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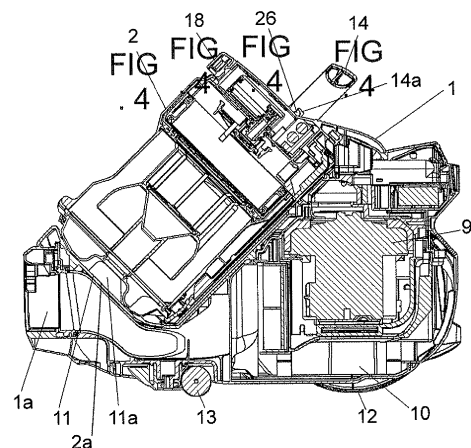
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(54) **ELECTRIC VACUUM CLEANER**

(57) An electric vacuum cleaner includes a cleaner body, dust collector, and handle. The handle has an engaging section at an end, and the dust collector has a first target section for the engaging section. An engagement of the engaging section with the first target section allows the handle to be kept standing. The cleaner body has a second target section for the engaging section, and an engagement of the engaging section with the second target section allows the cleaner body to hold the dust collector. When the dust collector is mounted to the cleaner body with the handle standing, the engagement of the engaging section with the first target section is released, and the engaging section engages with the second target section.

FIG. 2



Description

Technical Field

[0001] The present invention relates to an electric vacuum cleaner.

Background Art

[0002] A conventional cyclone-type electric vacuum cleaner includes a dust collector, which has a handle rotatably supported on a shaft and disposed at an upper section of the dust collector. A claw is fixedly provided to an end of the handle. When a user mounts the dust collector to a cleaner body, the dust collector is held upright before it is mounted to the cleaner body. Then the user aligns the claw of the handle with an engaging section of the cleaner body, and rotates the handle from a standing state to a rest state while the claw fits into the engaging section. The dust collector is thus rigidly mounted to the cleaner body (e.g. refer to Patent Literature 1.)

[0003] However, the foregoing conventional cleaner needs improvement for better usability. To be more specific, the dust collector cannot be mounted to the cleaner body with the handle being kept standing, so that the user should rotate the handle from the standing state to the rest state with the claw being aligned with the engaging section of the cleaner body. It thus requires a cumbersome time for mounting the dust collector to the cleaner body, and this mechanism degrades the usability of the vacuum cleaner.

Related Art Literature

[0004]

Patent Literature 1: Unexamined Japanese Patent Publication No. 2007 - 236950

Disclosure of Invention

[0005] An electric vacuum cleaner of the present invention comprises the following structural elements:

- a cleaner body incorporating a blower that generates suction wind;
- a dust collector detachably mounted to the cleaner body; and
- a handle rotatably supported on a shaft and disposed at an upper section of the dust collector, and having an engaging section at its end.

[0006] A first target section for the engaging section is formed at an upper section of the dust collector, and an engagement of the engaging section with the first target section allows the handle to be kept in a standing position, while a second target section for the engaging section is formed at the cleaner body, and an engagement of the

engaging section with the second target section allows the cleaner body to hold the dust collector. When the dust collector is mounted to the cleaner body with the handle being kept standing, the engagement between the engaging section and the first target section is released, and the engaging section is engaged with the second target section.

[0007] The foregoing structure allows the dust collector to be mounted to the cleaner body with the handle being kept standing. The user needs not rotate the handle from the standing state to the rest state while aligning the engaging section of the handle with the first target section of the cleaner body, so that the dust collector can be mounted with ease to the cleaner body. As a result, the usability of the cleaner improves.

Brief Description of Drawings

[0008]

Fig. 1 is a perspective view of an electric vacuum cleaner in accordance with an embodiment of the present invention.

Fig. 2 is a sectional view of a cleaner body of the vacuum cleaner shown in Fig. 1.

Fig. 3 is a sectional view of a dust collector of the vacuum cleaner shown in Fig. 1.

Fig. 4 is a perspective view of the dust collector of the vacuum cleaner.

Fig. 5A is a lateral view of the cleaner body for illustrating a way of mounting the dust collector of the vacuum cleaner to the cleaner body.

Fig. 5B is a lateral view of the cleaner body for illustrating the dust collector of the vacuum cleaner with the cleaner body mounted thereto.

Preferred Embodiment for Carrying out the Invention

[0009] An exemplary embodiment of the present invention is demonstrated hereinafter with reference to the accompanying drawings. Not to mention, the present invention is not limited to this embodiment.

Exemplary Embodiment

[0010] Fig. 1 is a perspective view of an electric vacuum cleaner in accordance with the embodiment of the present invention. As Fig. 1 shows, electric vacuum cleaner 100 includes cleaner body 1, dust collector 2, sucking device 3, extension pipe 4, and hose 5. Sucking device 3 collects dust from a target face. Extension pipe 4 telescopes and is detachably connected to sucking device 3 at its first end. Hose 5 is detachably connected to a second end of extension pipe 4 at its first end, and also detachably connected to suction port 1a of cleaner body 1 at its second end. Sucking device 3 incorporates a rotary brush (not shown) for scraping dust off the target face and a motor (not shown) for driving the rotary brush.

Hose 5 includes leader pipe 7 having grip 6 for a user to hold in operation at a first end where extension pipe 4 is connected. Extension pipe 4 is detachably connected to hose 5 via leader pipe 7. On top of that, hose 5 includes connection pipe 8 at a second end where cleaner body 1 is connected. Hose 5 is detachably connected to suction port 1a of cleaner body 1 via connection pipe 8.

[0011] Fig. 2 is a sectional view of the cleaner body of the vacuum cleaner in accordance with this embodiment. As Fig. 2 shows, cleaner body 1 incorporates blower 9 that sucks air for generating suction wind. Dust collector 2 is detachably mounted to cleaner body 1.

[0012] Cleaner body 1 includes blower chamber 10 for accommodating blower 9 and a cord winder (not shown) at its rear section, and includes dust-collector receptor 11, which receives dust collector 2 detachably, at its front section. Dust-collector receptor 11 has mating protrusion 11a for positioning dust collector 2 to cleaner body 1.

[0013] Fig. 3 is a sectional view of the dust collector of the electric vacuum cleaner in accordance with the embodiment. As Figs. 2 and 3 show, when dust collector 2 is mounted to cleaner body 1, mating protrusion 11a mates with mating recess 17a provided to lower lid 17 of dust collector 2. A pair of moving wheels 12 is disposed rotatably on both sides of the lower rear section of cleaner body 1. Moving caster 13 is disposed rotatably at the front bottom of cleaner body 1.

[0014] Handle 14 is disposed at the upper section of cleaner body 1 for a user to hold it and carry cleaner body 1. Handle 14 placed at this upper section allows dust collector 2 to stay mounted to cleaner body 1. Second recesses 14a are formed on both ends of handle 14. Recesses 14a working as a second target section is engaged with first claws 26 provided as an engaging section to dust collector 2, so that dust collector 2 is rigidly held by cleaner body 1 with first claws 26 and second recesses 14a.

[0015] Fig. 4 is a perspective view of the dust collector of the electric vacuum cleaner in accordance with the embodiment of the present invention. As shown in Fig. 4, dust collector 2 includes collector body 15, upper lid 16, lower lid 17, handle 18, and operational section 30. As shown in Fig. 3, collector body 15 shapes like a cylinder having opening 15a at the underside. Upper lid 16 covers the top face of collector body 15, while lower lid 17 opens or shuts opening 15a. Handle 18 is rotatably supported on a shaft of upper lid 16 disposed at the upper section of dust collector 2, which is rotatably supported on a shaft of cleaner body 1.

[0016] As Fig. 4 shows, collector body 15 includes intake port 15b at the rear section, and this intake port 15b communicates with suction port 1a shown in Fig. 1 when dust collector 2 is mounted to cleaner body 1. As Fig. 3 shows, collector body 15 includes concentric filter-frame 20 therein, to which first stage filter 19 is mounted. Inner cylindrical section 22 including umbrella type extension part 21 is disposed under first stage filter 19, and inner cylindrical section 22 is mounted to frame 20 by welding

or engagement with a claw (not shown). Pleated second stage filter 23 is disposed over first stage filter 19. Dust removing section 24 and motor 25 are disposed above second stage filter 23, and dust removing section 24 drops the dust accumulated in second stage filter 23 by applying vibration thereto. Motor 25 gives the vibration to dust removing section 24.

[0017] First stage filter 19 is made of metallic material, and the metallic surface of first stage filter 19 should be free from peaks and valleys formed of resin so that a circling air-stream can travel smoothly. The foregoing structure allows the dust to be separated more efficiently, and thus prevents the dust from twining. A polished surface of first stage filter 19 will also allows the dust to be separated efficiently. First stage filter 19 having undergone the antibacterial process can be kept clean.

[0018] Upper lid 16 is disposed above collector body 15 such that it covers dust removing section 24 and motor 25 therein and caps the top face of collector body 15. As Fig. 4 shows, handle 18 is rotatably supported on a shaft of upper lid 16. Handle 18 includes first claw 26 at its end to be used for engagement. On top face 16b of upper lid 16, first recess 27 working as a first target section for the engaging section is formed, and first recess 27 is engaged with first claw 26 so that handle 18 can be kept in a standing position when handle 18 stands at 90° or more relative to top face 16b of upper lid 16. As shown in Fig. 3, second claw 29 is formed at the front of upper lid 16, and second claw 29 engages with third recess 28 provided to handle 18 so that handle 18 can be laid in a rest state.

[0019] As Fig. 4 shows, operational section 30 is provided to a rear upper section of upper lid 16, and it is used for opening lower lid 17. Upper lid 16 also includes discharge port 16a at the rear section for communicating with blower 9 when dust collector 2 is mounted to cleaner body 1. The air from which the dust is separated in dust collector 2 is discharged outside dust collector 2 through this discharge port 16a.

[0020] As Fig. 3 shows, hinged lower-lid 17 is provided pivotably to hinge section 31 of collector body 15, and it is attached to collector body 15 by buckle 32 provided to collector body 15 with opening 15a closed. Lower lid 17 includes packing 33 at a position confronting collector body 15, and packing 33 allows lower lid 17 to cover collector body 15 air-tightly.

[0021] A user operates operational section 30 to push down slider 34 provided to the rear section of collector body 15, and slider 34 rotates buckle 32 for releasing the engagement between lower lid 17 and buckle 32, so that opening 15a is opened. Recess 17a is formed at approx. center of lower lid 17 for mating with protrusion 11a (shown in Fig. 2) formed on dust collector receptor 11.

[0022] The operation of electric vacuum cleaner 100 with the structure discussed above is demonstrated hereinafter. When a user holds grip 6 shown in Fig. 1 and starts working cleaner 100, blower 9 generates suction wind, so that suction force is produced. A movement of

sucking device 3 on a target face allows sucking device 3 to suck the dust on the target face together with air, then the air containing the dust flows into cleaner body 1 via extension pipe 4, hose 5, and suction port 1a. The air containing the dust then flows into dust collector 2 through intake port 15b shown in Fig. 4.

[0023] The air containing the dust then flows into cyclone space 35 formed of the outer periphery of first stage filter 19 shown in Fig. 3 and collector body 15, and then the air is separated by centrifugal force, caused by the circling air-stream generated in cyclone space 35, into rough dust chiefly formed of dust balls and air still containing fine dust. The rough dust chiefly formed of dust balls passes through dust collecting path 36 formed between extension part 21 and collector body 15, and is accumulated in dust accumulation space 37.

[0024] The rough dust is centrifuged in cyclone space 35, and the remaining air still containing fine dust passes through first stage filter 19, and then the fine dust is filtered by second stage filter 23. As a result, the air without the fine dust passes through second stage filter 23 and is discharged outside dust collector 2 from discharge port 16a (shown in Fig. 4). The discharged air is sucked by blower 9 and discharged outside cleaner body 1 from a discharge port (not shown) provided to cleaner body 1.

[0025] During a halt of blower 9, the fine dust accumulated in second stage filter 23 drops therefrom due to the vibration applied by motor 25 to dust removing section 24 disposed above filter 23. The fine dust dropped passes through the space inside the mounting frame 20 of the first stage filter, and is accumulated in inner cylindrical section 22 disposed under first stage filter 19 and yet inside extension part 21.

[0026] Next, when the user dumps the dust accumulated in dust collector 2, the user takes the following actions: Move upward the handle 18 disposed on upper lid 16 of dust collector 2, then this action releases the engagement between first claw 26 (shown in Fig. 4) disposed at the end of handle 18 and second recess 14a (shown in Fig. 2) disposed on handle 14 of cleaner body 1, so that dust collector 2 can be detached from cleaner body 1. After dust collector 2 is detached from cleaner body 1, the user stands handle 18 at an angle ranging from 90° to 140° (inclusive) relative to top face 16b of upper lid 16.

[0027] First claw 26 and first recess 27 both shown in Fig 4 are engaged with each other, thereby standing handle 18 stably. In this state, the user holds handle 18, and moves dust collector 2 above a garbage box before manipulating operational section 30, which pushes down slider 34 for rotating buckle 32, whereby the engagement between lower lid 17 and buckle 32 is released. The dust is then discharged from opening 15a to the outside of dust collector 2.

[0028] Next, in the case of mounting dust collector 2 to cleaner body 1, the user takes the following actions, which are described with reference to Figs. 5A and 5B. Fig. 5A is a lateral view of the cleaner body to which the

dust collector is going to be mounted, and Fig. 5B is a lateral view of the cleaner body with the dust collector mounted.

[0029] When the user dumps the dust accumulated in dust collector 2 and then restores dust collector 2 to cleaner body 1, the user takes the following action while handle 18 is kept standing: The user mates recess 17a (shown in Fig. 3) provided to lower lid 17 with protrusion 11a (shown in Fig. 2) provided to dust collector receptor 11 of cleaner body 1, thereby positioning dust collector 2 to cleaner body 1. Dust collector 2 is thus mounted to cleaner body 1. In other words, as shown in Figs. 2 and 3, protrusion 11a is provided to cleaner body 1 such that it confronts bottom face 2a of dust collector 2, and recess 17a is provide to bottom face 2a of dust collector 2 so that protrusion 11a can mate with recess 17a.

[0030] As Figs. 5A and 5B show, when the user mounts dust collector 2 to cleaner body 1 with handle 18 standing, handle 18 disposed at upper lid 16 of dust collector 2 is brought into contact with handle 14 disposed on the upper section of cleaner body 1. Then first claw 26 is released from first recess 27, so that handle 18 rotates from the standing state (Fig. 5A) to a rest state (Fig. 5B), and first claw 26 engages with second recess 14a. In this state, the user pushes down handle 18 so that second claw 29 engages with third recess 28 shown in Fig. 3, whereby dust collector 2 is mounted to cleaner body 1.

[0031] As discussed above and shown in Figs. 2 and 3, when the user mounts dust collector 2 to cleaner body 1, the user mates protrusion 11a with recess 17a for positioning dust collector 2 to cleaner body 1 with ease. Dust collector 2 can be thus mounted to cleaner body 1 with ease, and as a result, the usability of electric vacuum cleaner 100 can be further improved.

[0032] As shown in Fig. 5B, when dust collector 2 is mounted to cleaner body 1 with handle 18 standing, handle 18 is brought into contact with handle 14, and first claw 26 is released from first recess 27, so that handle 18 rotates from the standing state to the rest state. On top of that, this structure allows first claw 26 to engage with second recess 14a, so that dust collector 2 can be mounted to cleaner body 1 with handle 18 standing. The user thus needs not to rotate handle 18 from the standing state to the rest state while the user aligns first claw 26 with second recess 14a. Dust collector 2 can be thus mounted to cleaner body 1 with ease, and the usability of electric vacuum cleaner 100 can be thus improved.

[0033] As shown in Fig. 4, first claw 26 engages with first recess 27 while handle 18 stands at an angle ranging from 90° to 140° (inclusive) relative to top face 16b of upper lid 16, so that handle 18 is kept in the standing position rigidly. Operational section 30 is provided to the upper rear of upper lid 16 for the user to manipulate it with one hand, the dust can be thus discharged with ease, and the usability improves.

[0034] In the case of top face 16b of upper lid 16 being parallel to the floor, it is preferable to keep handle 18 standing at an angle ranging from 90° to 140° (inclusive)

relative to top face 16b of upper lid 16, and it is more preferable to keep handle 18 standing at an angle ranging from 90° to 130° (inclusive). A greater angle included between handle 18 and top face 16b allows the user to manipulate operational section 30 with more ease while the user holds handle 18. However, an excessively greater angle will narrow a clearance between handle 18 and operational section 30, so that it is difficult for the user to hold handle 18.

[0035] As shown in Fig. 5B, dust collector 2 is mounted to cleaner body 1 with angle 38 ranging from 30° to 60° (inclusive). Angle 38 is included between center line 2b of the dust collector and center line 1b of cleaner body 1. This structure allows downsizing cleaner body 1, so that dust collector 2 can be mounted to cleaner body with ease.

Industrial Applicability

[0036] The electric vacuum cleaner of the present invention allows the dust cleaner to be mounted to the cleaner body with ease, so that the vacuum cleaner can improve its usability. The present invention is thus useful for household-use vacuum cleaners and business-use vacuum cleaners.

Description of Reference Marks

[0037]

- 1 cleaner body
- 1a suction port
- 1b center line of cleaner body
- 2 dust collector
- 2a bottom face of dust collector
- 2b center line of dust collector
- 3 sucking device
- 4 extension pipe
- 5 hose
- 6 grip
- 7 leader pipe
- 8 connecting pipe
- 9 blower
- 10 blower chamber
- 11 dust collector receptor
- 11a protrusion
- 12 wheel
- 13 caster
- 14 handle
- 14a second recess (second target section for engaging section)
- 15 collector body
- 15a opening
- 15b intake port
- 16 upper lid
- 16a discharge port
- 16b top face of upper lid
- 17 lower lid

- 17a recess
- 18 handle
- 19 first stage filter
- 20 filter frame
- 21 extension part
- 22 inner cylindrical section
- 23 second stage filter
- 24 dust removing section
- 25 motor
- 26 first claw (engaging section)
- 27 first recess (first target section for engaging section)
- 28 third recess
- 29 second claw
- 30 operational section
- 31 hinge section
- 32 buckle
- 33 packing
- 34 slider
- 35 cyclone space
- 36 dust collecting path
- 37 dust accumulation space
- 38 angle
- 100 electric vacuum cleaner

Claims

1. An electric vacuum cleaner comprising:

a cleaner body incorporating a blower that generates suction wind;
 a dust collector to be mounted detachably to the cleaner body;
 a handle disposed rotatably and supported on a shaft at an upper section of the dust collector; wherein the handle includes an engaging section at an end, and the dust collector includes a first target section for the engaging section, and an engagement of the engaging section with the first target section allows the handle to be kept in a standing position,
 wherein the cleaner body includes a second target section for the engaging section, and an engagement of the engaging section with the second target section allows the cleaner body to hold the dust collector;
 wherein when the dust collector is mounted to the cleaner body with the handle standing, the engagement of the engaging section with the first target section is released, and the engaging section engages with the second target section.

2. The electric vacuum cleaner of claim 1, wherein the cleaner body includes a protrusion confronting a bottom face of the dust collector for positioning, and the bottom face of the dust collector includes a recess to be mated with the protrusion.

3. The electric vacuum cleaner of claim 1 or claim 2, wherein the dust collector includes:

a collector body having an opening at an under-
side; 5
an upper lid for capping a top face of the collector
body;
a lower lid disposed rotatably and supported on
a shaft of the collector body for opening/shutting
the opening; 10
an operational section disposed at an upper rear
section of the upper lid for opening the lower lid;
wherein the handle is provided to the upper lid
and can stand at an angle ranging from 90° to
140° (inclusive) in the standing position relative 15
to a top face of the upper lid.

4. The electric vacuum cleaner of claim 1, wherein the
dust collector is mounted to the cleaner body at an
angle raging from 30° to 60° (inclusive), the angle 20
included between a center line of the dust collector
and a center line of the cleaner body.

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FIG. 1

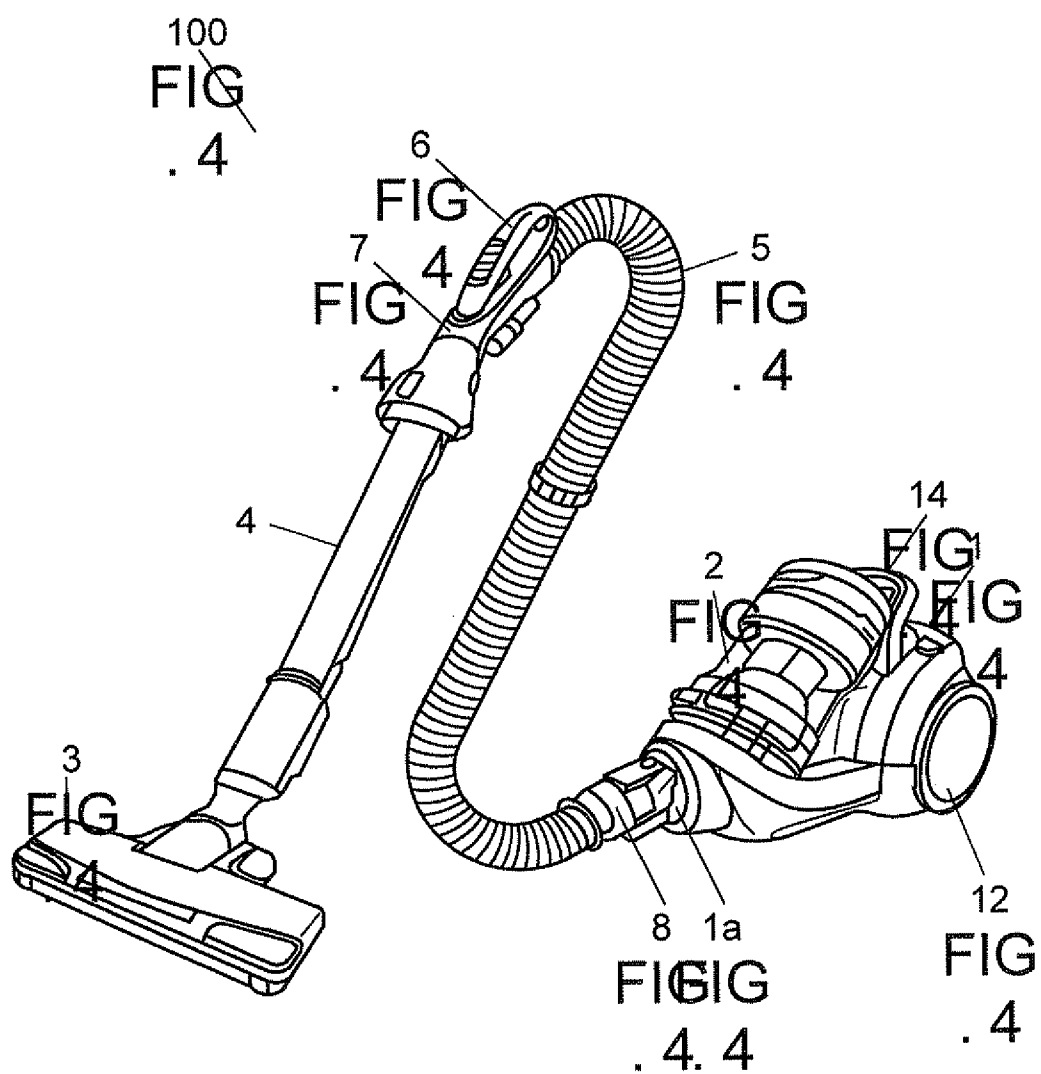


FIG. 2

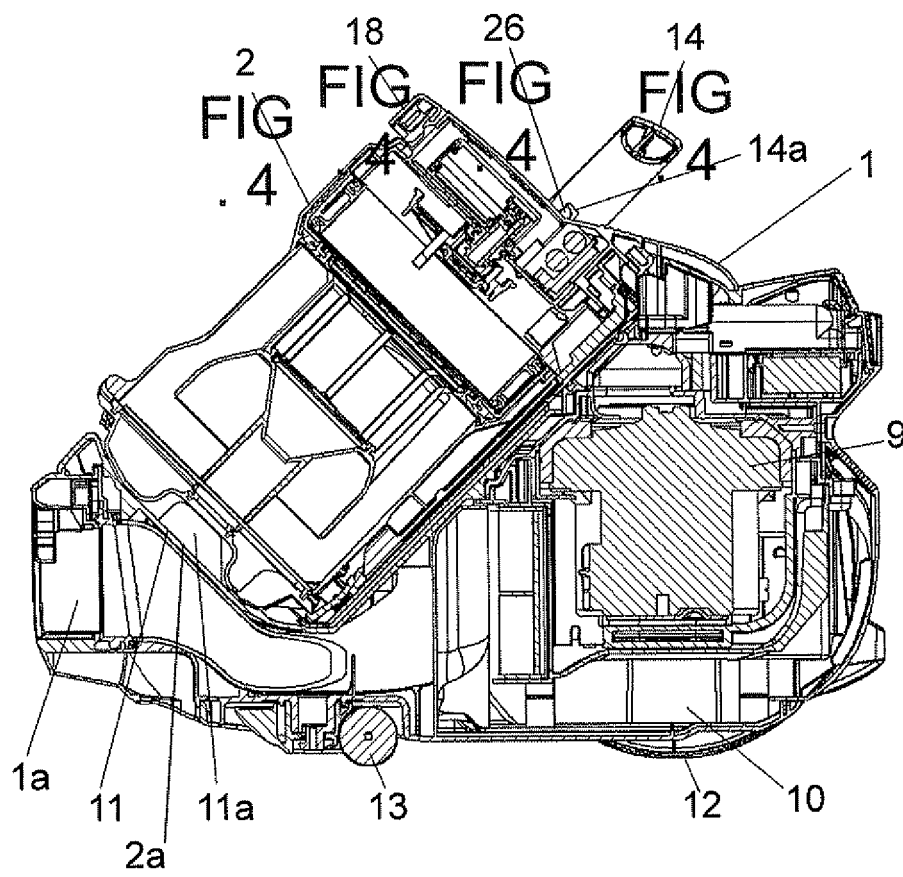
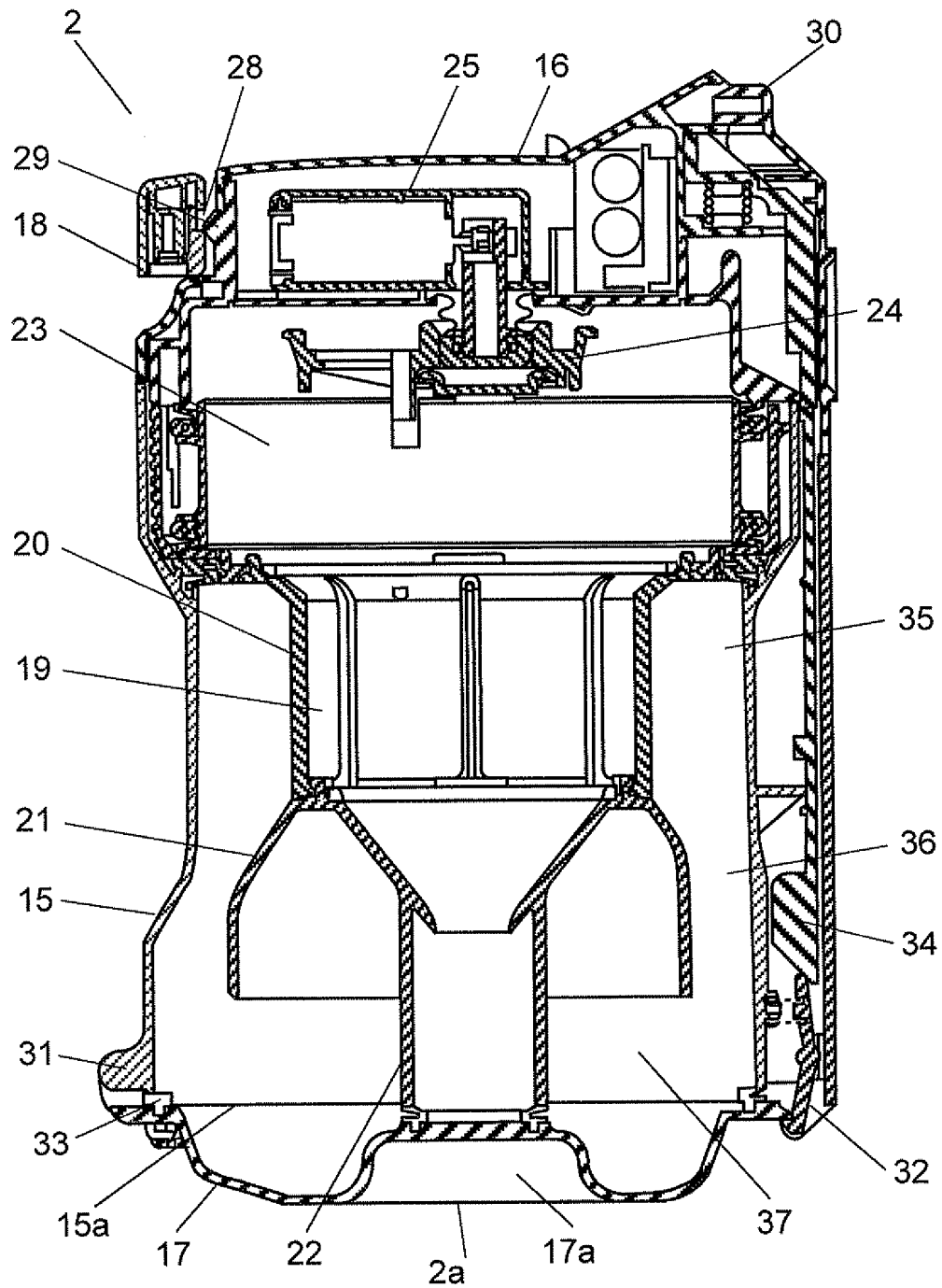


FIG. 3



□

FIG. 4

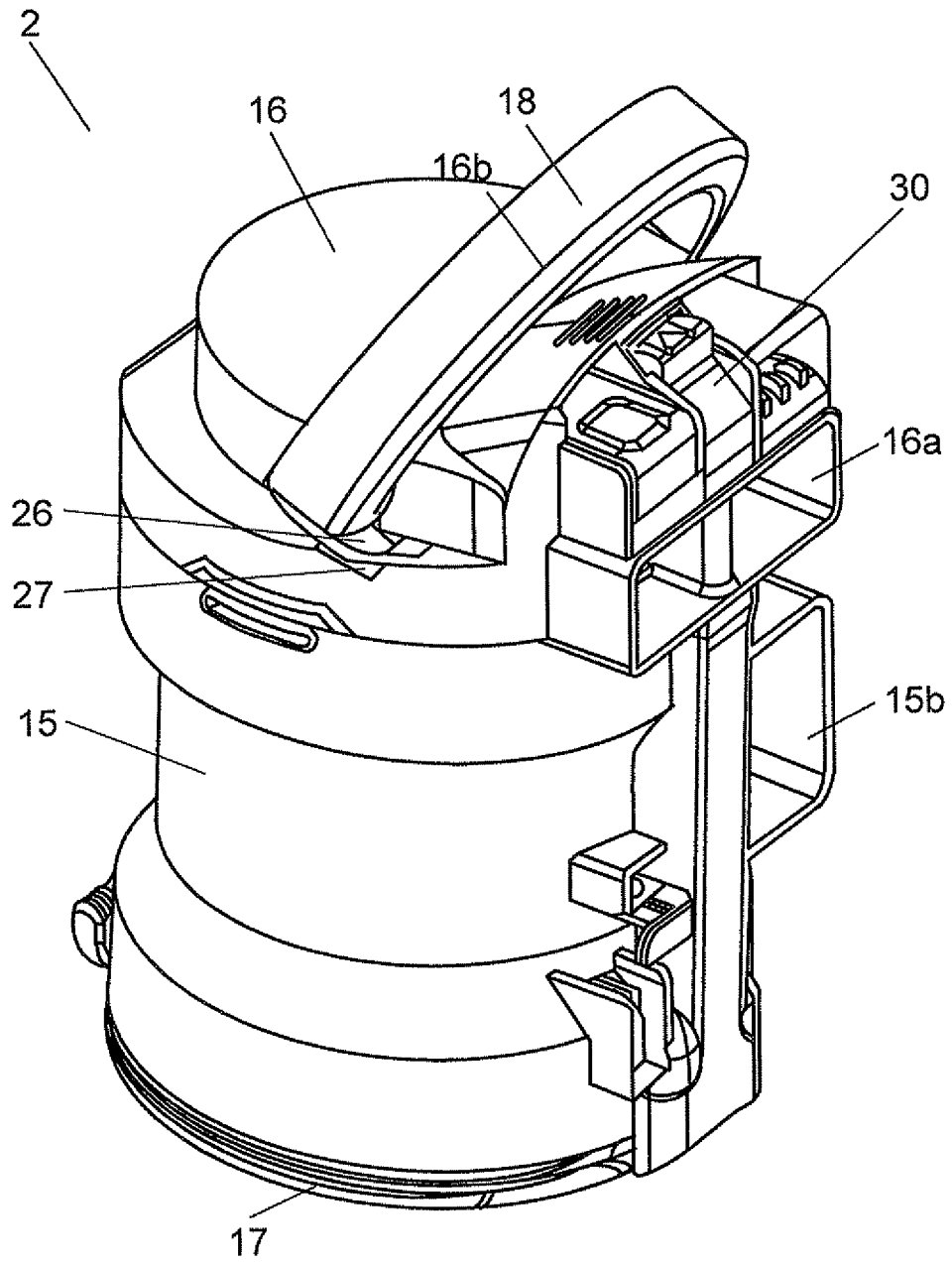


FIG. 5A

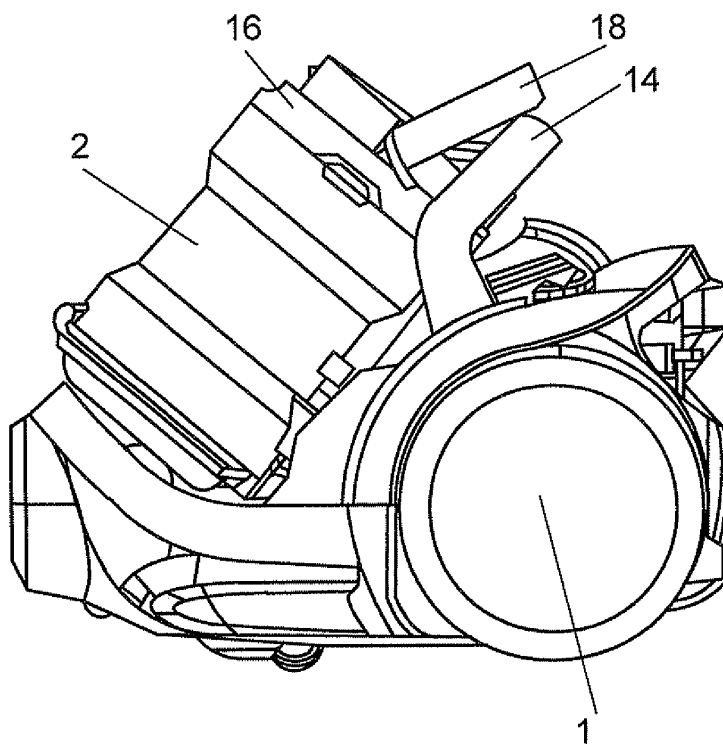
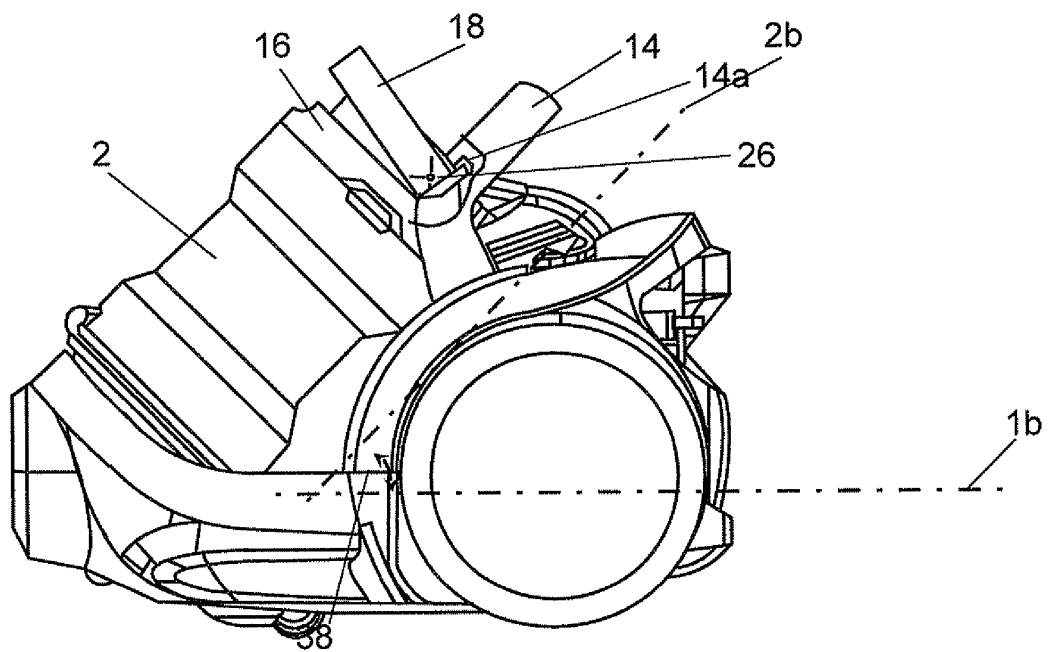


FIG. 5B



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/004662

A. CLASSIFICATION OF SUBJECT MATTER

A47L9/10 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L9/10

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2011

Kokai Jitsuyo Shinan Koho 1971-2011 Toroku Jitsuyo Shinan Koho 1994-2011

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2010-99236 A (Sharp Corp.), 06 May 2010 (06.05.2010), paragraphs [0010] to [0020]; fig. 1 to 3 & CN 101721169 A	1-4
A	JP 2010-500067 A (Dyson Technology Ltd.), 07 January 2010 (07.01.2010), fig. 4, 6 & US 2010/0071153 A1 & GB 2440715 A & GB 615681 D0 & EP 2049000 A & WO 2008/017802 A1 & KR 10-2009-0034399 A & CN 101500466 A & AT 511378 T	2

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Date of the actual completion of the international search
21 November, 2011 (21.11.11)Date of mailing of the international search report
06 December, 2011 (06.12.11)Name and mailing address of the ISA/
Japanese Patent Office

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/004662

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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