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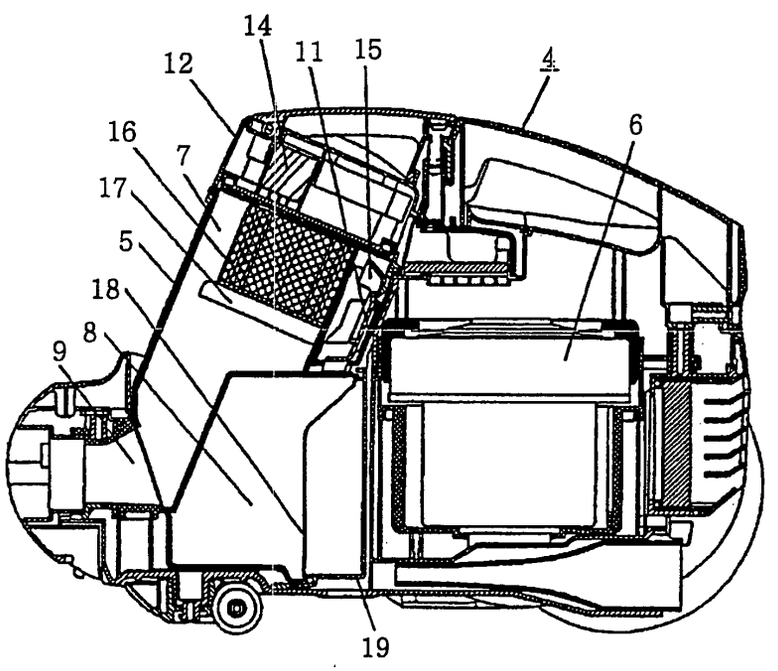
(54) Vacuum cleaner

(57) A vacuum cleaner of the present invention includes an electric blower for generating a suction air stream; a plurality of centrifugal separation parts for separating dirt particles from the suction air stream; and an air inlet installed upstream of the centrifugal separation parts. The suction air stream suctioned in the air inlet is divided in plural streams to flow into the respective centrifugal separation parts. By installing the multiple centrifugal separation parts, dirt collecting capability can be improved and, at the same time, a size of the vacuum cleaner can be scaled down in comparison with a case where a single large centrifugal separation part having equal dirt collecting capability is installed.

FIG. 1



EP 1 457 150 A2

Description

[0001] The present invention relates to a household vacuum cleaner; and, more particularly, to a vacuum cleaner having an improved usability.

[0002] Referring to Figs. 18 and 19, there is shown a conventional vacuum cleaner.

[0003] In Figs. 18 and 19, reference numeral 1 represents a main body communicating with suction nozzle 2 through which the dirt particle are suctioned, the main body including therein an electric blower (not shown) for generating a suction air stream containing dirt particles. Reference numeral 3 is a dirt collection unit detachably installed in main body 1. Dirt collection unit 3 includes centrifugal separation part 3a at an upper portion thereof, which centrifugally separates dirt particles from a suction air stream; and dirt accumulation part 3b at a lower portion thereof for accumulating the dirt particles separated from the suction air stream by centrifugal separation part 3a.

[0004] During an operation of the above-described vacuum cleaner, dirt particles are suctioned together with the suction air stream through suction nozzle 2 into dirt collection unit 3, and are centrifugally separated from the suction air stream by centrifugal separation part 3a. Thus separated dirt particles are then accumulated in dirt accumulation part 3b, while the suctioned air stream is drawn to pass through filter 3c by a suction force of the electric blower.

[0005] Each of centrifugal separation part 3a and dirt accumulation part 3b is of a cylindrical shape having a longitudinal central axis extending in a substantially vertical direction (see, Japanese Patent Laid-open Publication No. 1997-176871).

[0006] However, in the conventional vacuum cleaner, in order to improve dirt collecting capability thereof, centrifugal separation part 3a for separating dirt particles from the suction air stream and dirt accumulation part 3b for accumulating dirt particles therein need to be enlarged, thereby increasing the size of the vacuum cleaner.

[0007] It is, therefore, an object of the present invention to provide a vacuum cleaner capable of scaling down a size of a dirt collection unit including a centrifugal separation part and a dirt accumulation part without deteriorating dirt collecting capability thereof and, at the same time, improving its usability.

[0008] In accordance with an aspect of the present invention, there is provided a vacuum cleaner including: an electric blower for generating a suction air stream; a plurality of centrifugal separation parts for separating dirt particles from the suction air stream; and an air inlet installed upstream of the centrifugal separation parts, wherein the suction air stream suctioned in the air inlet is divided in plural streams to flow into the respective centrifugal separation parts.

[0009] In order to centrifugally collecting dirt particles, the centrifugal separation parts should have an approximately cylindrical or conical shape. Therefore, in case of a single centrifugal separation part, in order to improve dirt collecting capability, a size of the centrifugal separation part needs to be enlarged, which entails an enlarged main body.

[0010] In the above-described configuration of the present invention, however, by providing a plurality of centrifugal separation parts, a degree of freedom of arrangement is increased so that a compact arrangement can be implemented without deteriorating the dirt collecting capability.

[0011] The above and other objects and features of the present invention will become apparent from the following description of preferred embodiments, given in conjunction with the accompanying drawings, in which:

Fig. 1 shows a sectional side view of a center portion of a main body of a vacuum cleaner in accordance with a first preferred embodiment of the present invention;

Fig. 2 illustrates a sectional side view of the main body;

Fig. 3 describes an external side view of a dirt collection unit of the main body;

Fig. 4 depicts an external front view of the dirt collection unit;

Fig. 5 provides a sectional top view of the dirt collection unit;

Fig. 6 presents an external rear view of the dirt collection unit (in case a grip unit is held);

Fig. 7 represents a sectional side view of a center portion of the dirt collection unit;

Fig. 8 offers a sectional side view of another exemplary dirt collection unit;

Fig. 9 illustrates an external side view of the dirt collection unit;

Fig. 10 shows a sectional side view of the dirt collection unit (in case a cover is opened);

Fig. 11 provides a cross-sectional view of principal parts of a main body of a vacuum cleaner in accordance with a second preferred embodiment of the present invention;

Fig. 12 presents a cross-sectional view of principal parts of a dirt collection unit of the main body of the vacuum cleaner;

Fig. 13 represents a cross-sectional view of principal parts of the main body of the vacuum cleaner;

Fig. 14 describes a cross-sectional view of principal parts of the dirt collection unit;

Fig. 15 depicts a cross-sectional view of principal parts of the dirt collection unit;

Fig. 16 offers a cross-sectional view of principal parts of another exemplary dirt collection unit;

Fig. 17 sets forth a cross-sectional view of principal parts of the dirt collection unit;

Fig. 18 provides an external view of a conventional vacuum cleaner; and

Fig. 19 illustrates a sectional side view of the vacu-

um cleaner.

[0012] A first preferred embodiment of the present invention will now be described with reference to Figs. 1 to 10.

[0013] Referring to Figs. 1 to 10, reference numeral 4 represents a main body, and reference numeral 5 represents dirt collection unit including centrifugal separation parts 7 disposed at an upper portion of main body 4 for separating dirt particles from a suction air stream and dirt accumulation part 8 placed at a lower portion of main body 4, for accumulating the dirt particles separated by the centrifugal separation parts 7. Dirt collection unit 5 communicates with electric blower 6 for producing a suction air stream and with a suction nozzle (not shown) through which the dirt particles are suctioned. Dirt collection unit 5 is constructed such that longitudinal central axes of centrifugal separation part 7 are inclined at an angle of 30 degrees with respect to a longitudinal central axis of dirt accumulation part 8.

[0014] Reference numeral 9 indicates an air inlet for introducing a suction air stream containing dirt particles suctioned through the suction nozzle into dirt collection unit 5. Reference numeral 10 represents air stream separation ports for approximately uniformly distributing the suction air stream from air inlet 9 into respective centrifugal separation parts 7 at entrances thereof. Further, reference numeral 11 represents a grip unit which is used to hold and carry dirt collection unit 5; reference numeral 12 indicates a dirt collection unit cover for covering openings 13 provided at an approximately upper portion of dirt collection unit 5, dirt collecting unit cover 12 including therein filter 14 for filtering dirt particles contained in the air stream suctioned therein; reference numeral 15 represents a manipulation unit installed near grip unit 11, for connecting and disconnecting dirt collection unit cover 12 and dirt collection unit 5. Manipulation unit 15 may include grip unit 11 and, at the same time, operate it.

[0015] Furthermore, reference numeral 16 represents approximately cylindrical pre-filters disposed between dirt collection unit 5 and dirt collection unit cover 12, pre-filters 16 being disposed on the longitudinal central axes of centrifugal separation parts 7, respectively, for accumulating bulky dirt particles. Reference numeral 17 indicates approximately pan-shaped protecting members provided at lower portions of pre-filters 16, respectively.

[0016] Moreover, reference numeral 18 indicates a discharge port provided at a peripheral portion of dirt accumulation part 8, for discharging dirt particles, and reference numeral 19 represents a discharge port cover for covering discharge port 18. Discharge port cover 19 is rotatably supported by hinge shaft 20 installed near discharge port 18, and hooks 21 for fixing discharge port cover 19 upon rotation thereof are installed near hinge shaft 20.

[0017] Hereinafter, an operation of a vacuum cleaner in accordance with the first preferred embodiment of the present invention will be described in detail.

[0018] With reference to Figs. 1 and 2, during an operation of the vacuum cleaner, a suction air stream containing dirt particle suctioned by electric blower 6 pass through air inlet 9 and are then divided into approximately equal air streams by air stream separation ports 10 provided upstream of centrifugal separation parts 7 and the divided air streams are introduced into centrifugal separation members 7 in approximately tangential directions along inner surfaces thereof, respectively.

[0019] Dirt particles contained in the air streams drop downward due to their own weights while rotating together with the air streams along the inner circumferential surfaces of centrifugal separation parts 7 to be accumulated in dirt accumulation part 8 provided under centrifugal separation parts 7. Thereafter, since rotational air current generated by centrifugal separation parts 7 is reflected by a bottom surface of dirt accumulation part 8 and then rise upward, the dirt particles float upward therewith. But, they rebound downward from protecting members 17 installed at lower portions of pre-filters 16 to be again accumulated in dirt accumulation part 8. Protecting members 17 are of a pan-shape opened downward which has an outer size greater than that of pre-filter 16. By repeat of such operation, dirt particles are increasingly accumulated in dirt accumulation part 8.

[0020] Suction air streams containing fine dirt particles, from which bulky dirt particles have been separated by centrifugal separation members 7, pass through pre-filters 16 and then filter 14 provided inside dirt collection cover 12 so that fine dirt particles are filtered by filter 14. Therefore, clean air streams substantially free of dirt particles are suctioned by electric blower 6 and then discharged to an atmosphere.

[0021] When the dirt particles accumulated in dirt accumulation part 8 are to be discharged, a user may choose two methods. In the first method, the user removes dirt collection unit 5 from main body 4 by holding and lifting grip unit 11. Then, by pushing manipulation unit 15 installed inside grip unit 11, the user separates dirt collection unit cover 12 from dirt collection unit 5. In this way, dirt particles can be discharged from opening 13 provided at an upper portion of dirt collection unit 5.

[0022] Further, in a second method, the user removes dirt collection unit 5 from main body 4 and opens discharge port cover 19 provided at a lower portion of dirt collection unit 5 so that dirt particles in dirt accumulation part 8 can be discharged from discharge port 18.

[0023] Referring to Figs. 1 to 3, since dirt collection unit 5 is constructed such that the longitudinal central axes of centrifugal separation parts 7 are inclined at an angle of 30 degrees with respect to the longitudinal central axis of dirt accumulation part 8, a total height thereof can be reduced compared with a case where centrifugal separation parts 7 and dirt accumulation part 8 are arranged in line vertically. Accordingly, dirt collection unit 5 can be installed in so-called a cylinder vacuum cleaner

as well as an upright vacuum cleaner. Further, although dirt collection unit 5 is constructed such that the longitudinal central axes of centrifugal separation parts 7 are inclined at an angle of 30 degrees with respect to the longitudinal central axis of dirt accumulation part 8 in this embodiment, the object of the present invention can be sufficiently satisfied with an angle ranging from 5 to 85 degrees.

[0024] Since centrifugal separation members 7 are inclined at 30° with respect to a vertical direction as illustrated in Figs. 1 to 3, dirt particles can move downward due to their own weights. As a result, it is possible to avoid a drawback that dirt particles separated from the suction air stream are not efficiently moved in case centrifugal separation parts 7 and dirt accumulation part 8 are horizontally arranged.

[0025] Besides, since it is difficult for dirt particles accumulated in dirt accumulation part 8 to rise upward again by a centrifugal force generated by centrifugal separation parts 7, they are hardly adhered to pre-filters 16 included in centrifugal separation parts 7, thereby preventing a deterioration of dirt collecting capability.

[0026] Additionally, since the centrifugal force generated by centrifugal separation parts 7 is almost equal in upper portions and lower portions of centrifugal separation parts 7, deterioration of the dirt collecting capability can be reduced.

[0027] Further, centrifugal separation parts 7 are inclined while a shape of dirt accumulation part 8 can be freely designed without any limits. Therefore, by enlarging dirt accumulation part 8 as great as possible, a dirt collecting volume of dirt collection unit 5 can be increased. Accordingly, a frequency of discarding dirt particles is reduced so that the usability of the vacuum cleaner can be improved.

[0028] With reference to Figs. 4 and 5, by horizontally arranging dirt collection units 5 having a thin configuration parallel to each other, entire dirt collection unit 5 can be of an approximately rectangular shape in section with round corners, as shown in Fig. 5. Thus, it is possible to design, dirt collection unit 5 variously. Specifically, arrangements of a plurality of dirt collection units 5 or dirt collection units 5 of different sizes can be implemented to increase variety of design and, at the same time, dirt collection unit 5 can be installed even in a small space.

[0029] In order to centrifugally collect dirt particles, centrifugal separation parts 7 should have an approximately cylindrical shape or an approximately conical shape. Thus, in case of a single centrifugal separation part, in order to improve dirt collecting capability, a size of centrifugal separation parts 7 and should be increased, resulting in an enlarged main body. However, with the above-described configuration, especially, by providing a plurality of centrifugal separation parts 7, a degree of freedom of arrangement is increased so that a compact arrangement can implemented without deteriorating dirt collecting capability.

[0030] As shown in Fig. 5, since the suction air stream from air inlet 9 is approximately uniformly divided in plural streams, the dirt particles suctioned through the suction nozzle are approximately uniformly distributed into respective dirt collection units 5 and equally accumulated therein. Accordingly, it is possible to avoid a drawback that a user is unaware of a time to discard dirt particles because of the different amount of dirt particles accumulated in each of dirt collection units 5.

[0031] Furthermore, grip unit 11 which is used to hold and carry dirt collection unit 5 is provided at dirt collection unit 5, so that it is easy to carry dirt collection unit 5. Further, in case dirt particles are discarded, since hands of the user are prevented from being contaminated, the usability thereof can be improved.

[0032] Moreover, since openings 13 are provided at an approximately upper portion of dirt collection unit 5 and dirt collection unit cover 12 is provided which covers openings 13 and includes therein filter 14 for filtering fine dirt particles in the air streams separated by centrifugal separation parts 7, it is possible to eliminate drawbacks such as performance degradation and stability deterioration due to an adhesion of fine dirt particles to electric blower 6. At the same time, by separating dirt collection unit cover 12, it is easy to discard dirt particles accumulated in dirt collection unit 5 from openings 13, thereby improving the usability thereof.

[0033] Manipulation units 15 for connecting and disconnecting dirt collection unit cover 12 and dirt collection unit 5 are installed near grip unit 11 of dirt collection unit 5, so that manipulation unit 15 can be manipulated to separate dirt collection unit cover 12 from dirt collecting unit 5 while holding grip unit 11 as shown in Fig. 6. As a result, when dirt particles are discarded, it is unnecessary to use the other hand on purpose, thereby improving the usability thereof.

[0034] When dirt collection unit cover 12 is separated from dirt collection unit 5, manipulation unit 15 is manipulated by one hand of the user in a direction of holding grip unit 11. Accordingly, dirt collection unit 5 can be positively held, thereby making it possible to previously preventing dirt collection unit 5 from dropping.

[0035] With reference to Figs. 2 and 7, dirt particles, which may be adhered to filter 4 in dirt collection unit cover 12 without being separated by centrifugal separation parts 7 to cause performance degradation thereof, are accumulated by pre-filters 16. Therefore, dirt particles adhered to filter 14 can be reduced so that the performance degradation can be avoided. Further, by forming pre-filters 16 of an approximately cylindrical shape, an area of pre-filters 16 can be enlarged and, therefore, it is possible to prevent the performance degradation thereof due to dirt particles accumulated to pre-filters 16.

[0036] As shown in Figs. 2 and 7, there is provided at lower portions of pre-filters 16 pan-shaped protecting members 17 with a surface approximately perpendicular to the longitudinal central axes of centrifugal separation parts 7. Accordingly, when dirt particles carried

into dirt accumulation part 8 by rotational air current generated by centrifugal separation parts 7 are floated upward by the rotational air current reflected by the bottom surface of dirt accumulation part 8, protecting members 17 block the ascending air current in front of centrifugal separation parts 7 and allows the rotational air current to move down. As a result, it is possible to avoid a problem that the dirt particles return to centrifugal separation parts 7 to disturb separation of newly suctioned dirt particles.

[0037] As illustrated in Fig. 8, there is provided at lower portions of pre-filters 16 pan-shaped protecting members 17 with a surface approximately perpendicular to the longitudinal central axes of dirt accumulation part 8. When dirt particles, which are separated by centrifugal separation parts 7 to be carried into underlying dirt accumulation part 8 by the rotational air current generated by centrifugal separation parts 7, are floated upward again by the rotational air current reflected by the bottom surface of dirt accumulation part 8, protecting members 17 block the ascending air current in front of centrifugal separation parts 7 and allows the rotational air current to move down. At this time, since protecting members 17 have the approximately perpendicular surface with respect to the longitudinal central axis of dirt accumulation part 8, the rotational air current ascending along dirt accumulation part 8 can be completely blocked by the approximately perpendicular surface. As a result, it is possible to avoid a problem that the dirt particles return to centrifugal separation parts 7 to disturb separation of newly suctioned dirt particles.

[0038] As can be seen from Figs. 9 and 10, there is installed at a peripheral portion of dirt accumulation part 8 discharge port 18 for discharging dirt particles accumulated therein and discharge port cover 19 for covering discharge port 18. By opening discharge port cover 19, dirt particles accumulated in dirt accumulation part 8 can be easily discarded from discharge port 19 provided at a lower portion of dirt collection unit 5, thereby improving the usability thereof.

[0039] Further, by providing discharge port 18 at a rear surface of dirt accumulation part 8, even though discharge port cover 19 is opened, dirt particles therein are not unintentionally discarded. Instead, a user can control a desired amount and speed of discharge of the dirt particles, so that it is possible to solve a problem that dirt particles are scattered, resulting in an improvement of the usability.

[0040] The first embodiment describes a canister vacuum cleaner in which dirt collection unit 5 is vertically arranged. However, the same effects can be obtained by using an upright vacuum cleaner.

[0041] Hereinafter, a vacuum cleaner in accordance with a second embodiment of the present invention will be described in detail with reference to Figs. 11 to 17. Detailed explanations of parts that are identical to those in the first embodiment will be omitted for simplicity, and like reference numerals will be used therefor.

[0042] Figs. 11 and 13 provide cross-sectional views of principal parts of a main body of the vacuum cleaner in accordance with the second embodiment. Figs. 12 and 14 to 17 present cross-sectional views of principal parts of a dirt collection unit attached to the main body.

[0043] While, in the above-described first embodiment, the grip unit is installed at a rear portion of dirt collection unit 5, a grip unit is installed at an upper portion of dirt collection unit 5 in this embodiment.

[0044] In the drawings, reference numeral 4 indicates a main body including therein electric blower 6 for suctioning dirt particles; reference numeral 5 represents a dirt collection unit detachably attached to main body 4, dirt collection unit communicating with a suction nozzle (not shown) through which dirt particles are suctioned; reference numeral 30 represents a grip unit having hinge shaft 31 at one end portion thereof and stopper 32 for controlling a rotation angle at the other end portion thereof; and reference numeral 33 indicates a buckle for keeping the connection of dirt collection unit 5 with main body 4.

[0045] In an irrotational state of grip unit 30, by contacting grip unit rib 34 extended from grip unit 30 with top surface 35 of buckle 33, a movement of buckle 33 is suppressed. At that time, claw 36 installed at buckle 33 is hooked up to buckle hook 37 provided at main body 4, thereby connecting dirt collection unit 5 with main body 4.

[0046] Since grip unit rib 34 is separated from top surface 35 by rotating grip unit 30, if buckle 33 rotates about central axis 38 provided at an approximately central portion of buckle 33, claw 36 installed at buckle 33 is separated from buckle hook 37 installed at main body 4, thereby separating dirt collection unit 5 from main body 4.

[0047] Moreover, since buckle 33 has a length corresponding to a distance from central axis 38 to claw 36, buckle 33 can be elastically deformed enough to go beyond a stepped portion of buckle hook 37 despite of its fixed state.

[0048] Reference numeral 39 represents a grip unit hook for maintaining grip unit 30 in an irrotational state and preventing grip unit 30 from rotating unintentionally due to an accidental impact or vibration.

[0049] With reference to Figs. 16 and 17, in the irrotational state of grip unit 30, convex portion 40 installed in grip unit 30 is inserted at concave portion 41 provided at buckle 33, thereby preventing a movement of buckle 33. In this case, even if convex portion 40 and concave portion 41 are exchanged with each other, the same effects can be obtained. Meanwhile, in a rotational state of grip unit 30, projected portion 42 installed at an approximately side surface of grip unit 30 is contacted with end portion 43 of buckle 33, so that buckle 33 is forcibly rotated, thereby making it possible to separate dirt collection unit 5 from main body 4.

[0050] Box 44 for covering buckle 33 is installed at dirt collection unit 5, and main box 45 is installed at main

body 4. Main box 45 is disposed inside box 44 for maintaining box 44 while dirt collection unit 5 is attached to main body 4. Further, the box 44 is constructed such that it is contacted with main box 45 before buckle 33 is contacted with buckle hook 37 of main body 4.

[0051] In the following, an operation of the above-described arrangements will be described in detail.

[0052] In a normal state, i.e., an irrotational state of grip unit 30, by contacting grip unit rib 34 extended from grip unit 30 with top surface 35 of buckle 33 as shown in Figs. 11 and 12, the movement of buckle 33 is stopped. Claw 36 installed at buckle 33 is hooked up to buckle hook 37 provided at main body 4, thereby connecting dirt collection unit 5 with main body 4.

[0053] When dirt particles accumulated in dirt collection unit 5 are discarded, grip unit 30 is lifted upward so that it rotates about hinge shaft 31 as shown in Fig. 13. By such rotation of grip unit 30, grip unit rib 34 is separated from top surface 35 as illustrated in Fig. 14. Accordingly, buckle 33 rotates about central axis 38 provided at an approximately central portion of buckle 33, thereby separating claw 36 installed at buckle 33 from buckle hook 37 provided at main body 4. As a result, dirt collection unit 5 and main body 4 are disconnected so that dirt collection unit 5 can be removed from main body 4.

[0054] In other words, two steps of separating dirt collection unit 5 and main body 4 and removing dirt collection unit 5 therefrom can be performed by one step. Further, since grip unit 30 is prevented from rotating further by stopper 32, grip unit 30 has significantly greater tensile stress and higher reliability than a cantilevered grip unit.

[0055] Buckle 33 has a length corresponding to a distance from central axis 38 to claw 36. Therefore, in the irrotational state of grip unit 30, i.e., in case dirt collection unit 5 is attached to main body 4 with buckle 33 fixed, when buckle 33 moves beyond the stepped portion of buckle hook 37 of main body 4, it is elastically deformed as shown in Fig. 15. Accordingly, claw 36 can be retained by buckle hook 37 without being damaged, so that it is possible to provide a highly reliable vacuum cleaner.

[0056] As shown in Fig. 11, by installing grip unit hook 39 for maintaining the irrotational state of grip unit 30, it is possible to avoid a scatter of dirt particles and a damage of dirt collection unit 5, which may occur in case dirt collection unit 5 is separated and dropped from main body 4 due to a release of buckle 33 resulting from undesired rotation of grip unit 30 by an accidental impact or vibration of main body 4.

[0057] Further, as illustrated in Fig. 12, only in the irrotational state of grip unit 30, since grip unit rib 34 extended from grip unit 30 is contacted with top surface 35 of buckle 34, i.e., buckle 33 is held at only one point by grip unit rib 34, buckle 22 can be released by even slight rotation of grip unit 30. As a result, dirt collection unit 5 can be attached to and separated from main body 4 more easily and accurately, thereby improving the usability thereof.

[0058] As can be seen from Fig. 16, in the irrotational state of grip unit 30, convex portion 40 installed at grip unit 30 is inserted into concave portion 41 installed at buckle 33, thereby preventing a movement of buckle 33. Accordingly, in case dirt collection unit 5 is urged to be separated without rotating grip unit 30, there is a movement of claw 36 of buckle 33 to be separated from buckle hook 37 of main body 4. However, since concave portion 41 receives therein convex portion 40, buckle 22 cannot rotate. Thus, dirt collection unit 5 and main body 4 are kept being connected to each other and, therefore, it is possible to prevent an unintentional separation of dirt collection unit 5 from main body 4 due to an accidental impact and vibration, resulting in an improvement of the usability thereof.

[0059] In this case, even if the concave portion and the convex portion are exchanged with each other, the same effects can be obtained.

[0060] Further, in a rotational state of grip unit 30, by contacting projected portion 42 installed at an approximately side surface of grip unit 30 with end portion 43 of buckle 33, buckle 33 is forcibly rotated to completely separate dirt collection unit 5 from main body 4. Accordingly, there is no obstacle while dirt collection unit 5 is removed from main body 4, thereby improving the usability thereof.

[0061] While the invention has been shown and described with respect to the preferred embodiments, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the scope of the invention as defined in the following claims.

Claims

1. A vacuum cleaner comprising:

an electric blower for generating a suction air stream;
a plurality of centrifugal separation parts for separating dirt particles from the suction air stream; and
an air inlet installed upstream of the centrifugal separation parts, wherein the suction air stream suctioned in the air inlet is divided in plural streams to flow into the respective centrifugal separation parts.

2. The vacuum cleaner of claim 1, wherein an air separation port is installed downstream of the air inlet, for approximately uniformly distributing the suction air streams into the respective centrifugal separation parts.

3. The vacuum cleaner of claim 1, further comprising:

a dirt accumulation part for accumulating therein dirt particles separated from the suction air streams by the centrifugal separation parts provided under at least one of the centrifugal separation parts.

4. The vacuum cleaner of claim 3, wherein an opening is formed at an approximately upper portion of at least one of the centrifugal separation parts and is covered by a dirt collection unit cover with a filter.

5. The vacuum cleaner of claim 4, further comprising:

a dirt collection unit having the centrifugal separation parts and the dirt accumulation part;
a grip unit installed at the dirt collection unit; and
a manipulation unit for connecting and disconnecting the dirt collection unit cover and the dirt collection unit, wherein the manipulation unit is manipulated while the grip unit being held.

6. The vacuum cleaner of claim 3, wherein an approximately cylindrical pre-filter is installed in at least one of the centrifugal separation parts and a protecting member is installed downstream of the pre-filter to suppress dirt particles floating upward.

7. A vacuum cleaner comprising:

an electric blower for generating a suction air stream;
a centrifugal separation part for separating dirt particles from the suction air stream; and a dirt accumulation part for accumulating therein dirt particles separated from the suction air stream by the centrifugal separation part, wherein the dirt accumulation part is installed slanted at an angle with respect to the centrifugal separation part.

8. The vacuum cleaner of claim 7, wherein the dirt accumulation part is provided under the centrifugal separation part.

9. The vacuum cleaner of claim 8, wherein an opening is formed at an approximately upper portion of the centrifugal separation part and is covered by a dirt collection unit cover with a filter.

10. The vacuum cleaner of claim 9, further comprising:

a dirt collection unit having the centrifugal separation part and the dirt accumulation part;
a grip unit installed at the dirt collection unit; and
a manipulation unit for connecting and disconnecting the dirt collection unit cover and the dirt collection unit, wherein the manipulation unit is manipulated while the grip unit being held.

11. The vacuum cleaner of claim 8, wherein an approximately cylindrical pre-filter is installed in the centrifugal separation part and an protecting member is installed downstream of the pre-filter to suppress dirt particles floating upward.

12. The vacuum cleaner of any one of claim 6 and 11, wherein the protecting member is of a pan-shape opened downward.

13. The vacuum cleaner of any one of claim 3 and 8, wherein the dirt accumulation part has a discharge port for discharging dirt particles accumulated therein and a discharge port cover for covering the discharge port is installed at the dirt accumulation part.

14. The vacuum cleaner of claim 13, wherein the discharge port is provided at a rear surface of the dirt accumulation part.

15. A vacuum cleaner comprising:

a main body including therein an electric blower for generating a suction air stream;
a dirt collection unit detachably installed in the main body, for collecting suctioned dirt particles;
a grip unit rotatably installed at the dirt collection unit; and
a buckle for connecting the dirt collection unit with the main body, wherein connecting and disconnecting operations of the buckle are performed by a rotational movement of the grip unit.

16. The vacuum cleaner of claim 15, wherein a grip unit hook, for retaining the grip unit in an irrotational state thereof, is installed at a dirt collection unit.

17. The vacuum cleaner of claim 15, wherein only in the irrotational state of the grip unit, the buckle is fixed.

18. The vacuum cleaner of claim 17, wherein a concave portion is installed at one of the grip unit and the buckle, and a convex portion is installed at the other, the convex portion being substantially inserted into the concave portion in the irrotational state of the grip unit.

19. The vacuum cleaner of claim 15, wherein a projected portion is installed at the grip unit, and the projected portion is contacted with an end portion of the buckle only during a rotational state of the grip unit so that the buckle is forcibly released.

FIG. 1

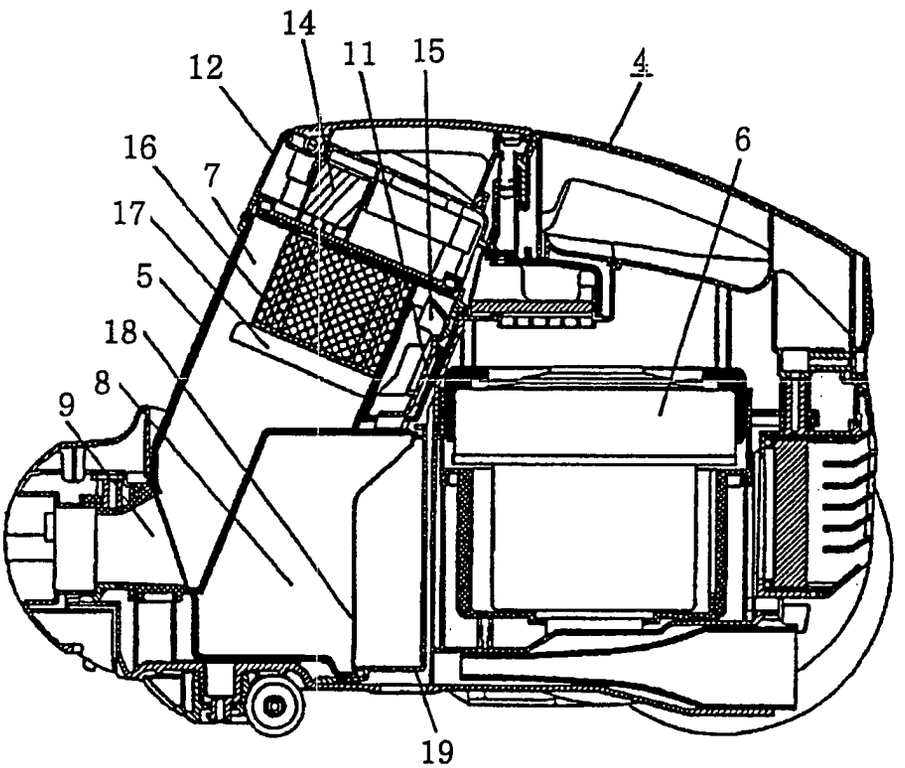


FIG.2

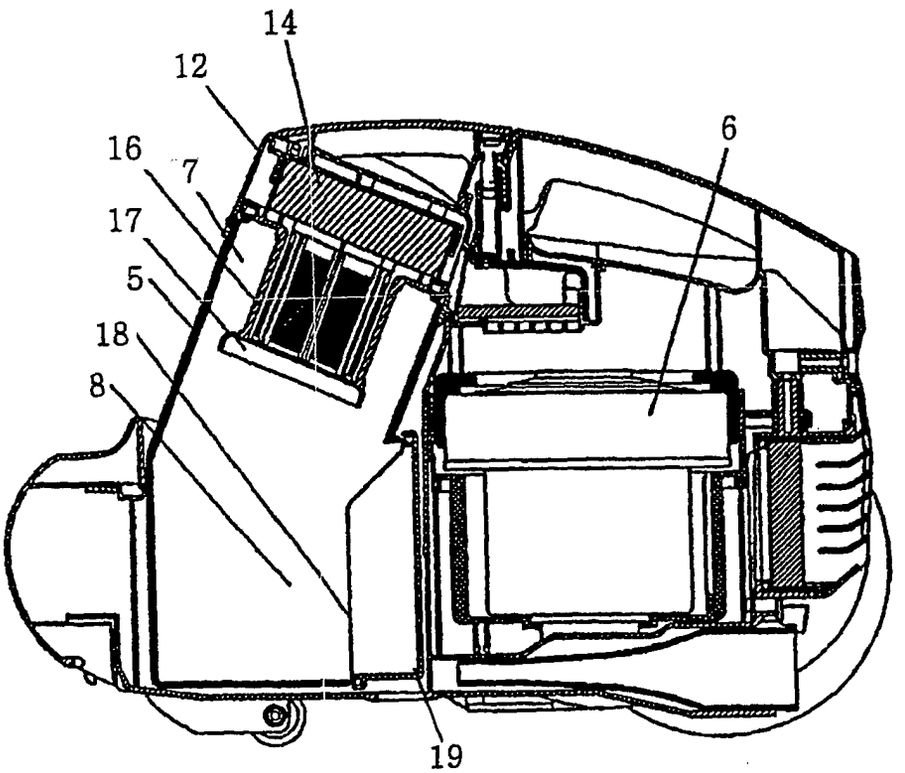


FIG.3

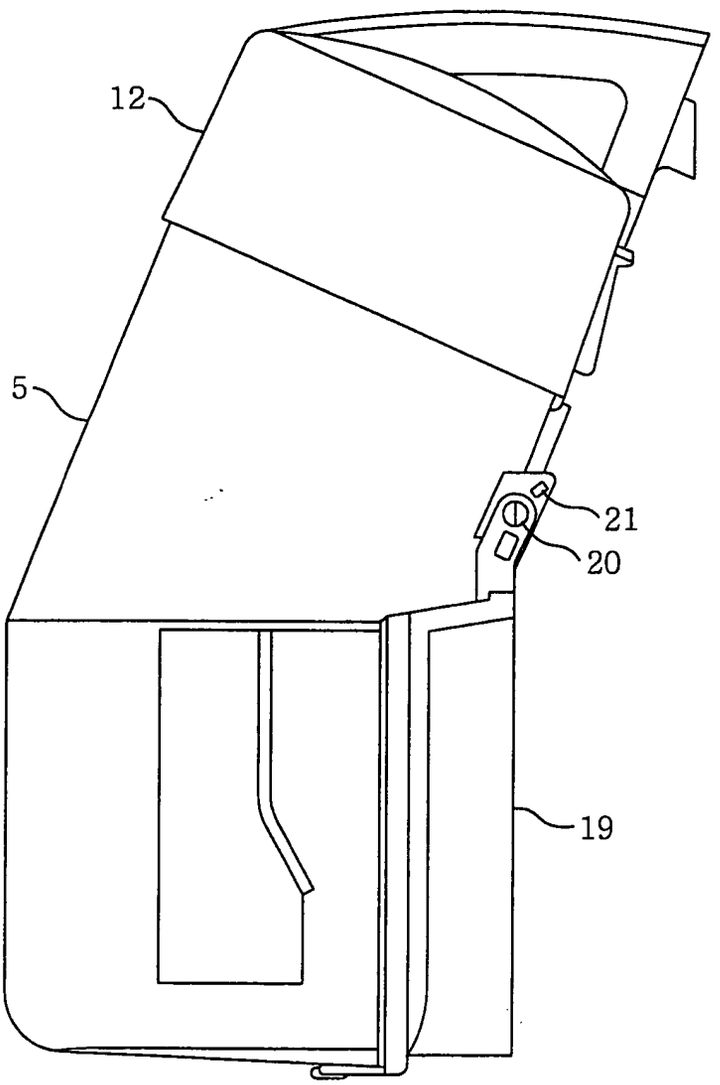


FIG. 4

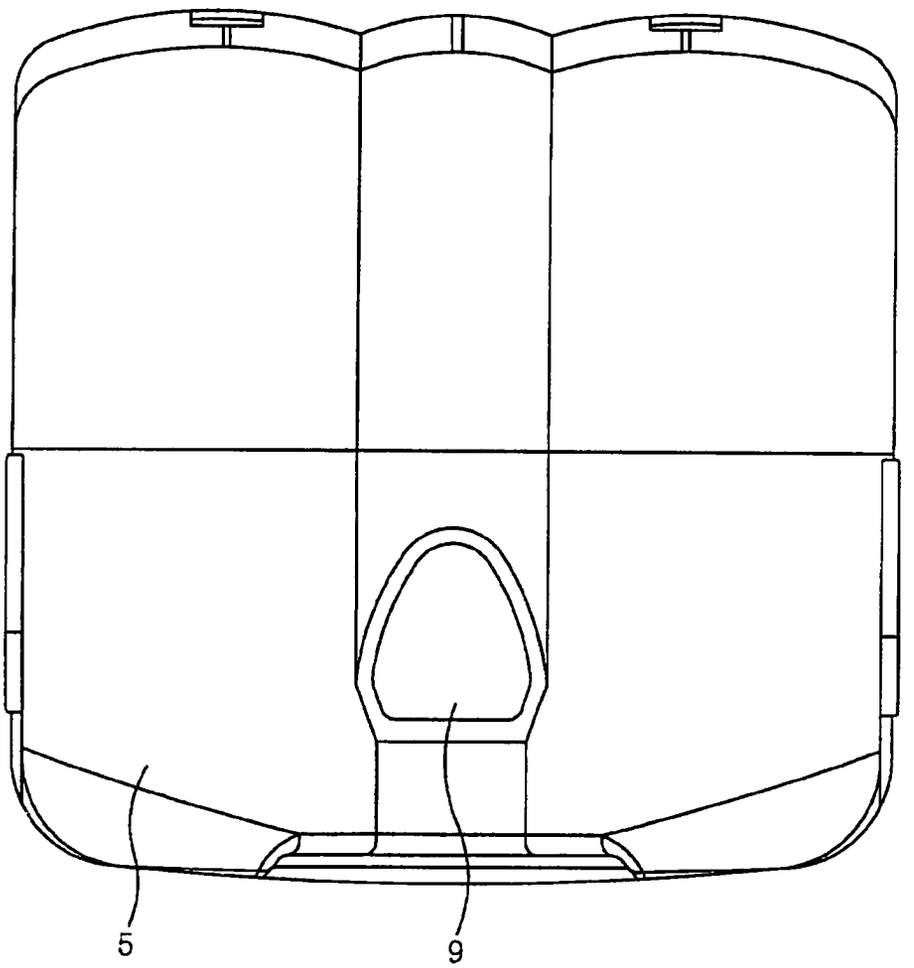


FIG.5

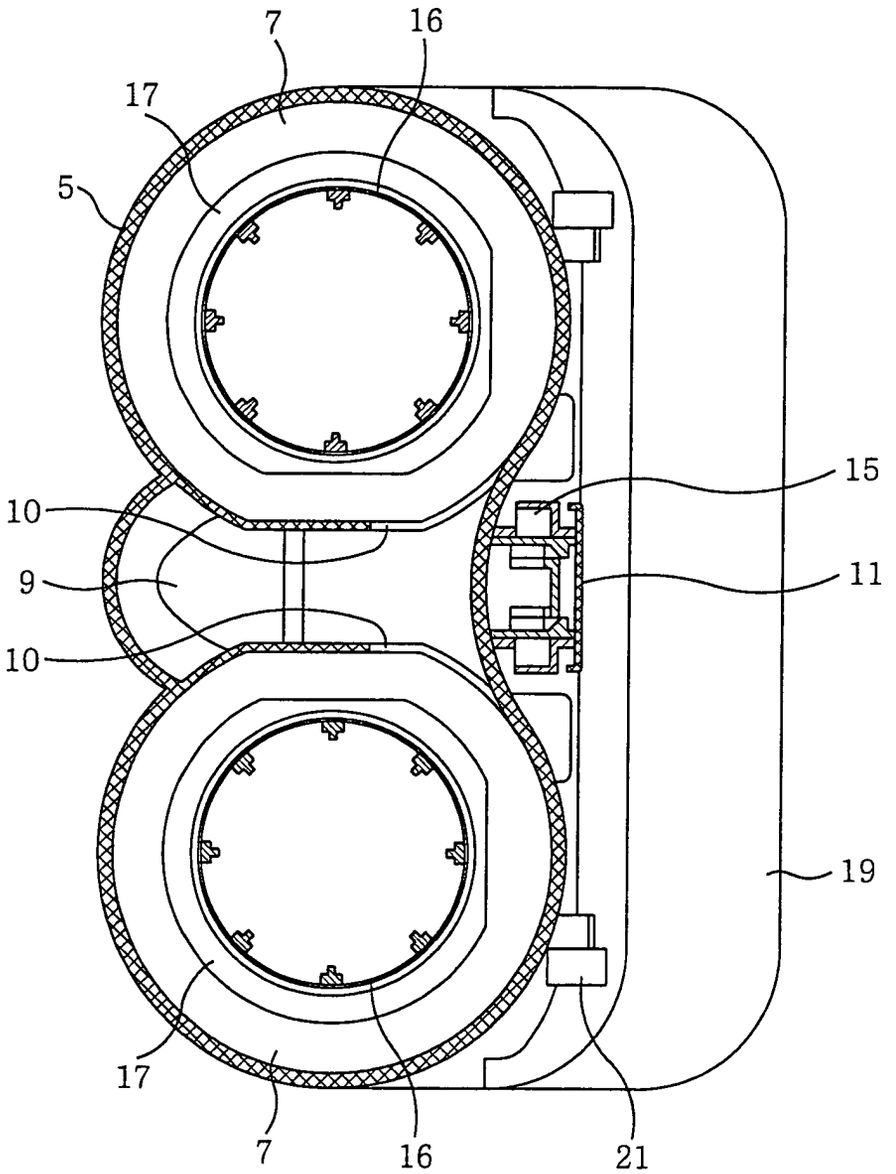


FIG.6

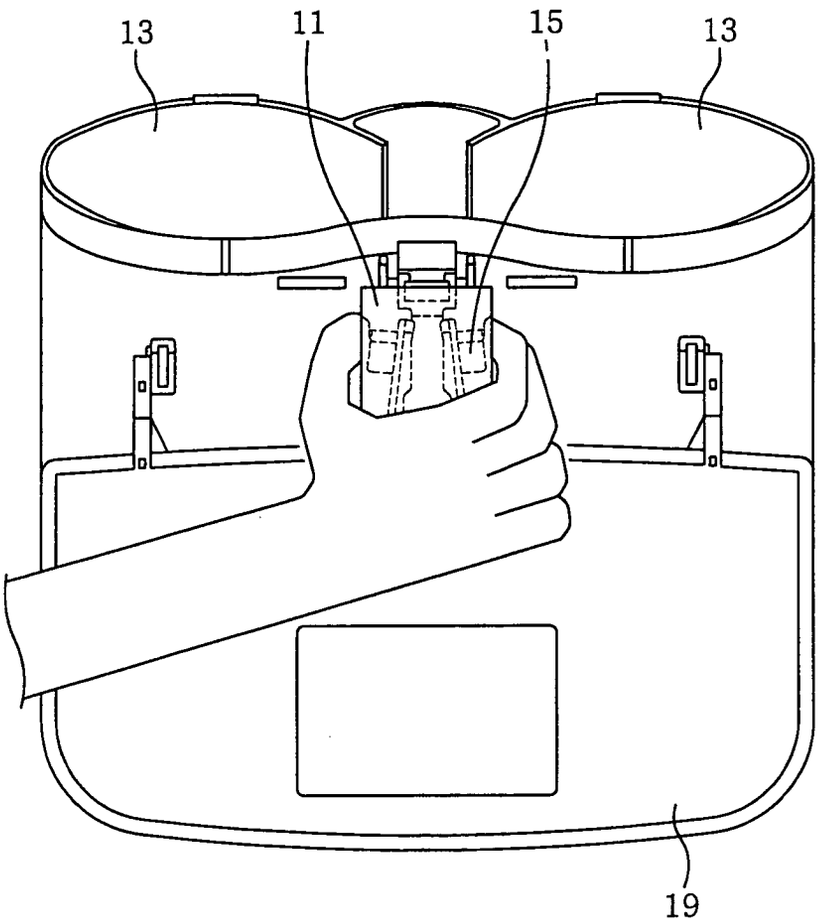


FIG.7

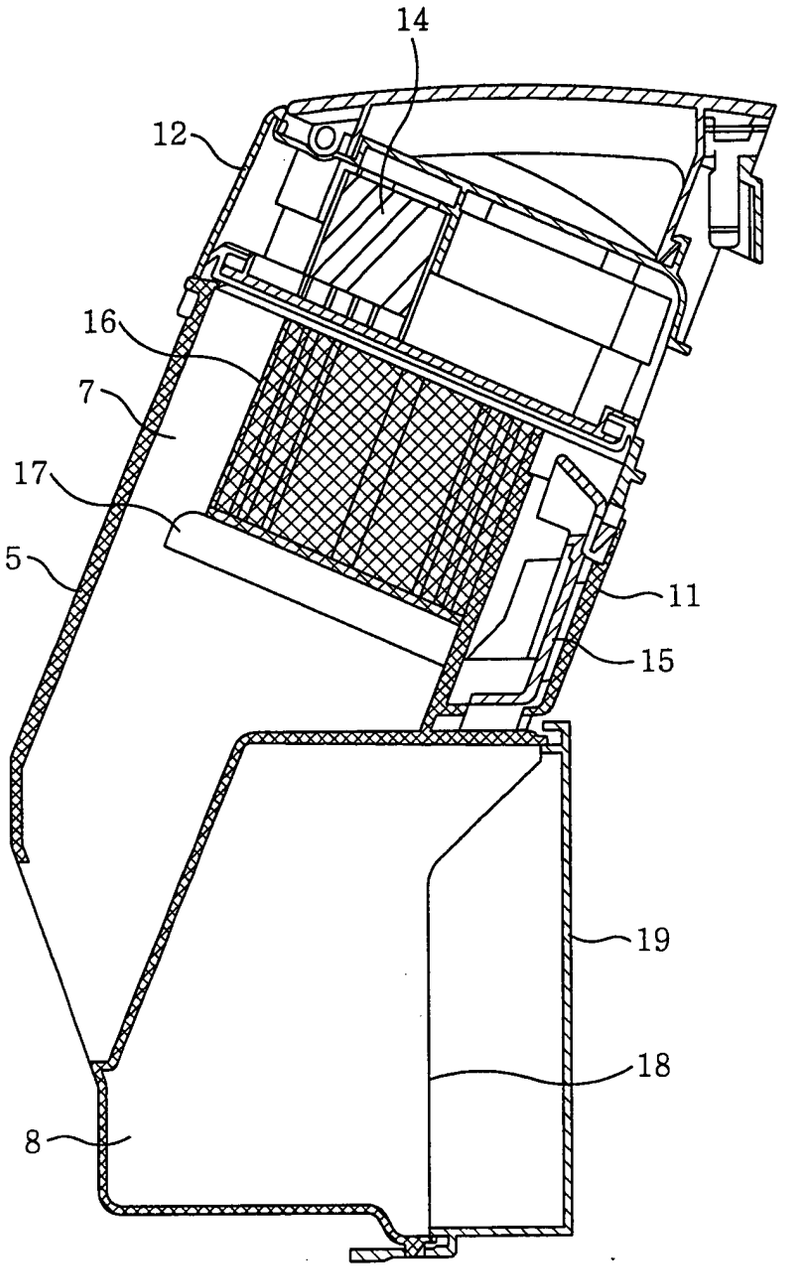


FIG.8

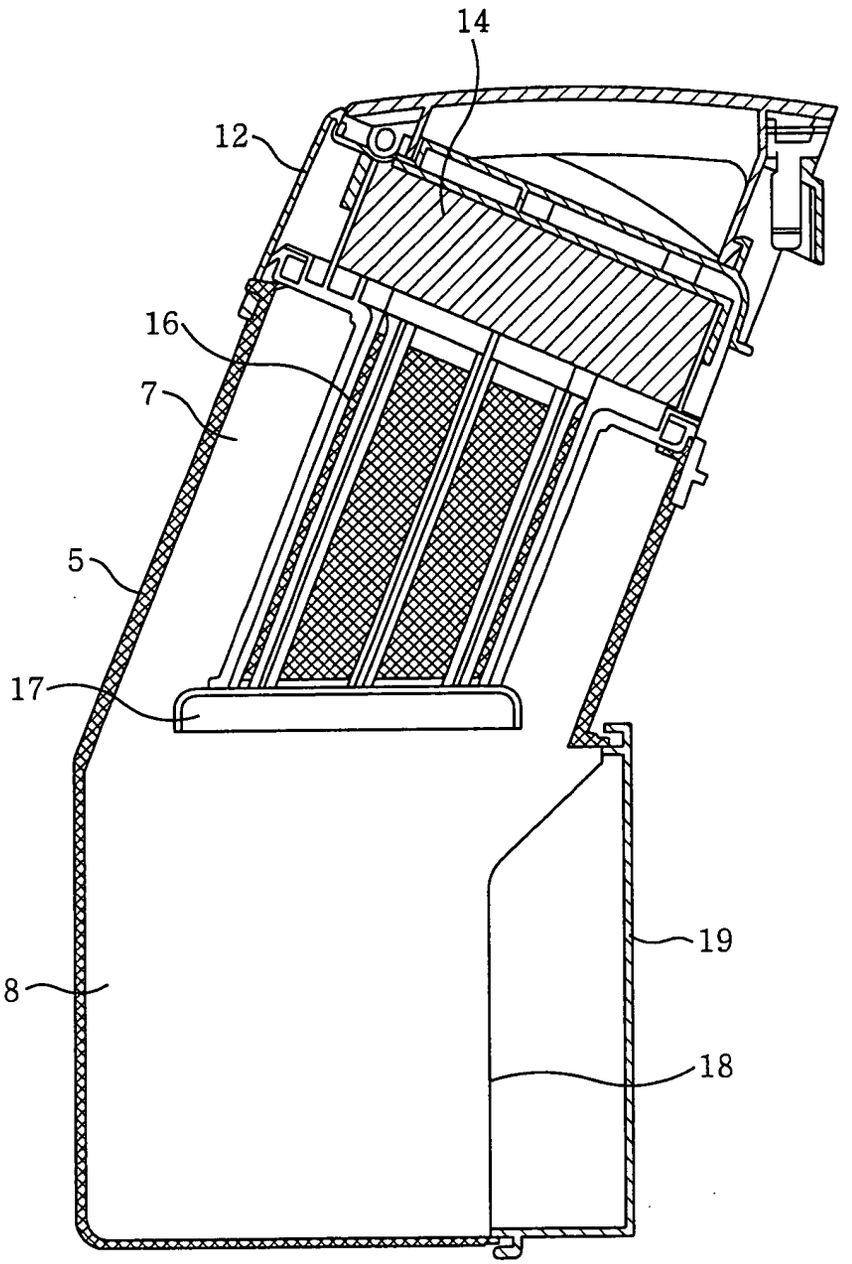


FIG.9

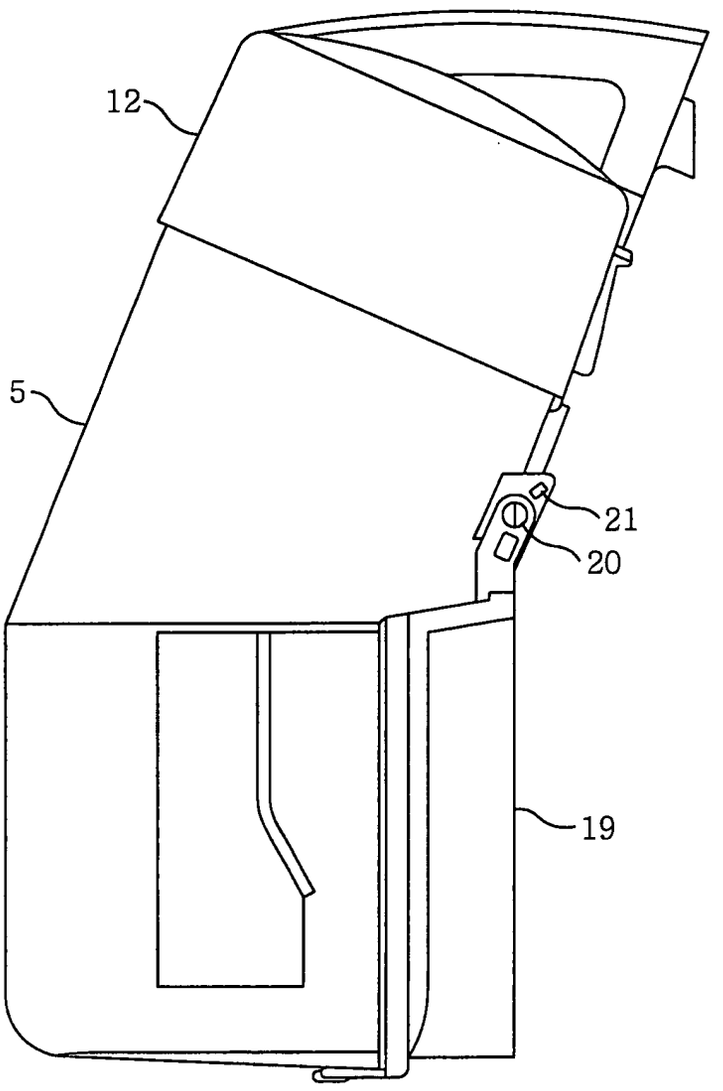


FIG. 10

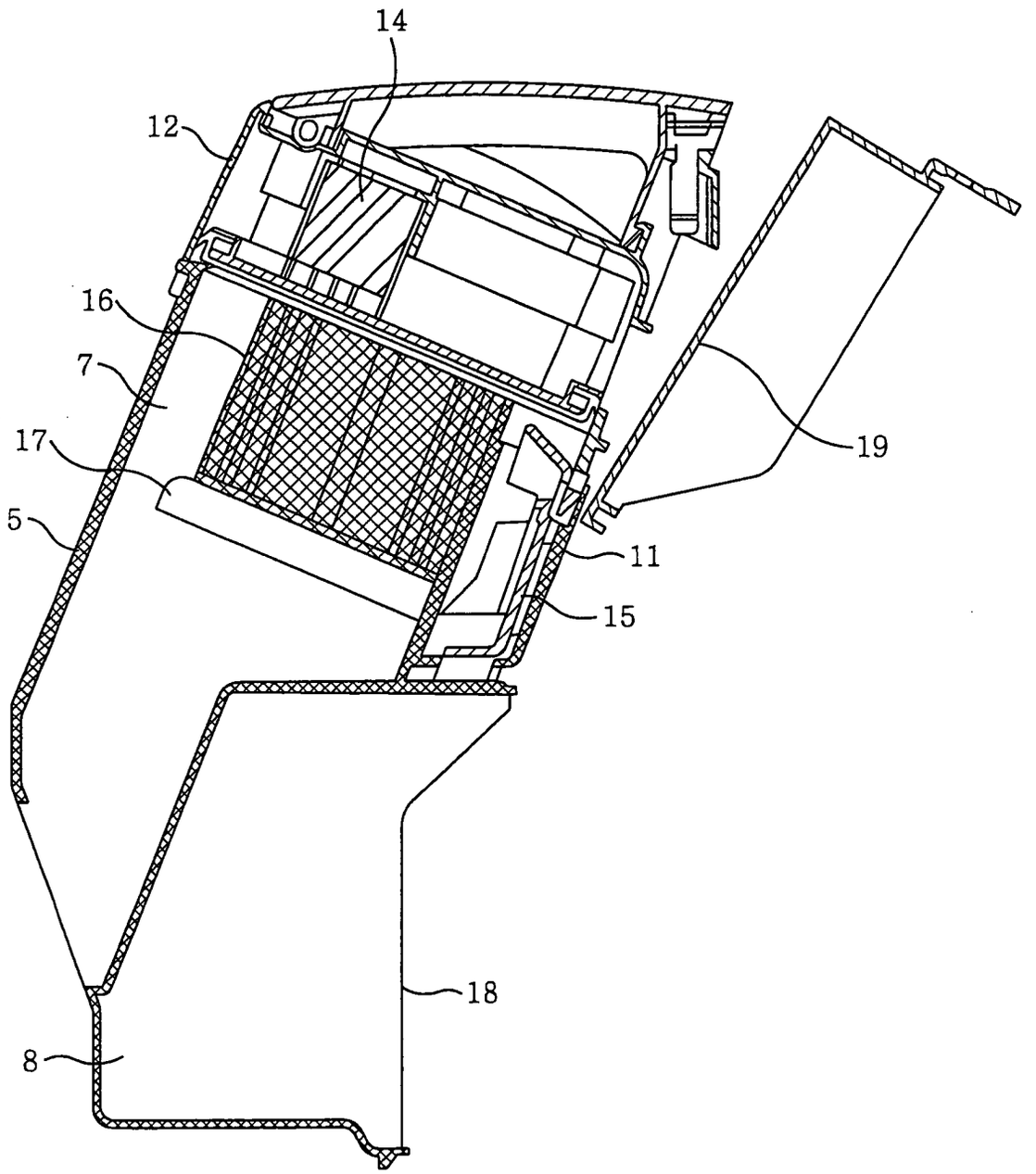


FIG. 11

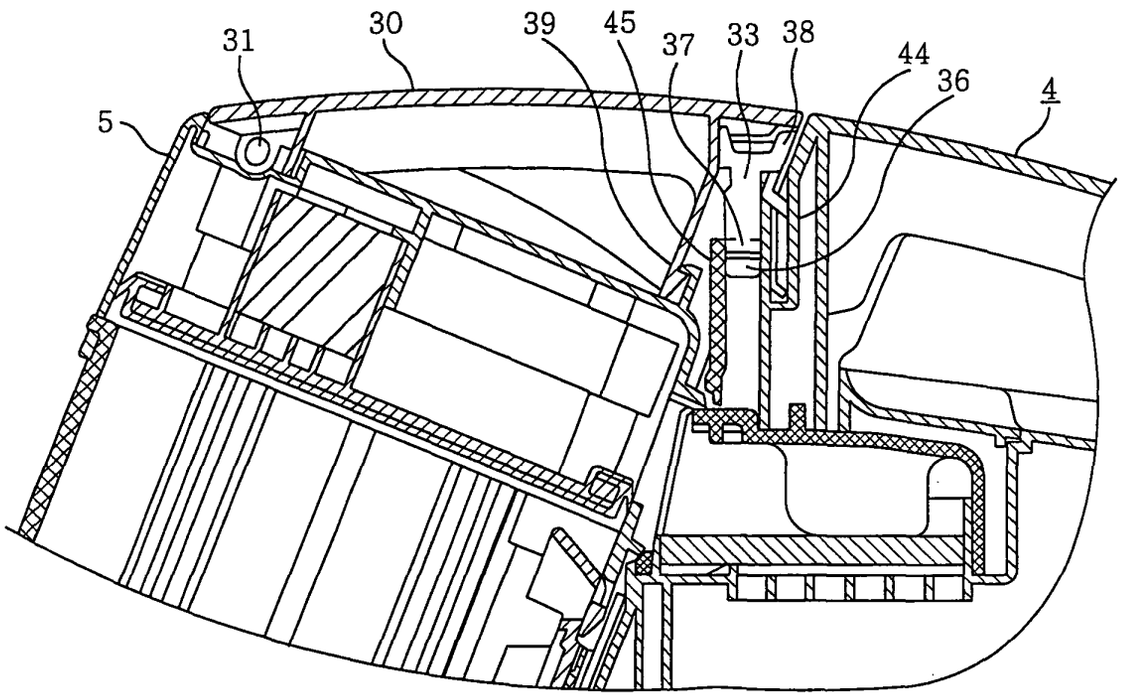


FIG. 12

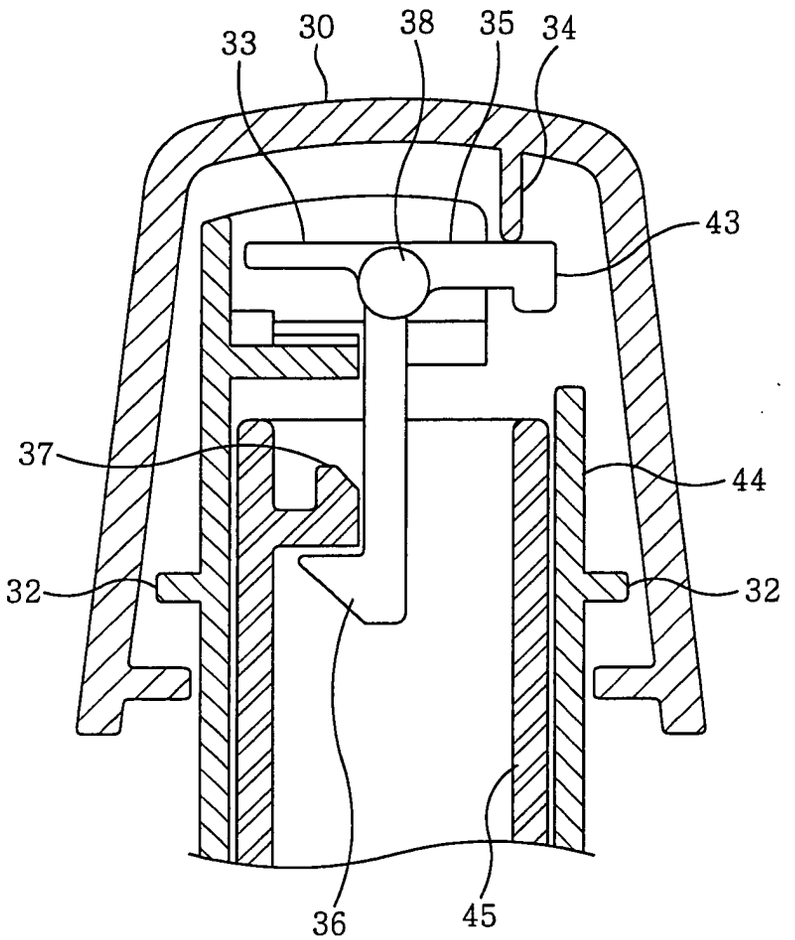


FIG. 13

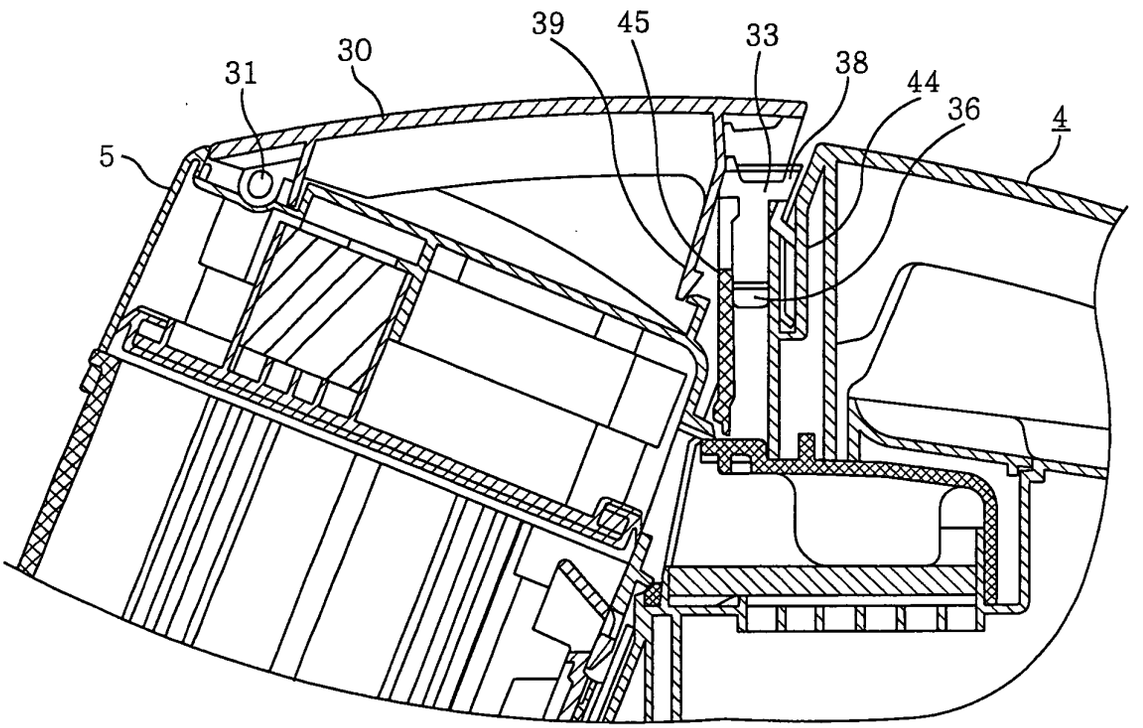


FIG. 14

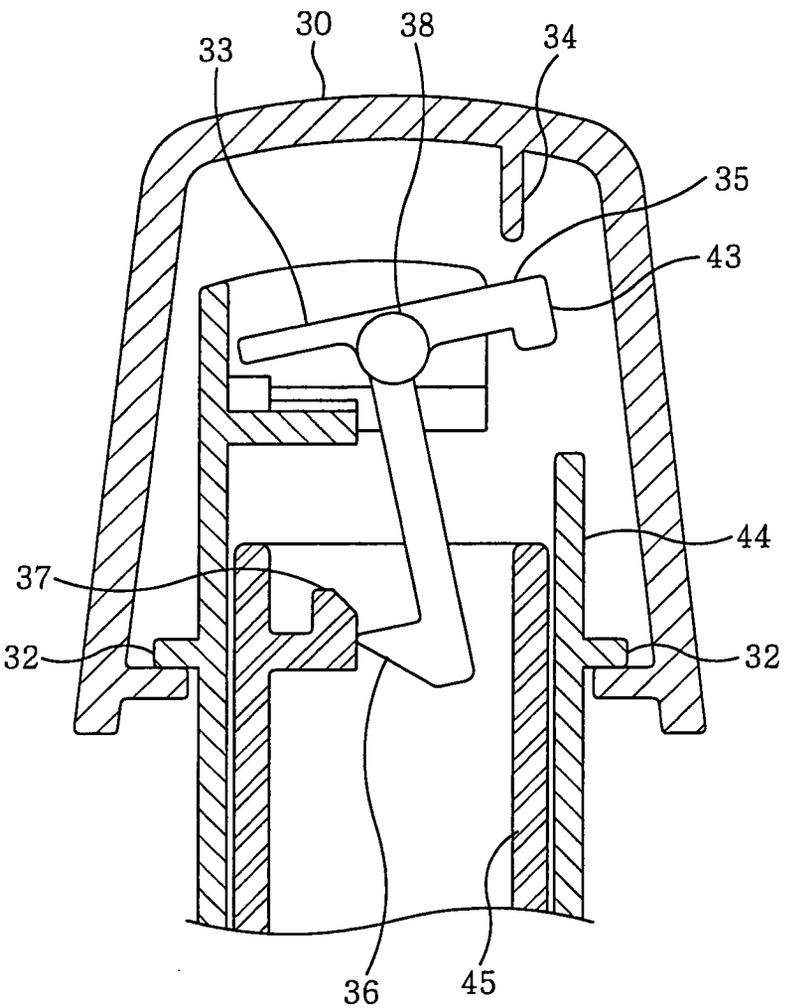


FIG. 15

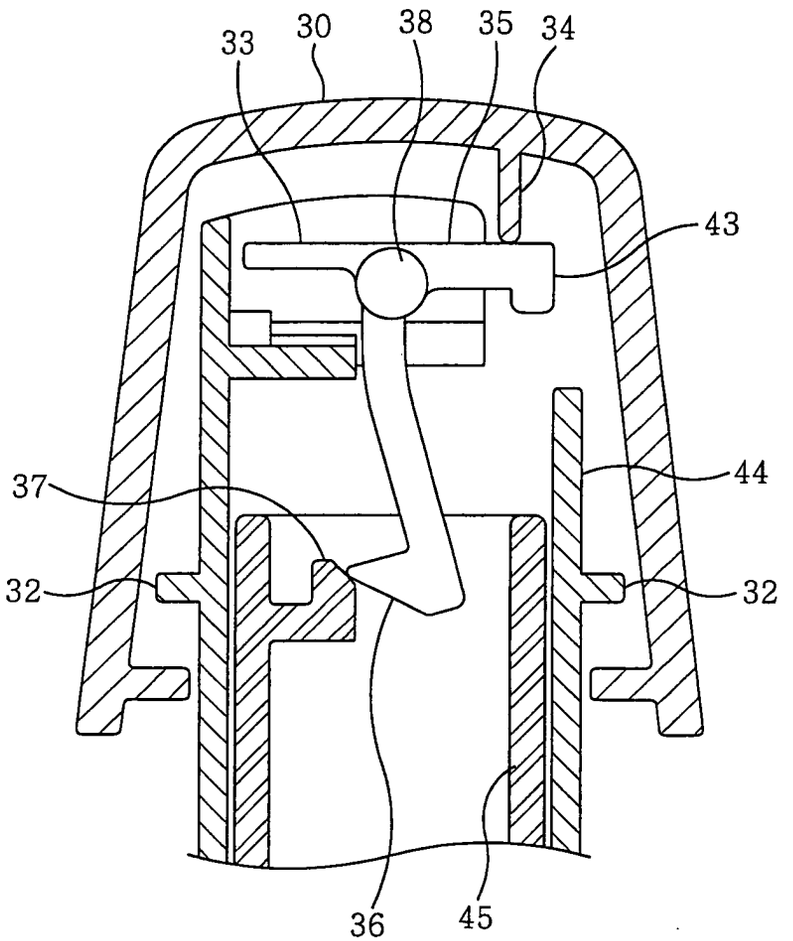


FIG. 16

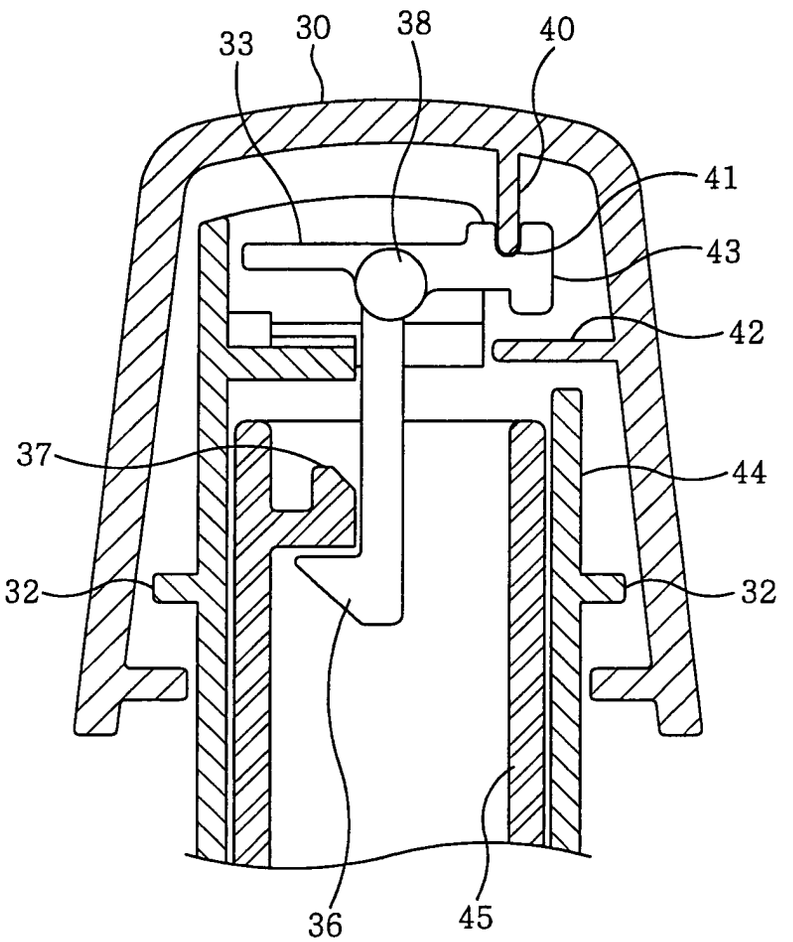


FIG. 17

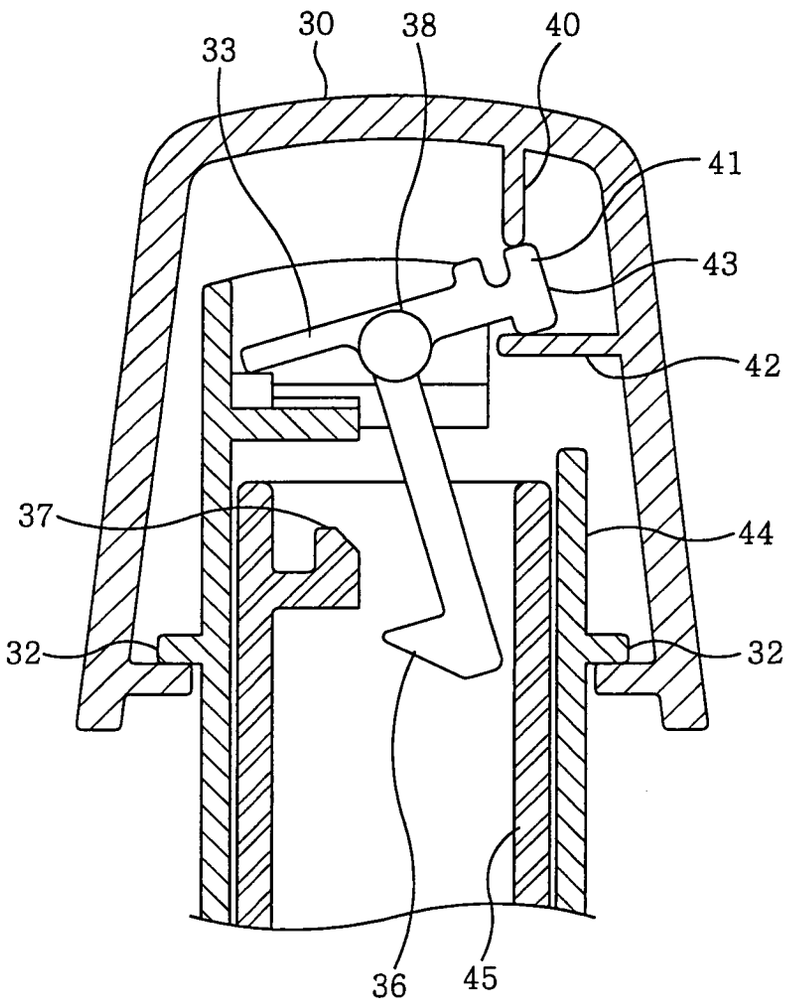


FIG. 18

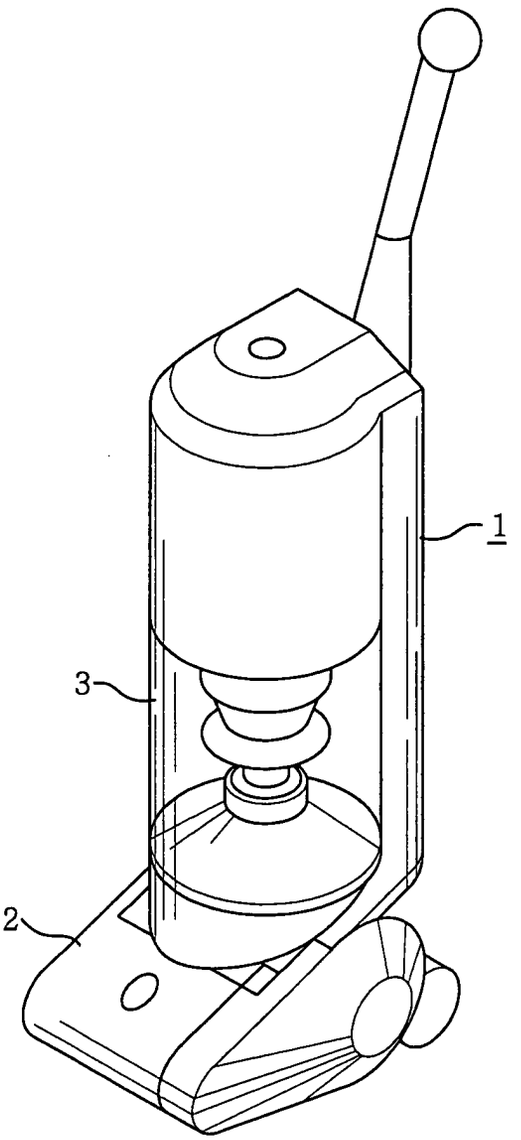


FIG. 19