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(74) Patent Agency: Beijing Xinhui Yongguang Intellectual Property
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(ESM) The identical invention-creation has been applied for an
invention patent on the same day

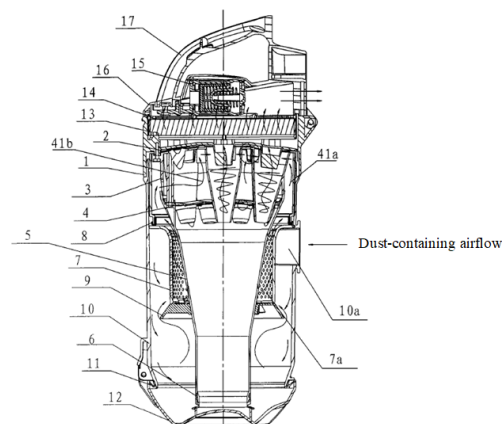
Claims: 3 pages Description: 8 pages Drawings: 8 pages

(54) Title of the Utility Model

CYCLONE SEPARATION DEVICE AND CYCLONE
VACUUM CLEANER EQUIPPED WITH SAME

(57) Abstract

The present utility model relates to the technical field of cleaning equipment, and in particular to a cyclone separation device and a cyclone vacuum cleaner equipped with same. A first cyclone separation unit in the device comprises a dust bucket and a mesh filter with air holes. An airflow enters the first cyclone separation unit for first gas-solid separation. The separated airflow enters a second cyclone separation unit from the air holes of the mesh filter. A filter in the second cyclone separation unit comprises a plurality of cyclone cylinders. Upper and lower ends of each cyclone cylinder are open, and the side wall of each cyclone cylinder is provided with a first air inlet and a second air inlet. The airflow after the gas-solid separation enters the first air inlet and the second air inlet through a first airflow channel and a second airflow channel, respectively. The airflow is mixed in the cyclone cylinders and then subjected to second gas-solid separation. The airflow after the gas-solid separation is discharged from openings at the upper ends of the cyclone cylinders. In the device, the separation effect is improved by changing the airflow direction and the cross-sectional area of the air inlets. According to the cyclone vacuum cleaner equipped with the device, the integral separation efficiency is improved, and the air purification effect is improved.



1. A cyclone separation device, comprising a first cyclone separation unit and a second cyclone separation unit, wherein the first cyclone separation unit comprises a dust bucket (10) with a tangential air inlet (10a) and a mesh filter (7) with air holes (7a);

an airflow enters the first cyclone separation unit from the tangential air inlet (10a) for first gas-solid separation, and the airflow after the first gas-solid separation enters the second cyclone separation unit through the air holes (7a);

the second cyclone separation unit comprises a separator (3) and a connecting bucket (5), the separator (3) comprises a plurality of cyclone cylinders (31), upper and lower ends of each cyclone cylinder (31) are open, and the side wall of each cyclone cylinder is provided with a first air inlet (31a) and a second air inlet (31b), characterized in that:

the airflow after the first gas-solid separation comprises a first airflow (41a) and a second airflow (41b), the first airflow (41a) enters each first air inlet (31a) through a first airflow channel, and the second airflow (41b) enters each second air inlet (31b) through gaps between the outer walls of the plurality of cyclone cylinders (31) in a second airflow channel, the first airflow (41a) and the second airflow (41b) are subjected to second gas-solid separation in the cyclone cylinders (31), and the airflow after the second gas-solid separation flows to opening at the upper ends of the cyclone cylinders (31).

2. The cyclone separation device according to claim 1, characterized in that: the first air inlets (31a) and the second air inlets (31b) are symmetrically distributed on the side walls of the cyclone cylinders (31).

3. The cyclone separation device according to claim 1, characterized in that: a connecting bucket sealing cover (4) is provided below the separator (3), circular holes are provided in the connecting bucket sealing cover (4), and the number of circular holes in the connecting bucket sealing cover (4) is the same as the number of cyclone cylinders (31).

4. The cyclone separation device according to claim 3, characterized in that: the diameter of the circular hole in the connecting bucket sealing cover (4) is greater than or equal to the diameter of the lower end of the cyclone cylinder (31) and smaller than the diameter of the upper end of the cyclone cylinder (31), and the cyclone cylinder (31) is connected to the connecting bucket (5) by means of the circular hole of the connecting bucket sealing cover (4).

5. The cyclone separation device according to claim 3 or 4, characterized in that: the connecting bucket sealing cover (4) and the connecting bucket (5) are sealedly connected.

6. The cyclone separation device according to claim 1, characterized in that: both the first airflow channel and the second airflow channel comprise a gap between the inner wall of the mesh filter (7) and the outer wall of the connecting bucket (5).

7. The cyclone separation device according to claim 6, characterized in that: the cyclone separation device comprises a conical hole cover (1), and the conical hole cover (1) is located above the dust bucket (10); and the first airflow channel further comprises gaps between the outer wall of the separator (3), the inner wall of the conical hole cover (1), and the inner wall of the mesh filter (7).

8. The cyclone separation device according to claim 1, characterized in that: the second airflow channel further comprises a groove (301) provided on the outer wall of the separator (3), and the second airflow (41b) enters gaps between the outer walls of the plurality of cyclone cylinders (31) through the groove (301).

9. The cyclone separation device according to claim 1, characterized in that: the air holes (7a) are a plurality of through holes provided on the mesh filter (7).

10. The cyclone separation device according to claim 1, characterized in that: the first air inlet (31a) and the second air inlet (31b) have the same cross-sectional area.

11. The cyclone separation device according to claim 1, characterized in that: there are 6 to 12 cyclone cylinders (31), and the cyclone cylinders (31) are evenly arranged around a central axis of the separator (3).

12. The cyclone separation device according to claim 11, characterized in that: there are eight cyclone cylinders (31).

13. The cyclone separation device according to claim 11, characterized in that: the opening of the first air inlet (31a) of the cyclone cylinder (31) faces the outside of the separator (3), and the opening of the second air inlet (31b) of the cyclone cylinder (31) faces the inside of the separator (3).

14. The cyclone separation device according to claim 11, characterized in that: the cyclone separation device further comprises a central cyclone cylinder (32) provided at a central position of the separator (3), two air inlets (32a) are provided on the side wall of the central cyclone cylinder (32), and the second airflow (41b) enters the two air inlets (32a) through the second airflow channel.

15. The cyclone separation device according to claim 1 or 11, characterized in that: an included angle between an axis of the cyclone cylinder (31) and an axis of the cyclone separation device is 6° to 12° .

16. The cyclone separation device according to claim 15, characterized in that: the included angle between the axis of the cyclone cylinder (31) and the axis of the cyclone separation device is 8° .

17. A cyclone vacuum cleaner, comprising a vacuum cleaner body and a suction head, characterized in that: a cyclone separation device is provided in the vacuum cleaner body, and the cyclone separation device is the cyclone separation device according to any one of claims 1-16.

CYCLONE SEPARATION DEVICE AND CYCLONE VACUUM CLEANER EQUIPPED WITH SAME

Technical Field

[0001] The present utility model relates to the technical field of cleaning equipment, and in particular to a cyclone separation device and a cyclone vacuum cleaner equipped with same.

[0002] Background Art

[0003] A vacuum cleaner uses its built-in motor to drive a fan to generate negative pressure for dust removal. It does not cause dust to fly during operation and can absorb and remove dust in gaps and on carpets which are generally difficult to clean. It is easy to use and simple to operate, and is widely used in homes and public places.

[0004] As people's living standards increasingly improve, their awareness of environmental protection is also gradually increasing. In addition to effective dust absorption functions, people's requirements for vacuum cleaners also take into account comprehensive factors such as service life, noise, and dust collection efficiency. Thus, a vacuum cleaner with a cyclone separation device came into being and has been widely recognized by people.

[0005] The cyclone vacuum cleaner is a cleaning device that uses centrifugal force generated by rotating airflow to separate dust in the air. A common cyclone vacuum cleaner on the market is composed of two cyclone units connected in series, wherein larger dirt in the air is separated from a first-stage cyclone unit, and smaller particles are separated from the second-stage cyclone unit. The Chinese patent application for invention with the publication number CN101862165A discloses a cyclone separation device, a cyclone body of which in a second-stage cyclone unit adopts a double-inlet air intake method to improve or suppress the vortex core deformation of the airflow in the cyclone body, thereby improving the separation efficiency of the cyclone cylinder. However, its disadvantage is as follows. As shown in Fig. 1, all cyclone cylinders in the second-stage cyclone unit have at least two air inlets. A part of the airflow enters each first air inlet 21a from the side through an airflow channel 3, and another part of the airflow is introduced into each second air inlet 21b through a diversion channel 502. In order to ensure that the positions of the two air inlets in the cyclone cylinders are distributed with a phase difference of 180 degrees with respect to the rotation axes of the cyclone cylinders, the airflow channel 3 and the diversion channel 502 occupy a considerable space in the second cyclone separation unit, which affects the arrangement and structural size of the cyclone cylinders and is disadvantageous for maximizing the use of space. Next, with such an airflow channel design, because adjacent airflow channels have substantially the same wind speed, the forces on both ends of the dirt are substantially the same. When blocked by the cyclone cylinders, the dirt cannot escape, causing dust, such as hair, strips of dirt, etc., to accumulate on the outer walls of the cyclone cylinders near the adjacent airflows channels, thereby affecting the subsequent cleaning effect.

[0006] Summary of the Invention

[0007] The technical problem to be solved by the present utility model is to provide a cyclone separation device in view of the shortcomings in the prior art, which changes the direction of the

airflow, increases the cross-sectional area of the air inlets on the cyclone cylinders, and evenly distributes the airflow entering the cyclone cylinders, thereby improving the separation efficiency.

[0008] The present utility model further provides a cyclone vacuum cleaner equipped with the above-mentioned cyclone separation device, which can increase the overall separation efficiency and improve the air purification effect.

[0009] The technical problem to be solved by the present utility model is achieved by the following technical solution:

[0010] The present utility model further provides a cyclone separation device, comprising a first cyclone separation unit and a second cyclone separation unit, wherein the first cyclone separation unit comprises a dust bucket 10 with a tangential air inlet 10a and a mesh filter 7 with air holes 7a;

[0011] An airflow enters the first cyclone separation unit from the tangential air inlet 10a for first gas-solid separation, and the airflow after the first gas-solid separation enters the second cyclone separation unit through the air holes 7a;

[0012] The second cyclone separation unit comprises a separator 3 and a connecting bucket 5, the separator 3 comprises a plurality of cyclone cylinders 31, upper and lower ends of each cyclone cylinder 31 are open, and the side wall of each cyclone cylinder is provided with a first air inlet 31a and a second air inlet 31b; the airflow after the first gas-solid separation comprises a first airflow 41a and a second airflow 41b, the first airflow 41a enters each first air inlet 31a through a first airflow channel, and the second airflow 41b enters each second air inlet 31b through gaps between the outer walls of the plurality of cyclone cylinders 31 in a second airflow channel; the first airflow 41a and the second airflow 41b are subjected to second gas-solid separation in the cyclone cylinders 31, and the airflow after the second gas-solid separation flows to opening at the upper ends of the cyclone cylinders 31.

[0013] The first air inlets 31a and the second air inlets 31b are symmetrically distributed on the side walls of the cyclone cylinders 31.

[0014] A connecting bucket sealing cover 4 is provided below the separator 3, circular holes are provided in the connecting bucket sealing cover 4, and the number of circular holes in the connecting bucket sealing cover 4 is the same as the number of cyclone cylinders 31.

[0015] The diameter of the circular hole in the connecting bucket sealing cover 4 is greater than or equal to the diameter of the lower end of the cyclone cylinder 31 and smaller than the diameter of the upper end of the cyclone cylinder 31, and the cyclone cylinder 31 is connected to the connecting bucket 5 by means of the circular hole of the connecting bucket sealing cover 4.

[0016] The connecting bucket sealing cover 4 and the connecting bucket 5 are sealedly connected.

[0017] Both the first airflow channel and the second airflow channel comprise a gap between the inner wall of the mesh filter 7 and the outer wall of the connecting bucket 5.

[0018] The cyclone separation device comprises a conical hole cover 1, and the conical hole cover 1 is located above the dust bucket 10; and the first airflow channel further comprises gaps between the outer wall of the separator 3, the inner wall of the conical hole cover 1, and the inner wall of the mesh filter 7.

[0019] The second airflow channel comprises gaps between the outer walls of the plurality of cyclone cylinders 31.

[0020] The second airflow channel further comprises a groove 301 provided on the outer wall of the separator 3, and the second airflow 41b enters gaps between the outer walls of the plurality of cyclone cylinders 31 through the groove 301.

[0021] The air holes 7a are a plurality of through holes provided on the mesh filter 7.

[0022] The first air inlet 31a and the second air inlet 31b have the same cross-sectional area.

[0023] There are 6 to 12 cyclone cylinders 31, and the cyclone cylinders 31 are evenly arranged around a central axis of the separator 3.

[0024] Preferably, there are eight cyclone cylinders 31.

[0025] The opening of the first air inlet 31a of the cyclone cylinder 31 faces the outside of the separator 3, and the opening of the second air inlet 31b of the cyclone cylinder 31 faces the inside of the separator 3.

[0026] Preferably, the cyclone separation device is further provided with a central cyclone cylinder 32, the central cyclone cylinder 32 is provided at a central position of the separator 3, two air inlets 32a are provided on the side wall of the central cyclone cylinder 32, and the second airflow 41b enters the two air inlets 32a through the second airflow channel.

[0027] An included angle between an axis of the cyclone cylinder 31 and an axis of the cyclone separation device is 6° to 12° .

[0028] Preferably, the included angle between the axis of the cyclone cylinder 31 and the axis of the cyclone separation device is 8° .

[0029] The cyclone vacuum cleaner of the present utility model is a cyclone vacuum cleaner comprising a vacuum cleaner body and a suction head, wherein the cyclone separation device described above is provided in the vacuum cleaner body.

[0030] Compared with the prior art, the present utility model has the following beneficial effects:

[0031] The cyclone separation device of the present utility model has a simple structure. The airflow entering the second-stage cyclone separation unit is evenly distributed into each cyclone cylinder. When the cross-sectional area of the cyclone cylinders is constant, the cross-sectional area of the two air inlets of the cyclone cylinders can be expanded. The cyclone vacuum cleaner equipped with the cyclone separation further improves the overall efficiency of the vacuum cleaner, thereby reducing dust accumulation outside the cyclone cylinders and improving the air purification effect.

Brief Description of the Drawings

[0032] Fig. 1 is a top view of a cyclone separation device for a cyclone vacuum cleaner in the prior art;

[0033] Fig. 2 is a 3D exploded view of a specific structure of a cyclone separation device according to Embodiment 1 of the present utility model;

[0034] Fig. 3 is a schematic structural view of the cyclone separation device according to Embodiment 1 of the present utility model;

[0035] Fig. 4 is a top view of a separator in the cyclone separation device according to Embodiment 1 of the present utility model;

[0036] Fig. 5 is a partial schematic view of a separator of an embodiment of the cyclone separation device according to Embodiment 1 of the present utility model;

[0037] Fig. 6 is a schematic structural view of a separator in a cyclone separation device according to Embodiment 2 of the present utility model;

[0038] Fig. 7 is a perspective view of a vertical cyclone vacuum cleaner of the present utility model; and

[0039] Fig. 8 is a perspective view of a horizontal cyclone vacuum cleaner of the present utility model.

[0040] Reference signs:

[0041] 1. Conical hole cover 2. Separator sealing ring 3. Separator

[0042] 31. Cyclone cylinder 301. Groove 31a. First air inlet

[0043] 31b. Second air inlet 32. Central cyclone cylinder 32a. Air inlet

[0044] 41a. First airflow 41b. Second airflow 4. Connecting bucket sealing cover

[0045] 5. Connecting bucket 6. Connecting bucket bottom cover sealing ring 7. Mesh filter

[0046] 7a. Air hole 8. Dust bucket sealing ring 9. Dust blocking ring

[0047] 10. Dust bucket 10a. Tangential air inlet 11. Dust bucket bottom cover sealing ring

[0048] 12. Dust bucket bottom cover 13. Filter pad 13a. Airflow diversion channel

[0049] 14. Dust bucket cover sealing ring 15. Safety valve 16. Dust bucket cover

[0050] 17. Handle cover 18. Elastic component 19. Dust bucket release button

[0051] 100. Vertical cyclone vacuum cleaner 200. Horizontal cyclone vacuum cleaner 101, 201. Vacuum cleaner body

[0052] 102, 202. Cyclone separation device 130, 230. Suction head 25. Annular diversion channel

[0053] 502. Diversion channel 21a. First air inlet 21b. Second air inlet

Detailed Description of the Preferred Embodiments

[0054] Embodiment 1

[0055] As shown in Figs. 2 and 3, the cyclone separation device of the present utility model includes a first cyclone unit and a second cyclone separation unit. The first cyclone unit includes a dust bucket 10 and a mesh filter 7. The dust bucket 10 is provided with a tangential air inlet 10a. The dust bucket 10 is used for gas-solid separation between gas and dirt such as particles, and its bottom is used to collect dirt. The mesh filter 7 is provided with air holes 7a. The air holes 7a are a plurality of through holes provided on the mesh filter 7. The second cyclone separation unit is located downstream of the first cyclone separation unit. It includes a separator 3 and a connecting bucket 5. The separator 3 filters small particles of dirt. The separator 3 includes a plurality of cyclone cylinders 31. Both upper and lower ends of each cyclone cylinder 31 are open, and two tangential air inlets are provided on the side wall of each cyclone cylinder 31. Specifically, the two air inlets may be distributed with a phase difference of 180 degrees along the rotation axis of the

cyclone cylinder. To make the layout of the cyclone cylinders 31 compact, a certain included angle is set between an axis of the cyclone cylinder 31 and an axis of the cyclone separation device, and the included angle range is generally 6° to 12° . In this embodiment, the included angle between the two is 8° . To improve the separation effect of the second airflow, the two air inlets on the side wall of the cyclone cylinder 31 are symmetrically distributed. A connecting bucket sealing cover 4 is provided below the separator 3. The connecting bucket sealing cover 4 is provided with circular holes. The number of circular holes is the same as the number of cyclone cylinders 31. The diameter of the circular hole is larger than the diameter of the lower end opening of the cyclone cylinder 31 and smaller than the diameter of the upper end opening of the cyclone cylinder 31. The cyclone cylinder 31 passes through the circular hole of the connecting bucket sealing cover 4 so that the cyclone cylinder 31 partially extends into the connecting bucket 5 and is connected to the connecting bucket 5 by means of the circular hole of the connecting bucket sealing cover 4. In addition to this method, the diameter of the circular hole provided in the connecting bucket sealing cover 4 may also be equal to the diameter of the lower end opening of the cyclone cylinder 31 and smaller than the diameter of the upper end opening of the cyclone cylinder 31. The cyclone cylinder 31 is provided on the connecting bucket 5, and its lower end opening corresponds to the circular hole of the connecting bucket sealing cover 4. The cyclone cylinder 31 is connected to the connecting bucket 5 by means of the circular hole of the connecting bucket sealing cover 4. The connecting bucket sealing cover 4 and the connecting bucket 5 are sealedly connected.

[0056] Fig. 4 is a top view of the separator in the cyclone separation device. As shown in Fig. 4, the separator 3 is arranged such that a plurality of cyclone cylinders 31 are provided around the outside. The number of cyclone cylinders may be 6 to 12. In this embodiment, there are 8 cyclone cylinders 31 which are evenly and closely arranged around the central axis of the separator 3. The side wall of the cyclone cylinder 31 is provided with two air inlets, which are a first air inlet 31a and a second air inlet 31b, respectively. The opening of the first air inlet 31a faces the outside of the separator 3, and the opening of the second air inlet 31b faces the inside of the separator 3. The first air inlet 31a and the second air inlet 31b are symmetrically distributed, and the two air inlets have the same height and cross-sectional area. The heights of the first air inlets 31a of the plurality of cyclone cylinders 31 are the same height, and the heights of the second air inlets 32a of the plurality of cyclone cylinders 31 are the same height.

[0057] To more effectively improve the cyclone separation effect, as shown in Fig. 4, a central cyclone cylinder 32 is further provided in the middle of the separator 3. The central cyclone cylinder 32 is provided at the central position of the separator 3. Two air inlets 32a are provided on the side wall of the central cyclone cylinder 32, and the two air inlets 32a have the same height. At the same time, a circular hole is correspondingly provided at the central position of the connecting bucket sealing cover 4 so that the number of circular holes on the connecting bucket sealing cover 4 corresponds to the total number of the cyclone cylinder 31 and the central cyclone cylinder 32 provided on the separator 3.

[0058] The working process of the cyclone separation device will be further described below with reference to the accompanying drawings.

[0059] As shown in Figs. 3 and 5, an airflow carrying dust, particles, and other dirt enters the dust bucket 10 along a tangential opening 10a on the dust bucket 10. The airflow rotates in the dust bucket 10 for first gas-solid separation in which large particles of dirt and some dust are separated from the airflow by means of centrifugal force. Further, a dust blocking ring 9 is provided on the mesh filter 7. The dust blocking ring 9 effectively prevents secondary dust from being blown up, thereby preventing the secondary dust from clogging the air holes 7a provided in the mesh filter 7. The dirt after the gas-solid separation falls into the bottom of the dust bucket 10. To ensure the separation efficiency of the cyclone separation device, the cyclone separation device is provided with different sealing rings at different positions, such as a dust bucket bottom cover sealing ring 11 provided between the dust bucket 10 and a dust bucket bottom cover 12, which effectively prevents air leakage and dust leakage; and a dust bucket sealing ring 8 provided between the dust bucket 10 and the mesh filter 7, which effectively prevents the airflow located in the dust bucket 10 from directly entering the separator 3 without passing through the air holes 7a of the mesh filter. The airflow from the first gas-solid separation enters the second separation unit through the air holes 7a in the mesh filter 7 and moves upward along the outer wall of the connecting bucket 5.

[0060] The airflow after the first separation includes a first airflow 41a and a second airflow 41b. The first airflow 41a enters the first air inlet 31a through a first airflow channel, and the second airflow 41b enters the second air inlet 31b through a second airflow channel, the process of which is as follows.

[0061] The first airflow 41a moves upward through the gap between the inner wall of the mesh filter 7 and the outer wall of the connecting bucket 5, reaches the upper end opening of the connecting bucket 5, then moves upward along gaps located between the outer wall of the separator 3, the inner wall of a conical hole cover 1 and the inner wall of the mesh filter 7, and directly enters the cyclone cylinder 31 from the first air inlet 31a. The first airflow channel includes a gap between the outer wall of the connecting bucket 5 and the inner wall of the mesh filter 7 and gaps between the outer wall of the separator 3, the inner wall of the conical hole cover 1, and the inner wall of the mesh filter 7. The second airflow 41b moves upward through the gap between the inner wall of the mesh filter 7 and the outer wall of the connecting bucket 5, reaches the upper end opening of the connecting bucket 5, and enters gaps between the outer walls of the cyclone cylinders 31 through the groove 301 on the outer wall of the separator 3. At this time, the airflow moves upward along the gaps between the outer walls of the cyclone cylinders 31, thereby entering the second air inlets 31b of the cyclone cylinders 31. The second airflow channel includes the gap between the outer wall of the connecting bucket 5 and the inner wall of the filter 7 and the gaps between the groove 301 on the outer surface of the separator 3 and the outer walls of the cyclone cylinders 31. The first airflow 41a and the second airflow 41b entering from the first air inlet 31a and the second air inlet 31b merge in the cyclone cylinder 31. The merged airflow is separated by means of centrifugal force, and the separated dirt falls into the connecting bucket 5 through the lower end opening of the cyclone cylinder 31, and the airflow after the second gas-solid separation is discharged through the upper end opening of the cyclone cylinder 31. A separator sealing ring 2

located on the separator 3 seals the upper end of the separator 3 and the conical hole cover 1 to effectively prevent air leakage. The filter pad 13 is located between the conical hole cover 1 and a dust bucket cover 16 and is used to filter the airflow after the second separation of the cyclone cylinder 31 and further filter the mixed fine dust to ensure that the discharged airflow is clean. The dust bucket cover sealing ring 14 is provided between the dust bucket cover 16 and the conical hole cover 1 for sealing, effectively preventing air leakage. The dust bucket cover is provided with a safety valve 15, an operating dust bucket release button 19, and an elastic component 18. If the cyclone separation device is clogged, the safety valve 15 bounces up, which can prevent the motor temperature from being too high and effectively protect the motor, the operating dust bucket release button 19 can easily remove and install the dust bucket 10 from the cyclone separation device, and the elastic component 18 ensures that the dust bucket release button 19 is reset after the operation is completed.

[0062] Embodiment 2

[0063] Fig. 6 is a schematic structural view of a separator in a cyclone separation device according to Embodiment 2 of the present utility model. As shown in Fig. 6, the only difference between Embodiment 2 and Embodiment 1 is that a separator 3 in Embodiment 2 is surrounded by a plurality of cyclone cylinders 31, and the outer surfaces of the plurality of cyclone cylinders 31 do not include outer walls with grooves. This separator 3 is placed on a connecting bucket that has a connecting bucket sealing cover the installed. There is a gap between the separator 3 and a connecting bucket.

[0064] In this cyclone separation device, after passing through a first-stage cyclone separation unit for gas-solid separation, a separated airflow enters a second-stage cyclone separation unit. The airflow after the first separation is divided into a first airflow and a second airflow. The way the first airflow travels is the same as in Embodiment 1, that is: the first airflow passes through the gap between the inner wall of a mesh filter and the outer wall of the connecting bucket, the gaps of the filter and the gaps between the outer wall of the filter, the inner wall of the conical hole cover and the inner wall of a mesh filter. The second airflow passes through the gap between the inner wall of the mesh filter and the connecting bucket, and directly enters the second air inlet through the gaps between the outer walls of the cyclone cylinders.

[0065] In this embodiment, by reducing the grooves provided on the separator in Embodiment 1, the airflow channel of the second airflow is designed to be more concise, and, at the same time, the same function and effect are achieved by material reduction and cost reduction.

[0066] In short, in the present utility model, a part of the air inlet channel is provided in the gaps between the cyclone cylinders 31, which can make the second cyclone separation unit have more available space to increase the cross-sectional area of the air inlets of the cyclone cylinders 31, further improving the air purification efficiency.

[0067] Fig. 7 is a perspective view of a vertical cyclone vacuum cleaner of the present utility model. As shown in Fig. 7, the vertical cyclone vacuum cleaner 100 includes a vacuum cleaner body 101 and a suction head 130. The vacuum cleaner body 101 is provided with an electric fan unit (not shown in the figure). The electric fan unit acts as a cyclone generator for generating

suction force. The suction head 130 is in communication with the vacuum cleaner body 101 and is used for sucking in air carrying dust from a surface to be cleaned. The vertical cyclone vacuum cleaner 100 includes a cyclone separation device 102. The cyclone separation device 102 is installed on the vacuum cleaner body 101. It is in communication with the vacuum cleaner body 101 and the suction head 130 and is used for achieving gas-solid separation. The clean airflow is released into the atmosphere through an outlet of the electric fan unit. When the vacuum cleaner body 101 is filled with dust particles, a user can take out the cyclone separation device 102 from the vacuum cleaner body to achieve a dust dumping function.

[0068] Fig. 8 is a perspective view of a horizontal cyclone vacuum cleaner of the present utility model. As shown in Fig. 8, the horizontal cyclone vacuum cleaner 200 includes a vacuum cleaner body 201 and a suction head 230. The vacuum cleaner body 201 is provided with an electric fan unit (not shown in the figure). The electric fan unit acts as a cyclone generator for generating suction force. The suction head 230 is in communication with the vacuum cleaner body 201 and is used for sucking dust and air from a surface to be cleaned. The horizontal cyclone vacuum cleaner 200 includes a cyclone separation device 202. The cyclone separation device 202 is installed on the vacuum cleaner body 201. It is in communication with the vacuum cleaner body 201 and the suction head 230 and is used for achieving gas-solid separation. The clean airflow is released into the atmosphere through the outlet of the electric fan unit.

[0069] The protection of the present utility model is not limited to the specific structural layout described in the embodiments listed in the detailed description. Obviously, within the protection scope of the claims of the present utility model, there may also be many different variants and structural combinations.

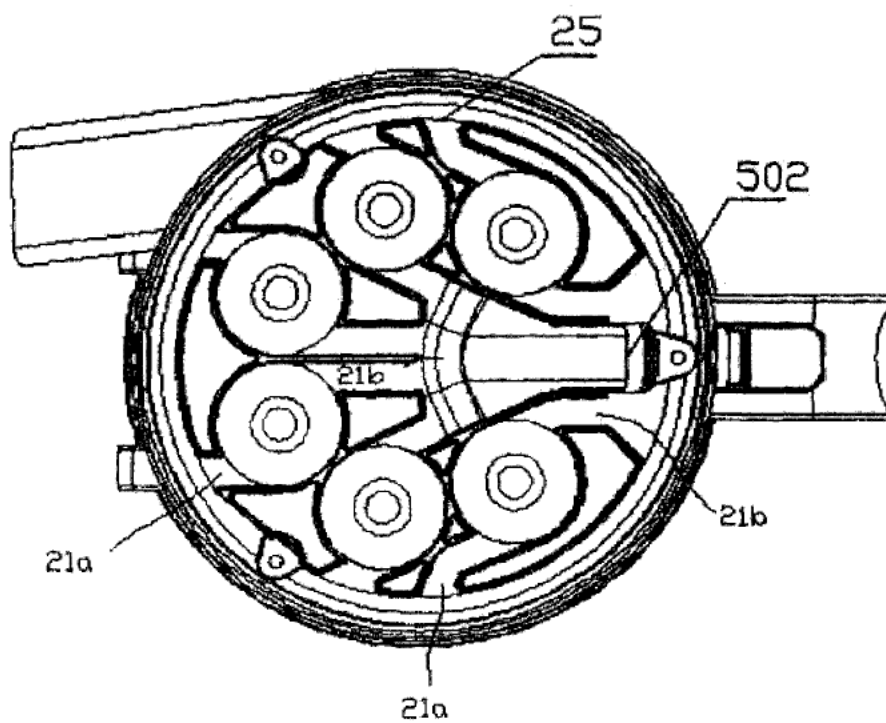


Fig. 1

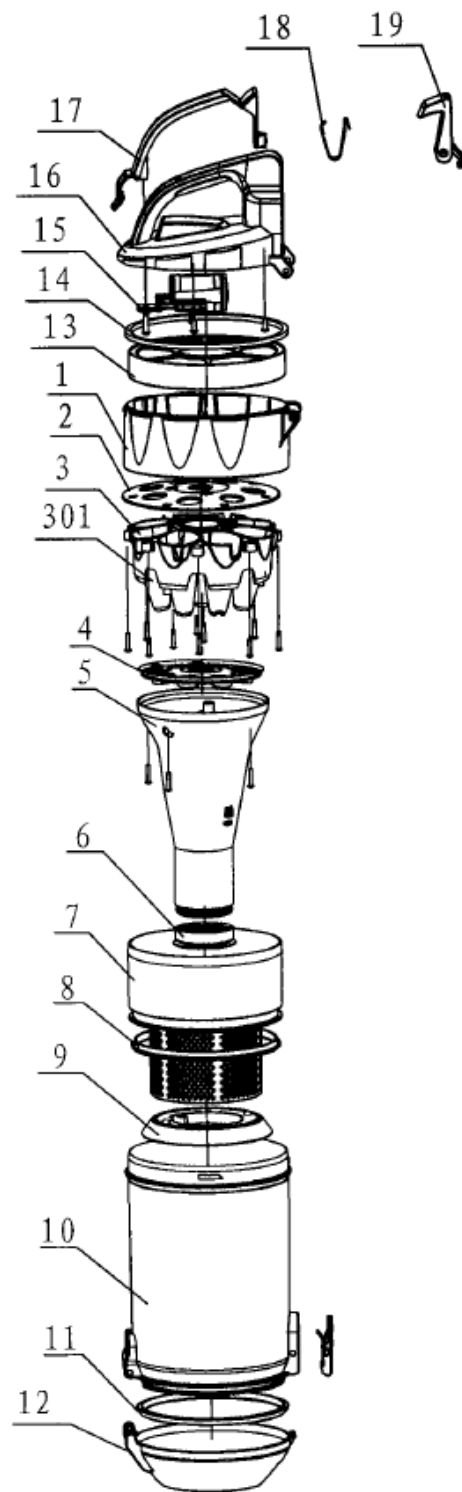


Fig. 2

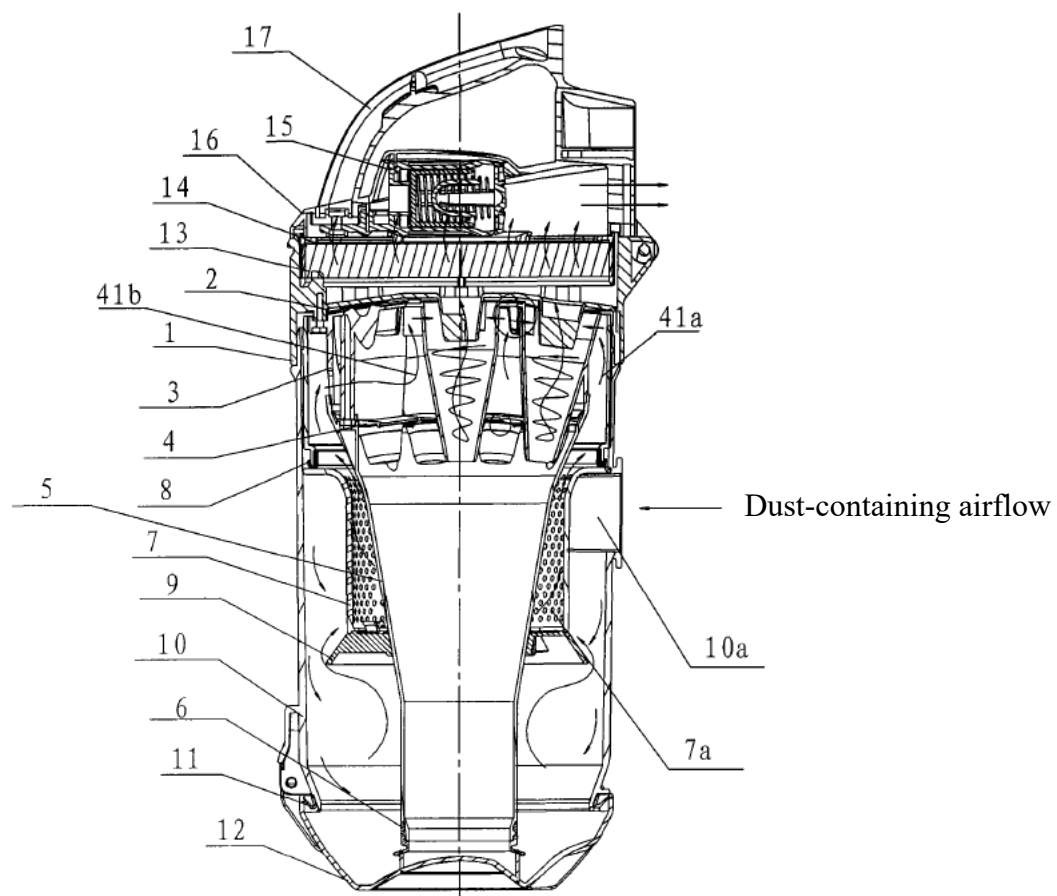


Fig. 3

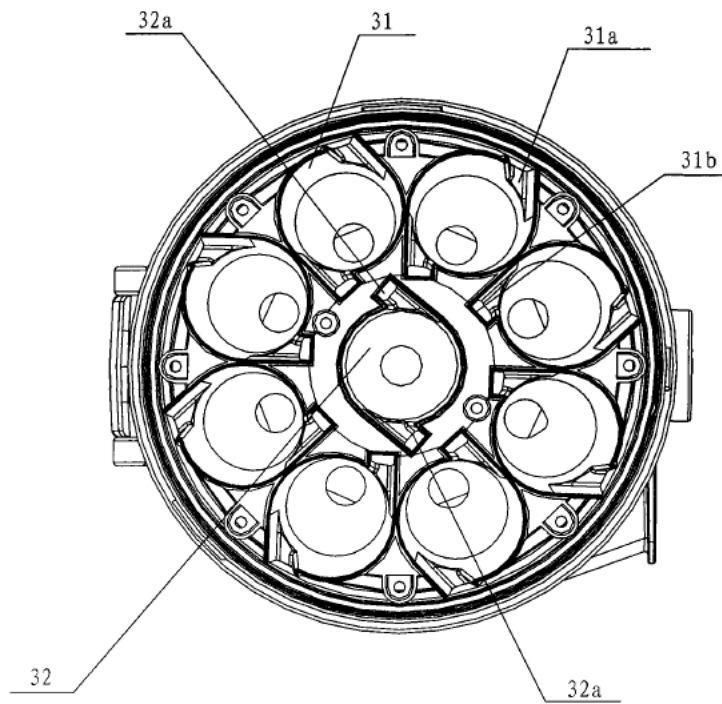


Fig. 4

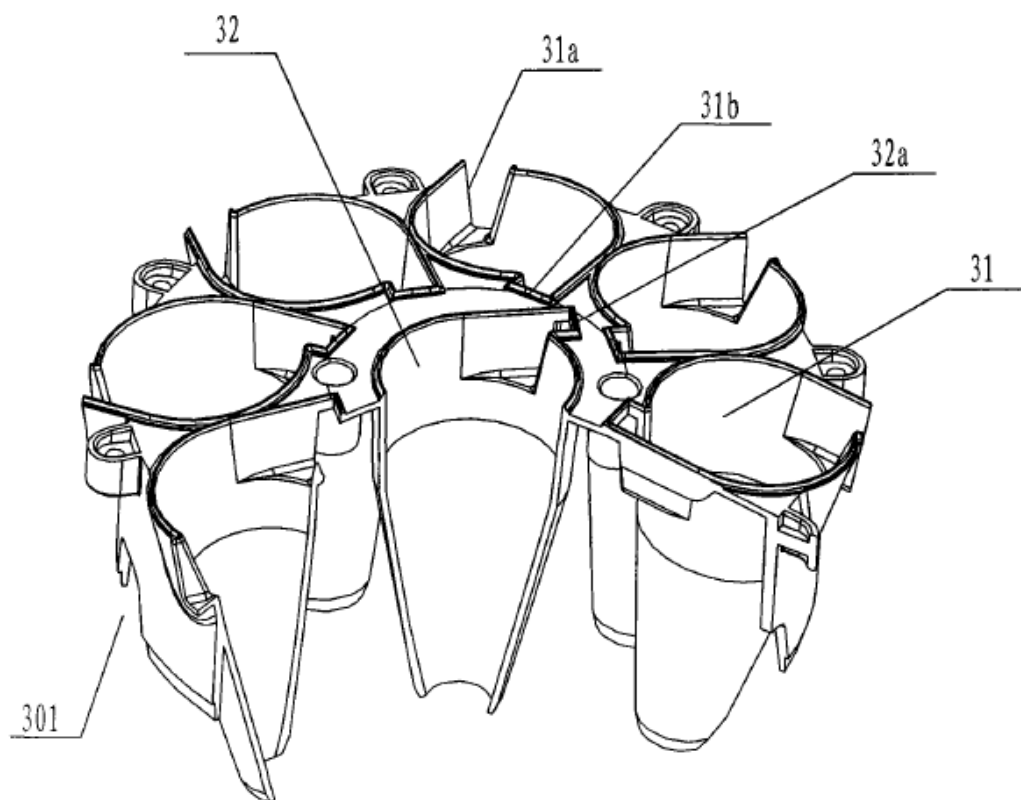


Fig. 5

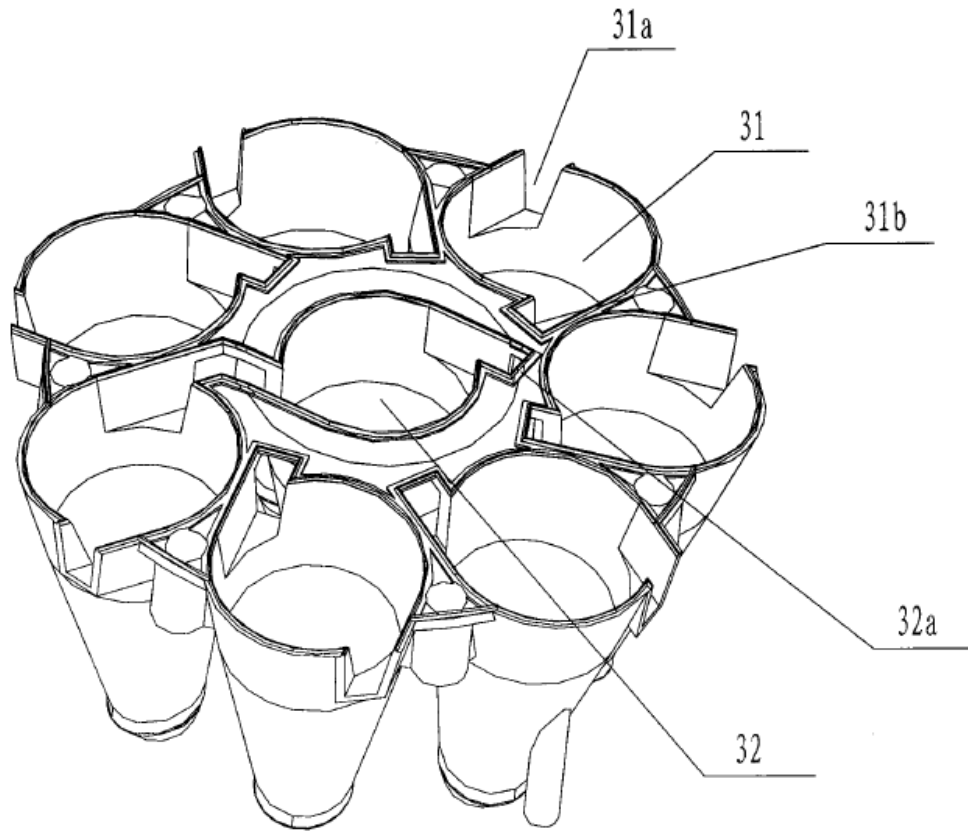


Fig. 6

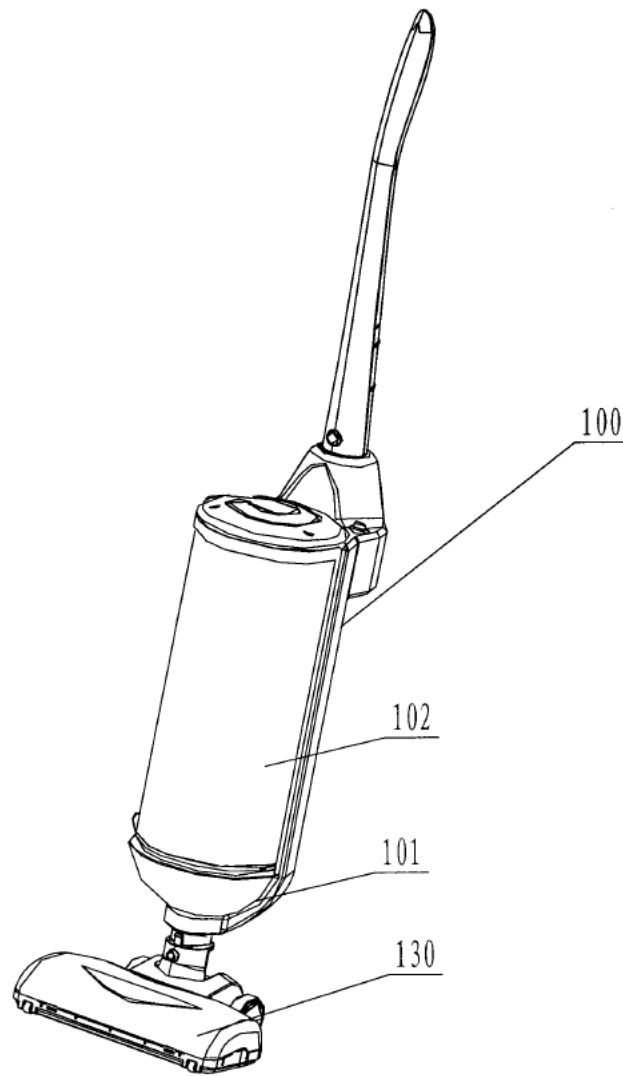


Fig. 7

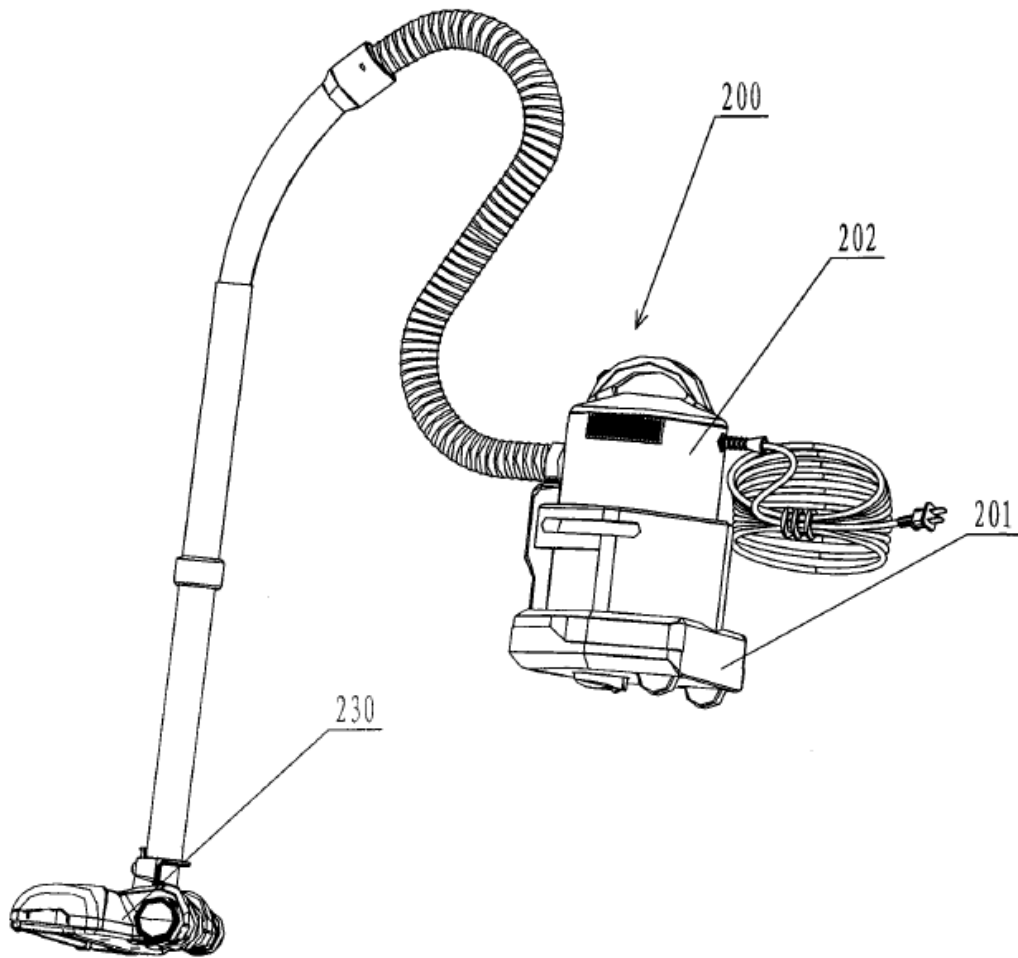


Fig. 8

TRANSLATOR CERTIFICATION

Date: December 9, 2023

To whom it may concern:

I, FANG CHEN, a translator fluent in the Chinese and English languages, on behalf of Morningside Translations, do solemnly and sincerely declare that the following is, to the best of my knowledge and belief, a true and correct translation of the document(s) listed below in a form that best reflects the intention and meaning of the original text.

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