(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 707 098 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.10.2006 Bulletin 2006/40

(51) Int Cl.:
A47L 9/18 *(2006.01)*

(21) Application number: **06003775.1**

(22) Date of filing: **24.02.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **29.03.2005 CN 200520070275**

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(54) Water filtration vacuum cleaner apparatus having sloping baffle

(57) 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 collecting dust, having at least one bending tube for conveying the dust-laden airflow into the liquid container (10), characterized in that the liquid container (10) is provided with an inwardly sloping wall (21), adjacent to the sloping wall there is a vertical baffle (6) and attached to the vertical baffle (6) there is a sloping baffle (7). The dust-laden airflow rushes into the water in the liquid container (10) along the bending tube to form a mixture of water and air B, most of which undergoes a rotary motion along the sloping wall (21) of the liquid container (10), the vertical baffle (6) and the sloping baffle (7), making the water and the dust mixing sufficiently; and part of the mixture of water and air and water pieces produced by the above process undergoes a second rotary mixing motion under the lower part of the vertical baffle (6) and the sloping baffle (7), causing the dust in the air dissolved or collected in water sufficiently

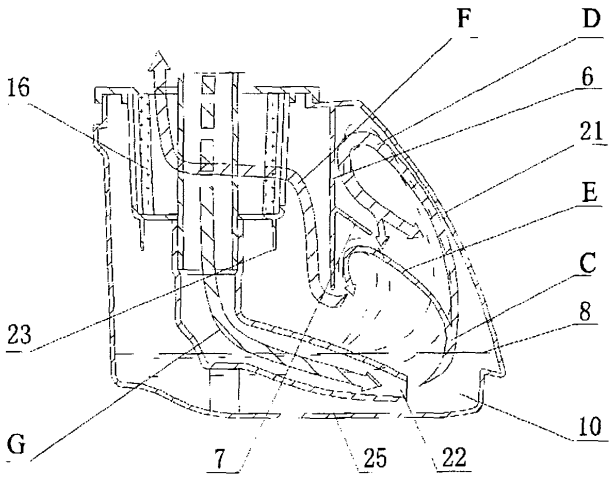

Fig. 4

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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.

Summary of the Invention

[0003] 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.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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

[0014] 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

[0015] 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.

[0016] 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.

[0017] The vertical baffle 6, together with its lower part 6-2 and the sloping baffle 7 may be integrally formed. As shown in Fig.5 a), 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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.

[0023] 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);
   a sloping baffle (7) attached to the vertical baffle (6) which forms an angle α with the vertical baffle (6);
   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).

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.

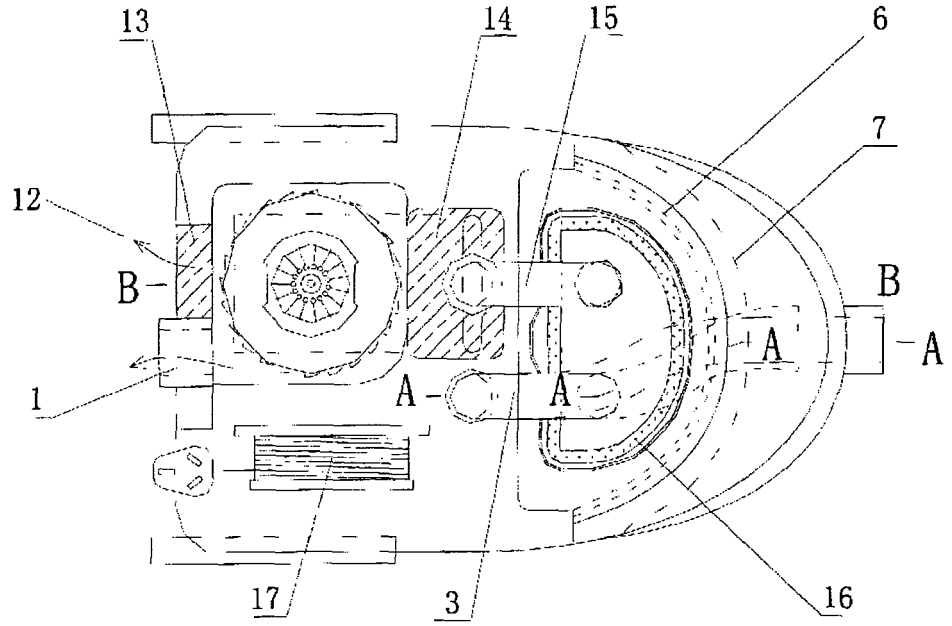

Fig. 1

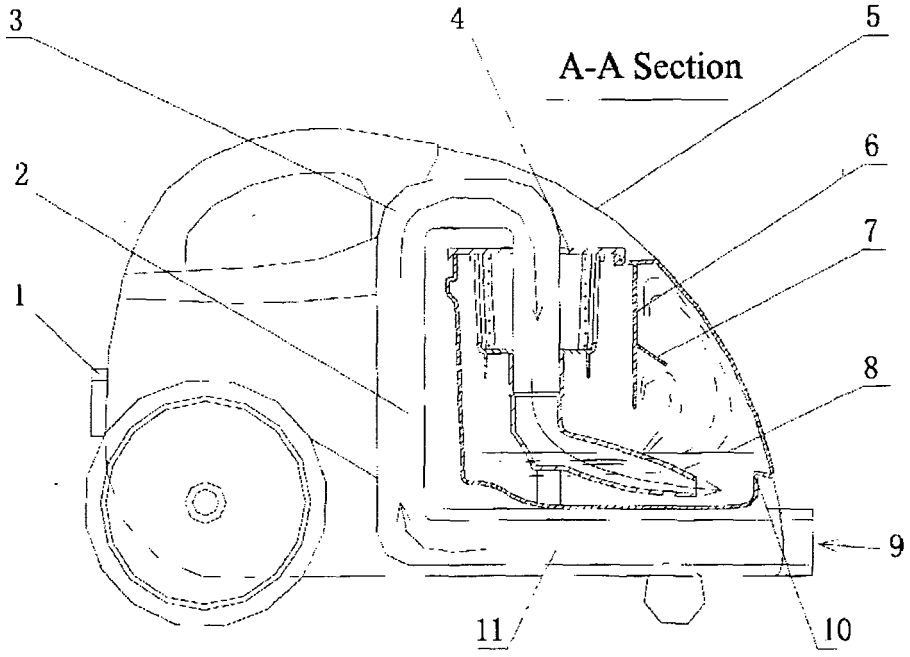

Fig. 2

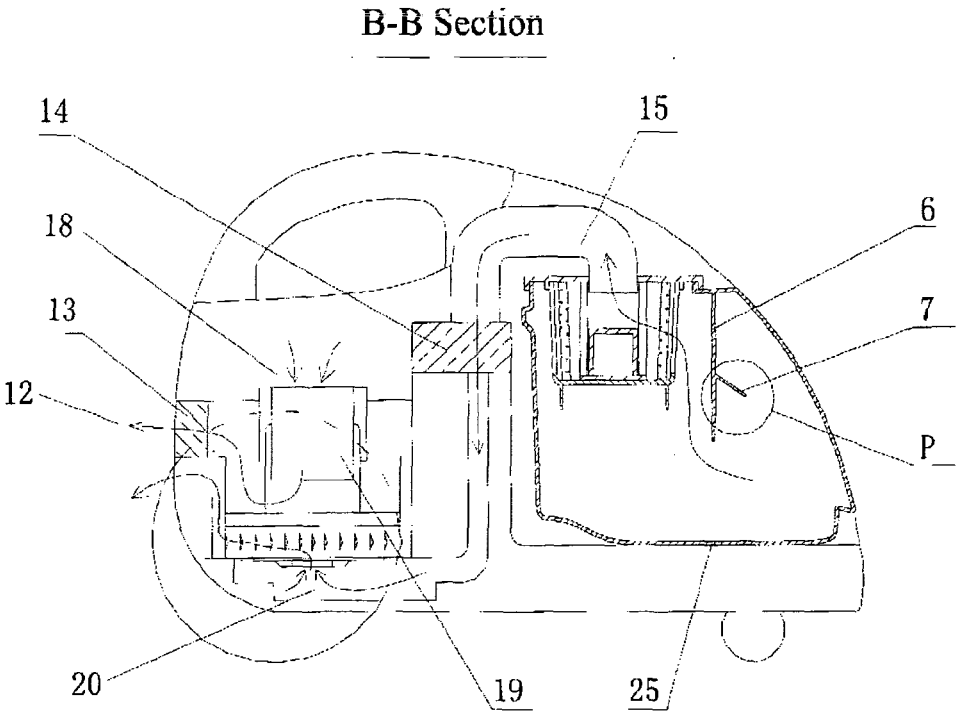

Fig. 3

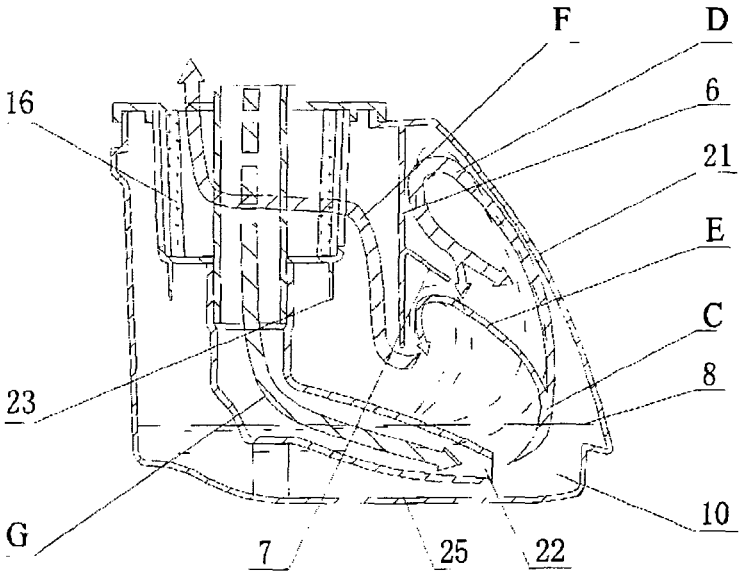

Fig. 4

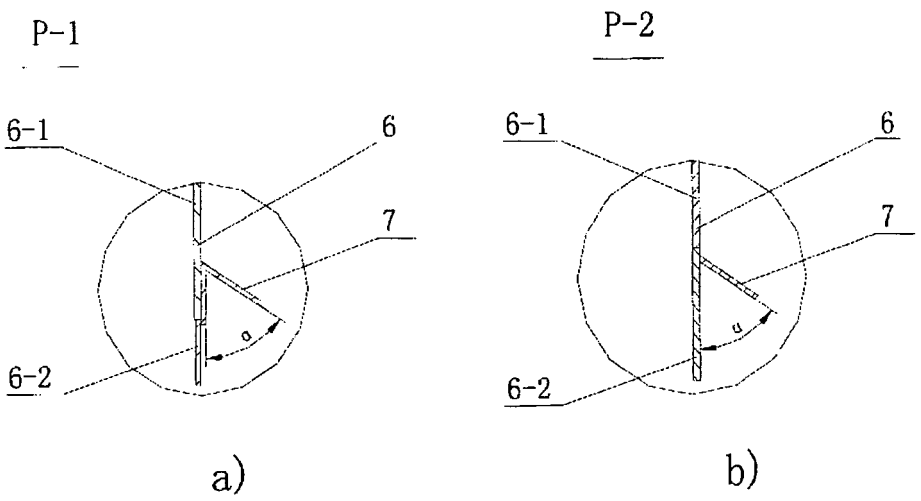

Fig. 5