

COLLECTING DEVICE AND VACUUM CLEANER HAVING THE SAME

TECHNICAL FIELD OF THE INVENTION

[0001] The present application relates to a dust-removal technical field, particular to
5 a collecting device. The present application also relates to a vacuum cleaner including
the above collecting device.

BACKGROUND OF THE INVENTION

[0002] With the rapid development of the economic construction, the environmental
requirement becomes higher and higher. Various vacuum cleaners were developed.
10 The vacuum cleaner generally utilizes the high-speed rotation of an electrical motor to
generate negative air pressure in a sealed casing to suck dust and debris. A portable
vacuum cleaner, as a kind of the vacuum cleaners, is favored by users because it is
portable and small and can be used in the small space.

[0003] Referring to Fig. 1, Fig. 1 is a schematic view of the structure of a collecting
15 device of a typical vacuum cleaner in the prior art; and a direction indicated by the
arrow in the figure is the moving direction of the dust when the vacuum cleaner is
working.

[0004] As shown by the direction indicated by the arrow in the figure, in the vacuum
cleaner in the prior art, a power motor is communicated to a filter 11 to extract the air
20 in a dust-collecting chamber 12 and to form negative pressure in the dust-collecting
chamber 12, such that under the action of the power motor the air and the dust passes
through a dust-suction tube 13 and a air channel to enter into the dust-collecting
chamber 12 and rotate around the filter 11, and then are gathered in the dust-collecting
chamber 12 in a spiral trend, thereby realizing the dust-removal object.

25 [0005] However, with the increase of the dust, the dust collected in the
dust-collecting chamber 12 is easy to be influenced by the power motor and tends to
move toward the filter 11 such that the dust is adhered onto the filter 11 and blocks a

filtering screen of the filter 11. In this way, the power consumption of the power motor is increased, the noise of the vacuum cleaner is increased, and the working efficiency of the vacuum cleaner is reduced. Furthermore, the service life of the filter 11 is affected, the maintenance frequency of the filter 11 is increased and the cleaning cost is increased.

[0006] Referring to Figs 2 and 3, Fig. 2 is a schematic view of the structure of a collecting device in the prior art; Fig. 3 is a schematic view of the working state of the collecting device as shown in Fig. 2; wherein a direction indicated by the solid arrow is a direction of the power generated by the power component, a direction indicated by the dotted arrow is a direction of the moving direction of the dust.

[0007] In a Chinese Patent Application No. ZL201020289589.9, the inventor modifies a channel leading into the dust-collecting chamber 12 to a spiral air channel such that after the dust entered into the dust-collecting chamber 12, a spiral air as shown in Fig. 3 is formed around the filter 11 to move the dust as far as possible to an end portion of the dust-collecting chamber 12 and to keep the dust far away from the filter 11, thus the service life of the filter 11 is prolonged, the noise and the power consumption of the vacuum cleaner are reduced, and the dust-removal cost is reduced.

[0008] However, in some occasions having more dust, it is difficult for the collecting device as shown in Figs. 2 and 3 to satisfy the dust-removal requirement which affects the applicability of the vacuum cleaner.

[0009] Therefore, a technical problem to be solved by those skilled in the art is to improve the working efficiency of the vacuum cleaner and improve the applicability of the collecting device while prolonging the service life of the filter.

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SUMMARY OF THE INVENTION

[0010] The object of the present application is to provide a collecting device which may effectively prolong the service life of filters and also improve the applicability of the collecting device. The present application further provides a vacuum cleaner

including the above collecting device, whose working efficiency is improved.

[0011] For realizing the above objects, the present application provides a collecting device including a dust-suction tube, a first air-intake channel, a first dust-collecting chamber and a first filter provided inside the first dust-collecting chamber. The
5 collecting device further includes a second filter provided inside the first filter, a second air-intake channel communicating the first filter with the second filter, and an air baffle radially isolating the first filter from the second filter. A second dust-collecting chamber is provided in a top end of the first filter, airflow sequentially passes through the dust-suction tube, the first air-intake channel, the first filter, the
10 second air-intake channel, the second dust-collecting chamber and the second filter in turn, and at least one of the first air-intake channel and the second air-intake channel is of a spiral structure extending axially.

[0012] Preferably, there are at least two second filters which are uniformly distributed in the first filter.

15 **[0013]** Preferably, each second filter corresponds to a corresponding air baffle, and there are at least two second filters and at least two air baffles which are uniformly distributed in the first filter.

[0014] Preferably, a sealing plate is fixedly connected to a top end of the air baffle, at least one of the air baffle and the sealing plate is provided with an obliquely cut
20 ventilation opening communicating the first filter with the second filter, and a start point and an end point of any one of obliquely cut ventilation openings isolate the first filter from the second filter along the radial direction or the axial direction.

[0015] Preferably, there are multiple obliquely cut ventilation openings which are uniformly distributed along a circumferential direction of the air baffle; and the
25 sealing plate is provided with a centre recess depressing towards a bottom end thereof.

[0016] Preferably, both of the first air-intake channel and the second air-intake channel are of a spiral structure extending axially.

[0017] Preferably, there are at least two second air-intake channels, each of which encircles a bottom end of the second filter, and inlets of the second air-intake channels

are uniformly distributed along a circumferential direction of the second filter.

[0018] Preferably, the collecting device further includes a tapered air guide cover provided in the top end of the first filter, and an outlet of the tapered air guide cover is communicated with the second dust-collecting chamber.

- 5 [0019] The present application further provides a vacuum cleaner including a power component, and further including any one of the collecting devices described above, wherein air passes through the collecting device and then enters into the power component.

[0020] Preferably, the vacuum cleaner is a portable vacuum cleaner.

- 10 [0021] The collecting device provided by the present application is provided with the dust-suction tube, the first air-intake channel, the first dust-collecting chamber, the first filter, the second air-intake channel, the second dust-collecting chamber and the second filter along the airflow direction when the collecting device is working. The power component generates negative pressure in the second filter such that the
- 15 sundries needed to be cleaned up like the dust are brought into the collecting device along the dust-suction tube, and enter into the first air-intake channel. After being gathered in the first dust-collecting chamber, part of the sundries are filtered by the first filter along with the airflow and are stored in the first dust-collecting chamber. Small particles in the other part of the sundries enter into the second air-intake
- 20 channel and the second dust-collecting chamber along the airflow and are gathered in the second dust-collecting chamber. By the filtration of the second filter, it is ensured that the airflow entering into the power component is clean and free of impurities such that the service life of the power component is prolonged. The air baffle is provided between the first filter and the second filter such that the air flowed from the first filter
- 25 cannot enter into the second filter along the radial direction but can enter into the second air-intake channel and the second dust-collecting chamber in the axial direction and then enter into the second filter. Moreover, at least one of the first air-intake channel and the second air-intake channel is of a spiral structure such that after entered into the air channel through the dust-suction tube, the dust is moved
- 30 gradually upwardly along the spiral air channel, and after moving out from the first

air-intake channel and/or the second air-intake channel, under the inertia of the high-speed rotation the dust may continue to move along the spiral path in the first dust-collecting chamber and/or the second dust-collecting chamber and has a trend of gradually moving away from a tail end of the air channel so as to be away from the filters. Therefore, the possibility that the dust is adhered onto the filters is reduced, the object for prolonging the service life of the filters and the object for reducing the maintenance frequency of the filters are realized, and the cleaning cost is reduced. In addition, the filters keeping in the clean state for a long time may reduce the power consumption of the vacuum cleaner, lower the noise of the vacuum cleaner and improve the working efficiency of the vacuum cleaner. Further, providing the second filter inside the first filter may further improve the cleaning efficiency of the dust, improve the cleanliness of the airflow, further prolong the service life of the filters, reduce the replacement frequency of the filters, reduce the maintenance cost of the collecting device significantly and improve the applicability of the collecting device.

[0022] In a preferred embodiment, there are at least two second filters which are uniformly distributed in the first filter. Under the circumstance that a volume of the first filter is constant, increased number of the second filters inside the first filter may increase the filtering area of the second filters to improve the filtering efficiency of the second filters so as to improve the dust-removal efficiency of the whole collecting device. Further, in addition to the improvement of the dust-removal efficiency, the volume of the whole collecting device is kept to be miniaturized, which can meet more dust-removal requirement and improve the applicability of the collecting device.

[0023] In another preferred embodiment, the sealing plate is fixedly connected to the top end of the air baffle, at least one of the sealing plate and the air baffle is provided with the obliquely cut ventilation opening communicating the first filter with the second filter, and the start point and the end point of any one of obliquely cut ventilation openings isolate the first filter from the second filter along the radial direction or the axial direction. The sealing plate may effectively prevent the airflow carrying dust from flowing back into the second filter through a top portion of the air baffle directly, reduce the load on the second filter and prolong the service life of the

second filter. Further, because both of the start point and the end point of the obliquely cut ventilation openings isolate the first filter from the second filter along the radial direction or the axial direction, the dust entered between the second filter and the air baffle through the second air-intake channel may be thrown into the second dust-collecting chamber via the obliquely cut ventilation openings, and the dust in the second dust-collecting chamber cannot enter into the second filter via the obliquely cut ventilation openings, which further reduces the load on the second filter and improves the dust-removal effect of the collecting device.

[0024] On the basis of the above collecting device, the present application further provides the vacuum cleaner including the above collecting device. Due to the fact that the collecting device has the above technical effects, the vacuum cleaner including the above collecting device also has the corresponding technical effects.

BRIEF DESCRIPTION OF DRAWINGS

[0025] Figure 1 is a schematic view of the structure of a collecting device of a typical vacuum cleaner in the prior art;

[0026] Figure 2 is a schematic view of the structure of another typical collecting device in the prior art;

[0027] Figure 3 is a schematic view of the working state of the collecting device as shown in Fig. 2;

[0028] Figure 4 is an exploded schematic view of the structure of a first embodiment of a collecting device according to the present application;

[0029] Figure 5 is a schematic view of the structure of a second embodiment of the collecting device according to the present application;

[0030] Figure 6 is an exploded schematic view of the collecting device as shown in Fig. 5;

[0031] Figure 7 is a schematic view of the structure of a third embodiment of the collecting device according to the present application;

[0032] Figure 8 is a schematic view of the structure of a fourth embodiment of the collecting device according to the present application;

[0033] Figure 9 is a exploded schematic view of one embodiment of a second filter and an air baffle according to the present application;

5 [0034] Figure 10 is a perspective schematic view of the structure of a first embodiment of an air baffle and a sealing plate according to the present application;

[0035] Figure 11 is a top view of the air baffle and the sealing plate as shown in Fig. 10;

10 [0036] Figure 12 is a perspective schematic view of the structure of a second embodiment of the air baffle and the sealing plate according to the present application;

[0037] Figure 13 is a perspective schematic view of the structure of a third embodiment of the air baffle and the sealing plate according to the present application;

15 [0038] Figure 14 is a exploded schematic view of the structure of one embodiment of the second filter and the air baffle according to the present application;

[0039] Figure 15 is a schematic view of the structure of a fifth embodiment of the collecting device according to the present application; and

20 [0040] Figure 16 is a schematic view of the structure of one embodiment of the second filter according to the present application.

DETAILED DESCRIPTION OF THE INVENTION

[0041] Spirit of the present application is to provide a collecting device which may effectively prolong the service life of the filter, reduce the frequency of the filter replacement, reduce the maintenance cost of the collecting device and also improve
25 the applicability of the collecting device. Another spirit of the present application is to provide a vacuum cleaner including the above collecting device whose working efficiency is improved.

[0042] Terms indicating “up” and “down” in the present application are defined on the basis that an opening of a dust-suction tube from which the dust enters is located at the highest point; axial direction described in the present application refers to a extending direction of the dust-suction tube and is defined on the basis of a height direction of a filter when an air channel rotates around the filter. It should be understood that, the terms indicating directions and positions in the present application should not limit the protection scope of the present application.

[0043] It should be noted that, the present application takes the vacuum cleaner as an example to illustrate the collecting device provided by the present application.

However, the applications of the collecting device provided by the present application include, but not limited to, the vacuum cleaner. The collecting device provided by the present application may be applied to some occasions having higher requirements on air cleanliness, for example an air cleaner, an air conditioning air-intake system, an automobile air-intake system and even an air-intake system of some large manufacturing plants. The spiral cyclone channel of the collecting device can gather more dust in the dust-collecting chamber, the design of multiple filters provided one inside another can significantly reduce the frequency of cleaning a filter screen, and the existing situation that the filter screen needs to be replaced frequently and the filter needs frequent maintenance are changed. For some occasions, even zero-maintenance can be realized which significantly reduce the maintenance cost of the collecting device.

[0044] For better understanding of the present technical solution for the person skilled in the art, the present application will be further described in detail in conjunction with drawings and embodiments as follows.

[0045] Referring to Fig. 4, Fig. 4 is an exploded schematic view of the structure of a first embodiment of a collecting device according to the present application.

[0046] The collecting device provided by the present application is provided with a dust-suction tube 21, a first air-intake channel (not shown in the figure, A is an inlet of the first air-intake channel), a first dust-collecting chamber 22, a first filter 23, a second air-intake channel (not shown in the figure, B is an inlet of the second

air-intake channel), a second dust-collecting chamber 24 and a second filter 25 along the airflow direction when the vacuum cleaner is working. The power component generates negative pressure in the second filter 25 such that the sundries needed to be cleaned such as the dust are brought into the collecting device along the dust-suction tube 21, and enter into the first air-intake channel. After being gathered in the first dust-collecting chamber 22, a part of the sundries are filtered by the first filter 23 along with the airflow and are stored in the first dust-collecting chamber 22. Small particles in the other part of the sundries enter into the second air-intake channel and the second dust-collecting chamber 24 along the airflow and are gathered in the second dust-collecting chamber 24. By the filtration of the second filter 25, it is ensured that the airflow entering into the power component is clean and free of impurities such that the service life of the power component is prolonged. An air baffle 26 is provided between the first filter 23 and the second filter 25 such that the air flowed out from the first filter 23 cannot enter into the second filter 25 along the radial direction, but can enter into the second air-intake channel and the second dust-collecting chamber 24 along the axial direction and then enter into the second filter 25.

[0047] At least one of the first air-intake channel and the second air-intake channel is of a spiral structure. In this way, after the dust enters into the air channel through the dust-suction tube 21, the dust is moved gradually upwardly along the spiral air channel, and after the dust is moved out from the first air-intake channel and/or the second air-intake channel, under the inertia of the high-speed rotation the dust may continue to move along the spiral path in the first dust-collecting chamber 22 and/or the second dust-collecting chamber 24 and has a trend of gradually moving away from an tail end of the air channel so as to be away from the filters. Thus, the possibility that the dust is adhered onto the filters is lowered, the object for prolonging the service life of the filters and the object for reducing the maintenance frequency of the filters are realized, and the cleaning cost is reduced. Furthermore, the filters keeping in the clean state for a long time may reduce the power consumption of the vacuum cleaner, lower the noise of the vacuum cleaner and improve the working efficiency of

the vacuum cleaner. In the meanwhile, providing the second filter 25 inside the first filter 23 may further improve the cleaning efficiency of the dust, improve the cleanliness of the airflow, further prolong the service life of the filters, reduce the replacement frequency of the filters, reduce the maintenance cost of the collecting device significantly and improve the applicability of the collecting device.

[0048] Further, the collecting device provided by the present application may also include a third filter whose structure is similar to the second filter 25. The third filter is provided inside the second filter 25. The second filter 25 and the third filter are communicated through a third air-intake channel which also may be of a spiral structure. In the meanwhile, a radial isolation air baffle is provided between the second filter 25 and the third filter; a third dust-collecting chamber is provided in a top end of the second filter 25. The airflow may flow through the dust-suction tube 21, the second air-intake channel, the second filter 25, the third air-intake channel, the third dust-collecting chamber and the third filter sequentially, and then enter into the power component. In this way, the air entered into the power component is filtered by three layers of filters, and thus has a higher cleanliness.

[0049] Refer to Figs. 5 and 6, Fig. 5 a schematic view of the structure of a second embodiment of the collecting device according to the present application, in which the direction indicated by the arrows is the flowing direction of the airflow; Fig. 6 is an exploded schematic view of the collecting device as shown in Fig. 5.

[0050] In the second embodiment, the collecting device provided by the present application includes a third filter 31. The third filter 31 is provided in the center of several second filters 25, and a second air baffle 32 is provided outside the third filter 31. A third dust-collecting chamber 33 is provided in a top of the third filter 31. After the airflow flows through the second filter 25, the airflow enters into the third filter 31 located in the center through a third air-intake channel. The airflow enters into the power component after flowing out from the third filter 31, thus three layers of filtration is realized.

[0051] Apparently, the collecting device provided by the present application may also include fourth filter even a fifth filter which may be provided one inside another

or may be provided side by side. The detailed arrangement thereof will not be enumerated herein.

[0052] Refer to Fig. 7, Fig. 7 is a schematic view of the structure of a third embodiment of the collecting device according to the present application, in which a direction indicated by the arrows is the flowing direction of the airflow when the collecting device is working.

[0053] In the third embodiment, the first air-intake channel and the second air-intake channel of the collecting device provided by the present application may be both of a spiral structure extending axially. As shown in Fig. 7, when the first air-intake channel and the second air-intake channel are both of the spiral structure, spiral air can be generated in both of the first dust-collecting chamber 22 and the second dust-collecting chamber 24 such that the dust has a trend of moving away from an bottom portion in the first dust-collecting chamber 22 and the second dust-collecting chamber 24, the possibility that the dust is adhered onto the surfaces of the first filter 23 and the second filter 25 is lowered. The loads on the first filter 23 and the second filter 25 are reduced, the service life of the first filter 23 and the second filter 25 is prolonged, the replacement frequency thereof is reduced and the dust-removal efficiency thereof is improved.

[0054] Refer to Fig. 8, Fig. 8 is a schematic view of the structure of a fourth embodiment of the collecting device according to the present application; in which a direction indicated by the arrows is the flowing direction of the airflow when the collecting device is working.

[0055] In the fourth embodiment, there are at least two second filters 25 which are uniformly distributed in the first filter 23 (in the second embodiment as shown in Figs. 5 and 6 there are seven second filters 25). Under the circumstance that a volume of the first filter 23 is constant, the increased number of the second filters 25 inside the first filter 23 may increase the filtering area of the second filters 25 to improve the filtering efficiency of the second filters 25 so as to improve the dust-removal efficiency of the whole collecting device. In the meanwhile, on the basis of improving the dust-removal efficiency, the volume of the whole collecting device is kept to be

miniaturized, more dust-removal requirement is satisfied and the applicability of the collecting device is improved.

[0056] Refer to Fig. 9, Fig. 9 is a exploded schematic view of one embodiment of a second filter and a air baffle according to the present application.

5 **[0057]** In another embodiment, each second filter 25 corresponds to a corresponding air baffle 26, and there are at least two second filters 25 and at least two air baffles 26. The air baffles 26 are uniformly distributed in the first filter 25. Two or multiple spiral air may be generated inside the first filter 23 so as to further improve the dust-removal efficiency while improving the dust-removal area of the second filters 25.

10 **[0058]** Therefore, in the collecting device provided by the present application, there may be one second filter 25, may also be two or multiple second filters 25; likewise, there may be one, two or multiple third filters 31. When there is one second filter 25, it may be provided one third filter 31 so as to form a structure consisted of one first filter 23, one second filter 25 and one third filter 31. In addition, there may also be
15 multiple third filters 31 which are uniformly distributed in the second filter 25. When there are two or multiple second filters 25, it may be provided two or multiple third filters 31 each of which corresponds to each second filter 25 and is provided inside each second filter 25. In the meanwhile, when there are two or multiple second filters 25, there also may be one third filter 31 which may be provided inside the second
20 filter 25 nearest to a air-intake orifice of the power component, or may be provided in the center of the second filters 25 as that in the second embodiment, such that it is ensured that the airflow entering into the power component is the air filtered by the third filter 31 and the cleanliness of the airflow is improved.

25 **[0059]** Refer to Figs. 10-12, Fig. 10 is a perspective schematic view of the structure of a first embodiment of an air baffle and a sealing plate according to the present application; Fig. 11 is a top view of the air baffle and the sealing plate as shown in Fig. 10; Fig. 12 is a perspective schematic view of the structure of a second embodiment of the air baffle and the sealing plate according to the present application.

[0060] In the fourth embodiment, a sealing plate 27 is fixedly connected to a top end

of the air baffle 26. At least one of the sealing plate 27 and the air baffle 26 is provided with an obliquely cut ventilation opening communicating the first filter 23 with the second filter 25. A start point and an end point of any one of obliquely cut ventilation openings isolate the first filter 23 from the second filter 25 along the radial direction or the axial direction. The sealing plate 27 may effectively prevent the airflow carrying dust from flowing back into the second filter 25 through a top portion of the air baffle 26 directly, reduce the load on the second filter 25 and prolong the service life of the second filter 25. In the meanwhile, because both of the start point and the end point of the obliquely cut ventilation opening isolate the first filter 23 from the second filter 25 along the radial direction or the axial direction, the dust entered between the second filter 25 and the air baffle 26 through the second air-intake channel may be thrown into the second dust-collecting chamber 24 via the obliquely cut ventilation openings, and the dust in the second dust-collecting chamber 24 cannot enter into the second filter 25 via the obliquely cut ventilation openings. Thus the load on the second filter 25 is further reduced and the dust-removal effect of the collecting device is improved.

[0061] Apparently, the sealing plate 27 may be omitted, i.e. the top end of the air baffle 26 may be a through hole, which structure may also realize the object of the present application and fall within the protection scope of the present application.

[0062] Refer to Fig. 13, Fig. 13 is a perspective schematic view of the structure of a third embodiment of the air baffle and the sealing plate according to the present application.

[0063] In the third detailed embodiment, the air baffle 26 provided by the present application is provided with an obliquely cut ventilation opening. There may be multiple obliquely cut ventilation openings which are uniformly distributed along a circumferential direction of the air baffle 26. The sealing plate 27 is provided with a centre recess depressing towards a bottom end thereof. The dust entered between the air baffle 26 and the second filter 25 through the second air-intake channel may be thrown out from the obliquely cut ventilation openings in the air baffle 26, in the meanwhile the centre recess of the sealing plate 27 may collect the dust in the second

dust-collecting chamber 24 so as to gather the dust collected in the second dust-collecting chamber 24 and reduce the possibility that the dust flies in the second dust-collecting chamber 24, thereby reducing a secondary pollution. Especially when the dust-suction tube 21 is orientated upwardly, for example when the collecting
5 device is applied to a portable vacuum cleaner to suck dust on a ceiling, a window curtain or other higher places, the centre recess of the sealing plate 27 may effectively catch the collected dust to avoid the dust entering into the power component, thereby further improving the dust-removal effect of the vacuum cleaner.

[0064] Apparently, the obliquely cut ventilation opening may be provided in the
10 sealing plate 27, and also may be provided in the air baffle 26, and may also be provided in both of the sealing plate 27 and the air baffle 26, as long as the obliquely cut ventilation opening may communicate the first filter 23 with the second filter 25. In the meanwhile, both of the start point and the end point of the obliquely cut ventilation opening isolate the first filter 23 from the second filter 25 along the radial
15 direction or the axial direction. Taking the sealing plate 27 as an example, it can be interpreted as that the sealing plate 27 includes a main portion and a shield portion (as shown in Fig. 10), the main portion is perpendicular to the air baffle 26, and the shield portion is fixedly connected to the main portion at a predetermined angle. Several ventilation openings are provided in the main portion, the shield portion blocks the
20 ventilation opening along the axial direction to form an obliquely cut ventilation opening. The sealing plate 27 may also be of the structure as shown in Fig. 12. The sealing plate 27 is obliquely cut along the thickness direction thereof such that the dust cannot enter into the internal of the air baffle 26 along the axial direction directly. The obliquely cut ventilation opening may be provided in the air baffle 26 in the same
25 way as it is provided in the sealing plate 27. In this case, the obliquely cut ventilation opening isolates the first filter 23 from the second filter 25 along the radial direction. This structure will not be described in detail herein.

[0065] Refer to Fig. 14, Fig. 14 is a exploded schematic view of one embodiment of the second filter and the air baffle according to the present application.

30 [0066] In a preferred embodiment, there are two or multiple second air-intake

channels, each of which encircles a bottom end of the second filter 25, and inlets of which are uniformly distributed along a circumferential direction of the second filter 25. As shown in Fig. 14, a bottom portion of the second filter 25 is provided with two spiral protrusions 34, both of which encircle the second filter 25 and cooperate with the air baffle 26 to form two spiral air-intake channels. Start points of the two spiral air-intake channels are the inlets of the second air-intake channels and there is a certain distance between the two start points. In particular, the two start points may be centrosymmetric relative to the second filter 25. End points of the two spiral air-intake channels are the bottom end of the second filter 25. Increased number of the second air-intake channels may increase a ventilation amount per unit time of the second filter 25, improve the working efficiency of the collecting device and improve the applicability of the collecting device. In the meanwhile, inlets of the second air-intake channels which are uniformly distributed along the circumferential direction of the second filter 25 may keep the airflow uniformly distributed in the collecting device, thus the airflow is more stable.

[0067] In addition, the second air-intake channel in the Fig. 14 is formed cooperatively by the spiral protrusion 34 and the air baffle 26 in the Fig. 14. Apparently, the second air-intake channel may also be formed by a groove in the bottom portion of the second filter 25, i.e. a spiral channel is formed in the solid body of the bottom portion of the second filter 25, which can also meet the requirement of the present application and should be fall within the protection scope of the present application. However, the second air-intake channel as shown in Fig. 14 has a simpler structure and can be easily machined which is beneficial to reduce the manufacturing cost of the collecting device.

[0068] Refer to Fig. 15, Fig. 15 is a schematic view of the structure of a fifth embodiment of the collecting device according to the present application, in which a direction indicated by the arrows is the flowing direction of the airflow when the collecting device is working.

[0069] In the fifth embodiment, the collecting device provided by the present application may also include a tapered air guide cover provided in the top end of the

first filter 23, and an outlet of the tapered air guide cover is communicated with the second dust-collecting chamber 24. When the collecting device is working, the airflow sequentially passes through the dust-suction tube 21, the first air-intake channel, the first filter 23, the second air-intake channel and the tapered air guide cover, and then enters into the second dust-collecting chamber 24 and the second filter 25. That is, the air flowed out from the second air-intake channel firstly passes through the tapered air guide cover to form a stronger spiral trend such that the dust moves away from the second filter 25 in the spiral airflow as much as possible, which reduces the load of the second filter 25, prolongs the service life of the second filter 25, reduces the replacement frequency of the second filter 25 and reduces the maintenance cost of the collecting device.

[0070] Refer to Fig. 16, Fig. 16 is a schematic view of the structure of one embodiment of the second filter according to the present application.

[0071] In one embodiment, a filtering hole of the second filter 25 provided by the present application may be strip-shaped holes. After filtered by the first filter 23, most of larger impurities like the hair in the dust have already been filtered and are less likely to enter into the second filter 25. Compared with dot-shaped holes, the strip-shaped holes may be machined in an easier process, have a lower cost and are applicable to more materials, which further reduce the machining difficulty and cost of the collecting device. Apparently, the first filter 23 and the third filter 31 may also use the filter with the strip-shaped holes.

[0072] Besides the collecting device, the present application further provides a vacuum cleaner including the above collecting device. A power component of the vacuum cleaner is connected to an outlet end of the second filter 25 of the collecting device. When the power component is working, negative pressure is formed in the collecting device such that the dust and debris may enter into the first dust-collecting chamber 22 and the second dust-collecting chamber 24 to achieve the technical effects of dust-removing and cleaning. The structure of other parts of the vacuum cleaner may refer to the prior art, which will not be described herein.

[0073] In particular, the above vacuum cleaner may be a portable vacuum cleaner,

which is widely used in the modern life due to its well dust-removal effect and light weight and portable feature. The portable vacuum cleaner has a better dust-removal effect especially for small corners in the automobiles and the precision electrical equipments such as computers. Furthermore, the vacuum cleaner provided by the
5 present application may also be a domestic large horizontal vacuum cleaner or an industrial vacuum cleaner, to which the collecting device of the present application may be applied to achieve the same technical effects, which also fall within the protection scope of the present application.

[0074] The collecting device provided by the present application and the vacuum
10 cleaner including the collecting device are described in detail hereinbefore. In the present description, specific examples are used to describe the principle and the embodiments of the present application. The above description of the embodiments is only used for better understanding of the method and the spirit of the present application, it should be noted that, for the person skilled in the art, any modifications
15 and improvements may be made to the present application without departing from the principle of the present application, and these modifications and improvements should be deemed to fall into the protection scope of the present application.

What is claimed is:

1. A collecting device comprising a dust-suction tube, a first air-intake channel, a first dust-collecting chamber and a first filter provided inside the first dust-collecting chamber, characterized by further comprising a second filter provided inside the first filter, a second air-intake channel communicating the first filter with the second filter, and an air baffle radially isolating the first filter from the second filter; wherein a second dust-collecting chamber is provided in a top end of the first filter, airflow sequentially passes through the dust-suction tube, the first air-intake channel, the first filter, the second air-intake channel, the second dust-collecting chamber and the second filter, and at least one of the first air-intake channel and the second air-intake channel is of a spiral structure extending axially.

2. The collecting device according to the claim 1, wherein, there are at least two second filters which are uniformly distributed in the first filter.

3. The collecting device according to the claim 1, wherein, each second filter corresponds to a corresponding air baffle, and there are at least two second filters and at least two air baffles which are uniformly distributed in the first filter.

4. The collecting device according to the claim 1, wherein, a sealing plate is fixedly connected to a top end of the air baffle, at least one of the air baffle and the sealing plate is provided with an obliquely cut ventilation opening communicating the first filter with the second filter, and a start point and a end point of any one of obliquely cut ventilation openings isolate the first filter from the second filter along the radial direction or the axial direction.

5. The collecting device according to the claim 4, wherein, there are multiple obliquely cut ventilation openings which are uniformly distributed along a circumferential direction of the air baffle; and the sealing plate is provided with a centre recess depressing towards a bottom end thereof.

6. The collecting device according to any one of claims 1-5, wherein, both of

the first air-intake channel and the second air-intake channel are of a spiral structure extending axially.

7. The collecting device according to any one of claims 1-5, wherein, there are at least two second air-intake channels, each of which encircles a bottom end of the second filter, and inlets of the second air-intake channels are uniformly distributed along a circumferential direction of the second filter.

8. The collecting device according to any one of claims 1-5, further comprising a tapered air guide cover provided in the top end of the first filter, and an outlet of the tapered air guide cover is communicated with the second dust-collecting chamber.

9. An vacuum cleaner comprising a power component, characterized by further comprising a collecting device according to any one of claims 1-8, wherein air passes through the collecting device and then enters into the power component.

10. The vacuum cleaner according to claim 9, wherein, the vacuum cleaner is a portable vacuum cleaner.