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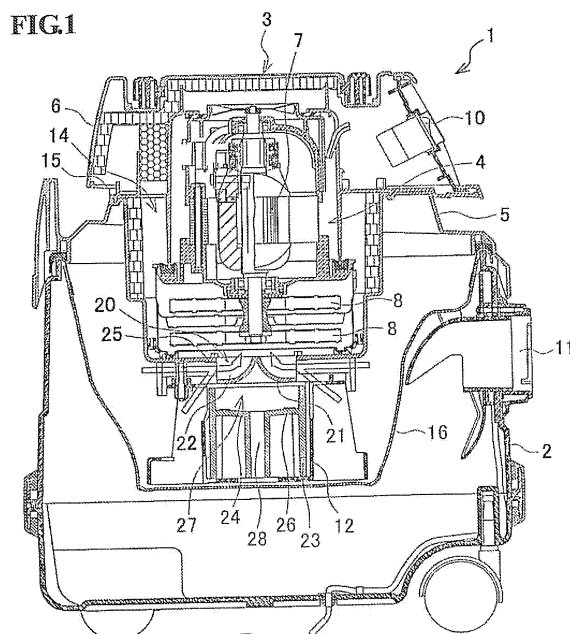
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(54) **DUST COLLECTOR**

(57) [OBJECT] To eliminate operational instability of a float and allow water and the like to be reliably sucked until a set capacity of a tank is attained, without incurring an increase in the size of the float or an increase in the weight of a dust collector.

[MEANS OF SOLVING THE PROBLEM] In a dust collector 1, an intake port 20 provided through a lower

portion of an intake unit 4 protrudes downward from the intake unit 4 and formed open laterally. Meanwhile, a closure portion 27 that closes the intake port 20 at an upper-limit position is formed at an upper portion of a float 23. Thus, the float 23 does not close the intake port 20 before reaching the upper-limit position. As a result, water can be reliably sucked into a tank 2 until the set capacity is attained.



Description

TECHNICAL FIELD

[0001] The present invention relates to a dust collector capable of sucking liquid such as water containing dust or the like.

BACKGROUND ART

[0002] FIG. 3 is a longitudinal sectional view of a conventional dust collector. A dust collector 1 comprises a main body 3 having an intake unit 4 therein above a tank 2 of whose upper face is opened. The intake unit 4 is suspended above the tank 2 by being supported by a tank cover 5 which supports the main body 3 by closing the tank 2. The intake unit 4 has a built-in motor 7 and a suction fan 8 which is rotated by a drive of the motor 7. Further, intake ports 9, 9, ... 9 are formed in the tank cover 5 so as to open to a lower face of the intake unit 4 directly below the suction fan 8. A cowling denoted by 6 covers an upper portion of the main body 3, and an operation switch 10 is provided on a lateral face of the cowling 6. A suction port denoted by 11 is provided on a lateral face of the tank 2, and to which a hose, a nozzle, or the like is connected.

Furthermore, a float cage 12 accommodating a float 13 which can vertically move is provided at a region below the intake unit 4. The float 13 vertically moves in accordance with changes of a level of liquid stored in the tank 2, such as water or the like. When the float 13 is at an upper-limit position thereof, an upper face of the float 13 closes the intake ports 9 by abutting on a cylindrical portion which is provided protrusively downward around the intake ports 9.

[0003] When the operation switch 10 is turned on to drive the motor 7 so as to rotate the suction fan 8, outside air is sucked into the tank 2 via the hose or the like connected to the suction port 11. The suction fan 8 sends the outside air to an air supply channel 14 in the cowling 6 through the intake ports 9, and the air is discharged from an exhaust port 15 which is formed on a lower face of the cowling 6. It should be noted that when water is sucked into the tank 2, the float 13 moves upward in accordance with a rise in the level of the water stored in the tank 2. When the float 13 comes at the upper-limit position, the float closes the intake ports 9 and stops suction of the water. A bag-shaped cloth filter denoted by 16 is sandwiched between the tank cover 5 and the opening of the tank 2 to block a space between the suction port 11 and the intake unit 4. The filter 16 is to filter the air and water sucked from the suction port 11 (see also Patent Document 1 as an example of a dust collector having a float).

[0004] [Patent Document 1] Japanese Patent Publication No. 61-57763

DISCLOSURE OF THE INVENTION

[Problem to be Solved by the Invention]

[0005] In the aforementioned conventional dust collector 1, the intake ports 9 of the intake unit 4 open directly downward. Therefore, an upward force serving to suck up the float 13 is always applied during collection of dust. In consequence, when the float 13 is approaching the intake ports 9 in accordance with a rise in the water level during the suction of water and the like, the float 13 is sucked up and closes the intake ports 9 before reaching the upper-limit position. In such cases, a full amount of water corresponding to a set capacity of the tank 2 cannot be sucked. On the other hand, using a heavy or large float to suck up the full amount of water causes an increase in the size of the float or the weight of the dust collector itself.

[0006] Therefore, an object of the present invention is to provide a dust collector that eliminates operational instability of a float and allows water and the like to be reliably sucked until a set capacity of a tank is attained without an increase in the size of the float or the weight of the dust collector.

[Means for Solving the Problem]

[0007] In order to achieve the above-stated object, the invention according to claim 1 provides a dust collector including a tank equipped with a suction port, a main body covering a space above the tank, an intake unit, an intake port, a float and a closure portion. The intake unit has a built-in suction fan provided in the main body and driven by a motor. The intake unit sucks liquid such as water from the suction port by means of rotation of the suction fan, so that the liquid can be stored in the tank. The intake port is laterally opened and protrudes downward from a lower face of the intake unit. The float is provided below the intake port and designed to move upward in accordance that a level of the liquid stored in the tank rises. The closure portion provided at an upper portion of the float is to close the intake port at an upper-limit position and stops suction of the liquid.

Further, in addition to the aforementioned invention, the float may be in a shape of a cylindrical body which accommodates the intake port in an upper portion and abuts on a lower face of the intake unit at the upper-limit position so as to form the closure portion with ease. The float may have a receiving wall therein, which abuts on a lower face of the intake port at the upper-limit position to partition an interior of the float, so that a space above the receiving wall constitutes the closure portion. Furthermore, an exhaust port penetrating the receiving wall may be formed at a position closer to a center of the float than that of an abutment portion where the receiving wall abuts on the lower face of the intake port.

[Effects of the Invention]

[0008] According to the invention in claim 1, the intake port is formed laterally to prevent a suction force from being applied to the float. Therefore, the float does not close the intake port before reaching the upper-limit position, and water and the like can be reliably sucked into the tank until the set capacity is attained. Besides, operational instability can be eliminated by simple changes of the configuration, such as changes in the formation of the closure portion for the float. Therefore, the size of the float or the weight of the dust collector is not increased. In particular, when the space above the receiving wall provided on the float is used as the closure portion, it is easy to form the closure portion by reasonably utilizing the float as a cylindrical body.

Further, when the exhaust port is formed through the receiving wall, retention of water and the like in the closure portion is prevented. As a result, the sealability of the closure portion is also favorably maintained at the upper-limit position of the float.

BEST MODE FOR CARRYING OUT THE INVENTION

[0009] An embodiment of the present invention will be described hereinafter on the basis of the drawings.

FIG. 1 is a longitudinal sectional view showing an example of a dust collector. The dust collector shown in this drawing is also identical in basic mechanism to the conventional dust collector shown in FIG. 3. Therefore, same component parts are denoted by the same reference symbols to omit the same description, and different component parts will be mainly described.

[0010] First of all, a dust collector 1 of the present invention has an intake port 20 formed through a lower face of an intake unit 4, which does not open downward, but opens laterally. The intake port 20 protrudes downward from a lower face of a bottomed cylindrical tank cover 5 which serves as a housing for the intake unit 4. More specifically, a conical lower member 21 in a circular shape on a plan view is coupled to the tank cover 5 via a partition plate 22, and the laterally directed intake port 20 is thereby provided protrusively downward. Thus, as indicated by arrows, the air sucked into the tank 2 from the suction port 11 flows horizontally toward or into the intake port 20 located at a center of the tank 2, slightly from below.

[0011] Further, in this case, a float 23 in a float cage 13 is also in a shape of a cylindrical body abutting on a lower face of the tank cover 5 and accommodating the intake port 20 at an upper-limit position in an upper portion thereof. The float 23 has a receiving wall 24 inside, which abuts on a lower face of the lower member 21 at the upper-limit position and partitions an interior of the float 23. On the other hand, ring-like sealing members 25 and 26 for sealing a space between members abutting on each other are stuck to the tank cover 5 at an abutment portion where the tank cover 5 abuts on the float 23, and

to the receiving wall 24 at an abutment portion where the receiving wall 24 abuts on the lower member 21, respectively. Thus, a closure portion 27 is formed on an upper portion of the receiving wall 24 in the float 23, and the closure portion 27 entirely accommodates the intake port 20 in a sealed state at the upper-limit position.

[0012] Furthermore, the receiving wall 24 is formed closer to a center of the float 23 than the abutment portion where the receiving wall 24 abuts on the lower member 21. The receiving wall 24 is in a taper shape, and gently inclined downward toward the center. A cylindrical exhaust port 28 is formed through the center of the receiving wall 24, which descends down and penetrates the receiving wall 24 to allow the closure portion 27 to communicate with a lower region.

[0013] In the dust collector 1 described above, an operation switch 10 is provided on a lateral face of a cowling 6. When the operation switch 10 is turned on to drive a motor 7, a suction fan 8 rotates to suck air from a suction port 11. The air sucked into the tank 2 flows into the laterally directed intake port 20 through a filter 16. The air is then sent to an air supply channel 14 in the cowling 6 by the suction fan 8, and discharged from an exhaust port 15. Due to the flow of this air, the air sucked from the suction port 11 is filtered by the filter 16 to trap dust and the like in the tank 2.

On the other hand, when a hose (not shown) connected to the suction port 11 sucks, for example, water, the sucked water is stored in the tank 2. However, when the level of the water rises, the float 23 in the float cage 12 moves upward correspondingly. At this moment, air is laterally sucked into the intake port 20, and sucking force is not applied to the float 23.

[0014] Next, when the float 23 reaches the upper-limit position, an upper end of the float 23 abuts on the lower face of the tank cover 5 as described above. At the same time, the receiving wall 24 abuts on the lower face of the lower member 21. As a result, the intake port 20 is entirely accommodated in the closure portion 27 of the float 23. In this state, the sealing member 25 seals a space between the upper end of the float 23 and the lower face of the tank cover 5. Similarly, the sealing member 26 also seals a space between the upper face of the receiving wall 24 and the lower face of the lower member 21. Therefore, the intake port 20 is sealed up and the air flow to the intake unit 4 is stopped. Accordingly, further suction of water is prevented.

[0015] It should be noted that the inclination of the receiving wall 24 ensures that the water is immediately guided to the exhaust port 28 at the center and returned to the tank 2 even when water enters the closure portion 27 of the float 23, for example, being scattered in the tank 2 or dripping from the intake port 20 while being sucked. Accordingly, there is not likely that the sealability of the closure portion 27 is deteriorated at the upper-limit position of the float 23 or that the water enters the intake port 20.

[0016] As described above, according to the dust col-

lector 1 of the foregoing embodiment of the present invention, the intake port 20 protrudes downward from the intake unit 4 and formed open laterally. The closure portion 27 is formed on the upper portion of the float 23, which closes the intake port 20 at the upper-limit position. Thus, the float 23 does not close the intake port 20 before reaching the upper-limit position. Therefore, water can be reliably sucked into the tank 2 until the set capacity is attained. Besides, operational instability can be eliminated by a simple change of a configuration, such as a change of the configuration of the closure portion 27 for the float 23. Therefore, the size of the float 23 or the weight of the dust collector 1 itself does not increase.

[0017] Especially in this case, the float 23 is in a shape of a cylindrical body, which accommodates the intake port 20 in the upper portion thereof, and the float 23 abuts on the lower face of the intake unit 4 at the upper-limit position. Further the float 23 includes the receiving wall 24 that abuts on the lower face of the lower member 21 at the upper-limit position to partition the interior of the float 23, so that the space above the receiving wall 24 constitutes the closure portion 27. As a result, the closure portion 27 can be formed with ease by reasonably utilizing the float 23 as the cylindrical body.

Further, the exhaust port 28 penetrating the receiving wall 24 is formed on the side closer to the center of the float 23 than the abutment portion where the receiving wall 24 abuts on the lower face of the lower member 21. Thus, it is not likely that water and dust enter the closure portion 27. As a result, the sealability of the closure portion 27 at the upper-limit position of the float 23 is also favorably maintained.

[0018] It should be noted that the sealing member between the lower face of the tank cover and the float is provided on the tank cover side, and the sealing member between the lower face of the intake port and the receiving wall of the float is provided on the receiving wall side respectively in the foregoing embodiment of the present invention. However, these sealing members may be also provided on the opposite sides respectively. Further, the sealing members are not absolutely required. For example, when sealability can be ensured by forming a recessed ring groove in the lower face of the tank cover so as to fit the upper end of the float portion, the sealing members may be dispensed with.

Further, the number or concrete configuration of intake ports can be appropriately changed as long as they are formed open laterally. The closure portion of the float may be also designed to close the intake port by partially erecting a wall body at an upper end of the float when the intake port is in a certain shape.

Furthermore, a plurality of exhaust ports may be provided and designed as simple permeable holes instead of being in shape of cylindrical bodies. As a matter of course, the exhaust ports can also be dispensed with.

It is explicitly stated that all features disclosed in the description and/or the claims are intended to be disclosed separately and independently from each other for the pur-

pose of original disclosure as well as for the purpose of restricting the claimed invention independent of the composition of the features in the embodiments and/or the claims. It is explicitly stated that all value ranges or indications of groups of entities disclose every possible intermediate value or intermediate entity for the purpose of original disclosure as well as for the purpose of restricting the claimed invention, in particular as limits of value ranges.

[Brief Description of the Drawings]

[0019]

[FIG. 1] FIG. 1 is a longitudinal sectional view of a dust collector (with a float at a lower-limit position thereof).

[FIG. 2] FIG. 2 is a longitudinal sectional view of the dust collector (with the float at an upper-limit position thereof).

[FIG. 3] FIG. 3 is a longitudinal sectional view of a conventional dust collector.

[Explanation of Reference Symbols]

[0020] 1 dust collector, 2 .. tank, 3 .. main body, 4 .. intake unit, 5 .. tank cover, 7 .. motor, 8 .. suction fan, 9 .. intake port, 11 .. suction port, 20 .. intake port, 21 .. lower member, 23 .. float, 24 .. receiving wall, 25, 26 .. sealing members, 27 .. closure portion, 28 .. exhaust port

Claims

1. A dust collector comprising:

a tank equipped with a suction port;
a main body covering a space above the tank;
an intake unit having a suction fan therein driven by a motor, wherein the intake unit sucks liquid such as water from the suction port by means of rotation of the suction fan so that the liquid can be stored in the tank;
an intake port protruding downward from a lower face of the intake unit and formed open laterally;
a float provided below the intake port and designed to move upward with a rise of a level of the liquid stored in the tank; and
a closure portion provided at an upper portion of the float to close the intake port at an upper-limit position and stop suction of the liquid.

2. The dust collector according to claim 1, wherein the float is in a shape of a cylindrical body, which accommodates the intake port in an upper portion thereof, abuts on a lower face of the intake unit at the upper-limit position and includes a receiving wall that abuts on a lower face of the intake port at the

upper-limit position to partition an interior of the float so that a space above the receiving wall constitutes the closure portion.

3. The dust collector according to claim 2, wherein the intake unit has a ring-like sealing member at an abutment portion where the intake unit abuts on the float, and the receiving wall has a ring-like sealing member at an abutment portion where the receiving wall abuts on the lower face of the intake port. 5
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4. The dust collector according to claim 2, wherein an exhaust port is formed penetrating the receiving wall closer to a center of the float than the abutment portion where the receiving wall abuts on the lower face of the intake port. 15
5. The dust collector according to claim 1, wherein the intake port is formed by coupling a conical lower member in a circular shape on a plan view to the lower face of the intake unit in such a state that the lower member protrudes downward via a partition plate. 20
6. The dust collector according to claim 5, wherein the receiving wall is formed in a tapered shape to be inclined more downward toward a center than an abutment portion where the receiving wall abuts on the lower member. 25
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FIG.1

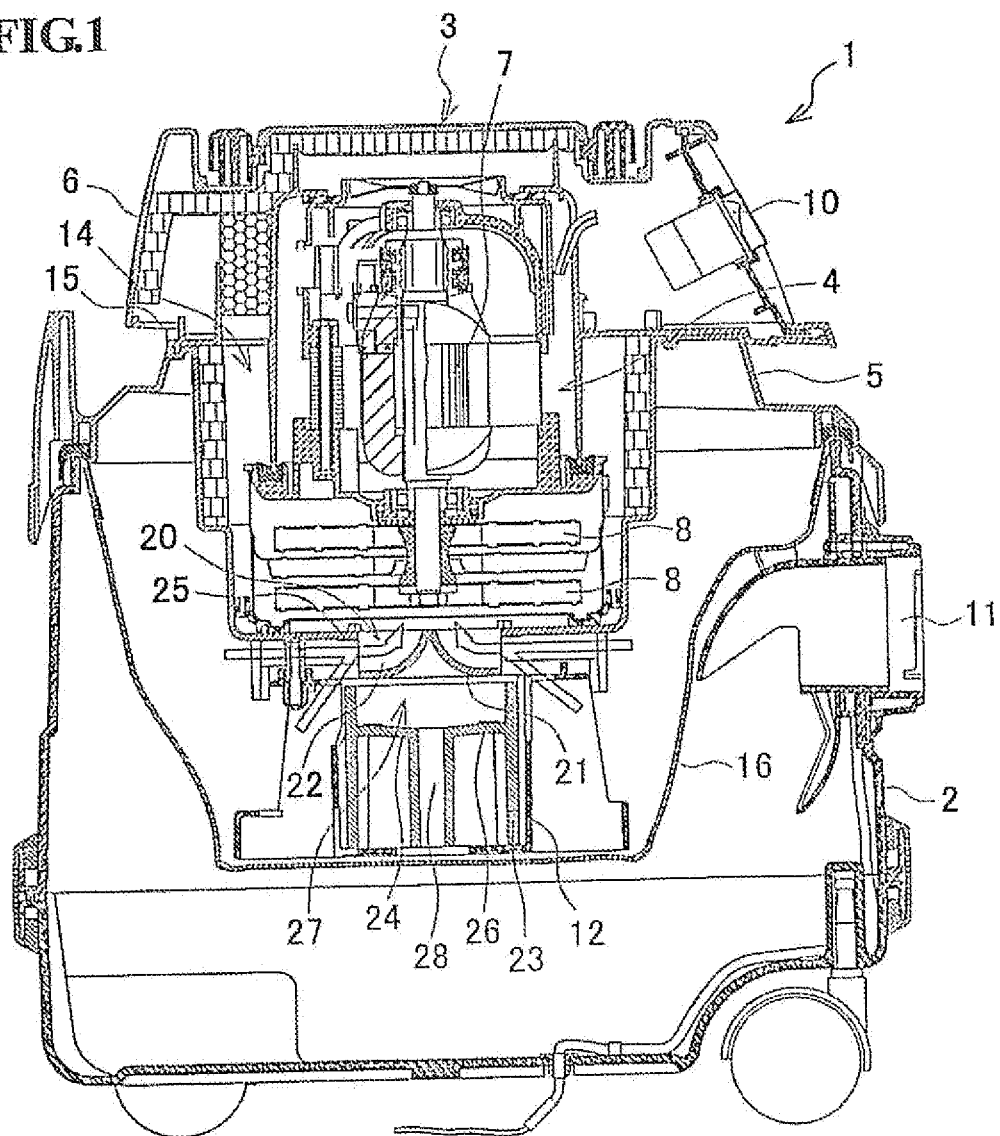


FIG. 2

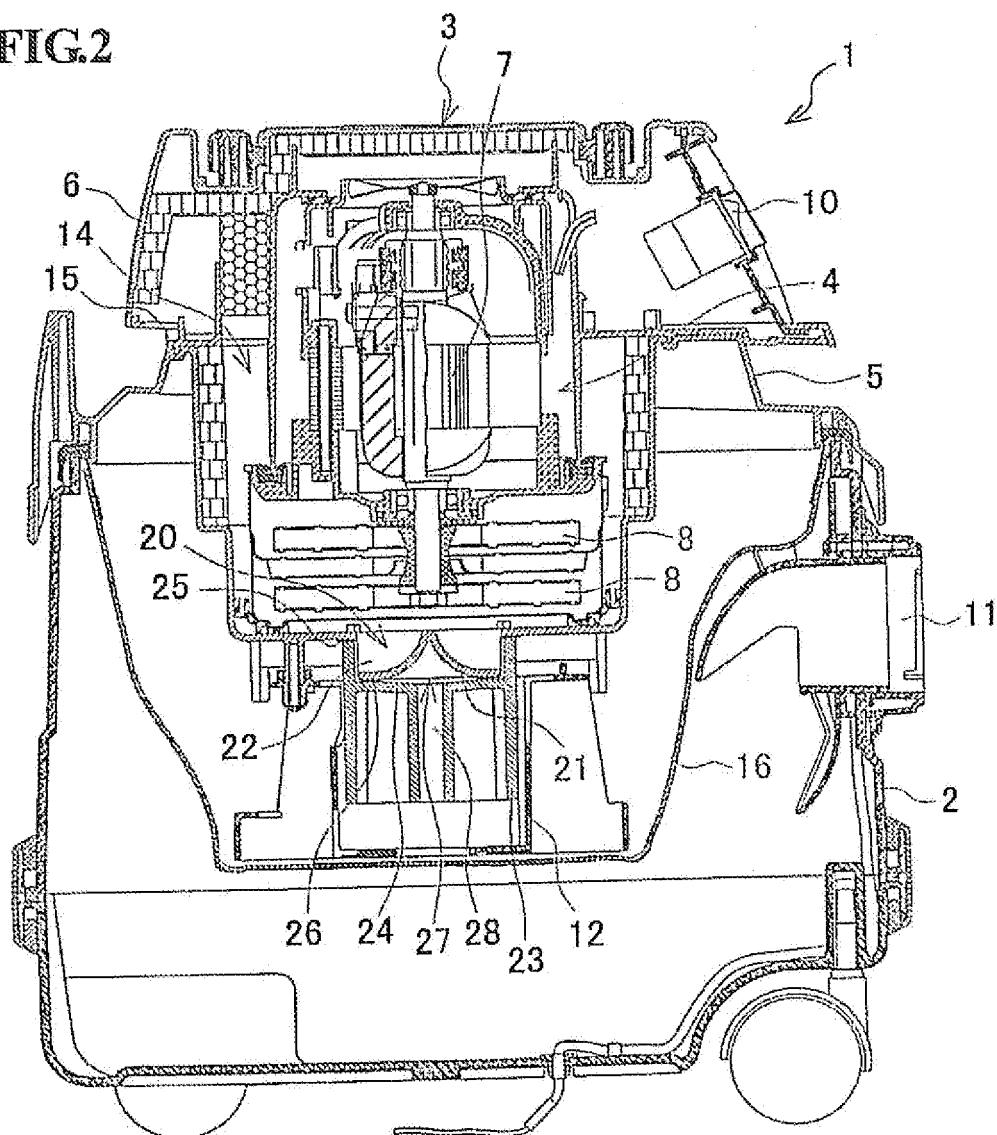
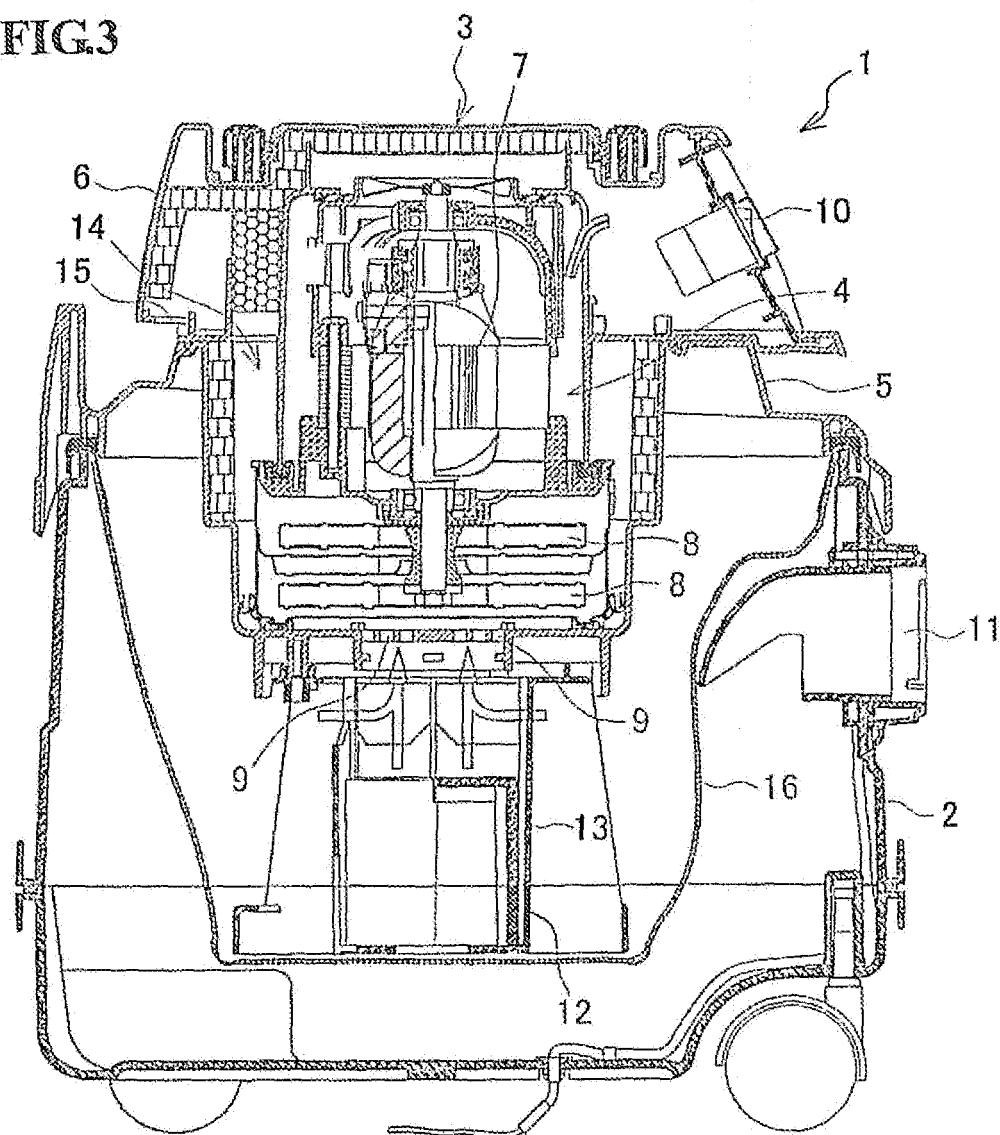


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/003945

A. CLASSIFICATION OF SUBJECT MATTER
A47L7/00 (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)
A47L7/00, A47L9/00, A47L11/00

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 1996-2009
Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009

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 2002-102124 A (Sanritsu-kiki Co., Ltd.), 09 April, 2002 (09.04.02), Par. Nos. [0004] to [0005]; Figs. 3 to 4 (Family: none)	1-6
A	JP 2006-334052 A (Sanyo Electric Co., Ltd.), 14 December, 2006 (14.12.06), Claim 1; Figs. 1 to 5 (Family: none)	1-6

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search
08 September, 2009 (08.09.09)

Date of mailing of the international search report
15 September, 2009 (15.09.09)

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 61057763 A [0004]