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(54) **Water filtration vacuum cleaner apparatus having sloping baffle**

Staubsauger mit Flüssigkeitsfilter und mit einer schrägen Luftleitfläche

Aspirateur à bain de liquide avec un déflecteur incliné

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Description

Field of the Invention

[0001] This invention relates to a household water filtration vacuum cleaner having a liquid container removable from a cleaner housing.

Background of the Invention

[0002] The conventional water filtration vacuum cleaner either has a complex configuration that is not suitable for home use, or has a simple construction that fails to thoroughly capture and dissolve the dust carried in sucked airflow. Hence, a large quantity of dust which is not filtrated by water needs additional means to further filtrate it, or else it is exhausted to the atmosphere, causing secondary pollution.

[0003] EP1112712A1 discloses a vacuum cleaner with a dust-collection reservoir. The vacuum cleaner contains a fluid and at least one duct for conveying an air-flow comprising the dust into the reservoir, the flow being mixed with the fluid so as to generate a dynamic and turbulent mixture, and is **characterized in that** the reservoir comprises means for intercepting the flow in order to generate a swirling motion of the mixture inside the reservoir.

Summary of the Invention

[0004] An object of the invention is to provide a water filtration vacuum cleaner apparatus having a sloping baffle, which improves the filtration efficiency and is easier to use.

[0005] To accomplish the above object, the water filtration vacuum cleaner apparatus having a sloping baffle according to the invention comprises a liquid container removable from a cleaner housing for keeping water and filtrating dust, having an inwardly sloping wall; a vertical baffle adjacent to the sloping wall; a sloping baffle attached to the vertical baffle which forms an angle $\alpha$with the vertical baffle; and at least one bending tube provided in the liquid container for conveying the dust-laden airflow into the liquid container, and an air outlet of the bending tube facing the sloping wall of the liquid container.

[0006] According to one embodiment, attached to the vertical baffle there are two or more sloping baffles, the outlet of the bending tube in the liquid container forms to be a flat shape, and there is a secondary filter screen in the opening of the liquid container, the bottom side of the vertical baffle is lower than the bottom side of the secondary filter screen.

[0007] The liquid container is provided at one side of the cleaner housing; and a suction duct provided in the liquid container includes a vertical air duct and a horizontal air duct. The suction duct is connected to an airflow inlet for sucking dust-laden air. A suction motor and a cable winder are provided at the other side of the cleaner housing. At least one filter is provided before an air inlet of the suction motor, and at least one filter is provided at the air outlet of the suction motor.

[0008] The cleaner housing is provided with a clean air outlet in fluid communication with an exhaust tube connected to the air outlet of the suction motor and the air outlet is connected to a hose so as to form a clean air blower. A wall of the liquid container is made of transparent or semi-transparent materials.

[0009] The invention is **characterized in that** the liquid container is so constructed that one of its walls is sloping inwardly; adjacent to the inwardly sloping wall there is a vertical baffle which can be an integral baffle or is formed by connecting an upper part and a lower part; the bottom side of the vertical baffle is higher than the predetermined highest water level in the liquid container; attached to the vertical baffle there is a sloping baffle; when the vertical baffle is formed by connecting an upper part and a lower part, the sloping baffle can be integrally formed with the lower part of the vertical baffle. The sloping baffle can be provided in various ways. In addition, the outlet of the bending tube for conveying the dust-laden airflow into the liquid container is facing the inwardly sloping wall of the liquid container. When the cleaner is in operation, the dust-laden airflow rushes into the water in the liquid container along the bending tube to form a mixture of water and air so that the dust and water will mix in the following two ways: in one way the mixture of water and air hits the sloping wall of the liquid container and moves upward along it, wherein the part with more momentum hits the vertical baffle, falls to the upper surface of the sloping baffle and rushes onto the sloping wall again under the baffle of the sloping wall; in the other way, the part with less momentum together with some water pieces produced by the above process is carried by the sucked airflow and hits the lower part of the vertical baffle (the lower surface of the sloping baffle), and it then falls downward under the baffle of the vertical baffle and the lower surface of the sloping baffle. As a result, the dust-laden airflow and water undergo a rotary motion, sufficiently mix with each other in the liquid container, so that the dust in the air will be dissolved or collected in the water sufficiently. Meanwhile, the clean air rushes to the air outlet of the liquid container through the gap between the vertical baffle and water level, enters into suction chamber of the suction motor and is discharged to the atmosphere.

[0010] Experiments show that by using sloping baffles the efficiency of filtration is improved and the water drips carried by the airflow is not likely to be expelled to the air outlet of the liquid container and enter into the suction motor. Hence, the dust will be completely filtrated by water using a relatively simple structure like this.

[0011] The liquid container is easily removed from the cleaner housing and it is easy to add fresh water to the liquid container or remove dirty water from the liquid container. Experiments indicate that the dust in the airflow is easier to mix with water by forming the outlet of the

bending tube for conveying the airflow into the liquid container into flat shape.

[0012] There is an opening in the upper part of the liquid container and around the opening there are an air intake tube, an air out tube and a secondary filter screen. Experiments indicate that the dust and water drips in the airflow can be filtered more effectively, so that the air entering into the suction motor is as clean and dry as possible. Experiments also indicate that when the bottom side of the vertical baffle is lower than the bottom of the secondary filter screen, the water drips in the airflow are not likely to rush to the secondary filter screen and thus the efficiency of filtration is further improved.

[0013] In addition, at least one high-performance HEPA filter is provided before the air inlet of the suction motor. Experiments indicate that the fine dust and water vapor that is not filtrated by water or leaks from the secondary filter screen will pass through the HEPA and get filtrated before entering the suction motor, making the air entering the suction motor almost 100% pure.

[0014] In addition, the suction motor used is generally a wet/dry vacuum cleaner motor, which may produce carbon particles when in operation. Hence, by providing an additional high-performance filer (such as HEPA filter) at the air outlet of the suction motor, the carbon particles produced can be filtered, preventing the carbon particles from being discharged into the atmosphere, causing secondary pollution. A clean air blower can be formed by connecting a hose to a clean air outlet of the cleaner housing. The walls of the liquid container are made of transparent or semi-transparent materials so that it is convenient for users to check the water level.

Brief Description of the Drawings

[0015] The invention will be described in detail by a preferred embodiment, reference being made to the accompanying drawings,
in which

Fig.1 is a partially sectional top view;
Fig. 2 is a partially sectional view taken along the line A-A in Fig. 1;
Fig.3 is a partially sectional view taken along the line B-B in Fig. 1;
Fig.4 is a sectional view of the liquid container according to the preferred embodiment; and
Fig.5 is an enlarged view of the part P in Fig.3.

Description of the Preferred Embodiments

[0016] Referring to Fig.1, Fig.2 and Fig.3, a water filtration vacuum cleaner apparatus having a slopping baffle according to the invention, comprises an airflow inlet 9 for dust-laden airflow, a horizontal air duct 11, a vertical air duct 2, a cleaner housing 5, a suction motor 19, a cable winder 17, a liquid container 10 for filtering and collecting dust, and the liquid container is provided with two bending tubes passing through a cover 4 of the liquid container for conveying the airflow, that is, a suction duct 3 for conveying the dust-laden airflow into the water in the liquid container 10 and an air outlet tube 15 communicating to the suction motor 19 for conveying the air filtered by water to the outside of the liquid container 10. Referring to Fig.4 and Fig.5, the invention is **characterized in that** the liquid container 10 is so constructed that one of its walls 21 is sloping inwardly; adjacent to the inwardly sloping wall 21 there is a vertical baffle 6, which can be an integral baffle or formed by connecting an upper part and a lower part. A bottom side of the vertical baffle 6 is higher than the predetermined highest water level 8. Attached to the vertical baffle 6 there is a sloping baffle 7; in the situation that the vertical baffle 6 is formed by connecting an upper part 6-1 and a lower part 6-2, the sloping baffle 7 can be integrally formed with the lower part 6-2 of the vertical baffle 6. The sloping baffle can be provided in various ways. The angle αbetween the sloping baffle 7 and the lower part 6-2 of the vertical baffle 6 is larger than 10°. In addition, the outlet of the bending tube 22 for conveying the dust-laden airflow into the liquid container 10 is facing the inwardly sloping wall 21 of the liquid container 10. When the cleaner is in operation, the dust-laden airflow rushes into the water in the liquid container 10 along the bending tube 22 to form a mixture C of water and air so that the dust and water will mix in the following two ways: in one way the mixture of water and air hits the sloping wall 21 of the liquid container 10 and moves upward along it, wherein the part with more momentum D hits the vertical baffle, falls to the upper surface of the sloping baffle 7 and rushes onto the sloping wall 21 again under the baffle of the sloping wall 21; in the other way, the part with less momentum E together with some water pieces produced by the above process is carried by the sucked airflow and hits the lower part of the vertical baffle (the lower surface of the sloping baffle), and it then falls downward under the baffle of the vertical baffle and the lower surface of the sloping baffle 7. As a result, the dust-laden airflow and water undergo a rotary motion respectively in the space defined by the sloping wall 21, the vertical baffle 6 and the sloping baffle 7 and the space defined by the lower part 6-2 of the vertical baffle 6, the sloping baffle 7 and bottom 25 of the liquid container, sufficiently mix with each other in the liquid container 10, so that the dust in the air will be dissolved or collected in the water sufficiently. Meanwhile, the clean air rushes to the air outlet of the liquid container through the gap between the vertical baffle and water level, enters the suction chamber of the suction motor and is discharged to the atmosphere. Experiments indicate that by using a sloping baffle 7 the efficiency of filtration is improved and the amount of the water drips carried by the airflow which is expelled to the air outlet tube 15 of the liquid container decreases greatly.

[0017] The above process is illustrated in Fig.4, in which G represents the dust-laden airflow, C represents a mixture of water and air, E represents the mixture of

water and air with less momentum, D represents the mixture of water and air with more momentum, and F represents clean air and small amount of water vapor.

[0018] The vertical baffle 6, together with its lower part 6-2 and the sloping baffle 7 may be integrally formed. As shown in Fig.5a), they can also be formed by connecting two parts. Or as shown in Fig.5 b), they can be formed by connecting three parts through welding, adhesion and other means.

[0019] The liquid container 10 is easily removed from the cleaner housing 5 and it is easy to add fresh water to the liquid container 10 or remove dirty water from the liquid container 10. Experiments indicate that the dust in the airflow is easier to mix with water by forming the outlet of the bending tube 22 for conveying the airflow into the liquid container into flat shape.

[0020] There is an opening in the upper part of the liquid container 10 and in the opening there provided a secondary filter screen 16. Experiments indicate that the dust and water drips carried by the airflow can be filtered more effectively by providing the secondary filter screen 16, making the air entering into the suction motor 19 as clean and dry as possible.

[0021] Experiments indicate that when the bottom side of the vertical baffle 6 is lower than the bottom 23 of the secondary filter screen 16, the water drips carried by the airflow are not likely rush to the secondary filter screen 16 and thus the efficiency of filtration is further improved.

[0022] In addition, at least one high-performance HEPA filter 14 is provided before the air inlet of the suction motor 19. Experiments indicate that the fine dust and water vapor that is not filtrated by water or leaks from the secondary filter screen will pass through the HEPA and get filtrated before entering the suction motor, making the air entering the suction motor almost 100% pure.

[0023] The suction motor 19 used is generally a wet/dry vacuum cleaner motor, which may produce carbon particles when in operation. Hence, by providing an additional high-performance filer 13 (such as HEPA filter) at the air outlet 12 of the suction motor 19 the carbon particles produced can be filtered, preventing the carbon particles from being discharged into the atmosphere, causing secondary pollution.

[0024] A clean air blower can be formed by connecting a hose to a clean air outlet 1 of the cleaner housing. And the walls of the liquid container 10 are made of transparent or semi-transparent materials so that it is convenient for the user to check the water level.

Claims

1. A water filtration vacuum cleaner apparatus having a sloping baffle, comprising
   a liquid container (10) removable from a cleaner housing (5) for keeping water and filtrating dust, having an inwardly sloping wall (21);
   a vertical baffle (6) adjacent to the sloping wall (21); and at least one bending tube (22) provided in the liquid container (10) for conveying the dust-laden airflow into the liquid container (10), an air outlet of the bending tube facing the sloping wall (21) of the liquid container (10), **characterized by** a sloping baffle (7) attached to the vertical baffle (6) which forms an angle (α) with the vertical baffle (6).

2. A water filtration vacuum cleaner apparatus having a sloping baffle according to claim 1, **characterized in that** two or more sloping baffles (7) are attached to the vertical baffle (6).

3. A water filtration vacuum cleaner apparatus having a sloping baffle according to claim 1 or 2, **characterized in that** the outlet of the bending tube (22) in the liquid container (10) forms to be a flat shape.

4. A water filtration vacuum cleaner apparatus having a sloping baffle according to claim 1, 2 or 3, **characterized in that** a secondary filter screen (16) is provided in the opening of the liquid container (10).

5. A water filtration vacuum cleaner apparatus having a sloping baffle according to any of the preceding claims, particularly to claim 1, **characterized in that** a bottom side of the vertical baffle (6) is lower than a bottom side (23) of the secondary filter screen (16).

6. A water filtration vacuum cleaner apparatus having a sloping baffle according to any of the preceding claims, particularly to claim 1, **characterized in that** the liquid container (10) is provided at one side of the cleaner housing (5); and a suction duct (3) provided in the liquid container (10) includes a vertical air duct (2) and a horizontal air duct (11) and the suction duct (3) is connected to an airflow inlet (9) for sucking dust-laden air; and a suction motor (19) and a cable winder (17) are provided at the other side of the cleaner housing (5); and at least one filter (14) is provided before an air inlet of the suction motor (19).

7. A water filtration vacuum cleaner apparatus having a sloping baffle according to any of the preceding claims, particularly to claim 6, **characterized in that** at least one filter (13) is provided at the air outlet (12) of the suction motor (19).

8. A water filtration vacuum cleaner apparatus having a sloping baffle according to any of the preceding claims, particularly to claim 6, **characterized in that** the cleaner housing (5) is provided with a clean air outlet (1) in fluid communication with an exhaust tube connected to an air outlet (12) of the suction motor (19) and the air outlet (12) is connected to a hose so as to form a clean air blower.

9. A water filtration vacuum cleaner apparatus having a sloping baffle according to any of the preceding claims, particularly to claim 1, **characterized in that** a wall of the liquid container (10) is made of transparent or semi-transparent materials.

Patentansprüche

1. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte aufweisend
einen Flüssigkeitsbehälter (10), der vom Staubsaugergehäuse (5) entfernbar ist, zum Aufbewahren von Flüssigkeit und Filtrationsstaub, und der eine inwärts geneigte Wand (21) besitzt;
eine vertikale Umlenkplatte (6), die zur geneigten Wand (21) benachbart ist; und
wenigstens eine gebogene Röhre (22), die im Flüssigkeitsbehälter (10) zum Befördern des Staub-geladenen Luftstroms in den Flüssigkeitsbehälter (10) vorgesehen ist, wobei ein Luftauslass der gebogenen Röhre gegenüber der geneigten Wand (21) des Flüssigkeitsbehälter aus (10) liegt,
gekennzeichnet durch
eine Umlenkplatte (7), die an der vertikalen Umlenkplatte (6) angebracht ist und einen Winkel (α) mit der vertikalen Umlenkplatte (6) bildet.

2. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß Anspruch 1,
dadurch gekennzeichnet, dass
zwei oder mehr Umlenkplatten (7) an der vertikalen Umlenkplatte (6) angebracht sind.

3. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß Anspruch 1 oder 2,
dadurch gekennzeichnet, dass
der Auslass der gebogenen Röhre (23) in den Flüssigkeitsbehälter (10) in einer flachen Gestalt ausgebildet ist.

4. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß Anspruch 1,2 oder 3,
dadurch gekennzeichnet, dass
ein zweites Filtersieb (16) in der Öffnung des Flüssigkeitsbehälters (10) vorgesehen ist.

5. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß einem der vorhergehenden Ansprüche, insbesondere Anspruch 1,
dadurch gekennzeichnet, dass
eine Unterseite der vertikalen Umlenkplatte (6) niedriger als eine Unterseite (23) des zweiten Filtersiebs (16) ist.

6. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß einem der vorhergehenden Ansprüche, insbesondere Anspruch 1,
dadurch gekennzeichnet, dass
der Flüssigkeitsbehälter (10) an einer Seite des Staubsaugergehäuses (5) vorgesehen ist;
und ein Ansaugkanal (3), der in dem Flüssigkeitsbehälter (10) vorgesehen ist, einen vertikalen Luftkanal (2) und einen horizontalen Luftkanal (11) besitzt, und der Ansaugkanal (3) mit einem Luftstromeinlass (9) zum Ansaugen von Staub-geladener Luft verbunden ist;
und ein Saugmotor (19) und eine Kabelwinde (17) an der anderen Seite des Staubsaugergehäuse s (5) vorgesehen sind;
und wenigstens ein Filter (14) vor einem Lufteinlass des Saugmotors (19) vorgesehen ist.

7. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß einem der vorhergehenden Ansprüche, insbesondere Anspruch 6,
dadurch gekennzeichnet, dass
wenigstens ein Filter (13) am Luftauslass (12) des Saugmotors (19) vorgesehen ist.

8. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß einem der vorhergehenden Ansprüche, insbesondere Anspruch 6,
dadurch gekennzeichnet, dass
das Staubsaugergehäuse (5) mit einem Auslass (1) für saubere Luft versehen ist, der einen Flüssigkeitsübertragungsweg mit einem Abdampfrohr, das mit einem Luftauslass (12) des Saugmotors (19) verbunden ist, besitzt, und dass der Luftauslass (12) mit einem Schlauch verbunden ist, um so ein Gebläse für reine Luft zu bilden.

9. Staubsauger mit Flüssigkeitsfilter und einer Umlenkplatte gemäß einem der vorhergehenden Ansprüche, insbesondere Anspruch 1,
dadurch gekennzeichnet, dass
eine Wand des Flüssigkeitsbehälters (10) aus einem transparenten oder semitransparenten Material hergestellt ist.

Revendications

1. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée, comprenant
un récipient liquide (10) démontable de plus propre à boîtier (5) pour maintenir la poussière d'eau et de filtrer, ayant un mur intérieurement incliné (21);
une cloison verticale (6) à côté du mur incliné (21) ;
et au moins un tube courbant (22) fourni dans le récipient liquide (10) pour transporter le flux d'air chargé de poussières dans le récipient liquide (10), une sortie d'air du parement de tube de bombage le mur incliné (21) du récipient liquide (10)
caractérisée par
une cloison inclinée (7) a fixé à la cloison verticale

(6) qui forme un angle (α) avec la cloison verticale (6).

2. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon la revendication 1, **caractérisée** dans celle deux ou de plus nombreuses cloisons inclinées (7) est fixé à la cloison verticale (6).

3. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon la revendication 1 ou 2, **caractérisé par**ce que la sortie du tube de bombage (22) dans le récipient liquide (10) forme est une forme plate.

4. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon la revendication 1, 2 ou 3, **caractérisée par**ce qu'un tamis filtrant secondaire (16) est pourvu dans l'ouverture du récipient liquide (10).

5. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon des réclamations précédantes l'unes des, pour réclamer notamment 1, **caractérisé par**ce qu'un côté inférieur de la cloison verticale (6) est plus inférieur qu'un côté inférieur (23) du tamis filtrant secondaire (16).

6. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon des réclamations précédantes l'unes des, pour réclamer notamment 1, **caractérisé par**ce que le récipient liquide (10) est pourvu sur un côté de à boîtier plus propre (5) ; et un canal d'aspiration (3) fourni dans le récipient liquide (10) comprend un canal d'air vertical (2) et un canal d'air horizontal (11) et le canal d'aspiration (3) est relié à une entrée de flux d'air (9) pour l'air chargé de poussières aspirant ; et un moteur d'aspiration (19) et un bobineur de câble (17) sont pourvu sur le côté autre de à boîtier plus propre (5) ; et au moins un filtre (14) est pourvu avant une entrée d'air du moteur d'aspiration (19).

7. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon des réclamations précédantes l'unes des, pour réclamer notamment 6, **caractérisé** dans ce au moins un filtre (13) est pourvu à la sortie d'air (12) du moteur d'aspiration (19).

8. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon des réclamations précédantes l'unes des, pour réclamer notamment 6, **caractérisé par**ce qu'à boîtier plus propre (5) est pourvu avec propre à sortie d'air (1) dans la communication fluide avec un tube d'échappement relié à une sortie d'air (12) du moteur d'aspiration (19) et la sortie d'air (12) est relié à un tuyau afin de former propre à ventilateur.

9. Un appareillage d'aspirateur de filtration de l'eau ayant une cloison inclinée selon des réclamations précédantes l'unes des, pour réclamer notamment 1, **caractérisé par**ce qu'un mur du récipient liquide (10) est rendu des matériaux transparents ou semi-finale-transparents.

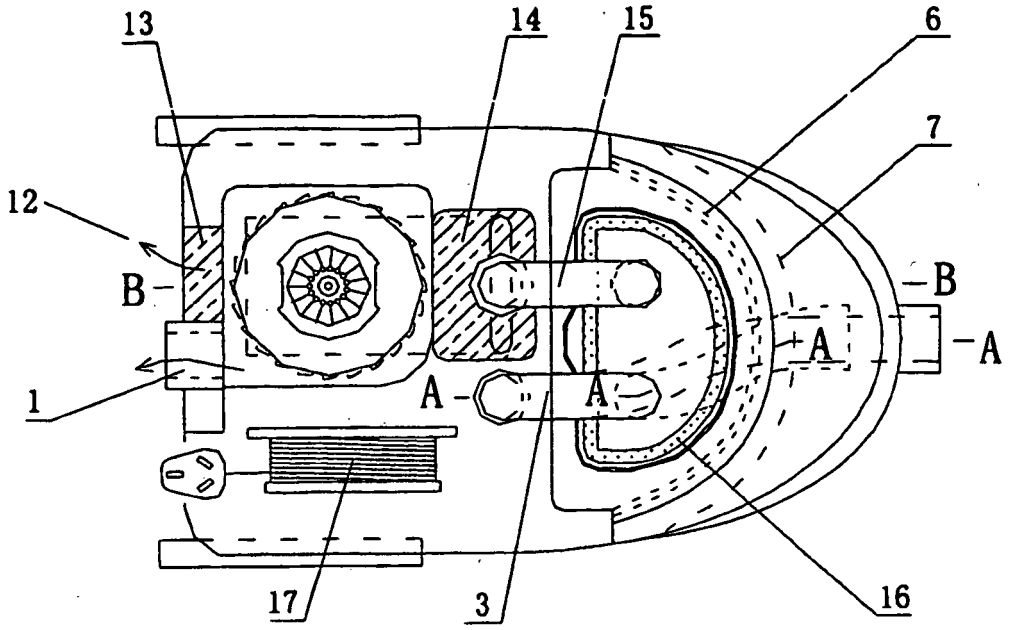

Fig. 1

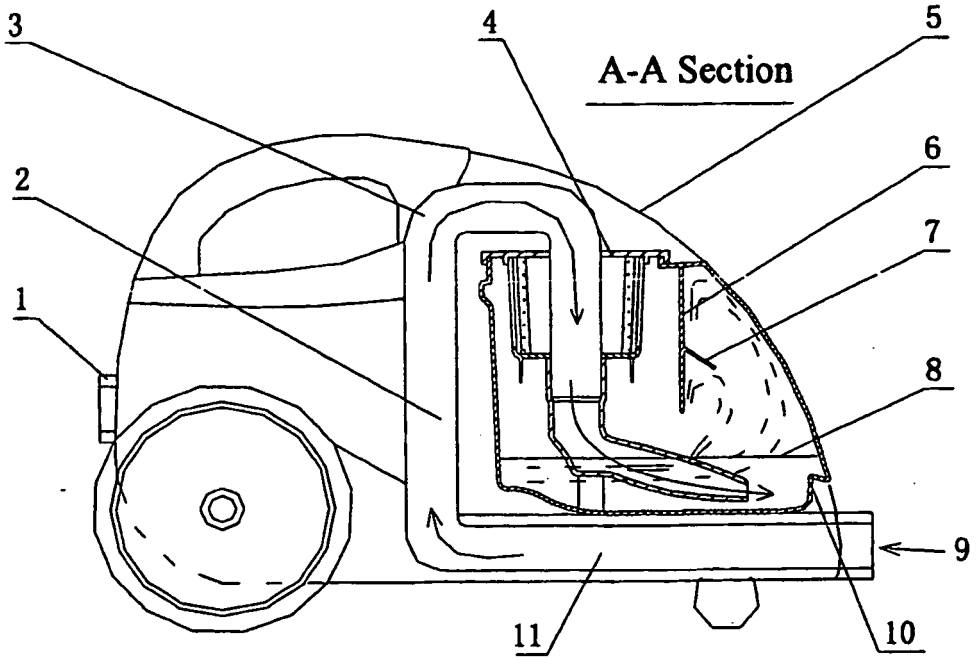

Fig. 2

B-B Section

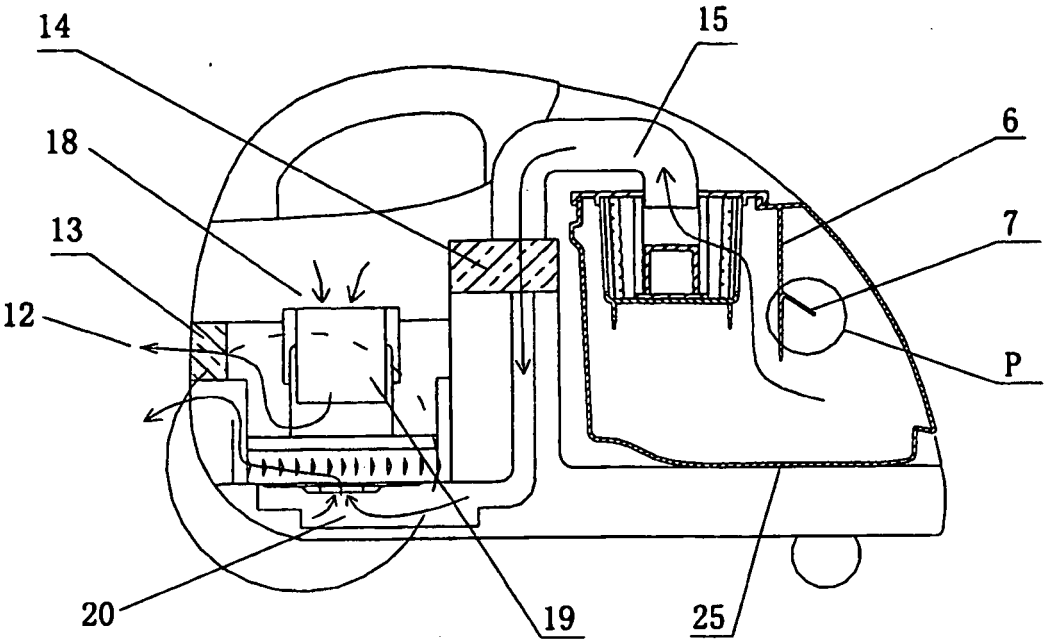

Fig. 3

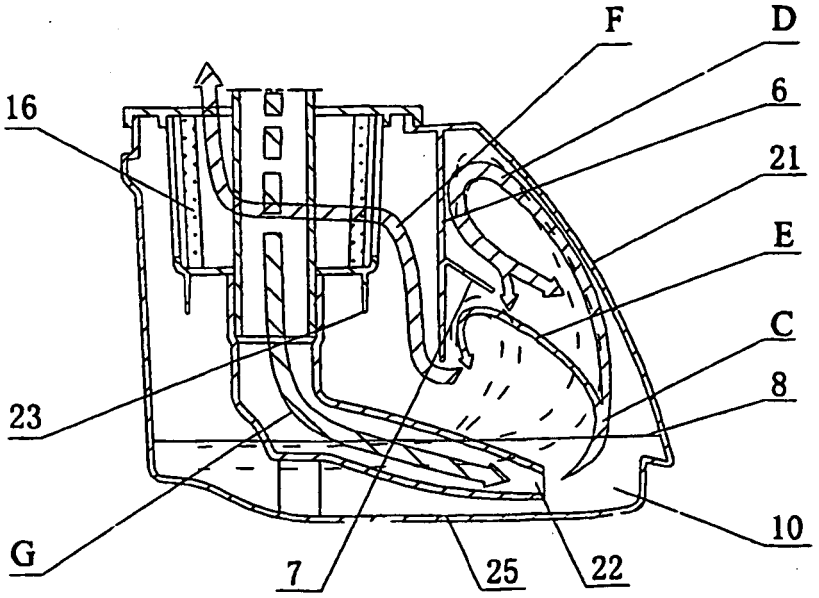

Fig. 4

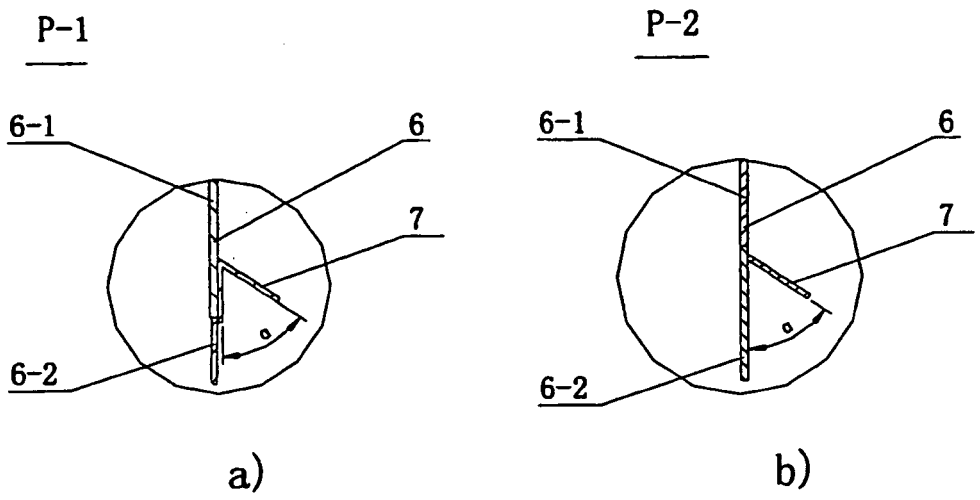

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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