31 Preferably, referring to Figs. 20 and 21, the casing D1 has a cylindrical outer surface, the upper arm
32 portion E12 is connected to a top end of the circumferential surface of the casing D1, and the lower arm
33 portion E13 is connected to a bottom end of the circumferential surface of the casing D1. Thus, an overall
34 size of the handle assembly WE may be increased, an overall gravity center of the handheld cleaner W is
35 effectively optimized, and the user may hold the handheld cleaner W more effortlessly.

1 Preferably, referring to Figs. 20 and 21, the casing D1 has a cylindrical outer surface, a center line of
2 the holding portion E11 (i.e. a center line of the holding portion E11 extending in a length direction thereof),
3 a center line of the upper arm portion E12 (i.e. a center line of the upper arm portion E12 extending in a
4 length direction thereof), a center line of the lower arm portion E13 (i.e. a center line of the lower arm
5 portion E13 extending in a length direction thereof) and an axis of the casing D1 are located in the same
6 plane. Thus, an overall gravity center of the handheld cleaner W is effectively optimized, and the user may
7 hold the handheld cleaner W more effortlessly.

8 **Hereinafter, referring to Figs. 20 and 21, a work principle of the handheld cleaner W according**
9 **to embodiments of the present disclosure will be briefly described.**

10 When the negative pressure device D3 (for example, including an electric motor and a fan) is started,
11 the dedusting chamber D102 sucks the dusty air from the outer environment via the suction nozzle D113.
12 After entering the cup body D11, the dusty air undergoes the first stage cyclone separation between the
13 outer circumferential surface of the continuous filtration tube and the inner circumferential surface of the
14 cup body D11, the dust matter separated by the first stage cyclone separation falls into the bottom of the
15 dust collecting cup D112, and the airflow separated by the first stage cyclone separation may enter the
16 continuous filtration tube via the filtration hole D220 of the continuous filtration tube, and enters the
17 plurality of cyclones to undergo the second stage cyclone separation via the tangential inlet in the side wall
18 of each cyclone. The dust matter separated by cyclone separation in the plurality of cyclones falls
19 downward into the bottom of the dust collecting cup D112 via the outlet of the bottom of the cyclone, and
20 the airflow separated by the second stage cyclone separation in the plurality of cyclones may flow upward,
21 pass through the air outlet pipe D212 of the filtration tube cover plate D21 and the filter D121 and air inlet
22 of the cleaner cover D12, and enter the communicating chamber, the airflow in the communicating chamber
23 is discharged into the air exhaust chamber D101 via air outlet of the cleaner cover D12, and finally the
24 airflow flows through the negative pressure device D3 and is discharged via the air exhaust port of the
25 casing D1.

26 **Hereinafter, beneficial effects of the handheld cleaner W according to embodiments of the**
27 **present disclosure will be briefly described.**

28 1. As to a handheld cleaner in the related art, a power supply device and a negative pressure device are
29 both provided in the handle, and the power supply device is generally disposed to a bottom of the handle,
30 such that the handle has a large volume and weight, which is not only inconvenient but also laborious for
31 handholding with little comfort.

32 However, with the handheld cleaner W according to embodiments of the present disclosure, the power
33 supply device E2 is disposed to the top of handle casing E1, meanwhile, the negative pressure device D3 is
34 provided in the dust collecting cup D112, such that a distribution of the center of gravity of the handheld
35 cleaner W is effectively improved, i.e. a position of the center of overall gravity of the handheld cleaner W

1 is balanced, the comfort of the user holding the handheld cleaner W is improved, such that the user may use
2 the handheld cleaner W more effortlessly and easily, improving the user experience.

3 2. As to the handheld cleaner in the related art, a dedusting device is fixed inside the cleaner body, the
4 user may not remove the dedusting device by himself to clean it, thus, the residual dust in the dedusting
5 device easily causes bacterial growth, resulting in stink, and further causes a secondary pollution for the
6 next use, which reduces the overall cleaning effect.

7 However, with the handheld cleaner W according to embodiments of the present disclosure, since the
8 cleaner cover D12 may be conveniently opened, and the dedusting device D2 may be taken out of the
9 interior of the dust collecting cup D112, such that the user may clean the dedusting device D2 conveniently,
10 which avoids residual dust in the casing D1, avoids problems of growth of bacteria, generation of stink, etc.,
11 and improves the overall cleaning effect of the handheld cleaner W.

12 **Embodiment 3**

13 Hereinafter, a handheld cleaner V according to an embodiment of the present disclosure will be
14 described with reference to Figs. 22 to 33.

15 As shown in Figs. 22, 28 and 30, the handheld cleaner V includes a dust cup assembly VB and a
16 handle assembly VC, in which the dust cup assembly VB includes a casing B1, a dedusting device B2 and a
17 negative pressure device B3. The casing B1 has an air suction port and an air exhaust port. The negative
18 pressure device B3 is provided in the casing B1 and configured to suck dusty air from the environment into
19 the casing B1 via the air suction port. The dedusting device B2 is provided in the casing B1 and configured
20 to perform dust and air separation on an airflow sucked into the casing B1. The separated air may be
21 exhausted out of the casing B1 via the air exhaust port by the negative pressure device B3, whereas the
22 separated dust may remain in the casing B1. It should be noted herein that the handheld cleaner refers to a
23 cleaner whose whole machine can be picked up by the user through a hand-holding action, which
24 distinguishes from the cleaner in the prior art whose whole machine needs to be pushed on a support
25 surface.

26 Referring to Figs. 22 and 30, the handle assembly VC is mounted to the dust cup assembly VB, and
27 for example, the handle assembly VC may be mounted to the casing B1 and used for handhold, that is, the
28 user may pick up the dust cup assembly VB by holding the handle assembly VC so as to perform the
29 cleaning work. In addition, optionally, the handle assembly VC may include a handle casing C1 and a

1 power supply device C2, in which the handle casing C1 is provided to the casing B1 and used for handheld,
2 and the power supply device C2 is mounted to the handle casing C1 and electrically connected with the
3 negative pressure device B3, such that the power supply device C2 may supply power to the negative
4 pressure device B3. Furthermore, since the power supply device C2 is mounted to the handle casing C1 of
5 the handle assembly VC, and the negative pressure device B3 is mounted inside the casing B1 of the dust
6 cup assembly VB, a gravity center of the entire handheld cleaner V may be optimized, such that the user
7 may hold the handheld cleaner V more easily and effortlessly.

8 Hereinafter, the dust cup assembly VB according to the embodiment of the present disclosure will be
9 described.

10 Referring to Fig. 30, a central chamber B101, a dedusting chamber B102 and a dust collecting
11 chamber B103 are provided within the casing B1, in which the central chamber B101 has an upright
12 columnar shape and includes an air exhaust chamber B1011 and a mounting chamber B1012 in
13 communication with each other in an up-and-down direction. The dedusting chamber B102 has a closed
14 annular cross section and the dedusting chamber B102 surrounds the air exhaust chamber B1011 by one
15 circle. The dust collecting chamber B103 is located below the dedusting chamber B102, has a non-closed
16 annular cross section and surrounds the mounting chamber B1012 by less than one circle. It should be
17 noted herein that a cross section of the central chamber B101 is not limited to having a regular shape such
18 as a circular shape or a polygonal shape, and a dimension of each cross section of the central chamber B101
19 may be inconsistent, that is, the shape of the central chamber B101 is not limited to a regular columnar
20 shape having equal cross sections. In addition, a cross section of the dedusting chamber B102 is not limited
21 to having a closed circular-ring shape or a closed polygonal-ring shape, but for example, may have an
22 irregular ring shape. Similarly, a cross section of the dust collecting chamber B103 is not limited to having
23 an open circular-ring shape or an open polygonal-ring shape, but for example, may have an irregular open
24 ring shape.

25 Referring to Figs. 30 and 33, at least a majority of the negative pressure device B3 is disposed in the
26 mounting chamber B1012, that is, a volume of a portion of the negative pressure device B3 disposed within
27 the mounting chamber B1012 accounts for more than half of a total volume of the negative pressure device

1 B3. Thus, by configuring the cross section of the dust collecting chamber B103 to have the non-closed
2 annular shape, i.e. the open ring shape, an occupation space of the dust collecting chamber B103 may be
3 reduced to increase an occupation space of the mounting chamber B1012, thereby facilitating the mounting
4 of the negative pressure device B3. Preferably, a lower portion of the air exhaust chamber B1011 is
5 configured as an expansion segment, that is, a transverse volume of the lower portion of the air exhaust
6 chamber B1011 is greater than a transverse volume of an upper portion thereof. For example, a
7 cross-sectional area of the lower portion of the air exhaust chamber B1011 may increase gradually, in which
8 case an upper end of the negative pressure device B3 extends into the expansion segment, so as to achieve a
9 compact structure and lower a height of the mounting chamber B1012. Certainly, the present disclosure is
10 not limited to this, and the negative pressure device B3 may be completely disposed in the mounting
11 chamber B1012.

12 Certainly, the present disclosure is not limited to this, and in other embodiments of the present
13 disclosure, the casing B1 may not have the air exhaust chamber B1011, in which case the dedusting
14 chamber B102 may be a columnar cavity and superposed upon the dust collecting chamber B103 and the
15 mounting chamber B1012, and the mounting chamber B1012 may be in direct communication with the
16 dedusting chamber B102. Additionally, referring to Fig. 30, when the casing B1 has the air exhaust
17 chamber B1011 therein, the air exhaust chamber B1011 may be communicated with the dedusting chamber
18 B102 through a communicating chamber B105 or other means, such that the negative pressure device B3
19 may be communicated with the dedusting chamber B102 through the air exhaust chamber B1011 and the
20 communicating chamber B105, so as to suck the dusty air in the environment into the dedusting chamber
21 B102.

22 Referring to Figs. 22 and 30, the casing B1 may include a cabinet B11 and a dust cup B12, in which
23 the central chamber B101 and the dedusting chamber B102 both are formed in the cabinet B11 and
24 configured to mount the negative pressure device B3 and the dedusting device B2 respectively. The dust
25 collecting chamber B103 is formed in the dust cup B12 and configured to receive the dust separated by the
26 dedusting device B2. The cabinet B11 and the dust cup B12 are detachably connected, such that when the
27 handheld cleaner V needs to be used for cleaning, the user may mount the dust cup B12 to the cabinet B11

1 by himself to collect dust, and when the handheld cleaner V does not need to be used for cleaning, e.g.
2 when the dust in the dust cup B12 needs to be poured out, or when the handheld cleaner V needs to be
3 cleaned or maintained, the user may detach the dust cup B12 from the cabinet B11.

4 For example, in the embodiment shown in Figs. 23, 30 and 31, the cabinet B11 may be detachably
5 connected with the dust cup B12 via a quick release assembly, the dust collecting chamber B103 is located
6 in front of the mounting chamber B1012 (i.e. a cup casing B122 is disposed in the front of a top of a base
7 B121), and the quick release assembly includes a first assembly B141 disposed at a front top of the dust cup
8 B12 and a second assembly B142 disposed at a rear bottom of the dust cup B12. Thus, the quick release
9 assembly may detachably connect the front top of the dust cup B12 with the cabinet B11 and detachably
10 connect the rear bottom of the dust cup B12 with the cabinet B11 respectively, so as to improve reliability
11 and stability of connection between the dust cup B12 and the cabinet B11 effectively, and to facilitate the
12 assembling and disassembling of the cabinet B11 and the dust cup B12.

13 Alternatively, referring to Figs. 22 and 23, the first assembly B141 includes a snap plate B1411 and a
14 snap piece B1412, in which the snap plate B1411 is disposed at a front bottom of the cabinet B11, extends
15 downwards and has a snap hole B14110, and the snap piece B1412 is disposed at the front top of the dust
16 cup B12 and extends forwards into the snap hole B14110 to limit a detachment of the dust cup B12 and the
17 cabinet B11 in a direction other than a front-and-rear direction. That is, by the fitting between the snap plate
18 B1411 and the snap piece B1412, the dust cup B12 and the cabinet B11 cannot be separated in other
19 directions but only in the front-and-rear direction. Thus, the first assembly B141 has a simple structure, is
20 convenient to process and assemble or disassemble, and has high reliability in position limitation.

21 Alternatively, referring to Figs. 22, 30 and 31, the second assembly B142 includes a first snap hook
22 B1421, a second snap hook B1422, a movable latch B1423 and an unlocking button B1424. The first snap
23 hook B1421 is disposed at a rear bottom of the cabinet B11 and has a front end bent downwards to define a
24 hooking groove. The second snap hook B1422 is disposed at the rear bottom of the dust cup B12 and has a
25 rear end bent upwards to extend into the hooking groove so as to limit the detachment of the dust cup B12
26 and the cabinet B11 in the front-and-rear direction. That is, by the fitting between the first snap hook B1421
27 and the second snap hook B1422, the dust cup B12 and the cabinet B11 cannot be separated in the

1 front-and-rear direction. Thus, the second assembly B142 has a simple structure, is convenient to process
2 and assemble or disassemble, and has high reliability in position limitation. In addition, through combined
3 position limitation of the first assembly B141 and the second assembly B142, the dust cup B12 and the
4 cabinet B11 cannot be separated in any direction, thus enhancing the assembling reliability of the casing
5 B1.

6 Alternatively, referring to Figs. 22, 30 and 31, the second assembly B142 may further include the
7 movable latch B1423 and the unlocking button B1424. The movable latch B1423 is disposed at the rear
8 bottom of the cabinet B11 and is movable in the front-and-rear direction, and a front end of the movable
9 latch B1423 abuts against a bottom of the second snap hook B1422 to prevent the second snap hook B1422
10 from moving downwards out of the hooking groove, such that the movable latch B1423 may prevent the
11 second snap hook B1422 from moving downwards, so as to ensure the reliability of position limitation
12 between the second snap hook B1422 and the first snap hook B1421. The unlocking button B1424 capable
13 of being pressed is disposed to the cabinet B11 and fitted with the movable latch B1423. The unlocking
14 button B1424 is configured to move the movable latch B1423 backwards when being pressed, so as to
15 release the position limitation on the second snap hook B1422. That is, when the unlocking button B1424 is
16 pressed down, the unlocking button B1424 drives the movable latch B1423 to move backwards, and at this
17 time the front end of the movable latch B1423 does not abut against the bottom of the second snap hook
18 B1422 any longer, such that the second snap hook B1422 may move downwards out of the hooking groove
19 to release the position limitation therebetween. It can be understood herein that through a downward
20 movement of the unlocking button B1424, the movable latch B1423 may be unlocked in various ways, for
21 example, through fitting between a wedge-shaped block and a wedge-shaped groove shown in Fig. 22,
22 which will not be elaborated herein.

23 As shown in Figs. 22 to 25, the dust cup B12 may include the base B121 and the cup casing B122.
24 The cup casing B122 is configured to have a non-closed annular cross section with an opening, so as to
25 define the dust collecting chamber B103 having the non-closed annular cross section in the cup casing
26 B122. The cup casing B122 is disposed at the top of the base B121, and a mounting space B107 located
27 outside the dust collecting chamber B103 is defined between an inner-ring wall face B1221 of the cup

1 casing B122 and a top wall of the base B121. A top of the mounting space B107 is directly opened, and a
2 side portion thereof is opened by an opening. Thus, a portion of the cabinet B11 for containing the negative
3 pressure device B3 may be mounted in the mounting space B107 via the opened portion of the mounting
4 space B107, such that the cabinet B1 and the negative pressure device B3 may be assembled or
5 disassembled very conveniently, thereby improving the assembling and disassembling efficiency and
6 providing use convenience.

7 Preferably, referring to Figs. 23 and 24, the base B121 is configured to have a flat cylindrical shape
8 (i.e. a cylinder having a diameter greater than an axial height thereof), and an outer-ring wall face B1222 of
9 the cup casing B122 is configured as an arc-shaped plate formed by vertically stretching an arc of an edge
10 of the base B121. That is, the outer-ring wall face B1222 of the cup casing B122 lies in a cylindrical surface
11 where an outer circumferential wall face of the base B121 is located. Thus, the base B121 may be smoothly
12 transmitted to the cup casing B122 at a junction of the base B121 and the cup casing B122, so as to
13 improve overall aesthetics of the dust cup B12. Preferably, a central angle of the above-described arc is
14 $180^{\circ}\sim 200^{\circ}$, that is, a central angle of the outer-ring wall face B1222 of the cup casing B122 is $180^{\circ}\sim 200^{\circ}$,
15 so it may be ensured that a size of the dust collecting chamber B103 is large enough to improve a dust
16 collection amount of the dust cup B12. In addition, the inner-ring wall face B1221 of the cup casing B122
17 may be processed as an arc-shaped plate formed by vertically stretching an arc-shaped curve, so as to
18 facilitate processing and achieve good processing technology.

19 Referring to Figs. 22, 23 and 30, the cabinet B11 may include an upper body B111 and a lower body
20 B112, the upper body B111 is disposed at a top of the lower body B112 and defines the air exhaust chamber
21 B1011 and the dedusting chamber B102 therein, and the lower body B112 is disposed at a bottom of the
22 upper body B111 and defines the mounting chamber B1012 therein, in which the lower body B112 is
23 mounted in the mounting space B107 via the opened portion of the mounting space B107, and the upper
24 body B111 is supported on the top of the cup casing B122. Thus, the cabinet B11 has a simple structure and
25 is matched with the profile of the dust cup B12, so that the assembling and disassembling of the cabinet
26 B11 and the dust cup B12 are convenient, and an overall structure of the casing B1 is highly reliable.

27 Referring to Figs. 23 and 32, the lower body B112 may include a protection casing plate B1121 and

1 an appearance casing plate B1122, in which the protection casing plate B1121 is disposed adjacent to the
2 inner-ring wall face B1221, the appearance casing plate B1122 is located at a side of the protection casing
3 plate B1121 away from the inner-ring wall face B1221, and the mounting chamber B1012 is defined
4 between the appearance casing plate B1122 and the protection casing plate B1121. Thus, the lower body
5 B112 has a simple structure and is convenient to process. Preferably, a shape of the protection casing plate
6 B1121 is matched with a shape of the inner-ring wall face B1221, that is, a distance between the protection
7 casing plate B1121 and the inner-ring wall face B1221 is equal everywhere, so as to improve a space
8 utilization rate and address problems such as installation interference. Preferably, two side edges of the
9 protection casing plate B1121 are connected with two side edges of the cup casing 122 in a ring-length
10 direction correspondingly and respectively, thereby improving an overall aesthetic effect of the handheld
11 cleaner V.

12 For example, in the embodiment shown in Figs. 22, 23, 24 and 32, the cup casing B122 is disposed on
13 a front portion of the base B121 and has a cross section of a circular-ring shape protruding forwards, the
14 protection casing plate B1121 is configured as an arc-shaped plate protruding forwards, and the appearance
15 casing plate B1122 is configured as an arc-shaped plate protruding rearwards. Left and right ends of the
16 protection casing plate B1121 are respectively connected to an inner surface of the appearance casing plate
17 B1122 to define the mounting chamber B1012 between the protection casing plate B1121 and the
18 appearance casing plate B1122. A left end of the appearance casing plate B1122 extends forwards on the
19 left and is connected with a left end of the cup casing B122, and a right end of the appearance casing plate
20 B1122 extends forwards on the right and is connected with a right end of the cup casing B122. Thus, the
21 lower body B112 has a simple structure and is easy to process.

22 Preferably, as shown in Figs. 22, 23, 30 and 32, the mounting chamber B1012 may be further
23 provided with an air-exhaust filtration device B4 therein, the air-exhaust filtration device B4 is located
24 between the negative pressure device B3 and the appearance casing plate B1122 and an air exhaust space
25 B106 is defined between the air-exhaust filtration device B4 and the appearance casing plate B1122, in
26 which the base B121 supports a bottom of the lower body B112 and avoids a bottom of the air exhaust
27 space B106. Therefore, the airflow sucked into the mounting chamber B1012 by the negative pressure

1 device B3 may undergo filtration of the air-exhaust filtration device B4, and then be exhausted out of the
2 casing B1 through the bottom of the air exhaust space B106, so as to improve an overall cleaning effect of
3 the handheld cleaner V. Furthermore, since the base B121 supports the bottom of the lower body B112, it is
4 possible to effectively prevent the negative pressure device B3 and the air-exhaust filtration device B4 from
5 falling down, and also to prevent the cabinet B11 from applying the entire pressure thereof to the cup
6 casing B122 and hence causing the cup casing B122 to be crushed. In addition, the cabinet B11 may further
7 include a bottom cover mounted at a bottom of the protection casing plate B1121, so as to further prevent
8 the negative pressure device B3 from falling down.

9 Preferably, as shown in Figs. 23 and 32, the protection casing plate B1121 and/or the appearance
10 casing plate B1122 have a sliding groove B11210 extending in the up-and-down direction, the air-exhaust
11 filtration device B4 has an elastic sliding sheet B41, and the elastic sliding sheet B41 is slidably fitted in the
12 sliding groove B11210 and has an elastic interference fit with the sliding groove B11210. Thus, through the
13 elastic interference fit between the elastic sliding sheet B41 and the sliding groove B11210, it is possible to
14 realize quick assembling and disassembling of the air-exhaust filtration device B4 and the mounting
15 chamber B1012, so as to make it convenient for the user to replace the air-exhaust filtration device B4. For
16 example, in the embodiment shown in Figs. 23 and 32, left and right sides of the protection casing plate
17 B1121 each have one sliding groove B11210, left and right sides of the air-exhaust filtration device B4 are
18 each provided with one elastic sliding sheet B41, the elastic sliding sheet B41 at the left side is slidably
19 fitted in the sliding groove B11210 at the left side, and the elastic sliding sheet B41 at the right side is
20 slidably fitted in the sliding groove B11210 at the right side, thereby making the fitted sliding movement
21 more stable and the position limitation more reliable.

22 Referring to Figs. 30 and 32, an isolating screen B5 may be further provided in the mounting chamber
23 B1012 and interposed between the negative pressure device B3 and the air-exhaust filtration device B4,
24 thus further improving operation reliability of the negative pressure device B3 and preventing the
25 air-exhaust filtration device B4 from being rolled into the negative pressure device B3.

26 Referring to Figs. 28 and 30, the upper body B111 may include a tube casing B1111 and an air exhaust
27 pipe B1112, in which the air exhaust pipe B1112 is provided in the tube casing B1111 and the dedusting

1 chamber B102 is defined between the air exhaust pipe B1112 and the tube casing B1111, a bottom of the air
2 exhaust pipe B1112 penetrates through a bottom wall of the tube casing B1111 and the air exhaust chamber
3 B1011 in communication with the mounting chamber B1012 is defined in the air exhaust pipe B1112. In
4 such a case, the dedusting device B2 may be fitted over the air exhaust pipe B1112 and located within the
5 dedusting chamber B102, and the upper end of the negative pressure device B3 may stretch into the air
6 exhaust pipe B1112. Preferably, a lower portion of the air exhaust pipe B1112 is configured as an expansion
7 pipe segment B11120, that is, a transverse volume of the lower portion of the air exhaust pipe B1112 is
8 greater than a transverse volume of an upper portion thereof. For example, a cross-sectional area of the
9 lower portion of the air exhaust pipe B1112 may increase gradually, so as to achieve a compact structure of
10 the casing B1 and lower an overall height of the casing B1.

11 In some embodiments of the present disclosure, referring to Figs. 22, 28 and 29, the casing B1 may
12 further include a cleaner cover B13 capable of being opened and closed and disposed at a top of the cabinet
13 B11, that is, the cleaner cover B13 may be disposed at the top of the tube casing B1111, in which case the
14 dedusting device B2 is removably disposed within the dedusting chamber B102 and located above the
15 negative pressure device B3. Thus, when the handheld cleaner V needs to be cleaned, the user may open the
16 cleaner cover B13 by himself/herself and take the dedusting device B2 located above out of the cabinet B11
17 to clean the dedusting device B2, such that it is convenient for the user to clean the handheld cleaner V, and
18 the cleaning effect of the handheld cleaner V is improved. Furthermore, when the user needs to use the
19 handheld cleaner V for vacuuming, the user may mount the dedusting device B2 back into the cabinet B11
20 by himself/herself, and then cover the cleaner cover B13 on the top of the cabinet B11, i.e. closing the
21 cabinet B11, such that the handheld cleaner V may operate normally.

22 Alternatively, an edge of the cleaner cover B13 has a first end and a second end opposite to each other
23 (for example, when the cleaner cover B13 is circular, the first end and the second end are located at two
24 sides of the cleaner cover B13 in a diameter direction thereof), the first end is articulated with the cabinet
25 B11, and the second end is connected to the cabinet B11 by a snap connection. Therefore, after the snap
26 connection is released, the user may grasp the second end of the cleaner cover B13 to lift the cleaner cover
27 B13, thus making it convenient for the user to open the cleaner cover B13, and avoiding problems of losing

1 the cleaner cover B13 when the cleaner cover B13 is removed completely and hardly assembling the
2 cleaner cover B13 back to the cabinet B11 after the cleaner cover B13 is removed completely. It should be
3 noted herein that, a snap structure for connecting the cabinet B11 and the cleaner cover B13 is well known
4 to those skilled in the art, and for example, it may be a snap structure for opening a cover of a rice cooker,
5 which thus will not be elaborated herein. Of course, the present disclosure is not limited to this, and the
6 cleaner cover B13 may be designed as a structure completely removable from the cabinet B11, which will
7 not be elaborated herein.

8 Alternatively, as shown in Figs. 29 and 30, the communicating chamber B105 may be provided in the
9 cleaner cover B13, an end surface of the cleaner cover B13, which is located at a side of the cleaner cover
10 B13 and faces the upper body B111, has an air inlet communicating the communicating chamber B105 with
11 the dedusting chamber B102 and an air outlet B1301 communicating the communicating chamber B105
12 with the central chamber B101, and the end surface of the cleaner cover B13 is provided with a filter B131
13 which is detachable and covers the air inlet. Thus, the airflow separated from the dedusting chamber B102
14 may enter the communicating chamber B105 via passing through the filter B131 and the air inlet, and then
15 the airflow entering the communicating chamber B105 is exhausted into the central chamber B101 via the
16 air outlet B1301. Thus, by providing the cleaner cover B13 with the communicating chamber B105 and the
17 filter B131, the cleaning effect of the handheld cleaner V may be further improved. Furthermore, since the
18 filter B131 is disposed at a position where the user may access the filter B131 directly, and a side surface of
19 the filter B131 used for filtration faces outwards, the user may clearly see whether the filter B131 needs to
20 be cleaned, and when the filter B131 needs to be cleaned, the user may easily remove the filter B131 and
21 mount the filter B131 back after cleaning.

22 In some embodiments of the present disclosure, referring to Figs. 28, 29 and 30, the dedusting device
23 B2 may include a cyclone separating member B21 and an end cover B22 disposed on the cyclone
24 separating member B21, in which the cyclone separating member B21 may include a filtration tube B211
25 and a plurality of cyclones B212. The filtration tube B211 is disposed in the dedusting chamber B102 and
26 divides the dedusting chamber B102 into a second cyclone chamber B1022 and a first cyclone chamber
27 B1021 located at an inner side and an outer side of the filtration tube B211 respectively. When the air

1 exhaust pipe B1112 is provided in the upper body B111, the filtration tube B211 is disposed in the
2 dedusting chamber B102 and freely fitted over the air exhaust pipe B1112, in which case the second
3 cyclone chamber B1022 is defined between the filtration tube B211 and the air exhaust pipe B1112, and the
4 first cyclone chamber B1021 is defined between the filtration tube B211 and the tube casing B1111.

5 Referring to Figs. 25, 29, 30 and 33, the plurality of cyclones B212 each are disposed in the second
6 cyclone chamber B1022, arranged successively along a circumferential direction of the filtration tube B211
7 and located right above the top of the cup casing B122, or the plurality of cyclones B212 are disposed
8 around the air exhaust chamber B1011 (or the air exhaust pipe B1112) and located right above the dust
9 collecting chamber B103, such that a line of centers of the plurality of cyclones B212 is also a non-closed
10 ring line having an opening, and hence it is ensured that the dust separated by each cyclone B212 is
11 accurately discharged into the dust collecting chamber B103, thus reducing the cost. Alternatively, each
12 cyclone B212 may be fixed to an inner circumferential wall of the filtration tube B211, such that the
13 cyclone filter B131 is an integral member, which is convenient to assemble, disassemble and process.
14 Preferably, each cyclone B212 may be configured as a conical tube having a tapered bottom portion, so as
15 to avoid interfering with the expansion pipe segment B11120 of the air exhaust pipe B1112 and improve
16 compactness of the structure.

17 Referring to Figs. 28, 29 and 30, a filtration hole B2110 is provided in a side wall of the filtration tube
18 B211, and for example, the filtration tube B211 may include a filtration tube body B2111 having a slot and
19 a filtration screen B2112 inserted in the slot. A tangential inlet B2120 is provided in a side wall of each
20 cyclone B212. The tube casing B1111 is provided with an air suction pipe B1113, and a guiding member is
21 provided at a junction of the air suction pipe B1113 and the tube casing B1111 and configured to guide the
22 airflow tangentially into the first cyclone chamber B1021, such that the airflow entering the first cyclone
23 chamber B1021 may move circumferentially, in which case the dust in the airflow may be thrown out by a
24 centrifugal force while the air separated from the airflow may enter the second cyclone chamber B1022
25 through the filtration hole B2110 in the filtration tube B211. The airflow entering the second cyclone
26 chamber B1022 may enter the cyclone B212 through the tangential inlet B2120 and move circumferentially
27 in the cyclone B212, in which case the dust in the airflow may be thrown out by the centrifugal force and

1 discharged out from a bottom of the cyclone B212 while the air separated from the airflow may be
2 exhausted upwards out from a top of the cyclone B212, thereby performing the dedusting operation by
3 cyclone separation. It should be noted herein that the air described herein is construed in a broad sense, i.e.
4 including non-pure air containing fine dust particles.

5 Alternatively, referring to Figs. 29, 30 and 31, the end cover B22 includes a cover plate B221
6 configured to cover the cyclone separating member B21 and a plurality of air outlet pipes B222 inserted in
7 the cover plate B221. Respective lower ends of the plurality of air outlet pipes B222 extend into the
8 plurality of cyclones B212 correspondingly while respective upper ends thereof are right opposite to a
9 plurality of air inlets in a plurality of cabinets B13, so as to guide the airflow separated from the cyclones
10 B212 into the communicating chamber B105. Thus, by providing the end cover B22, the air separated from
11 the cyclones B212 may be guided into the communicating chamber B105 simply, effectively and reliably,
12 and it is ensured that the dedusting device B2 becomes more modular and more integral.

13 Certainly, the present disclosure is not limited to this, and the dedusting device B2 may be free of the
14 cyclone separating member B21 and the end cover B22, in which case the dedusting device B2 may be
15 simply configured as a filter screen. Moreover, the cyclone separating member B21 may be free of the
16 filtration tube B211. That is to say, a specific structure of the dedusting device B2 may be specifically
17 configured in accordance with actual production requirements.

18 Referring to Figs. 25-27, 30 and 33, the cup casing B122 is provided with a chamber-partition wall
19 B123, the chamber-partition wall B123 is disposed between the inner-ring wall face B1221 and the
20 outer-ring wall face B1222 and divides the dust collecting chamber B103 into a first dust collecting
21 chamber B1031 and a second dust collecting chamber B1032 located at two sides of the chamber-partition
22 wall B123 and isolated mutually. That is to say, through an isolation action of the chamber-partition wall
23 B123, the first dust collecting chamber B1031 and the second dust collecting chamber B1032 are not in
24 communication with each other, such that the dust in the first dust collecting chamber B1031 will not flow
25 back into the second dust collecting chamber B1032, so as to avoid interfering with a secondary cyclone
26 separation operation described herein.

27 Referring to Fig. 27, a top end of the first dust collecting chamber B1031 is opened as an inlet thereof,

1 a top end of the second dust collecting chamber B1032 is opened as an inlet thereof, a bottom end of the
2 first dust collecting chamber B1031 is opened as an outlet thereof, and a bottom end of the second dust
3 collecting chamber B1032 is opened as an outlet B1230 thereof.

4 The first dust collecting chamber B1031 is located right under the first cyclone chamber B1021 and
5 the inlet of the first dust collecting chamber B1031 is in communication with the first cyclone chamber
6 B1021. The second dust collecting chamber B1032 is located right under the second cyclone chamber
7 B1022 and the inlet of the second dust collecting chamber B1032 is in communication with the plurality of
8 cyclones B212. Therefore, the dust separated from the first cyclone chamber B1021 may be accurately
9 discharged downwards into the first dust collecting chamber B1031, and the dust separated from the
10 cyclone B212 may be accurately discharged downwards into the second dust collecting chamber B1032,
11 thus effectively addressing a problem that the dust in the dust collecting chamber B103 flows back into the
12 dedusting chamber B102, so as to improve the cleaning effect and efficiency.

13 Alternatively, a bottom wall of the second dust collecting chamber B1032 is configured as an inclined
14 wall with a high center and two low ends, and the two ends of the inclined wall are opened as outlets B1230
15 of the second dust collecting chamber B1032. Therefore, the dust falling into the second dust collecting
16 chamber B1032 may slide from top to bottom along the bottom wall of the second dust collecting chamber
17 B1032 to the outlets B1230 at two sides of the bottom of the second dust collecting chamber B1032, thus
18 effectively preventing the dust from rising in the second dust collecting chamber B1032.

19 Alternatively, the chamber-partition wall B123 includes a vertical wall B1231 and a horizontal wall
20 B1232. The vertical wall B1231 is vertically disposed between the inner-ring wall face B1221 and the
21 outer-ring wall face B1222. Referring to Figs. 26 and 27, the vertical wall B1231 may be an arc-shaped
22 plate protruding forwards and vertically disposed, and a top end of the vertical wall B1231 is flush with a
23 top end of the dust collecting chamber B103. The horizontal wall B1232 is connected between a bottom end
24 of the vertical wall B1231 and the inner-ring wall face B1221, and the second dust collecting chamber
25 B1032 is defined by the horizontal wall B1232, the vertical wall B1231 and the inner-ring wall face B1221.
26 Thus, the chamber-partition wall B123 has a simple structure and is convenient to process.

27 Referring to Figs. 24 and 25, the dust cup B12 may further include a cup cover B124 disposed at the

1 top of the cup casing B122 and configured to cover the dust collecting chamber B103. The cup cover B124
2 has a dust inlet B1240 in communication with the dust collecting chamber B103. The dust inlet B1240
3 includes a first dust inlet B1241 communicating the first dust collecting chamber B1031 with the first
4 cyclone chamber B1021, and second dust inlets B1242 communicating the second dust collecting chamber
5 B1032 with the plurality of cyclones B212, and a lower end of each cyclone B212 penetrates through the
6 bottom wall of the tube casing B1111 and is inserted in the corresponding second dust inlet B1242 while
7 being fitted therewith. Therefore, the cup cover B124 is provided to prevent the dust in the dust collecting
8 chamber B103 from flowing into the environment on one hand, and to achieve a function of positioning the
9 cyclone B212 and thus improve reliability of mounting the cyclone B212 on the other hand.

10 For example, in the embodiment shown in Figs. 24 and 25, the cup cover B124 may have a
11 non-closed annular shape with an opening, so as to be matched with the top of the dust collecting chamber
12 B103, in which one first dust inlet B1241 may be provided and located at an outer-ring side of the cup
13 cover B124, and six second dust inlets B1242 may be provided and located at an inner-ring side of the cup
14 cover B124 and spaced apart from one another in a length direction of the cup cover B124. A shape and a
15 size of each second dust inlet B1242 are matched with those of the lower end of the corresponding cyclone
16 B212, such that after lower ends of the plurality of cyclones B212 are inserted into the second dust inlets
17 B1242, it is possible to prevent the cyclone separating member B21 from shaking in the tube casing B1111
18 and improve operation reliability of the cyclone separating member B21.

19 It should be noted herein that when the dedusting chamber B102 is not divided into the first cyclone
20 chamber B1021 and the second cyclone chamber B1022, the dust cup B12 may not be provided with the
21 chamber-partition wall B123. That is to say, the dust collecting chamber B103 does not need to be divided
22 into the first dust collecting chamber B1031 and the second dust collecting chamber B1032, in which case
23 the cup cover B124 only needs to be provided with the dust inlet B1240, but not need the first dust inlet
24 B1241 and the second dust inlet B1242.

25 Referring to Figs. 24-27, 25 and 30, the base B121 may include a base body B1211 and a base bottom
26 cover B1212, and the base bottom cover B1212 is connected to a bottom of the base body B1211 and is
27 capable of being opened and closed, so as to define a buffering chamber B104 between the base bottom

1 cover B1212 and the base body B1211. A top wall of the base body B1211 has a communication hole, and a
2 bottom edge of the outer-ring wall face B1222 is connected to an edge of the communication hole in a butt
3 joint, so as to communicate the first dust collecting chamber B1031 with the buffering chamber B104.
4 Bottom edges of the inner-ring wall face B1221 and the chamber-partition wall B123 are inserted in the
5 communication hole while being fitted therewith and abut against the base bottom cover B1212, so as to
6 isolate the second dust collecting chamber B1032 from the first dust collecting chamber B1031 and the
7 buffering chamber B104.

8 Therefore, when the base bottom cover B1212 is in a closed position, the buffering chamber B104 is
9 defined between the base bottom cover B1212 and the base body B1211, in which case the dust in the first
10 dust collecting chamber B1031 may be discharged into the buffering chamber B104 and accumulated in the
11 buffering chamber B104, while the dust in the second dust collecting chamber B1032 may be accumulated
12 at the bottom of the second dust collecting chamber B1032. When the base bottom cover B1212 is in an
13 open position, the base bottom cover B1212 may open a bottom of the buffering chamber B104 and the
14 bottom of the second dust collecting chamber B1032, such that the dust in the buffering chamber B104 may
15 be discharged downwards out and the dust in the second dust collecting chamber B1032 may be discharged
16 downwards out.

17 Therefore, referring to Figs. 24 and 25, the base B121 is provided to increase a total capacity of the
18 dust cup B12, and the base bottom cover B1212 is configured to be opened and closed to facilitate dust
19 pouring of the dust cup B12. Additionally, it can be understood that there are various ways to connect the
20 base bottom cover B1212 with the base body B1211 in an openable manner. For example, a first end of the
21 base body B1211 may be articulated with a first end of the base bottom cover B1212, and a second end of
22 the base body B1211 may be connected with a second end of the base bottom cover B1212 by snap
23 connection, such that when the snap connection is released, the second end of the base body B1211 may be
24 flipped down by gravity to effect an opening action.

25 **The handle assembly VC according to the embodiment of the present disclosure will be**
26 **described below.**

27 Referring to Figs. 22 and 30, the power supply device C2 is disposed to an inner top of the handle

1 casing C1 or an outer top of the handle casing C1. For example, the power supply device C2 may a battery
2 assembly embedded in the handle casing C1, or the power supply device C2 may also be a battery pack
3 detachable from the handle casing C1. Thus, by disposing the power supply device C2 to the top of the
4 handle casing C1, the gravity center of the entire handheld cleaner V is optimized, and hence the user may
5 hold the handheld cleaner V more effortlessly.

6 Optionally, referring to Figs. 22 and 30, the handle casing C1 includes an holding portion C11, an
7 upper arm portion C12 and a lower arm portion C13, in which the holding portion C11 is vertically
8 disposed and is spaced apart from the cabinet B11, the upper arm portion C12 is connected between an
9 upper end of the holding portion C11 and the cabinet B11, and the lower arm portion C13 is connected
10 between a lower end of the holding portion C11 and the cabinet B11. The power supply device C2 is
11 provided to an inner top or an outer top of the upper arm portion C12, so as to ensure that the power supply
12 device C2 is located at the top of the handle casing C1. Thus, by providing the upper arm portion C12 and
13 the lower arm portion C13, the holding portion C11 may be reliably mounted to the cabinet B11, and
14 furthermore, by providing the holding portion C11, the user may firmly grasp the handle assembly VC. Of
15 course, the present disclosure is not limited to thus, in other embodiments of the present disclosure, the
16 handle casing C1 may also have other shapes, and for example, the handle casing C1 may not include the
17 lower arm portion C13 etc., which will not be described herein.

18 Preferably, referring to Figs. 22 and 30, the upper end of the holding portion C11 is connected to a
19 center of a bottom of the upper arm portion C12, and the lower end of the holding portion C11 extends in a
20 direction running away from the cabinet B11. That is to say, the holding portion C11 obliquely extends in
21 the direction running away from the cabinet B11 from top to bottom, such that the user may hold the
22 holding portion C11 more effortlessly, and the user may adjust an operation angle of the handheld cleaner V
23 more easily. In addition, the upper end of the holding portion C11 is connected to the center of the bottom
24 of the upper arm portion C12, such that reliability of supporting the holding portion C11 may be improved,
25 and a force applied on the holding portion C11 may be reduced. Optionally, the lower arm portion C13
26 obliquely extends upwards in a direction from the cabinet B11 to the holding portion C11, such that a
27 grasping space for the user is increased, and hence the user may grasp the holding portion C11
28 conveniently.

29 In an alternative example of the present disclosure, referring to Figs. 22 and 30, the upper arm portion
30 C12 is configured as a rectangle shell B1 disposed horizontally, and the power supply device C2 is
31 provided in the upper arm portion C12. Therefore, the upper arm portion C12 has a simple structure and is
32 easy to process, and it is convenient to mount the power supply device C2. Moreover, the reliability of

1 mounting the power supply device C2 may be enhanced. In another alternative example (not shown in the
2 drawings) of the present disclosure, the cabinet B11 has an electrical connection port, and the power supply
3 device C2 is disposed to the outer top of the upper arm portion C12 and is electrically plugged in the
4 electrical connection port, such that the power supply device C2 may be easily removed to be charged.

5 Preferably, at least part of the upper arm portion C12, at least part of the lower arm portion C13 and
6 the cabinet B11 are integrally molded, that is to say, at least part of the upper arm portion C12, at least part
7 of the lower arm portion C13 and the cabinet B11 may be configured as an integral part through one
8 injection molding, such that reliability of connecting the handle casing C1 with the cabinet B11 may be
9 enhanced effectively. Preferably, at least part of the holding portion C11, at least part of the upper arm
10 portion C12 and at least part of the lower arm portion C13 may be integrally molded, that is to say, at least
11 part of the holding portion C11, at least part of the upper arm portion C12 and at least part of the lower arm
12 portion C13 may be an integral part through one injection molding, such that structural reliability of the
13 handle casing C1 may be improved effectively.

14 For example, the holding portion C11 may include an inner holding casing and an outer holding
15 casing, the upper arm portion C12 may include an upper-arm upper casing and an upper-arm lower casing,
16 and the lower arm portion C13 may include a lower-arm lower casing and a lower-arm upper casing. The
17 inner holding casing, the upper-arm lower casing, the lower-arm upper casing and the cabinet B11 are
18 integrally molded, the outer holding casing may be detachably mounted to an outer side of the inner
19 holding casing, the upper-arm upper casing may be detachably mounted to a top of the upper-arm lower
20 casing, and the lower-arm lower casing may be detachably mounted to a bottom of the lower-arm upper
21 casing.

22 Preferably, referring to Fig. 22, an outer surface of the casing B1 has a cylindrical shape, the upper arm
23 portion C12 is connected to a top end of a circumferential surface of the casing B1, and the lower arm
24 portion C13 is connected to a bottom end of the circumferential surface of the casing B1. Thus, an overall
25 size of the handle assembly VC may be increased to optimize the gravity center of the entire handheld
26 cleaner V effectively, and thus the user can hold the handheld cleaner V more effortlessly.

27 Preferably, referring to Fig. 22, the outer surface of the casing B1 has the cylindrical shape, a center
28 line of the holding portion C11 (i.e. a center line of the holding portion C11 extending in a length direction
29 thereof), a center line of the upper arm portion C12 (i.e. a center line of the upper arm portion C12

1 extending in a length direction thereof), a center line of the lower arm portion C13 (i.e. a center line of the
2 lower arm portion C13 extending in a length direction thereof), and an axis of the casing B1 are located in
3 the same plane. Thus, the gravity center of the entire handheld cleaner V is optimized more effectively, and
4 the user may hold the handheld cleaner V more effortlessly.

5 **In the following, referring to Fig. 30, in combination with Figs. 22-33, a working principle of the**
6 **handheld cleaner V according to the embodiment of the present disclosure will be described in brief.**

7 When the negative pressure device B3 (e.g. including a motor and a fan) starts, negative pressure is
8 produced in the mounting chamber B1012, and hence negative pressure is also produced in the air exhaust
9 chamber B1011, the communicating chamber B105, the dedusting chamber B102 and the air suction pipe
10 B1113 which are in communication with the mounting chamber B1012. In such a case, the handheld
11 cleaner V may suck the dusty air from the external environment into the dedusting chamber B102 through
12 the air suction pipe B1113, and the dusty air enters the first cyclone chamber B1021 tangentially to undergo
13 the cyclone separation. The dust separated by the cyclone separation in the first cyclone chamber B1021
14 falls down, enters the first dust collecting chamber B1031 via the first dust inlet B1241 in the cup cover
15 B124, and is further discharged into the buffering chamber B104, while the airflow separated by the
16 cyclone separation in the first cyclone chamber B1021 enters the second cyclone chamber B1022 through
17 the filtration hole B2110 in the filtration tube B211, enters the plurality of cyclones B212 through the
18 tangential inlet B2120 in the side wall of each cyclone B212 to undergo the cyclone separation. The dust
19 separated by the cyclone separation in the plurality of cyclones B212 falls down, enters the second dust
20 collecting chamber B1032 via the second dust inlets B1242 in the cup cover B124, while the airflow
21 separated by the cyclone separation in the plurality of cyclones B212 flows upwards, passes through the
22 plurality of air outlet pipes B222 of the end cover B22, and further through the filter B131 and the air inlet
23 of the cleaner cover B13, and enters the communicating chamber B105. Subsequently, the airflow in the
24 communicating chamber B105 is exhausted into the air exhaust chamber B1011 through the air outlet
25 B1301 in the cleaner cover B13, further passes through the negative pressure device B3 and the isolating
26 screen B5 at a rear side of the negative pressure device B3, and then is exhausted to the air-exhaust
27 filtration device B4. The airflow is further exhausted out of the bottom of the air exhaust space B106 to the
28 external environment of the handheld cleaner V, after final filtration by the air-exhaust filtration device B4.

1 **In the following, beneficial effects in some aspects of the handheld cleaner V according to the**
2 **embodiment of the present disclosure will be described in brief.**

3 1. For the handheld cleaner in the related art, the power supply device and the negative pressure
4 device are both provided in the handle, and the power supply device is generally disposed at the bottom of
5 the handle, such that the handle has large volume and weight, and thus it is not only inconvenient for the
6 user to hold the handle, but also troublesome and uncomfortable for handholding.

7 However, for the handheld cleaner V according to the embodiment of the present disclosure, the power
8 supply device C2 is disposed to the top of handle casing C1, and the negative pressure device B3 is
9 disposed in the dust cup B12, so as to improve distribution of the gravity center of the handheld cleaner V
10 effectively, enhance the comfort of holding the handheld cleaner V by the user, and enable the user to use
11 the handheld cleaner V more effortlessly and easily, thereby improving the user experience.

12 2. For the handheld cleaner in the related art, since the dedusting device is fixed inside the cleaner
13 body, the user cannot remove the dedusting device by himself/herself to clean the dedusting device, such
14 that the dust remaining in the dedusting device tends to cause bacteria growth, result in odor, and further
15 lead to secondary pollution for the next use, thus reducing the overall cleaning effect.

16 However, for the handheld cleaner V according to the embodiment of the present disclosure, since the
17 cleaner cover B13 may be conveniently opened, and the dedusting device B2 may be taken out of the
18 cabinet B11, the user may clean the dedusting device B2 conveniently, which prevents the dust from
19 remaining in the cabinet B11, avoids problems of bacteria growth and odor generation, and improves the
20 overall cleaning effect of the handheld cleaner V.

21 3. For the handheld cleaner in the related art, the negative pressure device is typically disposed in the
22 handle, so the handle has the large volume and weight, and thus it is not only inconvenient for the user to
23 hold the handle, but also troublesome and uncomfortable for handholding. In addition, for some other
24 handheld cleaners in the related art, the negative pressure device is disposed in the cup casing but
25 surrounded by the dust collecting chamber entirely, such that the negative pressure device is difficult to
26 assemble or disassemble and is not convenient to maintain or repair.

27 However, for the handheld cleaner V according to the embodiment of the present disclosure, by
28 disposing the negative pressure device B3 in the dust cup B12, the distribution of the gravity center of the
29 handheld cleaner V is improved effectively, and the comfort of holding the handheld cleaner V by the user
30 is enhanced. Moreover, since the cup casing B122 of the dust cup B12 is configured to have an
31 annular-column shape with a side opening, the negative pressure device B3 may be assembled or
32 disassembled from the side opening conveniently, thus facilitating the assembling, disassembling,
33 maintenance and replacement of the negative pressure device B3. Additionally, since the dedusting device

1 B2 is located in the dedusting chamber B102 outside the dust collecting chamber B103, the dust cup B12
2 and the dedusting device B2 are relatively independent, the dust in the dust collecting chamber B103 will
3 not be raised or flow back to the dedusting chamber B102 easily, so as to improve the dedusting effect,
4 reduce suction resistance, and lower energy consumption.

5 4. For the handheld cleaner V according to the embodiment of the present disclosure, the dedusting
6 device B2 and the negative pressure device B3 are both disposed in the cabinet B11, and the dedusting
7 device B2 is arranged at an upper side of the negative pressure device B3. Also, the dust cup B12 is
8 disposed outside the cabinet B11, and the cup casing B122 of the dust cup B12 surrounds the negative
9 pressure device B3 by less than one circle. Thus, the overall structure layout of the handheld cleaner V is
10 optimized and the user experience is improved.

11 5. For the handheld cleaner V according to the embodiment of the present disclosure, the dedusting
12 device B2 and the negative pressure device B3 are both disposed in the cabinet B11, and the dedusting
13 device B2 is arranged at the upper side of the negative pressure device B3. Also, the dust cup B12 is
14 disposed outside the cabinet B11, and the cup casing B122 of the dust cup B12 surrounds the negative
15 pressure device B3 by less than one circle. Moreover, the power supply device C2 is disposed at the top of
16 the handle casing C1. Thus, the overall structure layout of the handheld cleaner V is further optimized and
17 the user experience is further improved.

18 6. For the handheld cleaner V according to the embodiment of the present disclosure, since the upper
19 end of the negative pressure device B3 may utilize the expansion space among the bottoms of the plurality
20 of cyclones B212, the space utilization rate and the structural compactness of the dust cup assembly VB are
21 improved, an internal space of the casing B1 is saved, an effective volume of the dust cup B12 is increased,
22 and an overall size of the handheld cleaner V is decreased, thus making the entire handheld cleaner V
23 lightweight and enhancing the user experience.

24 In the specification, it is to be understood that terms such as “central,” “longitudinal,” “lateral,”
25 “length,” “width,” “thickness,” “upper,” “lower,” “front,” “rear,” “left,” “right,” “vertical,” “horizontal,”
26 “top,” “bottom,” “inner,” “outer,” “clockwise,” “counterclockwise,” “axial,” “radial” and “circumferential”
27 should be construed to refer to the orientation as then described or as shown in the drawings under
28 discussion. These relative terms are for convenience of description and do not require that the present
29 disclosure be constructed or operated in a particular orientation.

30 In addition, terms such as “first” and “second” are used herein for purposes of description and are not
31 intended to indicate or imply relative importance or significance or to imply the number of indicated
32 technical features. Thus, the feature defined with “first” and “second” may comprise one or more of this
33 feature. In the description of the present disclosure, “a plurality of” means two or more than two, unless

1 specified otherwise.

2 In the present disclosure, unless specified or limited otherwise, the terms “mounted,” “connected,”
3 “coupled,” “fixed” and the like are used broadly, and may be, for example, fixed connections, detachable
4 connections, or integral connections; may also be direct connections or indirect connections via intervening
5 structures; may also be inner communications of two elements or interaction of two elements, which can be
6 understood by those skilled in the art according to specific situations. In the present disclosure, unless
7 specified or limited otherwise, a structure in which a first feature is “on” or “below” a second feature may
8 include an embodiment in which the first feature is in direct contact with the second feature, and may also
9 include an embodiment in which the first feature and the second feature are not in direct contact with each
10 other, but are contacted via an additional feature formed therebetween. Furthermore, a first feature “on,”
11 “above,” or “on top of” a second feature may include an embodiment in which the first feature is right or
12 obliquely “on,” “above,” or “on top of” the second feature, or just means that the first feature is at a height
13 higher than that of the second feature; while a first feature “below,” “under,” or “on bottom of” a second
14 feature may include an embodiment in which the first feature is right or obliquely “below,” “under,” or “on
15 bottom of” the second feature, or just means that the first feature is at a height lower than that of the second
16 feature.

17 Reference throughout this specification to “an embodiment,” “some embodiments,” “an example,” “a
18 specific example,” or “some examples,” means that a particular feature, structure, material, or characteristic
19 described in connection with the embodiment or example is included in at least one embodiment or
20 example of the present disclosure. Thus, the appearances of the phrases in various places throughout this
21 specification are not necessarily referring to the same embodiment or example of the present disclosure.
22 Furthermore, the particular features, structures, materials, or characteristics may be combined in any
23 suitable manner in one or more embodiments or examples. In addition, those skilled in the art can integrate
24 and combine different embodiments or examples, and the features in different embodiments or examples
25 without contradiction.

26 Although embodiments of the present disclosure have been shown and illustrated, it shall be
27 understood by those skilled in the art that various changes, modifications, alternatives and variants without
28 departing from the principle and spirit of the present disclosure are acceptable. The scope of the present
29 disclosure is defined by the claims or the like.

What is claimed is:

1. A dust cup for the cleaner having the negative pressure device, comprising:
a base and a cup casing, wherein the cup casing has a non-closed annular cross section with an opening so as to define a dust collecting chamber having a non-closed annular cross section in the cup casing, the cup casing is disposed at a top of the base, a mounting space located outside the dust collecting chamber is defined between an inner-ring wall face of the cup casing and a top wall of the base, a top of the mounting space is directly opened, and a side of the mounting space is opened by an opening, and the negative pressure device is mounted to the mounting space via an opened portion of the mounting space.
2. The dust cup according to claim 1, wherein the inner-ring wall face of the cup casing is configured as an arc-shaped plate formed by vertically stretching an arc-shaped curve.
3. The dust cup according to any one of claims 1-2, wherein the base is configured to have a flat cylindrical shape, and an outer-ring wall face of the cup casing is configured as an arc-shaped plate formed by vertically stretching an arc of a base edge.
4. The dust cup according to claim 3, wherein a central angle of the above-described arc is $180^{\circ}\sim 200^{\circ}$.
5. The dust cup according to any one of claims 1 to 4, wherein the cup casing is provided with a chamber-partition wall, the chamber-partition wall is disposed between the inner-ring wall face and an outer-ring wall face and divides the dust collecting chamber into a first dust collecting chamber and a second dust collecting chamber located at two sides of the chamber-partition wall and isolated mutually, top ends of the first dust collecting chamber and the second dust collecting chamber are both opened as inlets, and bottom ends of the first dust collecting chamber and the second dust collecting chamber are both opened as outlets.
6. The dust cup according to claim 5, wherein a bottom wall of the second dust collecting chamber is configured as an inclined wall with a high center and two low ends, and the two ends of the inclined wall are opened as outlets of the second dust collecting chamber.
7. The dust cup according to any one of claims 5 to 6, wherein the chamber-partition wall comprises a vertical wall vertically disposed between the inner-ring wall face and the outer-ring wall face, and having a top end being flush with a top end of the dust collecting chamber; and
a horizontal wall connected between a bottom end of the vertical wall and the inner-ring wall face to

define the second dust collecting chamber among the horizontal wall, the vertical wall and the inner-ring wall face.

8. The dust cup according to any one of claims 1 to 7, wherein a buffering chamber in communication with the dust collecting chamber is provided in the base.

9. The dust cup according to claim 8, wherein the base comprises a base body and a base bottom cover, the base bottom cover is connected to a bottom of the base body and capable of being opened and closed to define the buffering chamber between the base bottom cover and the base body, a top wall of the base body has a communication hole, a bottom end edge of the outer-ring wall face is connected to an edge of the communication hole in a butt joint, so as to communicate the first dust collecting chamber with the buffering chamber, bottom end edges of the inner-ring wall face and the chamber-partition wall are inserted in the communication hole while being fitted therewith and abut against the base bottom cover, so as to isolate the second dust collecting chamber from the first dust collecting chamber and the buffering chamber.

10. The dust cup according to any one of claims 1- 9, wherein the dust cup further comprises a cup cover, the cup cover is disposed at the top of the cup casing, covered on the dust collecting chamber, and provided with a dust inlet in communication with the dust collecting chamber.

11. A dust cup assembly comprising:

a dust cup according to any one of claims 1-10;

a cabinet detachably mounted to the dust cup;

a dedusting device provided in the cabinet and used to remove dust from the airflow sucked into the cabinet; and

a negative pressure device provided in the cabinet and used to suck airflow from the environment into the cabinet.

12. A handheld cleaner comprising:

a dust cup assembly according to claim 11; and

a handle assembly disposed on the dust cup assembly and used for handholding.

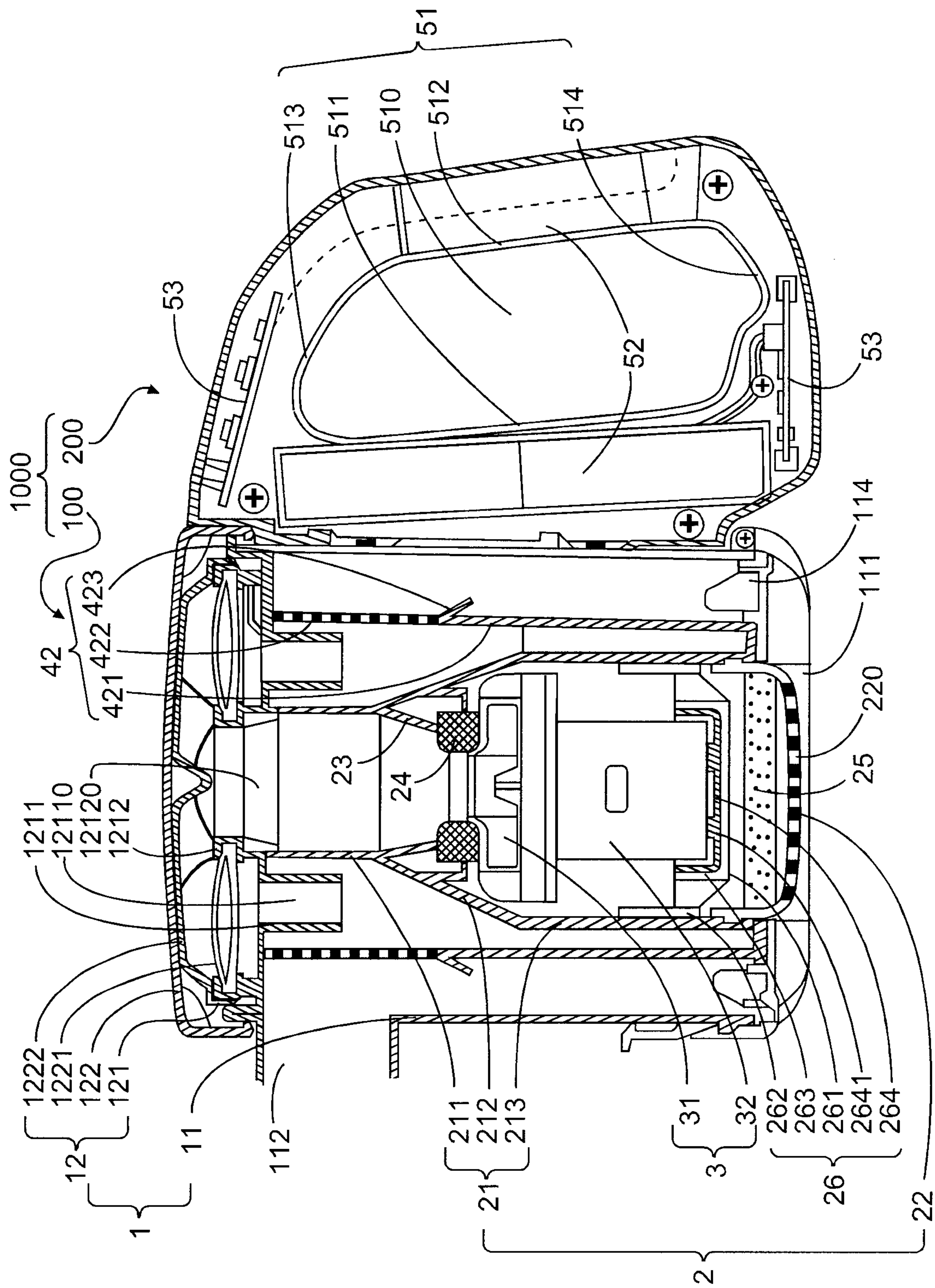
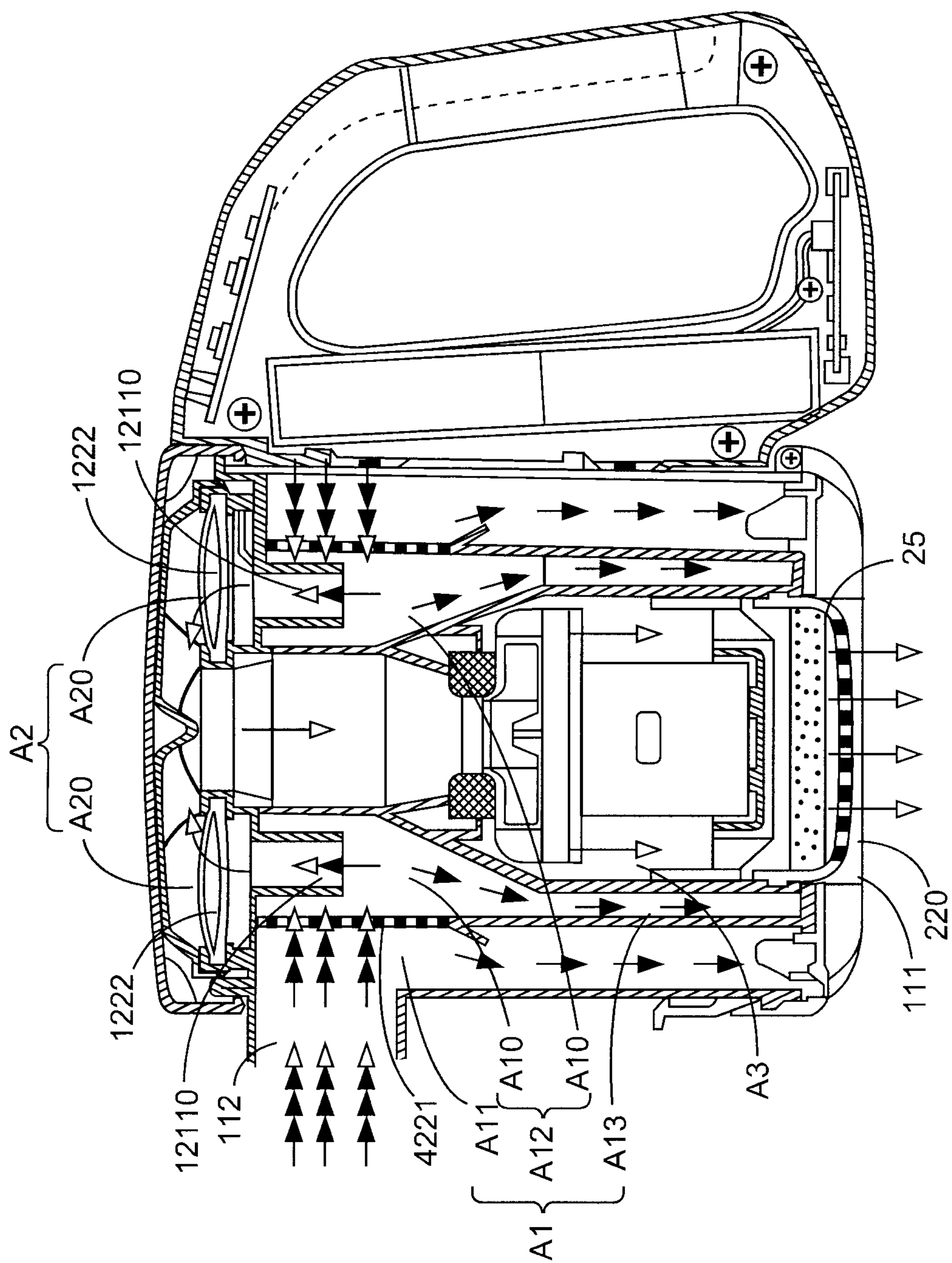


Fig. 1



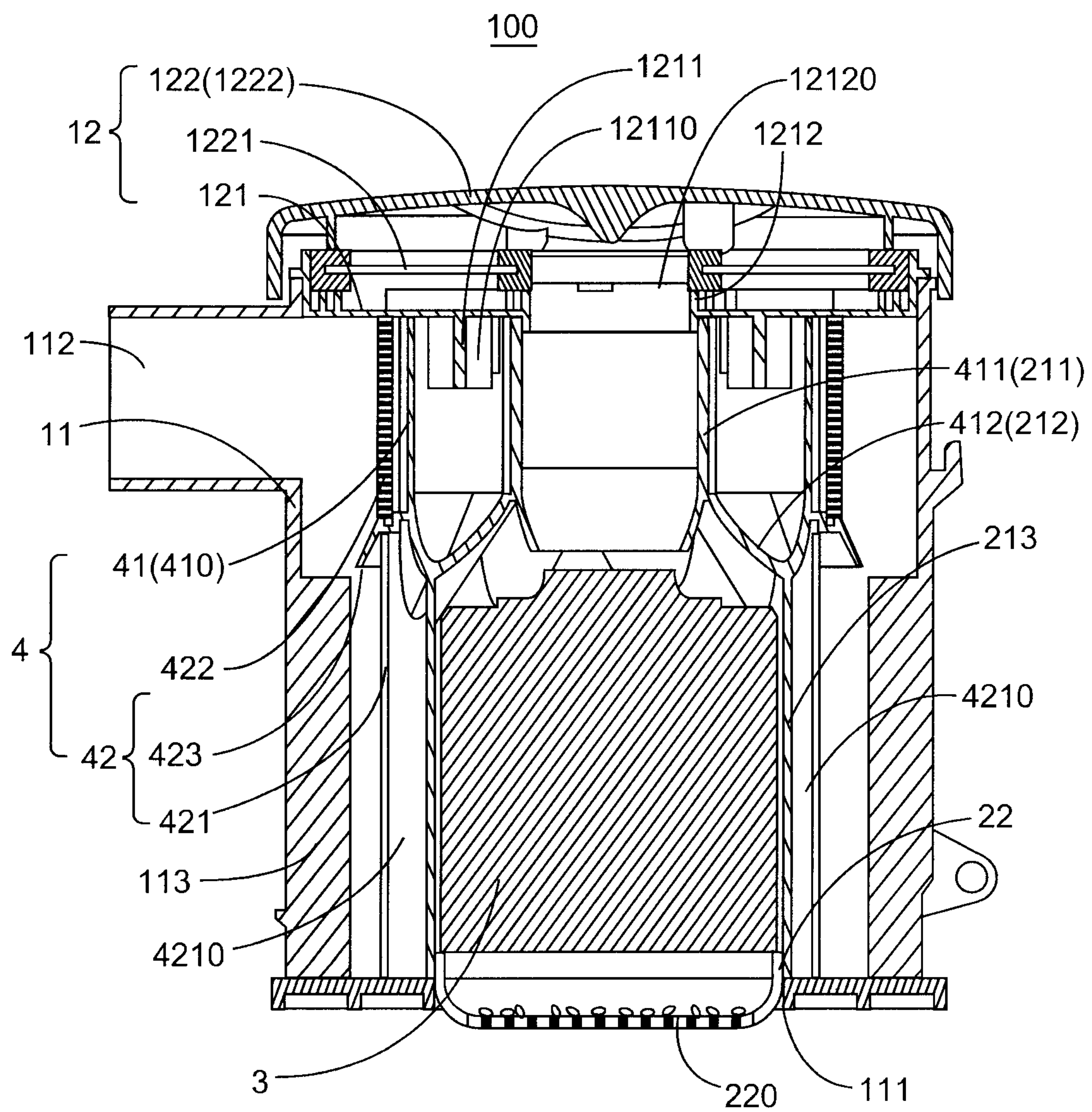


Fig. 3

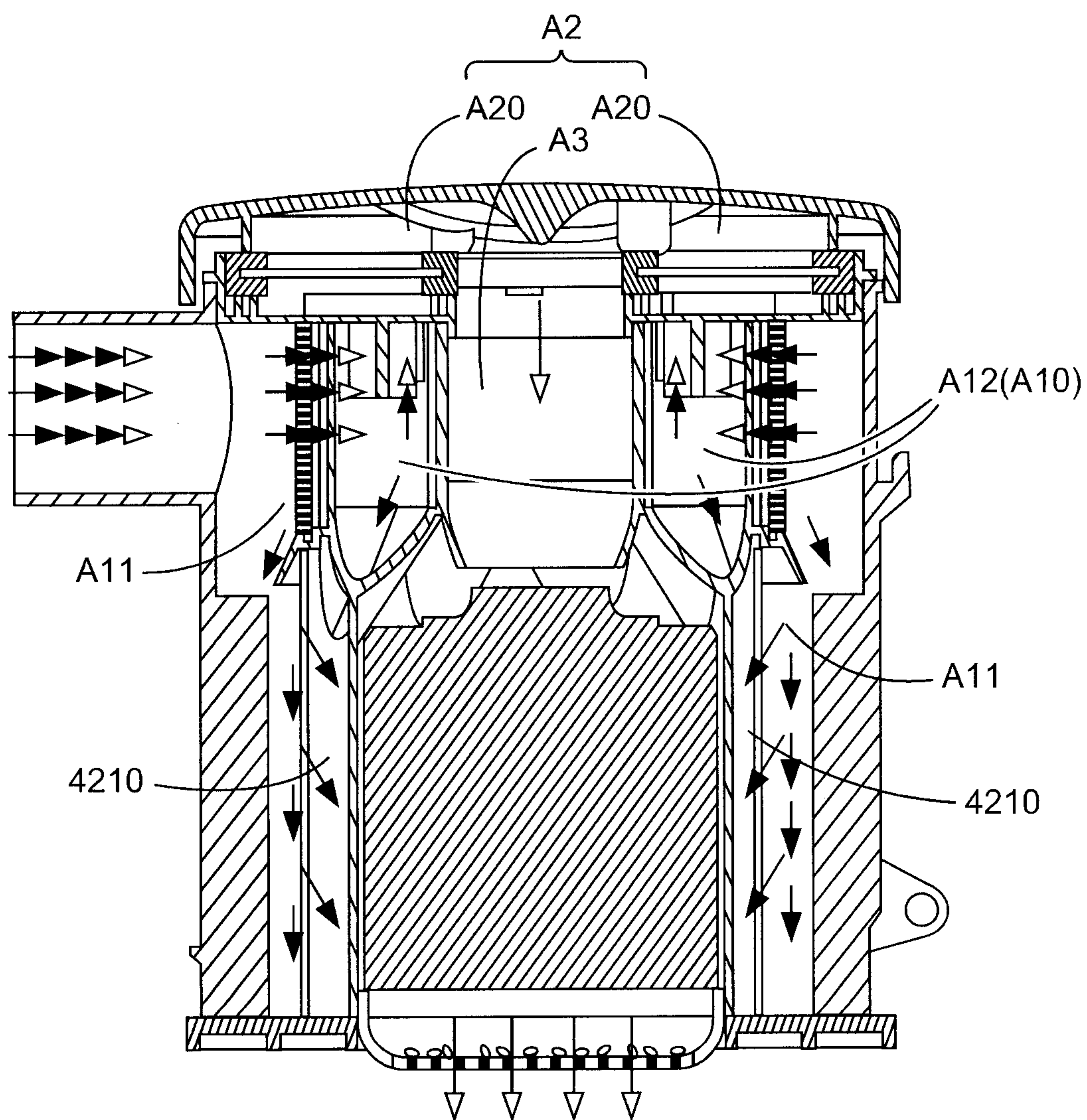


Fig. 4

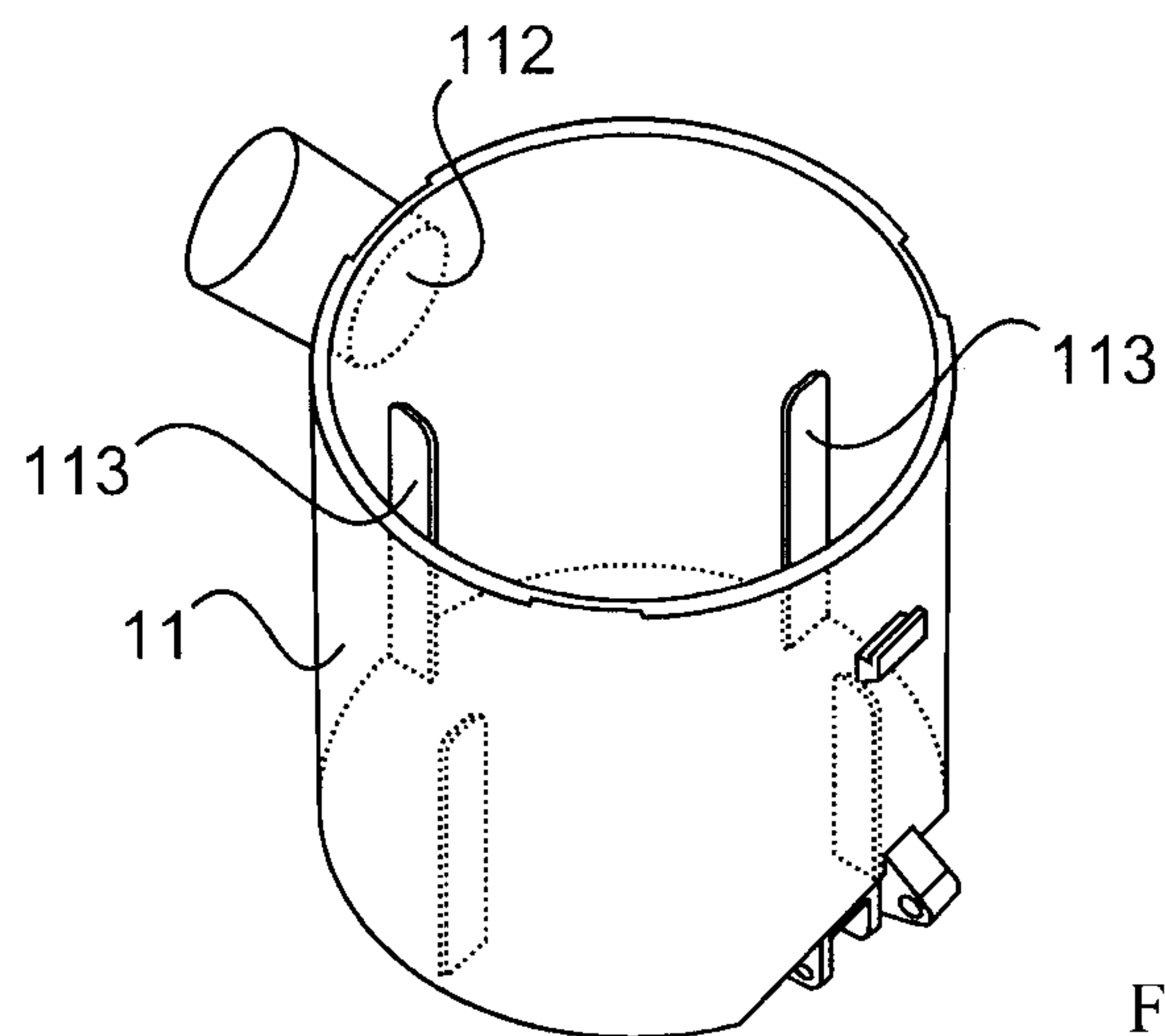


Fig. 5

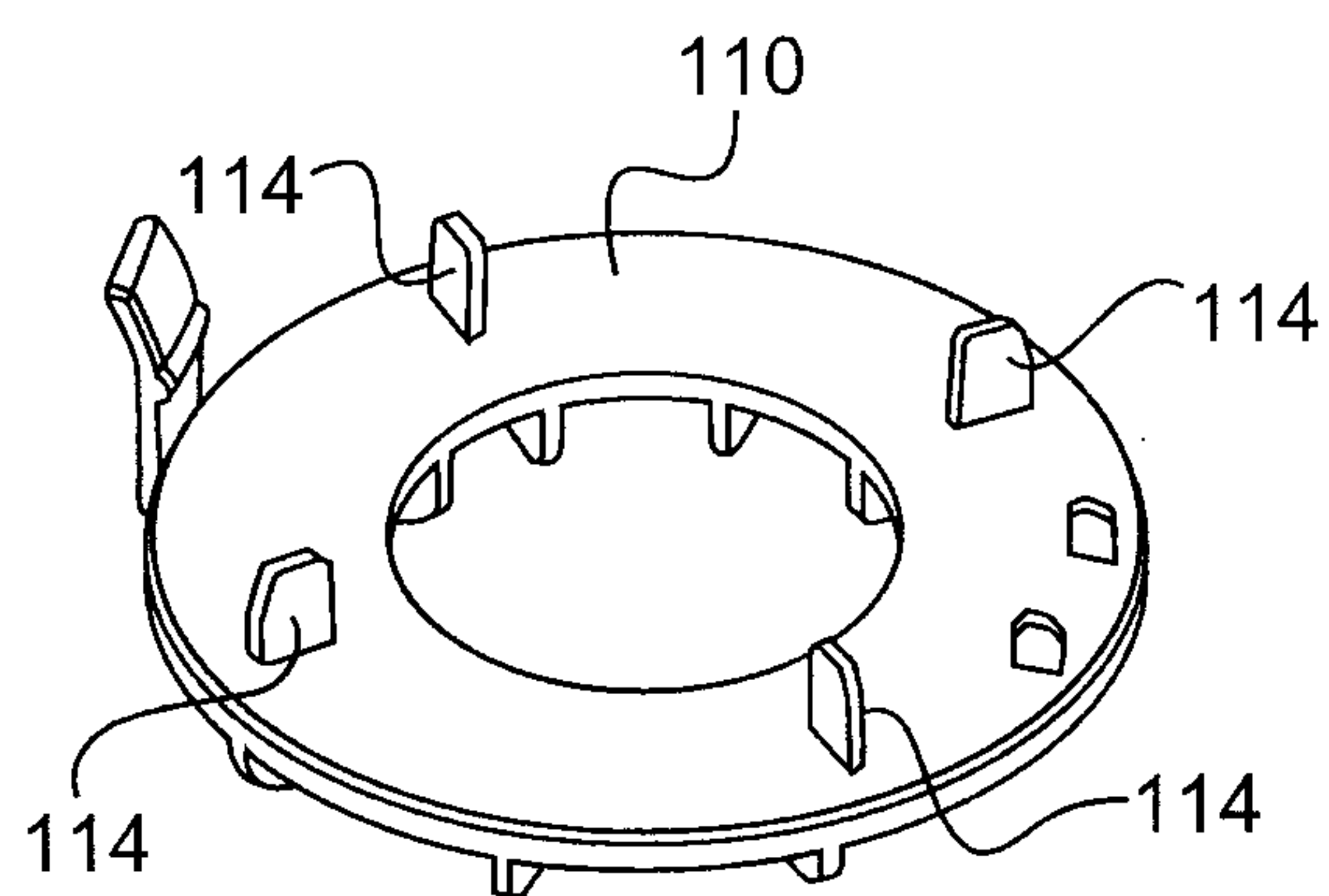


Fig. 6

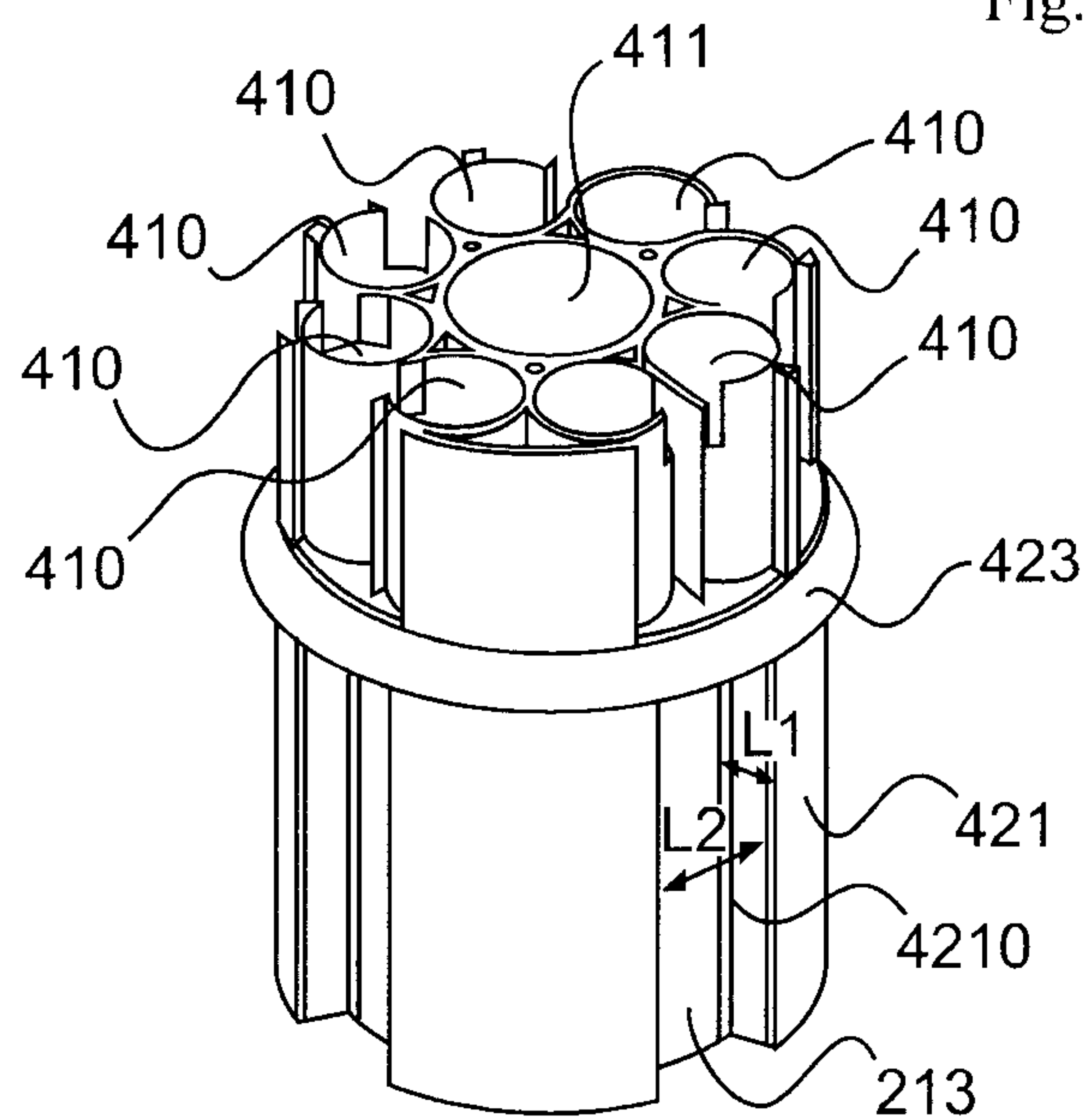


Fig. 7

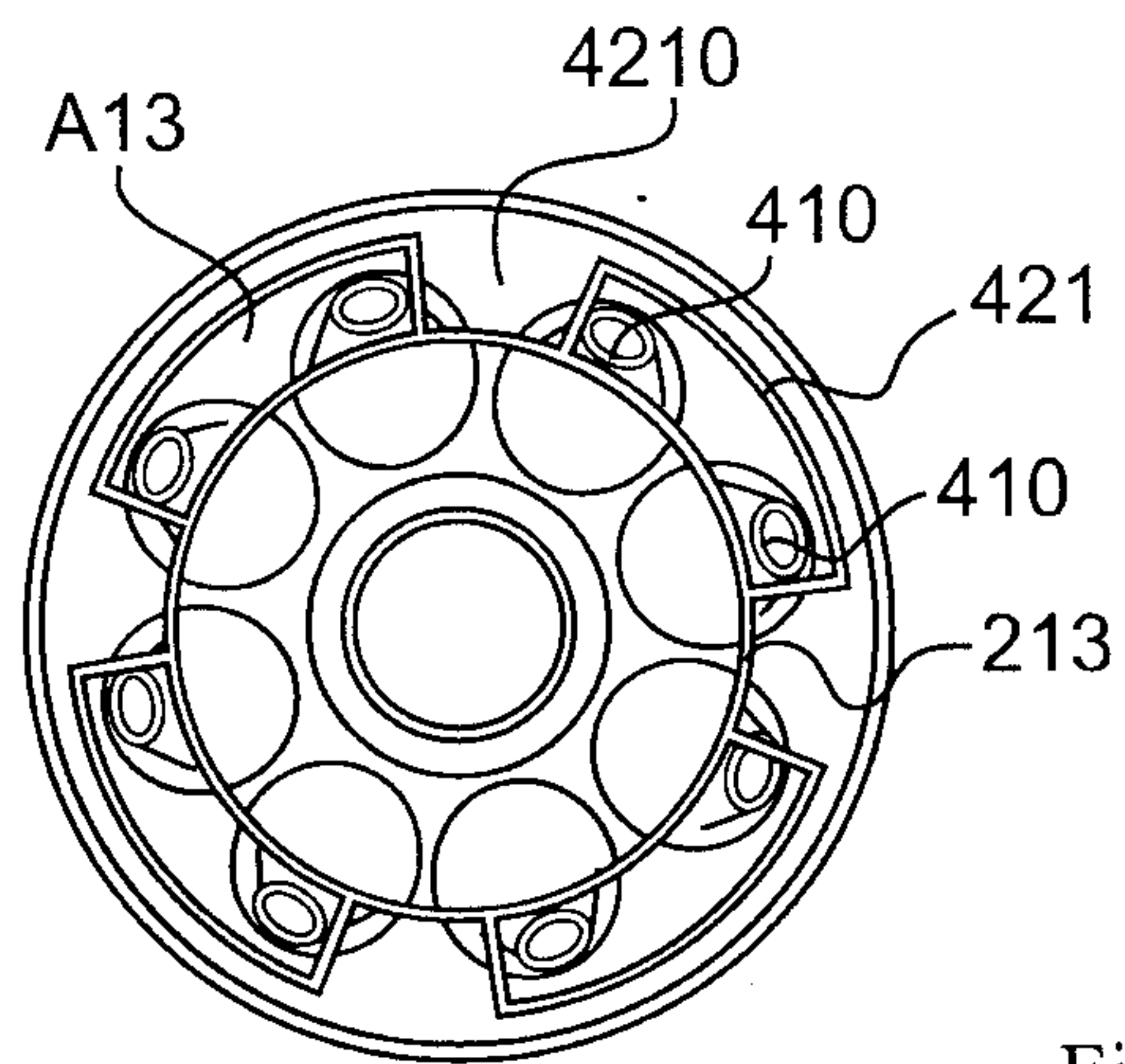


Fig. 8

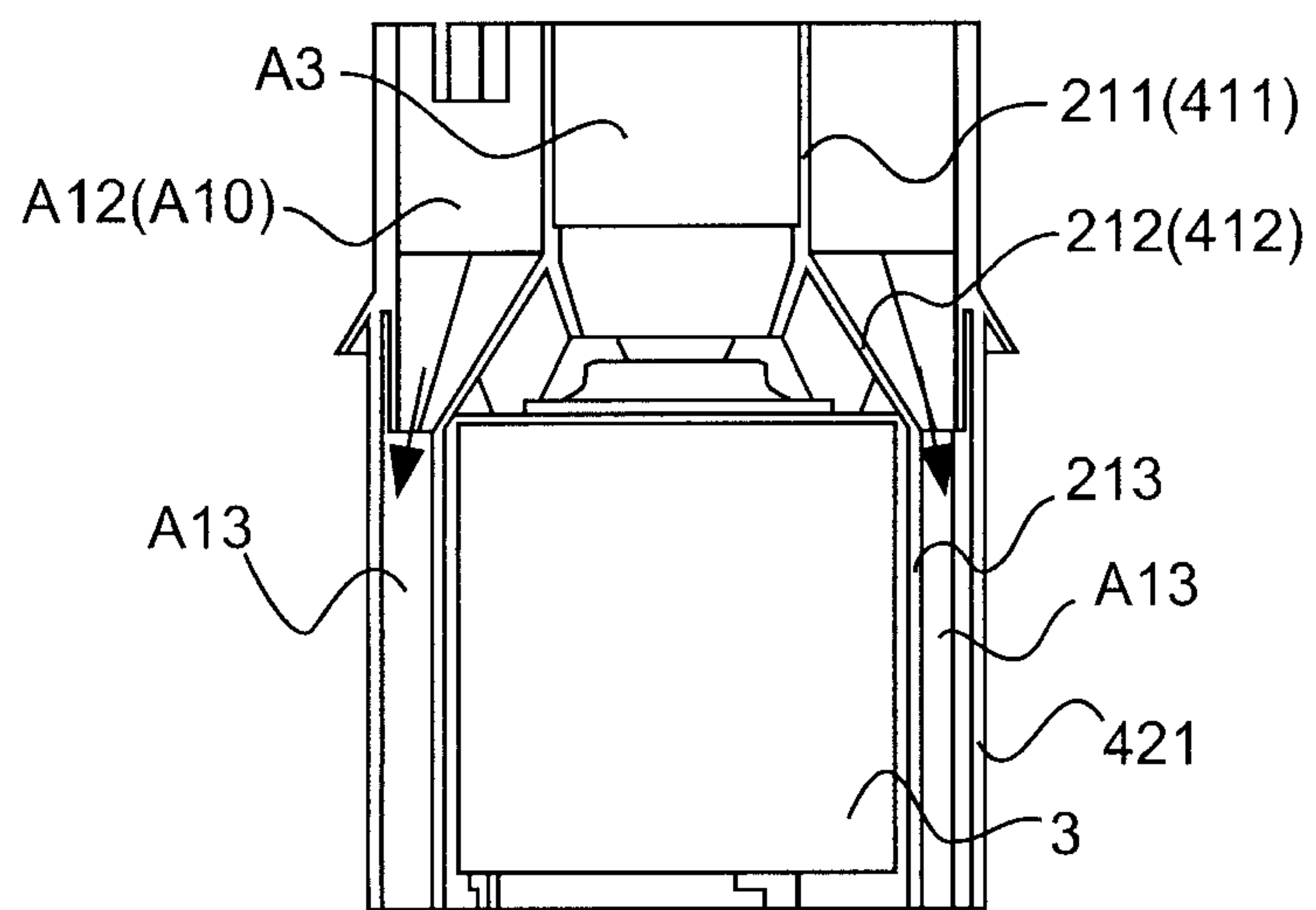


Fig. 9

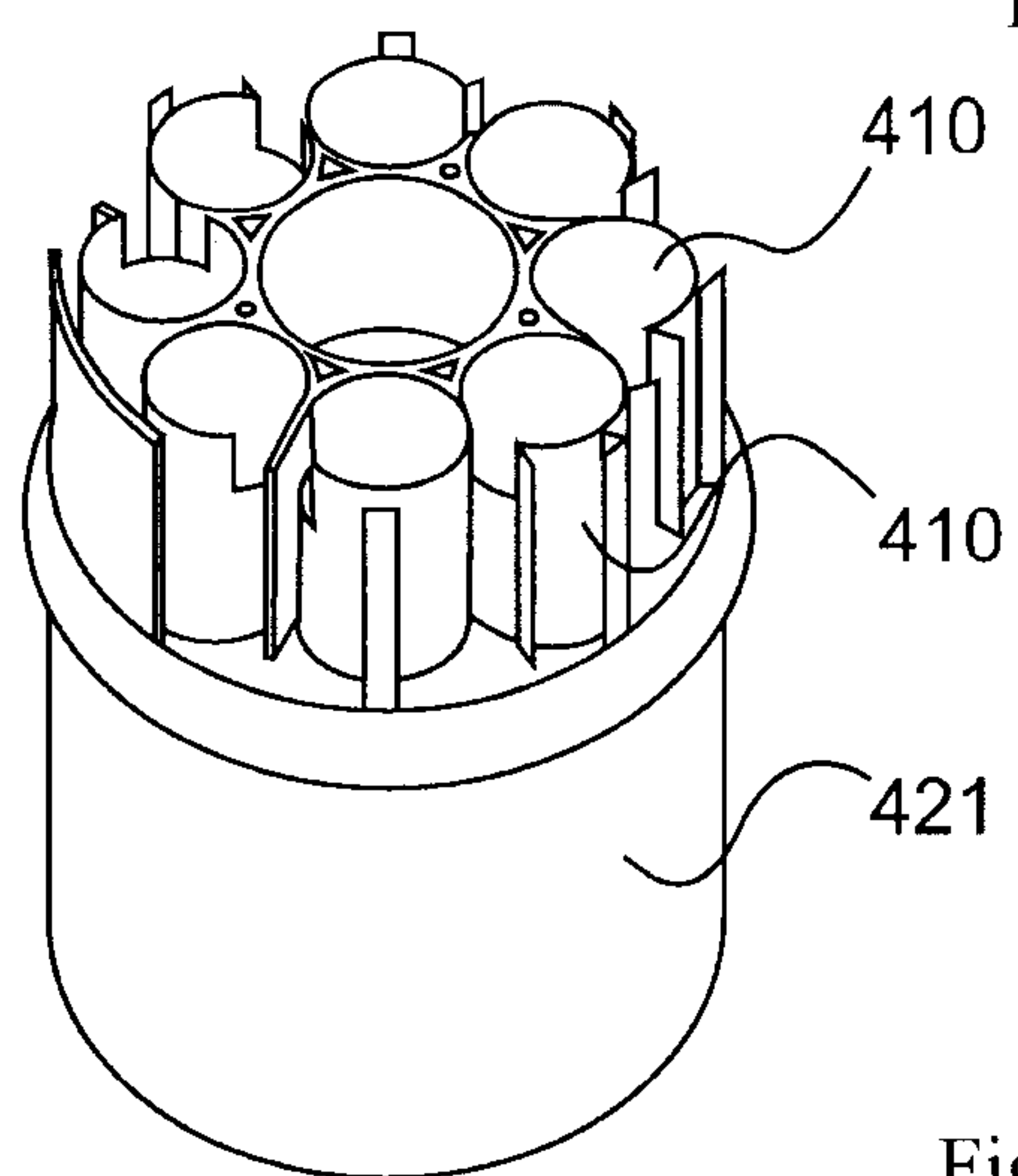


Fig. 10

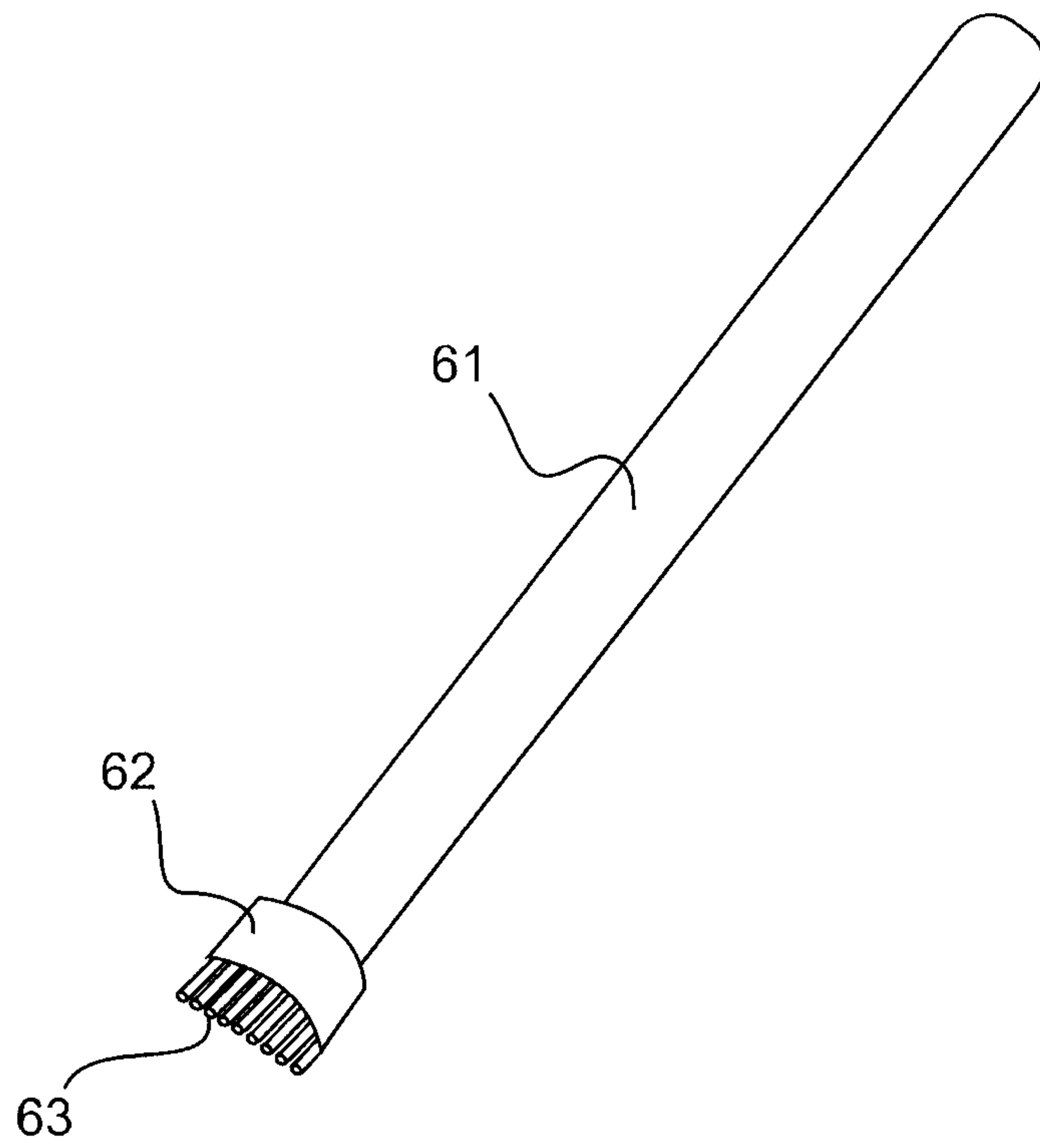


Fig. 11

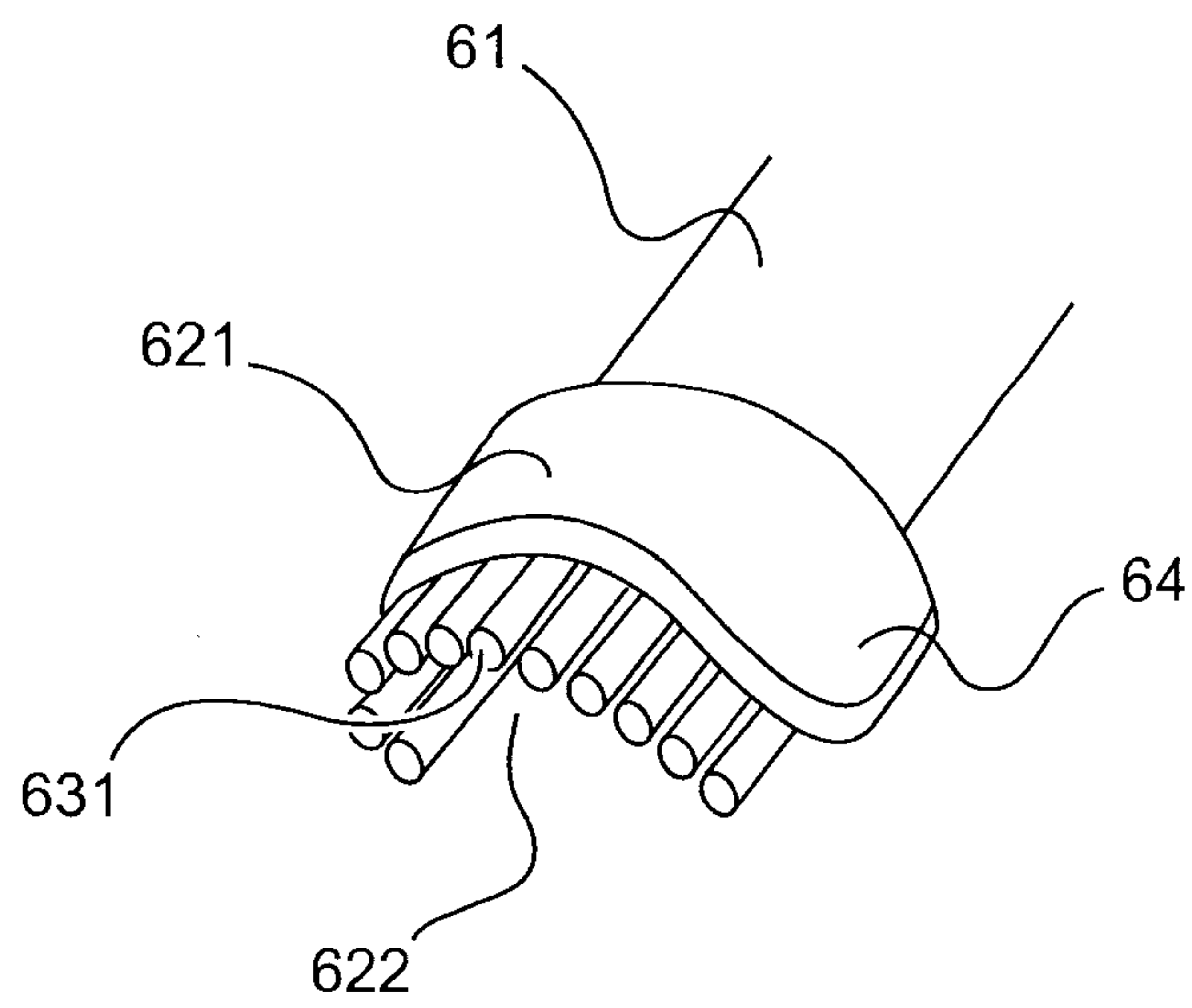


Fig. 12

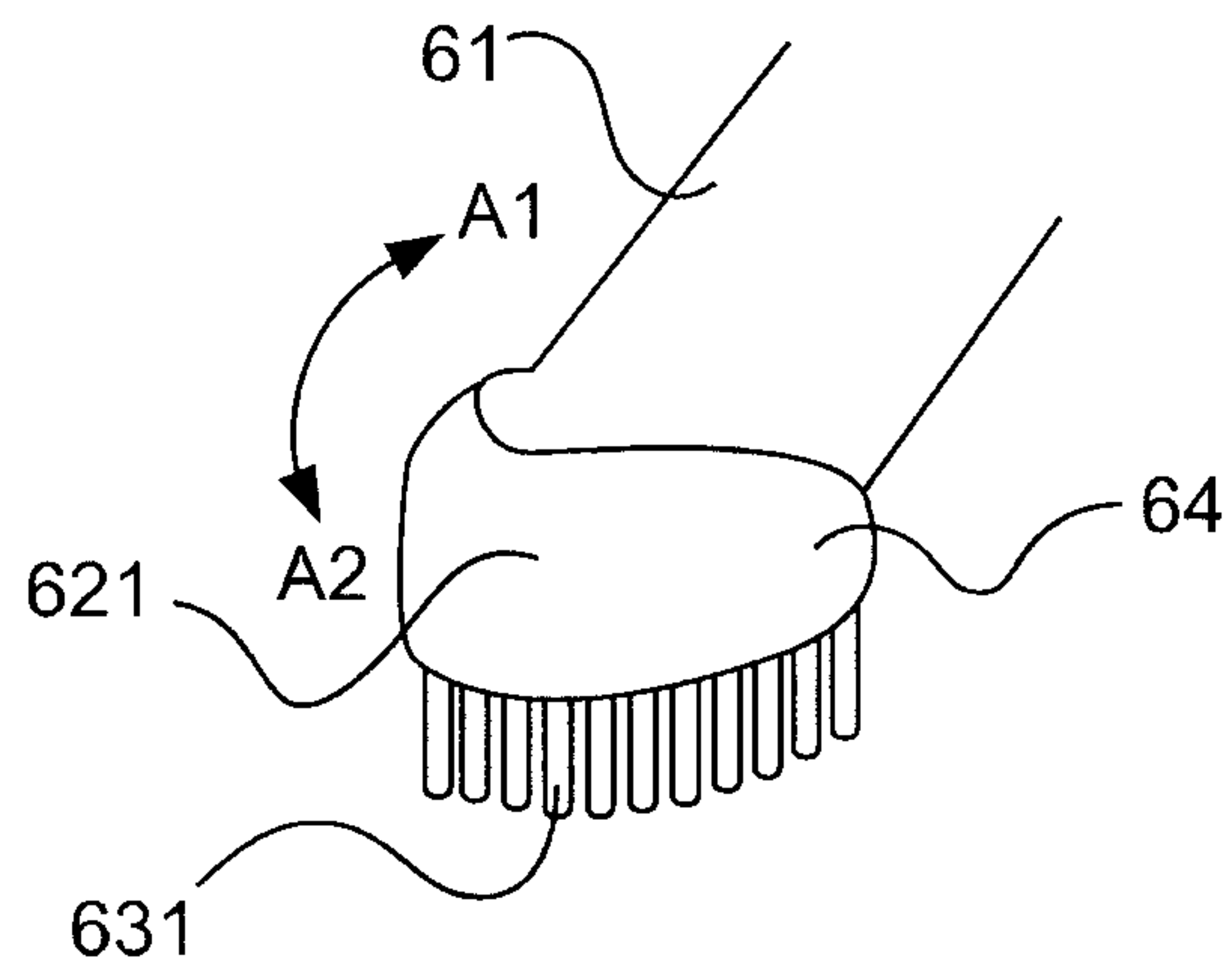


Fig. 13

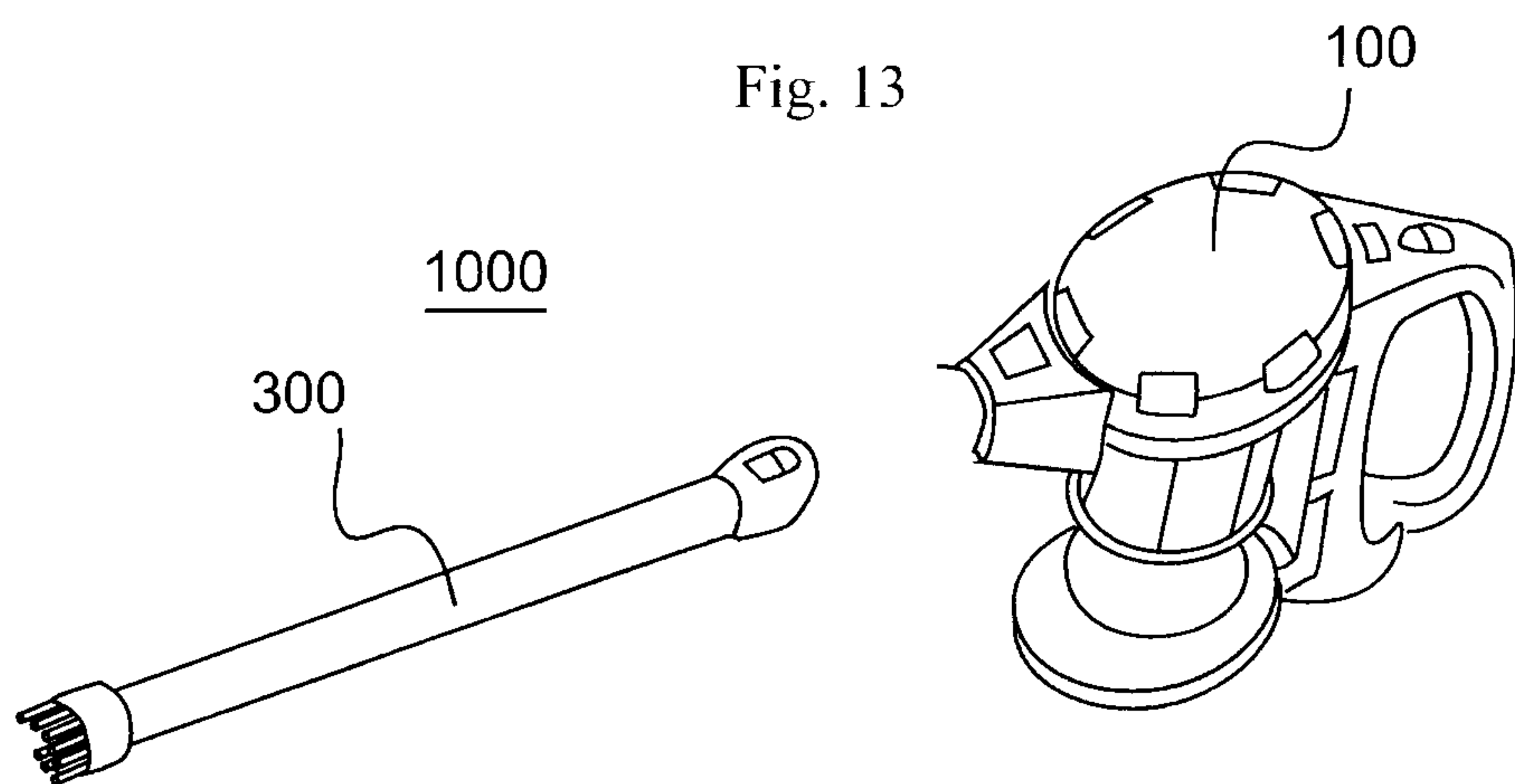


Fig. 14

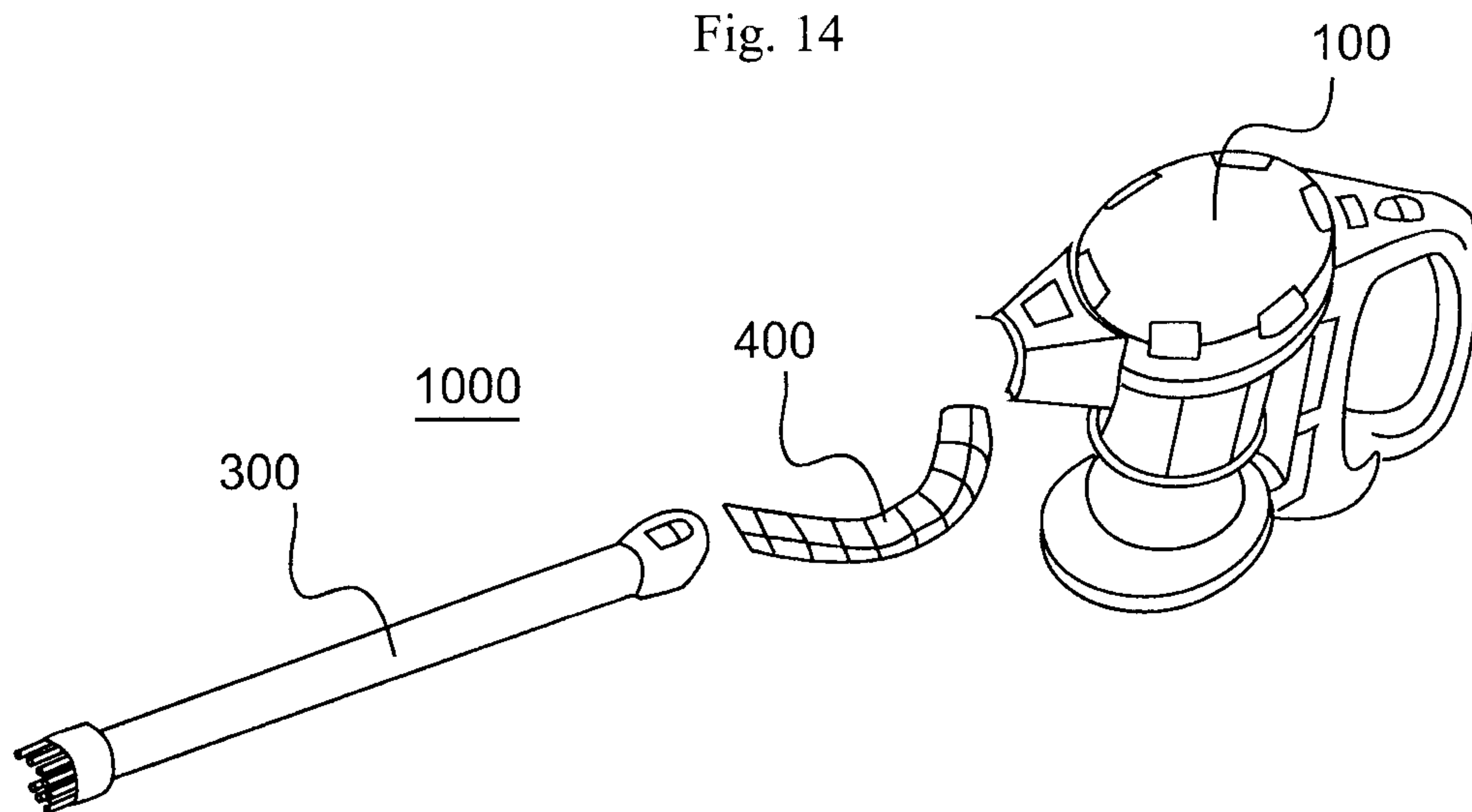


Fig. 15

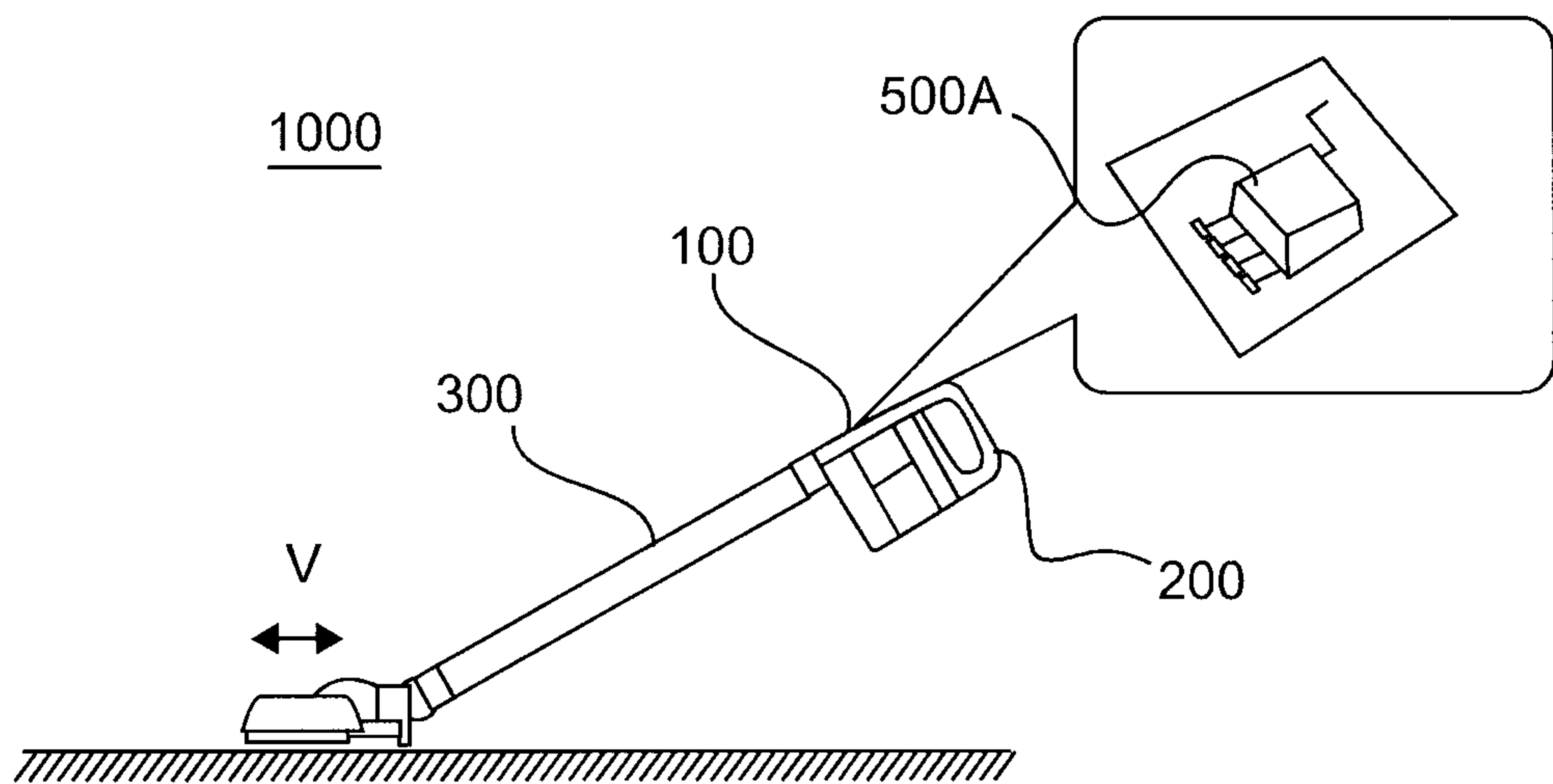


Fig. 16

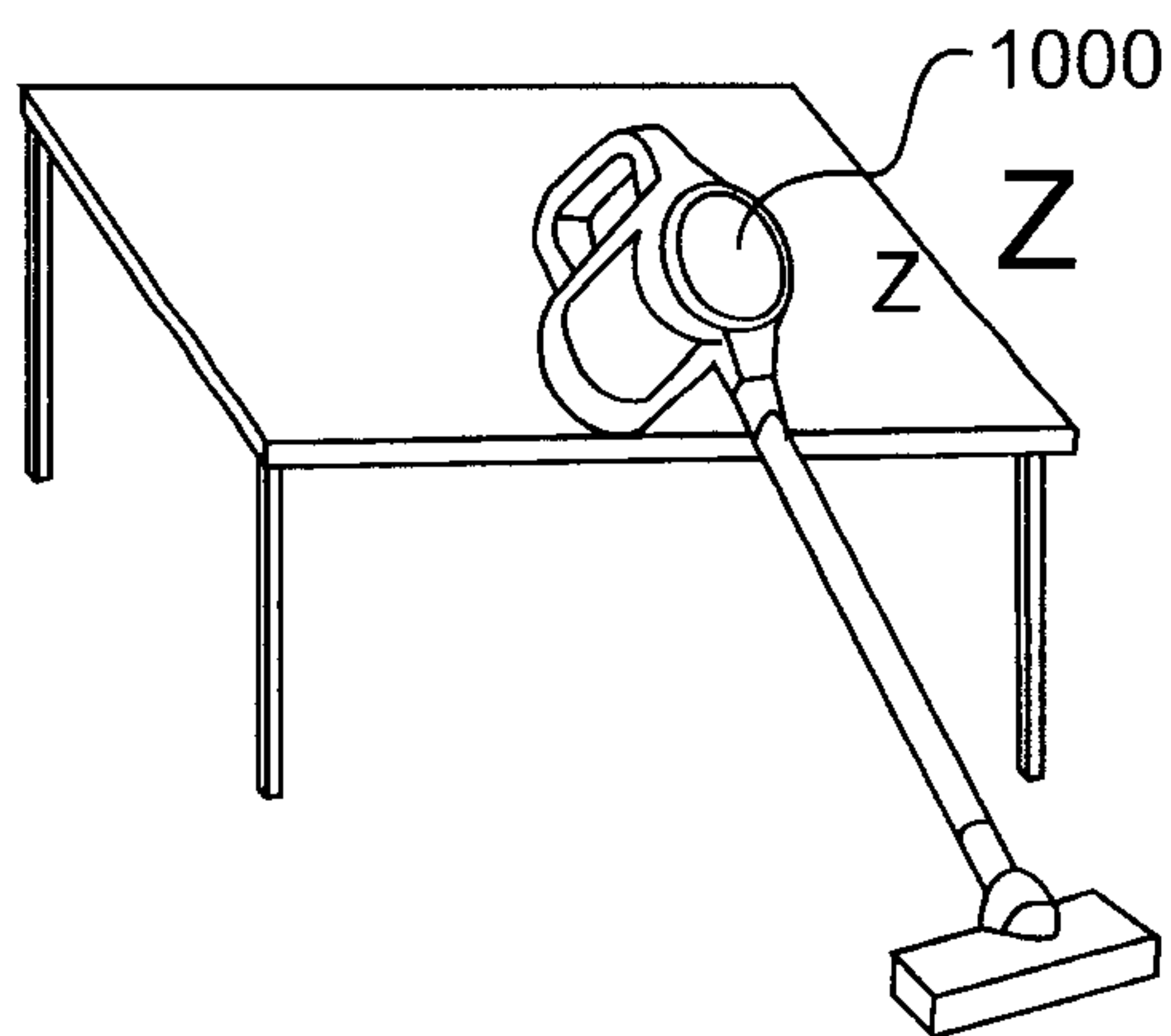


Fig. 17

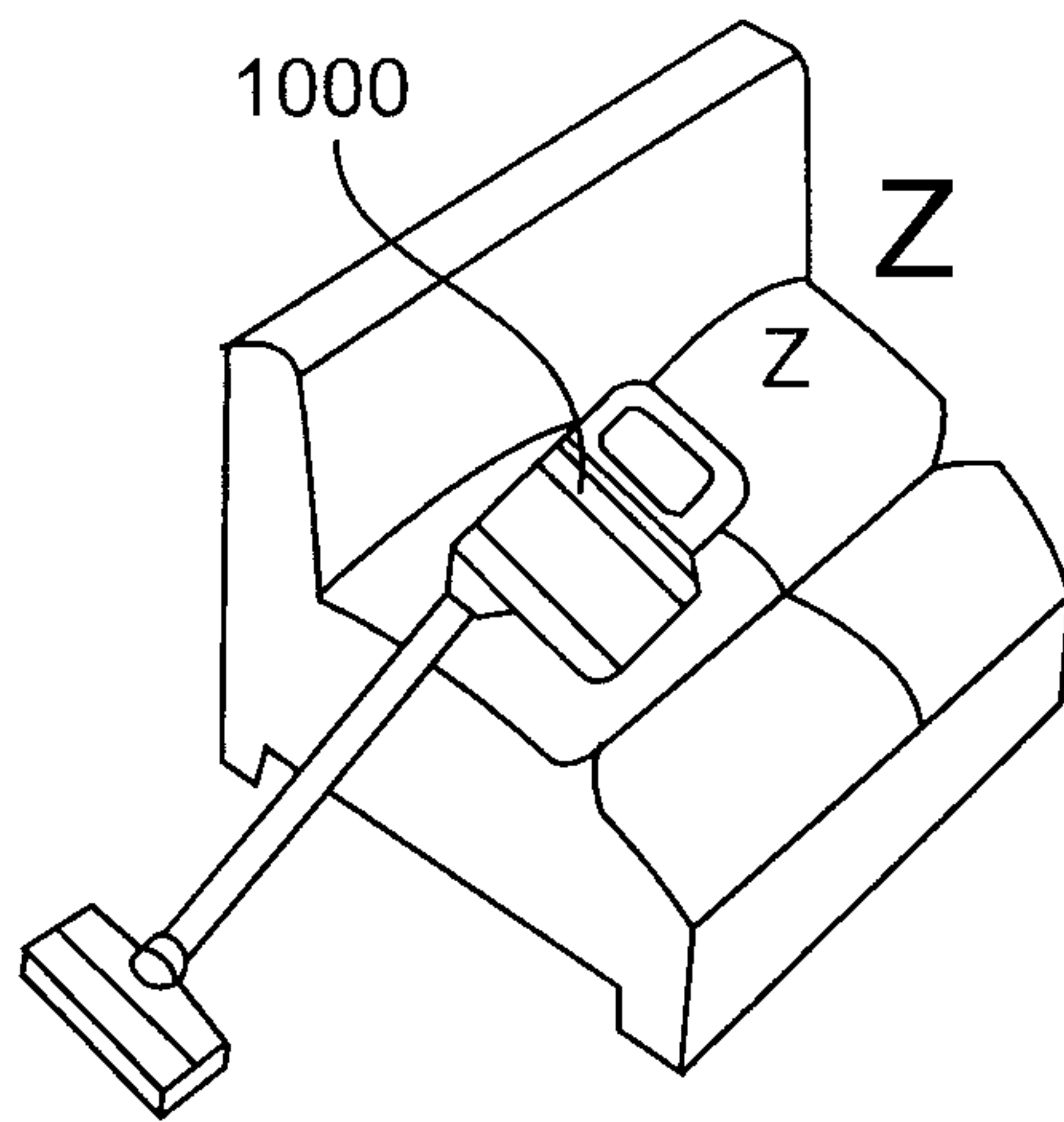


Fig. 18

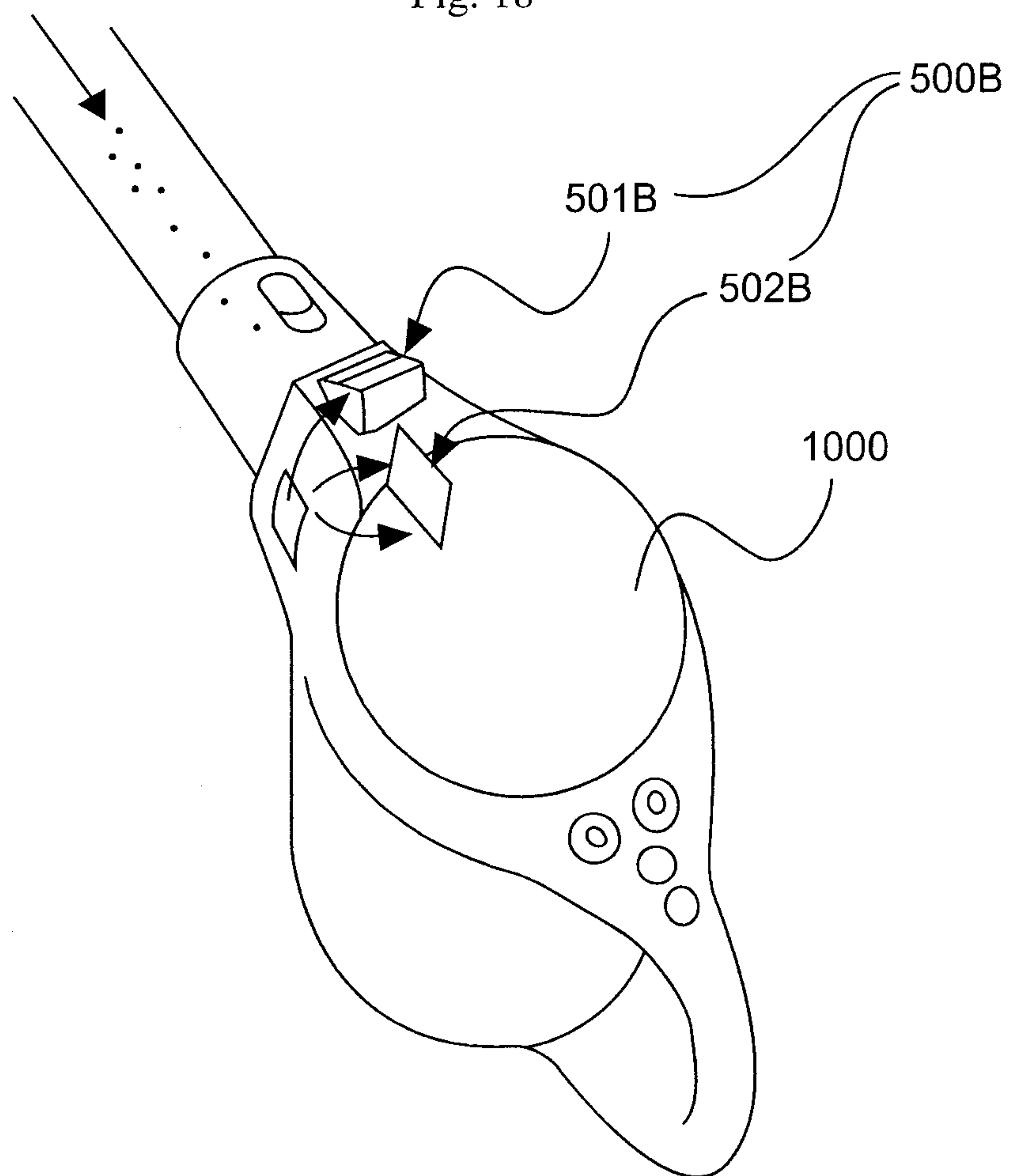


Fig. 19

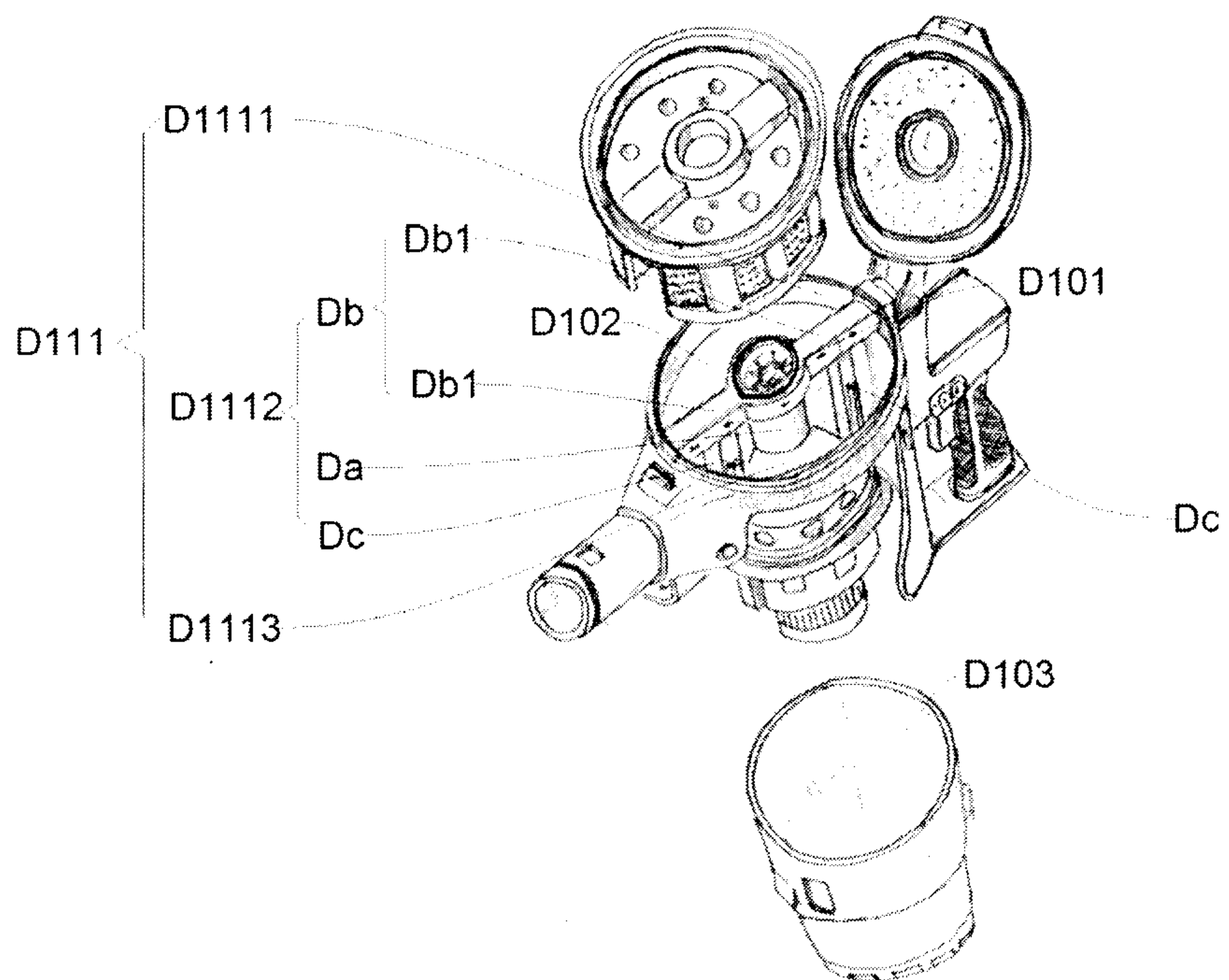


Fig. 21

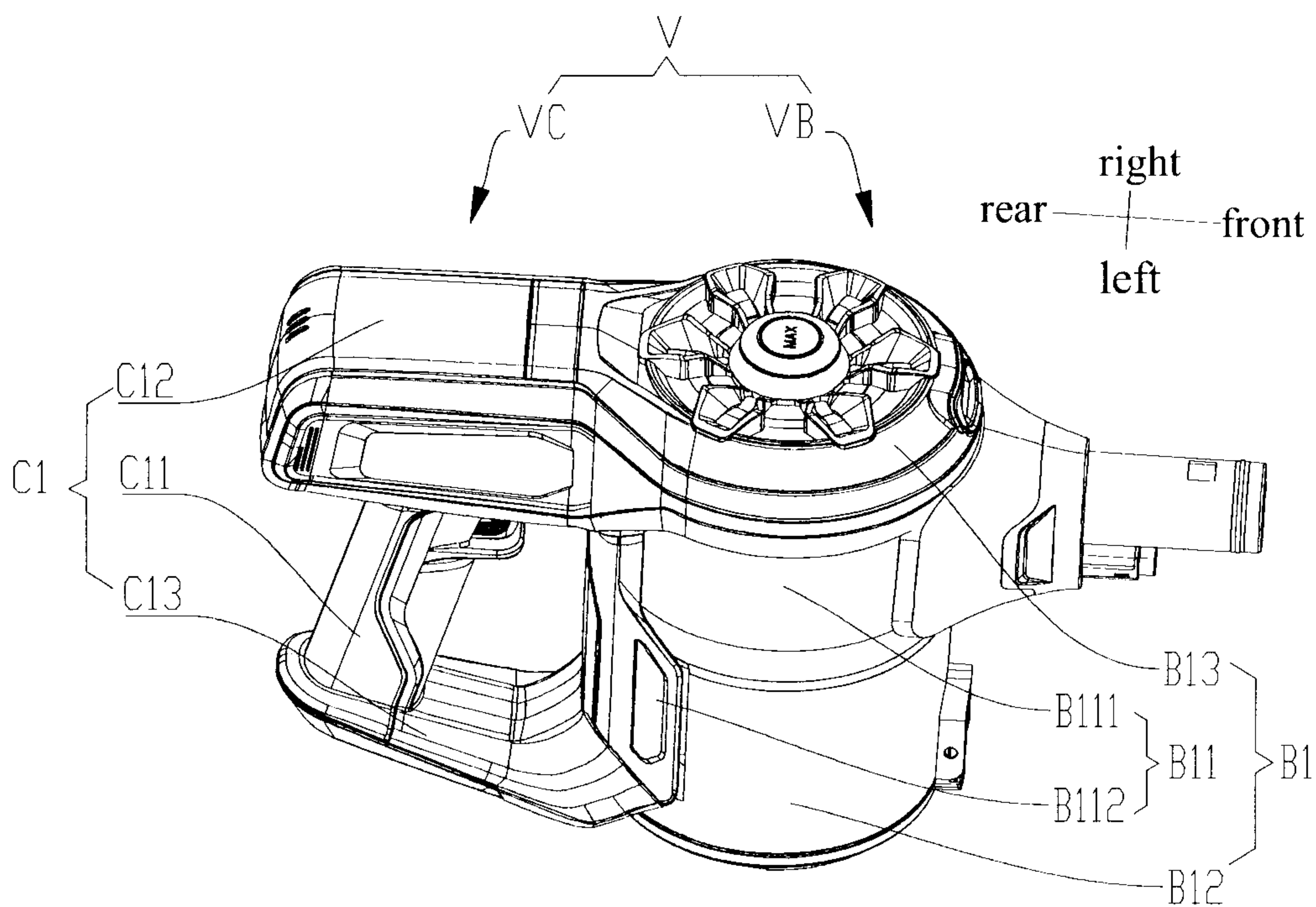


Fig. 22

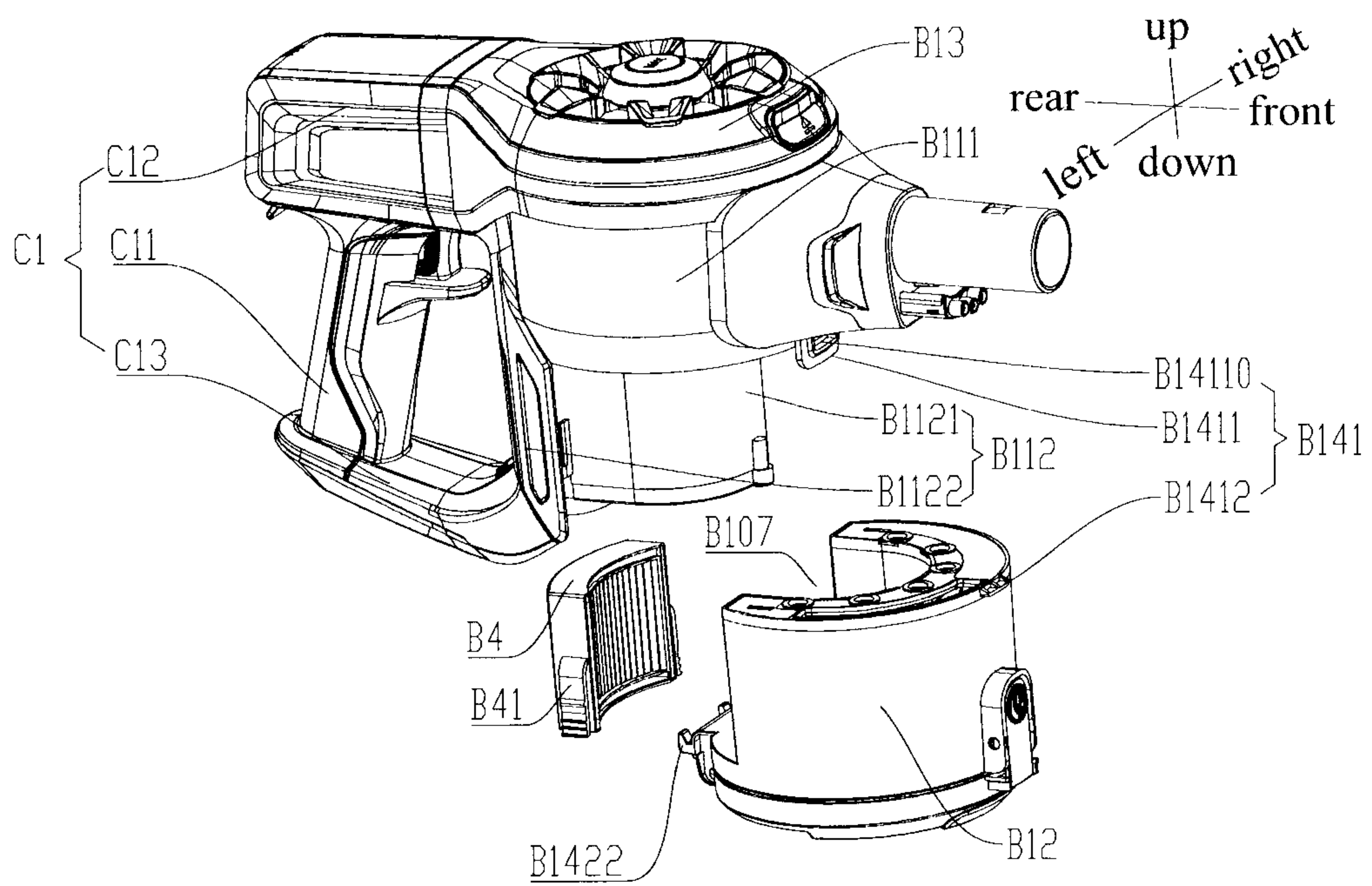


Fig. 23

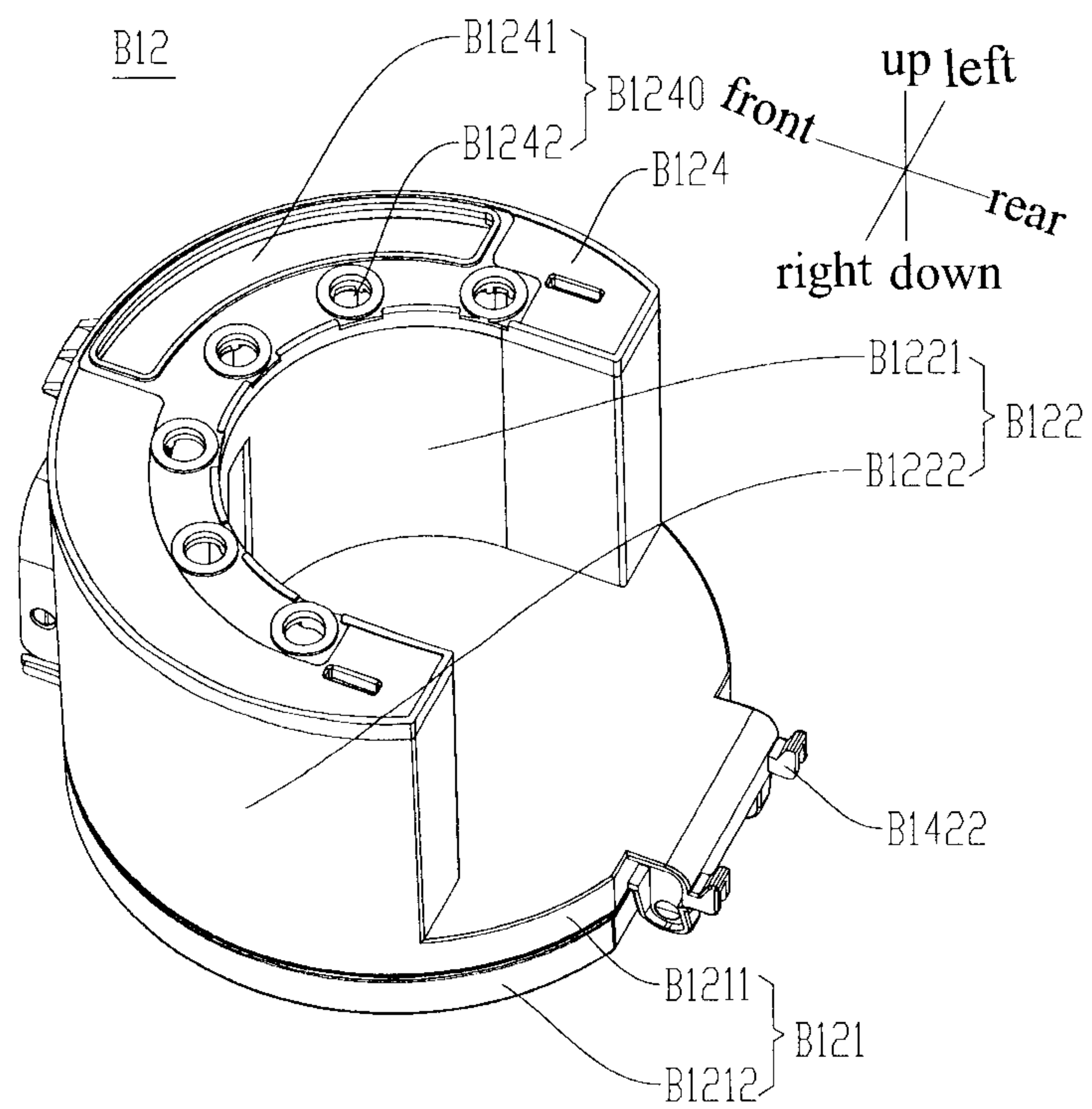


Fig. 24

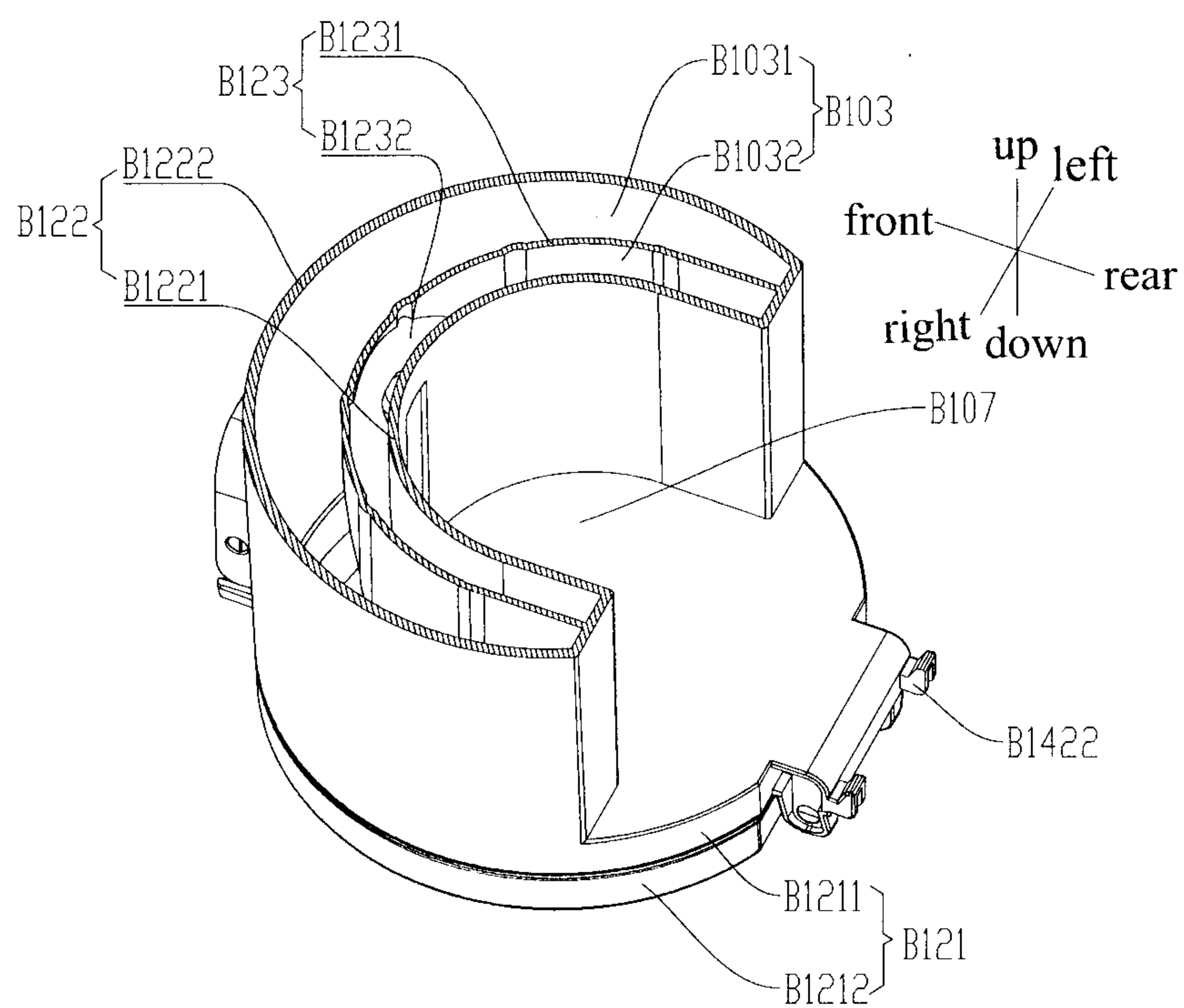


Fig. 25

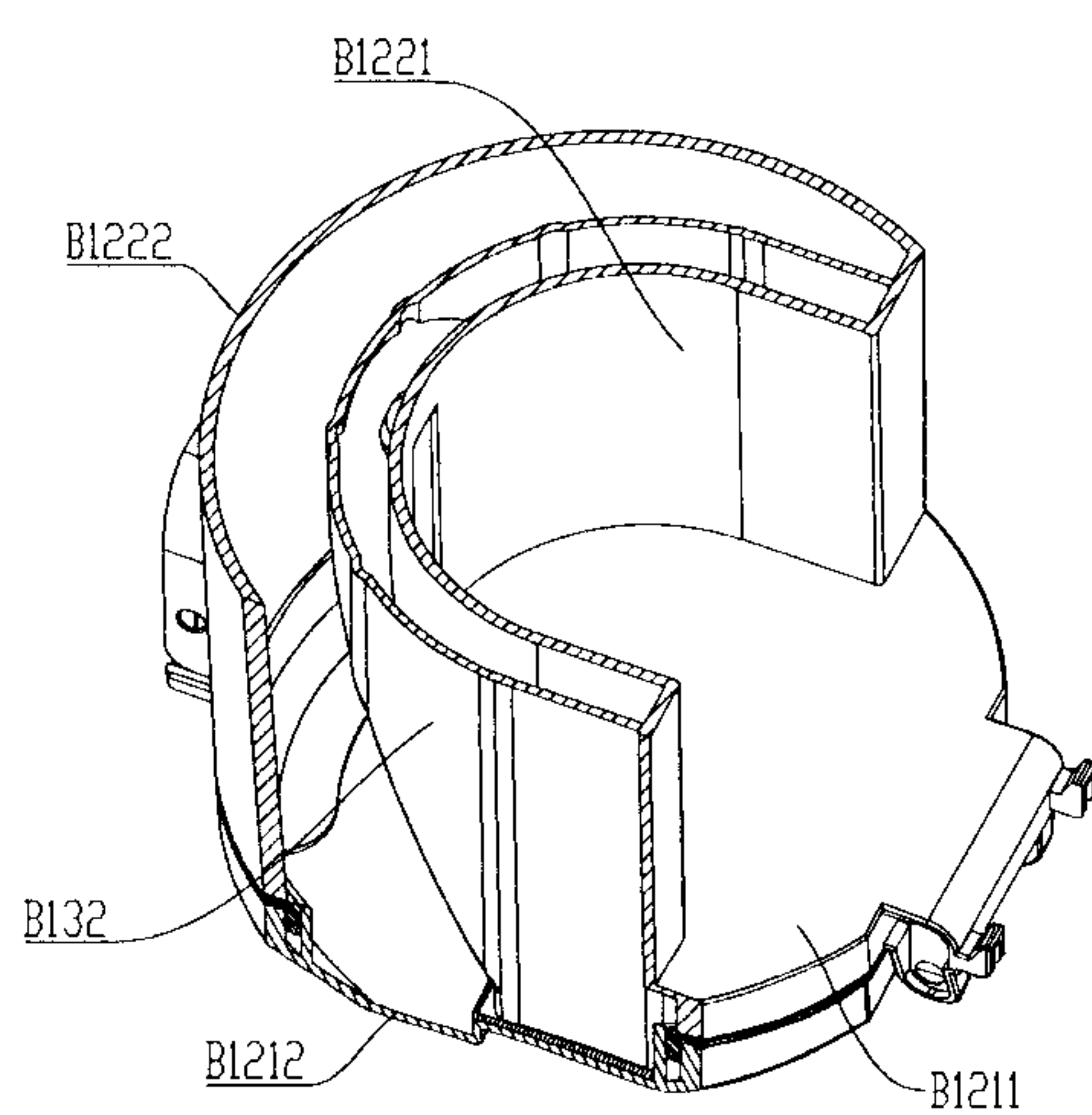


Fig. 26

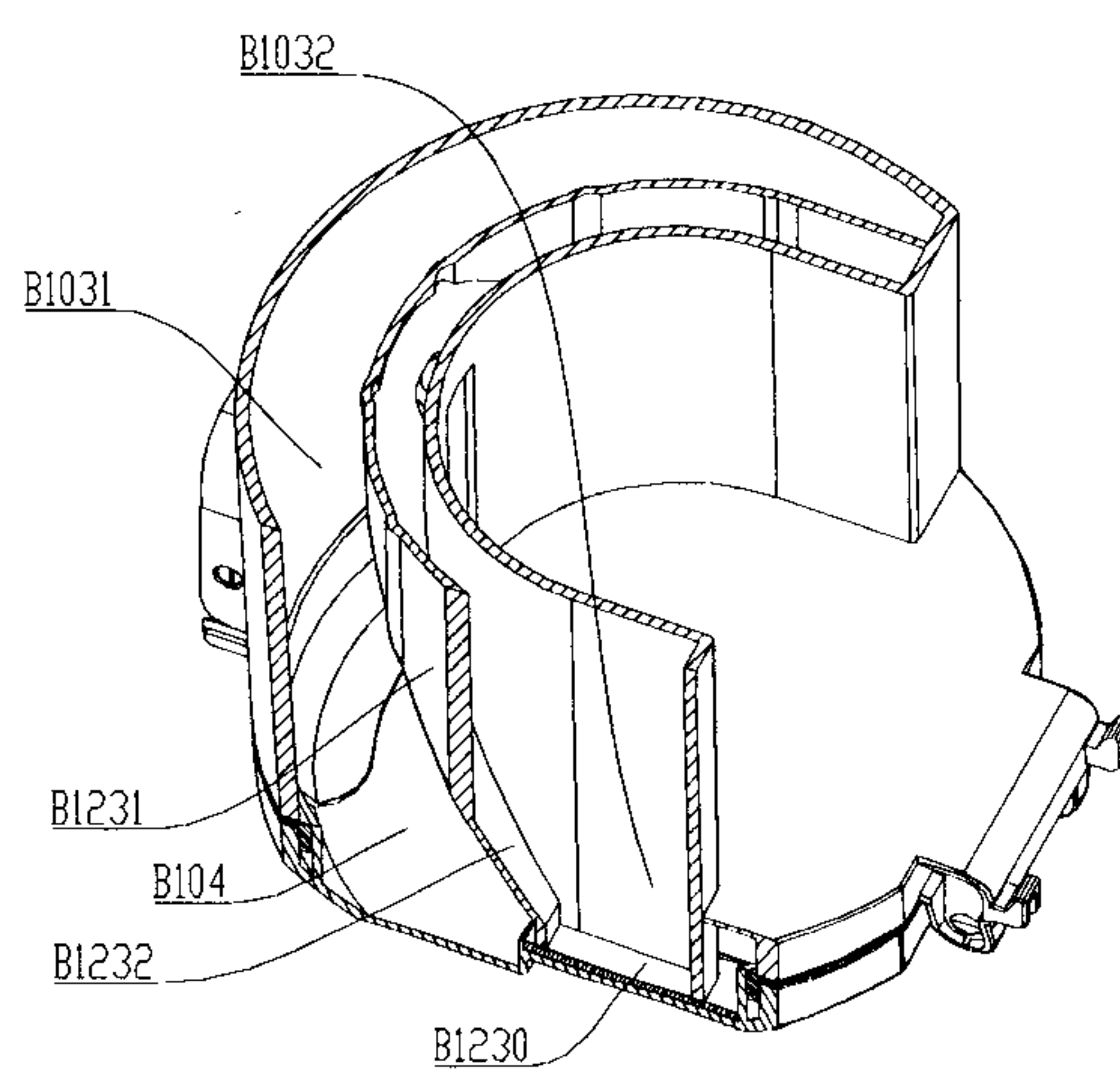


Fig. 27

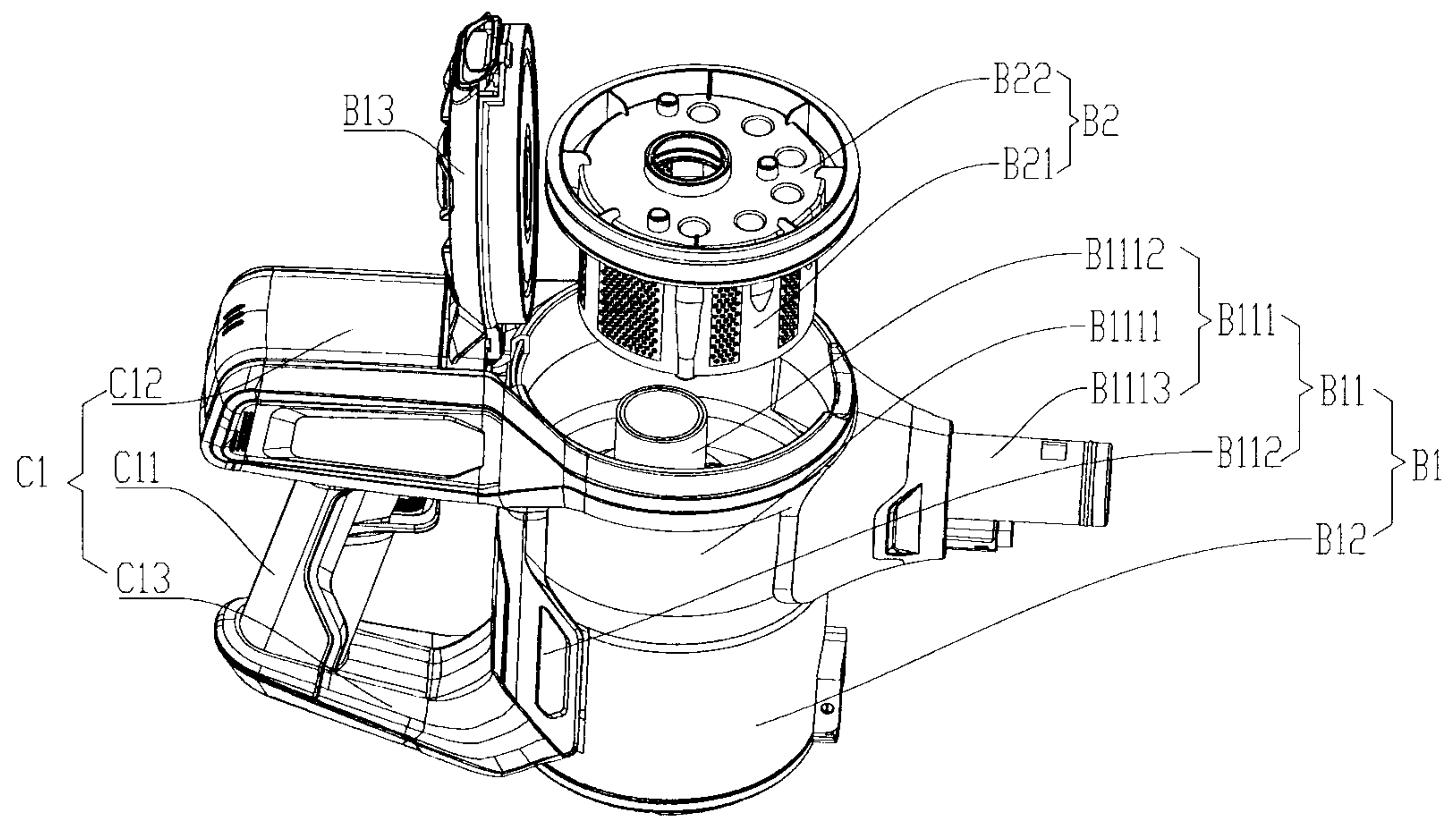


Fig. 28

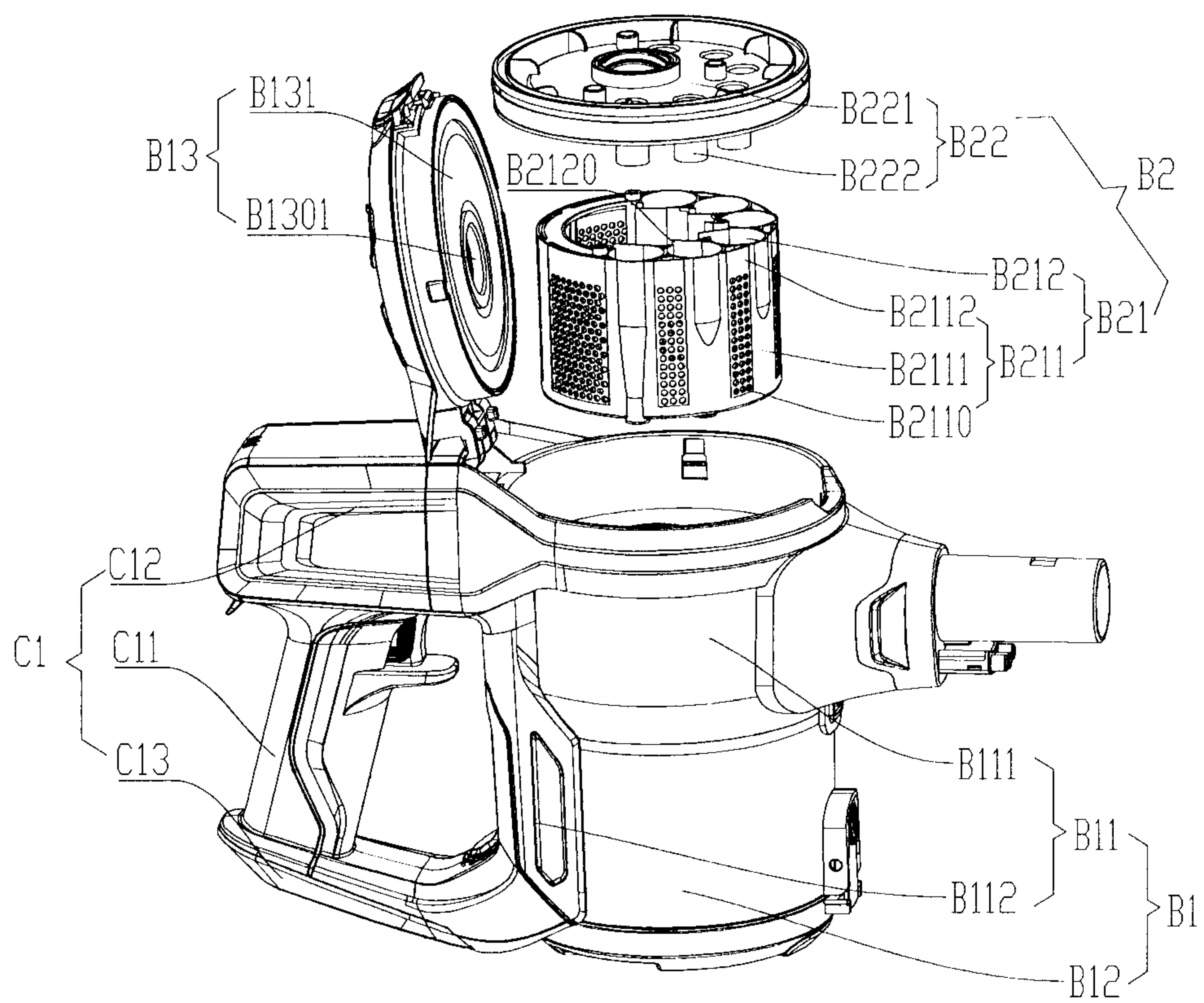


Fig. 29

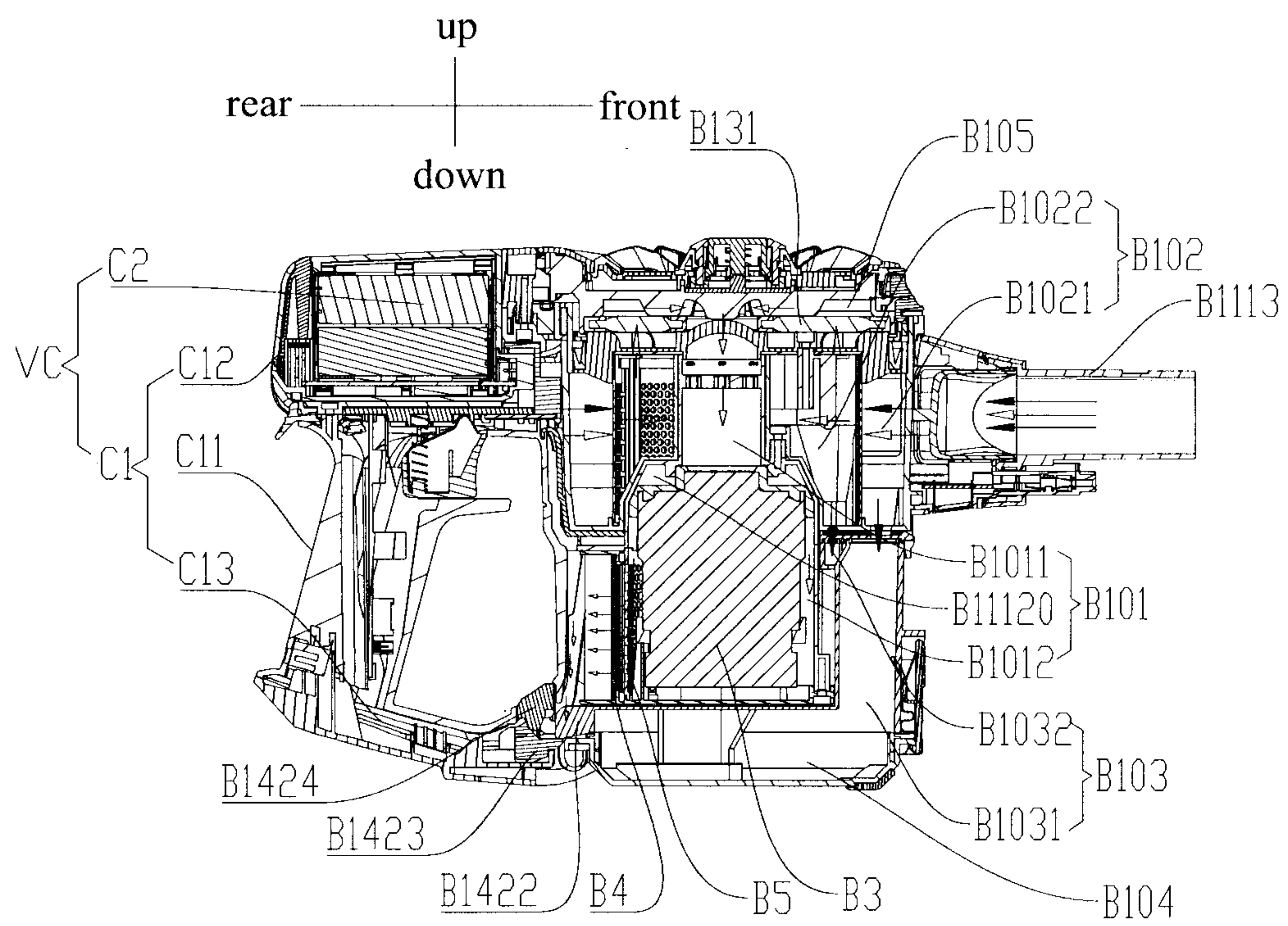


Fig. 30

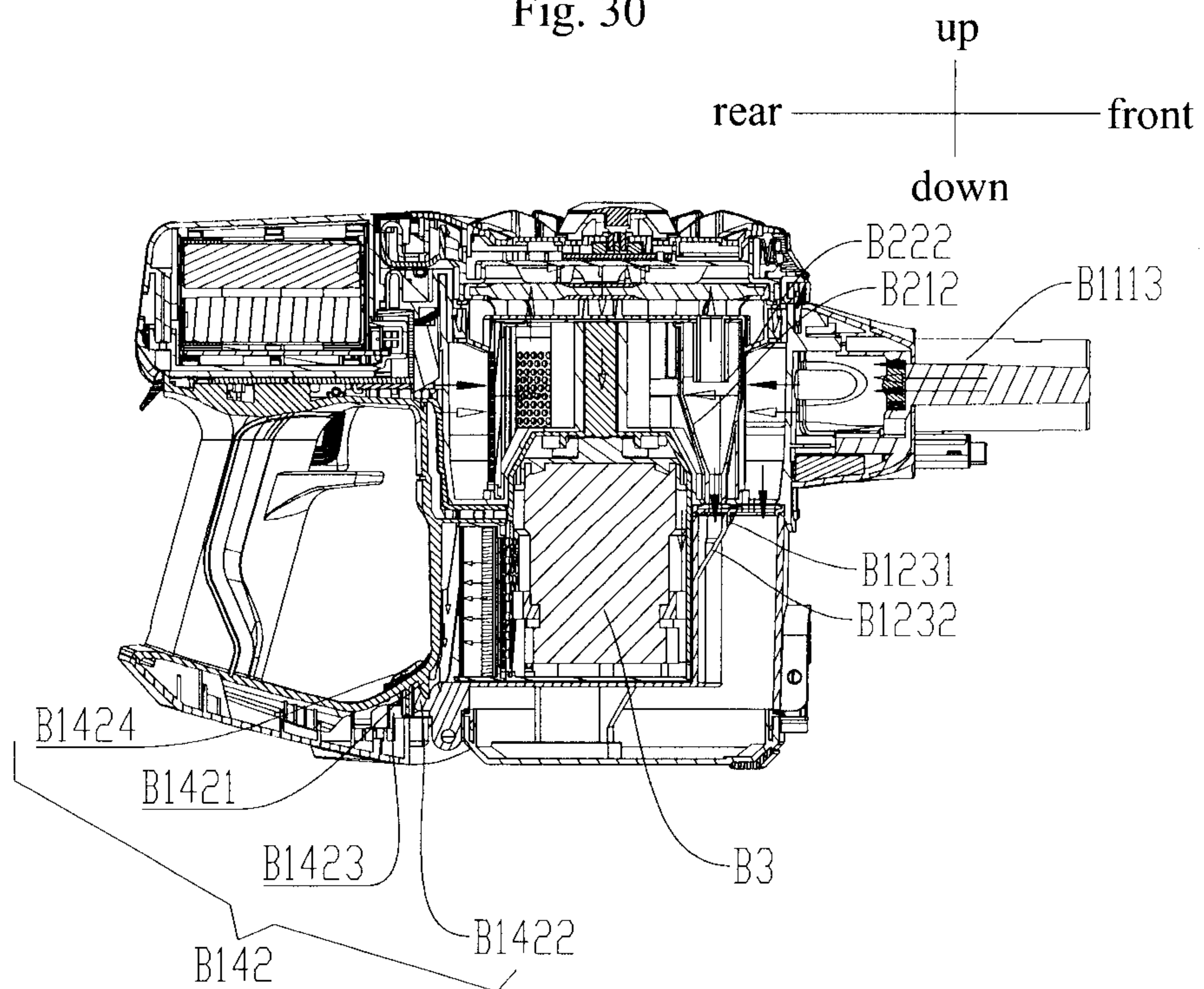


Fig. 31

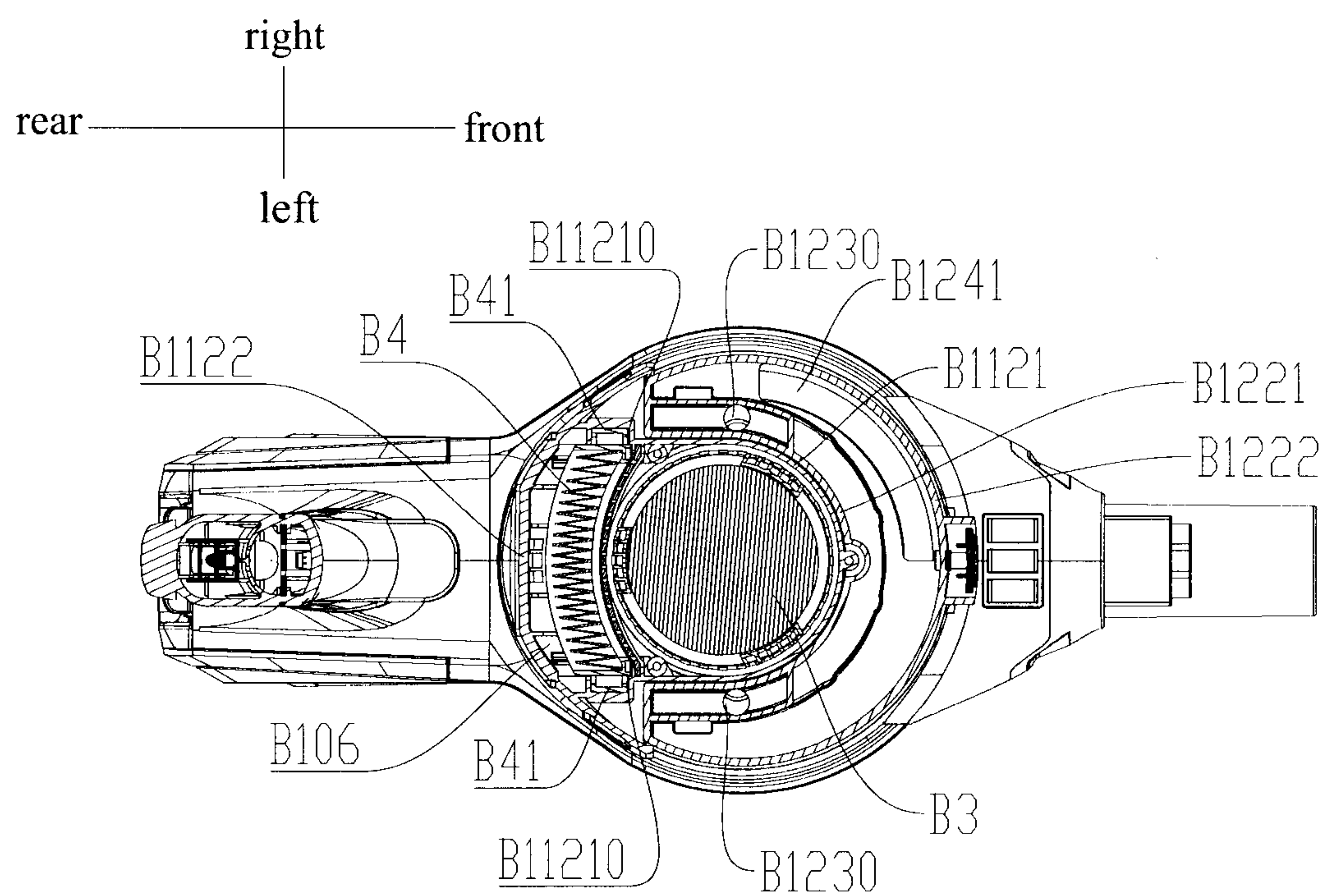


Fig. 32

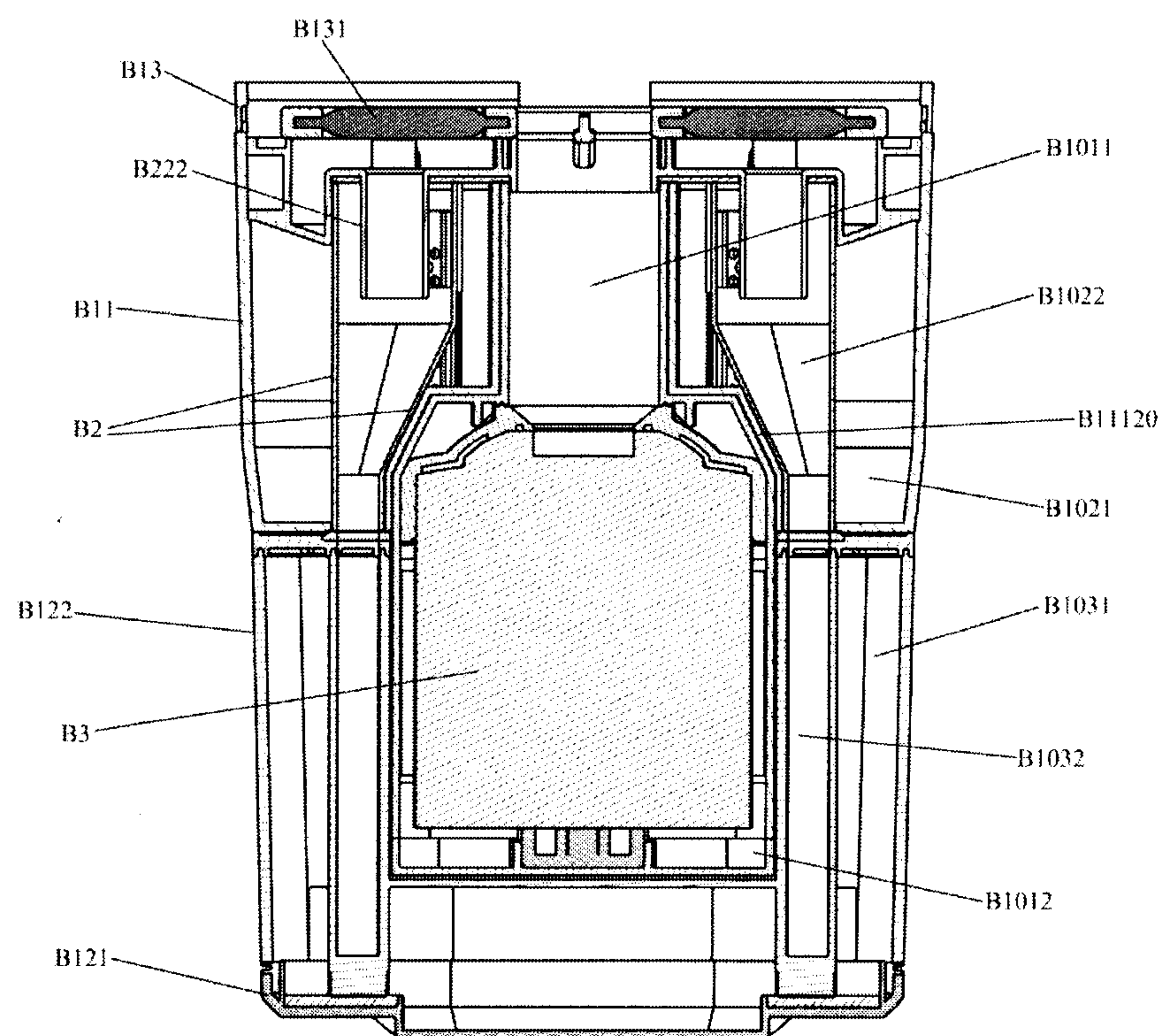


Fig. 33

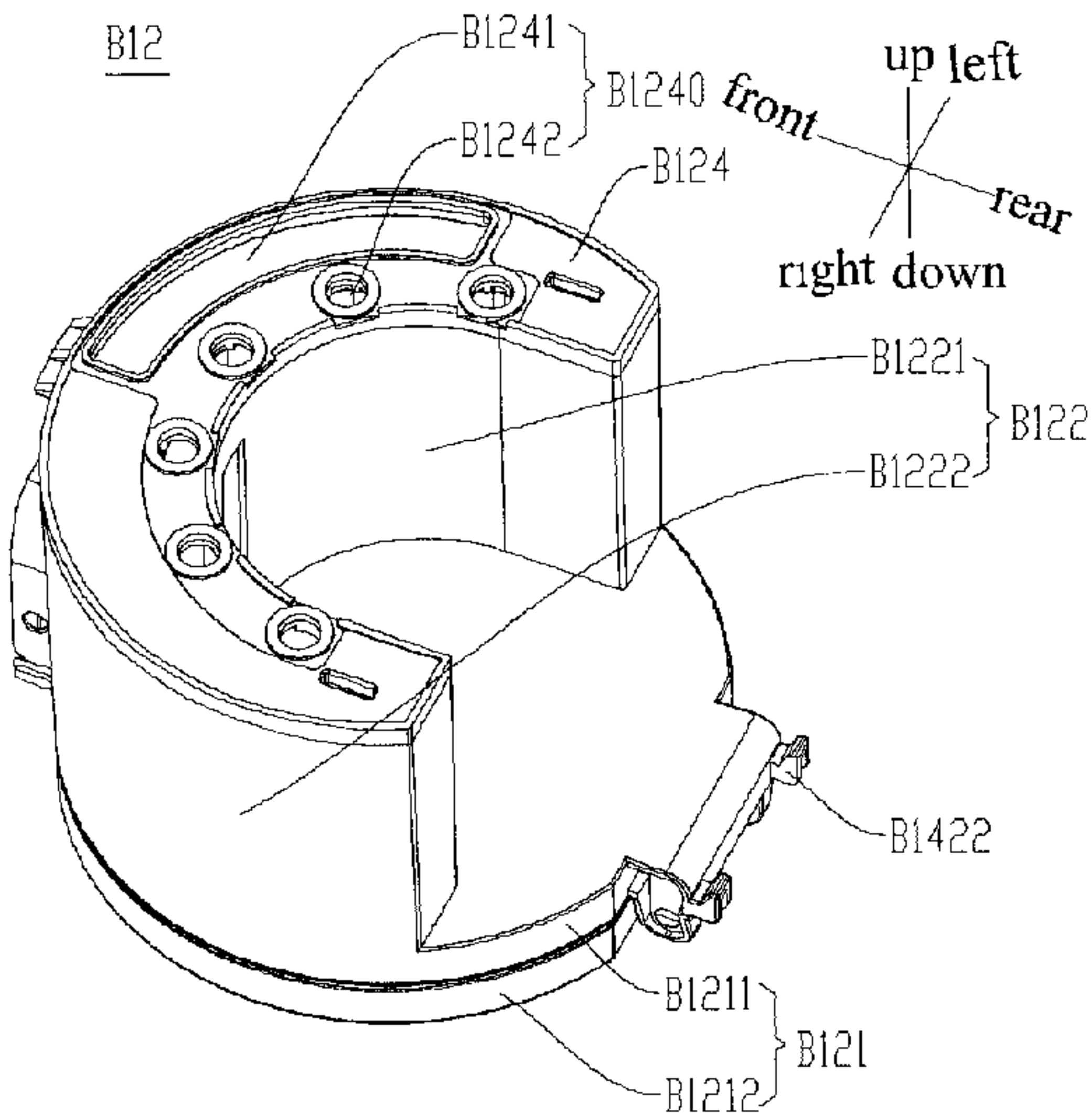


Fig. 24