

CLEANING APPARATUS

TECHNICAL FIELD

This application relates to the field of garbage cleaning technologies, and specifically, to a
5 cleaning apparatus.

BACKGROUND

A floor and a ground surface of a construction site are in a bad environment. In addition to solid garbage, a large quantity of cement dust needs to be cleaned. Sometimes, a thickness of cement dust in a specific area is not less than 10 mm. This poses a great challenge to a cleaning
10 capability of an overall cleaning apparatus and a dust filtering system. In a conventional cleaning apparatus, a large quantity of flying dust is generated in a process of cleaning garbage and dust by using a side brush. When excessive dust collects on the cleaning apparatus, a circuit component of the cleaning apparatus may fail, leading to that the cleaning apparatus cannot normally work, or that the cleaning apparatus needs to be repeatedly cleaned for a plurality of times. Consequently,
15 cleaning efficiency of the cleaning apparatus is significantly reduced.

SUMMARY

According to various embodiments of this application, a cleaning apparatus is provided, including:

a rack, provided with a traveling assembly, where a direction that is the same as a traveling
20 direction of the rack is a front direction, and a direction that is opposite to the traveling direction of the rack is a back direction;

a roller brush assembly, mounted on the rack, where the roller brush assembly includes a first brush shell, a second brush shell, and a roller brush arranged between the first brush shell and the second brush shell, the first brush shell is arranged in front of the second brush shell, the first brush
25 shell and the second brush shell form a first air duct, the first air duct has a first inlet and a first outlet, the roller brush is arranged at the first inlet, and the first outlet is located behind the first inlet;

a side brush, mounted below the rack, and is arranged in front of the first brush shell;

an auxiliary air duct shell, mounted on the rack, and is arranged in front of the first brush shell

and behind the side brush, where the auxiliary air duct shell and the first brush shell form a second air duct, the second air duct has a second inlet and a second outlet, the second inlet is arranged near the side brush, flying dust of the side brush can enter the second air duct by means of the second inlet, and the second outlet is located behind the second inlet; and

5 a filtering assembly, arranged near the first outlet and the second outlet.

In one embodiment, the auxiliary air duct shell includes a first auxiliary shell and a second auxiliary shell, the first auxiliary shell is arranged at an end that is of the second auxiliary shell and that is away from the second inlet, the second air duct includes a first channel and a second channel, the first channel is formed between the first auxiliary shell and the first brush shell, the second
10 channel is formed between the second auxiliary shell and the first brush shell, and an inner diameter of the first channel is less than an inner diameter of the second channel.

In one embodiment, the cleaning apparatus further includes a power supply support mounted on the rack. The power supply support is arranged on an upper part of the second channel and in front of the first channel, a mounting boss is formed at a joint between the first auxiliary shell and the second auxiliary shell, and an end of the power supply support is fastened to the mounting boss.
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In one embodiment, the auxiliary air duct shell is of an integrally molded structure, the second auxiliary shell is formed by extending downward the first auxiliary shell, and a part that is of the auxiliary air duct shell and that is close to the power supply support is bent to form the mounting boss, or the first auxiliary shell and the second auxiliary shell are of separated structures, and the
20 first auxiliary shell, the second auxiliary shell, and the power supply support are connected at a same place.

In one embodiment, the second auxiliary shell includes a first plate segment and a second plate segment, the first plate segment and the second plate segment are connected and arranged to present an included angle, the first plate segment and the first brush shell form the second channel, and the
25 second plate segment is connected to the power supply support.

In one embodiment, an included angle m exists between the first plate segment and the first brush shell, and the included angle m is 5° – 10° .

In one embodiment, the second auxiliary shell further includes a third plate segment connected to the first plate segment, the third plate segment is arranged to present an included angle with the

first plate segment and is arranged on a side that is of the first plate segment and that is away from the second plate segment, and the third plate segment extends forward.

In one embodiment, a ground clearance h_2 of the third plate segment is 230 mm–388 mm, the traveling assembly includes a wheel arranged below the rack, and a distance h_1 between a front
5 edge of the third plate segment and a rear edge of the wheel is 15 mm–30 mm.

In one embodiment, the cleaning apparatus further includes a power supply. The power supply is arranged on the power supply support, and the power supply is configured to supply power to the traveling assembly, the roller brush assembly, and the side brush.

In one embodiment, the cleaning apparatus further includes a reinforcing bar. The reinforcing
10 bar is fastened under the power supply support, and a connecting end of the first auxiliary shell and a connecting end of the second auxiliary shell are fastened to the reinforcing bar.

In one embodiment, the filtering assembly includes a filter and a fan, the fan is configured to suck air that is in the first air duct and the second air duct into the filter through the first outlet and the second outlet, and the filter is configured to filter sucked air.

15 In one embodiment, a flow deflector is formed on a part that is of the first brush shell and that is close to the first outlet, and an edge of the flow deflector extends in a direction away from the auxiliary air duct shell.

In one embodiment, an included angle c between the flow deflector and a horizontal plane is 20° to 30° , a lateral distance D between the flow deflector and the roller brush is 140 mm–150 mm,
20 and with the flow deflector, a ratio of an air volume of the first air duct to that of the second air duct is 0.74:1–2.08:1.

In one embodiment, the flow deflector is an arc plate, and on a vertical section, a center of the arc plate is in the first air duct.

In one embodiment, there are two roller brushes, a mounting angle β between a connecting line
25 of axial centers of the two roller brushes and a horizontal plane is 70° – 80° , a distance h_3 between the axial centers of the two rollers is 270 mm–300 mm, and an arc length d of the flow deflector is 40 mm–60 mm.

In one embodiment, the cleaning apparatus further includes a dustbin. The dustbin is mounted on the rack, and both the first outlet and the second outlet face an opening of the dustbin.

In one embodiment, a part that is of the first air duct and that is close to the first outlet and a part that is of the second air duct and that is close to the second outlet are combined to form a convergence channel, and an outlet of the convergence channel faces the opening of the dustbin.

Details of one or more embodiments of this application are provided in the following accompanying drawings and descriptions. Other features, objects, and advantages of this application are set forth in the specification, the accompanying drawings, and the claims.

BRIEF DESCRIPTION OF DRAWINGS

For a better description and explanation of embodiments and/or examples of those applications disclosed herein, reference may be made to one or more accompanying drawings. An additional detail or an example used to describe the accompanying drawings should not be understood as a limitation on a scope of any one of a disclosed application, a presently described embodiment and/or example, and a best mode of those presently understood applications.

FIG. 1 is a schematic diagram of a structure of a cleaning apparatus according to an embodiment of this application;

FIG. 2 is a sectional view of a cleaning apparatus in an A–A direction according to FIG. 1;

FIG. 3 is a schematic partial view of a cleaning apparatus according to FIG. 2;

FIG. 4 is a partially enlarged view of a cleaning apparatus according to FIG. 3; and

FIG. 5 is a three-dimensional schematic diagram of a structure of a second auxiliary shell of a cleaning apparatus according to FIG. 2.

Reference numerals:

10. Cleaning apparatus; 100. Rack; 110. Wheel; 200. Roller brush assembly; 210. First brush shell; 211. Flow deflector; 220. Second brush shell; 230. Roller brush; 240. First air duct; 241. First inlet; 242. First outlet; 250. Second air duct; 251. Second inlet; 252. Second outlet; 260. Convergence channel; 300. Side brush; 400. Auxiliary air duct shell; 410. First auxiliary shell; 420. Second auxiliary shell; 421. First plate segment; 422. Second plate segment; 423. Third plate segment; 430. Mounting boss; 511. Rough-precision multi-layer filter; 512. High-precision filter element filter; 600. Power supply support; 700. Power supply; 800. Reinforcing bar; and 900. Dustbin.

DESCRIPTION OF EMBODIMENTS

It should be noted that, in a case in which there is no conflict, embodiments in this application and features in embodiments may be mutually combined. The following describes this application in detail with reference to the accompanying drawings and in combination with embodiments.

5 It should be noted that, unless otherwise specified, all technical and scientific terms used in this application have a same meaning as generally understood by a person of ordinary skill in the art to which this application belongs.

10 In this application, in a case in which no opposite description is provided, the directional words such as "up", "down", "top", and "bottom" are generally used for a direction shown in the accompanying drawings, or for a component in an upright, vertical, or gravity direction. Similarly, for ease of understanding and description, "inside" and "outside" refer to the inside and the outside of a contour of each component, but the foregoing directional words are not used to limit this application.

15 As shown in FIG. 1 and FIG. 2, an embodiment of this application provides a cleaning apparatus 10, including a rack 100, a roller brush assembly 200, a side brush 300, an auxiliary air duct shell 400, and a filtering assembly. The rack 100 is provided with a traveling assembly 110. A direction that is the same as a traveling direction of the rack 100 is a front direction, and a direction that is opposite to the traveling direction of the rack 100 is a back direction. The roller brush assembly 200 is mounted on the rack 100, the roller brush assembly 200 includes a first brush shell 210, a second brush shell 220, and a roller brush 230 arranged between the first brush shell 210 and the second brush shell 220. The first brush shell 210 is arranged in front of the second brush shell 220, the first brush shell 210 and the second brush shell 220 form a first air duct 240, the first air duct 240 has a first inlet 241 and a first outlet 242, the roller brush 230 is arranged at the first inlet 241, and the first outlet 242 is located behind the first inlet 241. The side brush 300 is mounted 25 below the rack 100, and is arranged in front of the first brush shell 210. The auxiliary air duct shell 400 is mounted on the rack 100, and is arranged in front of the first brush shell 210 and behind the side brush 300. The auxiliary air duct shell 400 and the first brush shell 210 form a second air duct 250. The second air duct 250 has a second inlet 251 and a second outlet 252. The second inlet 251 is arranged near the side brush 300. Flying dust of the side brush 300 can enter the second air duct 250

by means of the second inlet 251, and the second outlet 252 is located behind the second inlet 251. The filtering assembly is arranged near the first outlet 242 and the second outlet 252.

In a traveling process of the cleaning apparatus 10, the side brush 300 drives dirt such as garbage and dust on a ground surface to a direction of the roller brush 230. The roller brush 230 can carry and send most of the dirt into the first air duct 240 through the first inlet 241, flying dust generated in a cleaning process of the roller brush 230 can also be collected into the first air duct 240, and flying dust generated at the side brush 300 is driven by a traveling wind speed to enter the second air duct 250. Dust removal filtration is performed on a wind that is in the first air duct 240 and the second air duct 250 through the filtering assembly, so that a problem caused by excessive dust that a circuit component of the cleaning apparatus 10 fails, or that the cleaning apparatus 10 needs to be repeatedly cleaned for a plurality of times is avoided, thereby ensuring that the cleaning apparatus 10 can normally and efficiently work. In addition, the second inlet 251 is arranged near the side brush 300, so that the second inlet 251 is closer to a position of flying dust to effectively suck dust raised by the side brush 300. In addition, compared with a conventional solution in which flying dust is processed in a manner of water spraying dust suppression, in this application, flying dust is collected by using the second air duct 250, and a problem of dust caking and inconvenient cleaning due to the water spraying dust suppression is avoided.

Specifically, the rack 100 includes a chassis and a support frame connected to the chassis, and the support frame is arranged on the chassis. The traveling assembly includes a wheel 110 arranged below the rack 100. In this embodiment, the wheel 110 is a universal wheel. In this embodiment, there are two roller brushes 230. Certainly, in another embodiment, a quantity of roller brushes 230 may be less than two or more than two based on an actual requirement.

Specifically, the auxiliary air duct shell 400 includes a first auxiliary shell 410 and a second auxiliary shell 420. The first auxiliary shell 410 is arranged at an end that is of the second auxiliary shell 420 and that is away from the second inlet 251, the second air duct 250 includes a first channel and a second channel, the first channel is formed between the first auxiliary shell 410 and the first brush shell 210, the second channel is formed between the second auxiliary shell 420 and the first brush shell 210, and an inner diameter of the first channel is less than an inner diameter of the second channel. In this way, a cross-sectional area of the first channel is less than a cross-sectional

area of the second channel, and a wind speed in the first channel is greater than a wind speed in the second channel, so that air pressure in the first channel is less than air pressure in the second channel, and dust is facilitated to be smoothly sucked into the second air duct 250 through the first inlet 241.

5 Specifically, the second auxiliary shell 420 is connected to a sidewall of an upwind side of the first auxiliary shell 410. In this way, when the cleaning apparatus 10 moves, the second auxiliary shell 420 is closer to a flying dust collecting area, and the traveling wind speed is generated at the second auxiliary shell 420 relative to the flying dust collecting area. Under an action of the traveling wind speed, the second air duct 250 is facilitated to collect flying dust by using the second inlet 251,
10 so that the problem caused by the excessive dust that the circuit component of the cleaning apparatus 10 fails, or that the cleaning apparatus 10 needs to be repeatedly cleaned for a plurality of times is avoided, thereby ensuring that the cleaning apparatus 10 can normally work.

 Further, the cleaning apparatus 10 further includes a power supply support 600 mounted on the rack 100. The power supply support 600 is arranged on an upper part of the second channel and in
15 front of the first channel, a mounting boss 430 is formed at a joint between the first auxiliary shell 410 and the second auxiliary shell 420, and an end of the power supply support 600 is fastened to the mounting boss 430. Because a radius of the first channel is less than a radius of the second channel, the first auxiliary shell 410 is closer to a front side of the rack 100 than the second auxiliary shell 420. Therefore, forming the mounting boss 430 that is configured to fasten the power
20 supply support 600 and that is at the joint between the first auxiliary shell 410 and the second auxiliary shell 420 can effectively utilize space formed between a front side of the first auxiliary shell 410 and a top side of the second auxiliary shell 420, thereby reducing a size of the entire cleaning apparatus 10.

 In this embodiment, the auxiliary air duct shell 400 is of an integrally molded structure, the
25 second auxiliary shell 420 is formed by extending downward the first auxiliary shell 410, and a part that is of the auxiliary air duct shell 400 and that is close to the power supply support 600 is bent to form the mounting boss 430. In another embodiment, the first auxiliary shell 410 and the second auxiliary shell 420 are of separated structures, and the first auxiliary shell 410, the second auxiliary shell 420, and the power supply support 600 are connected at a same place. The integrally molded

structure is easy to be processed and molded, while the separated structure is easy to be disassembled and maintained.

Specifically, as shown in FIG. 3 and FIG. 5, the second auxiliary shell 420 includes a first plate segment 421 and a second plate segment 422. The first plate segment 421 and the second plate segment 422 are connected and arranged to present an included angle, the first plate segment 421 and the first brush shell 210 form the second channel, and the second plate segment 422 is connected to the power supply support 600. This arrangement facilitates connection and fastening between the second auxiliary shell 420 and the power supply support 600. As shown in FIG. 3, in this embodiment, the cleaning apparatus 10 further includes two side plates that are configured to connect the first brush shell 210 to the second brush shell 220. The two side plates are arranged at intervals along an axial direction of the side brush 300, and the first brush shell 210, the second brush shell 220, the two side plates, and a bottom plate form the first air duct 240. Optionally, the first brush shell 210 and the second brush shell 220 are mounted on the side plate in a welding manner.

Further, as shown in FIG. 3, an included angle m exists between the first plate segment 421 and the first brush shell 210, and the included angle m is 5° – 10° . If the included angle m is less than 5° , the second auxiliary shell 420 interferes with a mechanism such as a lifting assembly of the side brush 300 during mounting, and cannot be normally mounted in the cleaning apparatus 10. If the included angle m is greater than 10° , the second auxiliary shell 420 is away from a flying dust area (that is, the flying dust collecting area) of the side brush 300, and a dust suppression effect of the second auxiliary shell 420 is reduced. The included angle m is set within the foregoing range, so that interference is avoided, an effective dust suction area of the second air duct 250 is significantly increased, and the dust suppression effect is the best.

Further, as shown in FIG. 5, the second auxiliary shell 420 further includes a third plate segment 423 connected to the first plate segment 421. The third plate segment 423 is arranged to present an included angle with the first plate segment 421 and is arranged on a side that is of the first plate segment 421 and that is away from the second plate segment 422, and the third plate segment 423 extends forward. The third plate segment 423 has a flow deflection function, and helps direct flying dust that is generated by operation of the side brush 300 to enter the second air duct

250 by means of the second inlet 251. Optionally, a ground clearance h_2 of the third plate segment 423 is 230 mm–388 mm, and a distance h_1 between a front edge of the third plate segment 423 and a rear edge of the wheel 110 is 15 mm–30 mm. Specifically, h_2 refers to an effective height (that is, a distance between the third plate segment 423 and a bottom of the wheel 110 arranged on the chassis) of a bottom of the third plate segment 423 to the ground. After the third plate segment 423 is mounted, a vertical tangent line is generated at a point of intersection of an extension line of the third plate segment 423 and the wheel 110, and h_1 refers to a lateral distance between an end that is of the third plate segment 423 and that is not connected to the first plate segment 421 and the vertical tangent line.

10 If a vertical distance between the third plate segment 423 and the ground is greater than 388 mm, the second auxiliary shell 420 is away from the flying dust area of the side brush 300, and the dust suppression effect is reduced. If a distance between the second auxiliary shell 420 and the wheel 110 is excessively large and is greater than 30 mm, the second auxiliary shell 420 interferes with the wheel 110 in front during mounting, and the mounting cannot be performed. If the distance between the second auxiliary shell 420 and the wheel 110 in front is excessively small and is less than 15 mm, the second auxiliary shell 420 cannot form a closing part for collecting flying dust, and a risk of dust escaping exists. Distances h_1 and h_2 are set within the foregoing range, so that interference with the wheel 110 is avoided, the second inlet 251 that effectively collects flying dust is formed, and the second inlet 251 can be closer to the flying dust area to achieve a relatively good dust suppression effect. In this embodiment, the included angle m is 5° , the distance h_1 is 15 mm, and the distance h_2 is 133 mm. In this way, the effective dust suction area of the second air duct 250 is significantly increased and the dust suppression effect is relatively good.

Optionally, a mounting hole is arranged on the third plate segment 423, and the third plate segment 423 may be connected to the power supply support 600 by using a locking piece such as a screw, that is, the second auxiliary shell 420 may be connected to the power supply support 600.

In this embodiment, as shown in FIG. 5, a first bending angle a exists between the first plate segment 421 and the second plate segment 422, and a second bending angle b exists between the first plate segment 421 and the third plate segment 423. Specifically, the third plate segment 423 is connected to the first auxiliary shell 410, and the first bending angle a can limit the included angle

m between the second auxiliary shell 420 and the first brush shell 210. The second bending angle b can limit the distance between the second auxiliary shell 420 and the wheel 110. In this way, the second auxiliary shell 420 can be mounted at a reasonable position, to meet a mounting requirement of the cleaning apparatus 10. In addition, the second auxiliary shell 420 is mounted at the reasonable position, so that the second auxiliary shell 420 can correctly absorb flying dust, thereby ensuring that the cleaning apparatus 10 can normally work.

Specifically, in this embodiment, the first bending angle a is 155° , and the second bending angle b is 115° . In the foregoing arrangement, the first bending angle a can limit the included angle m between the first plate segment 421 and the first brush shell 210 to 5° . The second bending angle b can limit the distance between the second auxiliary shell 420 and the wheel 110 to 15 mm. In this way, the second auxiliary shell 420 can be mounted at the reasonable position, to meet the mounting requirement of the cleaning apparatus 10. In addition, the second auxiliary shell 420 is mounted at the reasonable position, so that the second air duct 250 can absorb flying dust, thereby ensuring that the cleaning apparatus 10 can normally work.

Specifically, the filtering assembly includes a filter and a fan. The fan is configured to suck air that is in the first air duct 240 and the second air duct 250 into the filter through the first outlet 242 and the second outlet 252, and the filter is configured to filter sucked air. Specifically, the filter includes a rough-precision multi-layer filter 511 and a high-precision filter element filter 512. The rough-precision multi-layer filter 511 is arranged on top of the support frame, and is arranged above the second brush shell 220 in FIG. 2. The high-precision filter element filter 512 is arranged above the rough-precision multi-layer filter 511, and is fastened to the support frame. The rough-precision multi-layer filter 511 is connected to the high-precision filter element filter 512.

Further, the cleaning apparatus 10 further includes a power supply 700. The power supply 700 is arranged on the power supply support 600, and the power supply 700 is configured to supply power to the traveling assembly, the roller brush assembly 200, and the side brush 300.

Further, the cleaning apparatus 10 further includes a reinforcing bar 800. The reinforcing bar 800 is fastened under the power supply support 600, and a connecting end of the first auxiliary shell 410 and a connecting end of the second auxiliary shell 420 are fastened to the reinforcing bar 800. The reinforcing bar 800 can ensure strength of the power supply support 600, and connect the first

auxiliary shell 410 to the second auxiliary shell 420. In this embodiment, the reinforcing bar 800 is a square tube. Specifically, a side of the square tube is connected to the first auxiliary shell 410, and an adjacent side of the square tube is detachably connected to the third plate segment 423 by using a screw. In this way, the strength of the power supply support 600 can be ensured, and the first auxiliary shell 410 can be connected to the second auxiliary shell 420. Certainly, in an alternative embodiment not shown in the accompanying drawings, based on an actual requirement, the first auxiliary shell 410 may further extend downward by a part, and then the second auxiliary shell 420 is directly welded or detachably connected to the first auxiliary shell 410, or the second auxiliary shell 420 as a whole is formed by extending the first auxiliary shell 410.

Further, as shown in FIG. 4, a flow deflector 211 is formed on a part that is of the first brush shell 210 and that is close to the first outlet 242, and an edge of the flow deflector 211 extends in a direction away from the auxiliary air duct shell 400. The flow deflector 211 may reduce, by using the foregoing arrangement, a flow area of a cavity channel of the first air duct 240, and increase a flow area that is of the second air duct 250 and that is at the second outlet 252, so that a distribution ratio between an air volume of the second air duct 250 and that of the first air duct 240 can be adjusted by using the flow deflector 211. In this way, the distribution ratio between the air volume of the second air duct 250 and that of the first air duct 240 can be set as a reasonable value, so that the effective dust suction area of the second air duct 250 can be increased, and a flow deflection dust suppression effect at an outlet of the first air duct 240 can be ensured.

Further, an included angle c between the flow deflector 211 and a horizontal plane is 20° – 30° , a lateral distance D between the flow deflector 211 and the roller brush 230 is 140 mm–150 mm, and with the flow deflector 211, a ratio of an air volume of the first air duct 240 to that of the second air duct 250 is 0.74:1–2.08:1. When the included angle c is less than 20° , the flow deflection dust suppression effect (that is, an inertial force) in the first air duct 240 declines. When the included angle c is greater than 30° , garbage is prevented from being thrown into a dustbin 900. When D is less than 140 mm, the flow deflector 211 is away from a negative pressure opening, and a suction force of the second air duct 250 is reduced. When D is greater than 150 mm, the flow deflector 211 interferes with the wheel 110 during mounting, causing a problem of difficult assembly. In addition, by means of fluid calculation, the ratio of the air volume of the first air duct

240 to that of the second air duct 250 is set between 0.74:1 and 2.08:1, and a maximum wind speed is set between 4.73 m/s and 5.82 m/s. In this embodiment, the ratio of the air volume of the first air duct 240 (a main brush air duct) to that of the second air duct 250 (a side brush air duct) is 0.74:1, and the maximum wind speed is 5.61 m/s. In this way, the effective dust suction area of the second
 5 air duct 250 can be significantly increased, and the flow deflection dust suppression effect on an air flow that is of the first air duct 240 and that is close to the first outlet 242 can be ensured. An air volume is substantially proportional to the cross-sectional area of the first air duct 240 and that of the second air duct 250. In other words, a larger cavity channel area indicates a larger air volume, and a smaller cavity channel area indicates a smaller air volume. In actual use, because a brush
 10 tooth generates a flow disturbance effect, an increase in a rotation speed of the roller brush 230 leads to an increase in the air volume of the first air duct 240. A spacing between the first air duct 240 and the second air duct 250 also affects air volume distribution. That is, a larger D indicates a smaller air volume, and a smaller D indicates a larger air volume.

In this embodiment, it is most appropriate to set the included angle c as 20° , and the lateral
 15 distance D as 146 mm. In this way, interference during mounting does not occur, and the flow deflection dust suppression effect can be ensured. That is, by setting a mounting position of the flow deflector 211, the distribution ratio of the air volume of the first air duct 240 to that of the second air duct 250 can be limited to the foregoing range. In this way, the effective dust suction area of the second air duct 250 can be increased, and the flow deflection dust suppression effect at the outlet of
 20 the first air duct 240 can be ensured. It should be noted that the distance D refers to a horizontal distance between an outer edge of a free end of the flow deflector 211 and an axial line of a rotation center axis of an upper roller brush 230 in FIG. 3. The included angle c refers to an included angle between a tangent line of the outer edge of the free end of the flow deflector 211 and the horizontal plane, and the free end of the flow deflector 211 refers to an end that is of the flow deflector 211
 25 and that is not connected to the first brush shell 210.

Specifically, the flow deflector 211 is an arc plate, and on a vertical section, a center of the arc plate is in the first air duct 240. The arc plate is formed by extending outward the first brush shell 210. In this way, on one hand, processing of the flow deflector 211 is convenient, and manufacturing is simple. On the other hand, the effective dust suction area of the second air duct

250 can be increased by using the second auxiliary shell 420, so that the second inlet 251 is closer to the position of flying dust. In a forward traveling process of the cleaning apparatus 10, flying dust at the side brush 300 enters the second air duct 250 by using the traveling wind speed, so that the problem caused by the excessive dust that the circuit component of the cleaning apparatus 10 fails, or that the cleaning apparatus 10 needs to be repeatedly cleaned for a plurality of times is avoided, thereby ensuring that the cleaning apparatus 10 can normally work.

Specifically, a mounting angle β between a connecting line of axial centers of the two roller brushes 230 and a horizontal plane is 70° – 80° , a distance h_3 between the axial centers of the two rollers 230 is 270 mm–300 mm, and an arc length d of the flow deflector 211 is 40 mm–60 mm. Further, the cleaning apparatus 10 further includes the dustbin 900. The dustbin 900 is mounted on the rack 100, and both the first outlet 242 and the second outlet 252 face an opening of the dustbin 900. The dustbin 900 facilitates garbage collection.

In the foregoing arrangement, if an outer diameter of the roller brush 230 is greater than $\varnothing 300$ mm, h_3 is greater than 300 mm, and dimensions of an overall device will be too long. If the outer diameter of the roller brush 230 is less than $\varnothing 270$ mm, h_3 is less than 270 mm, and an effective volume of the dustbin 900 will be reduced. If β is greater than 80° or less than 70° , a throwing effect of garbage being thrown into the dustbin is bad. If the arc length of the flow deflector 211 is greater than 60 mm, garbage is prevented from being thrown into the dustbin 900, and the throwing effect is bad. If the arc length d of the flow deflector 211 is less than 40 mm, the air volumes in the second air duct 250 and the first air duct 240 are relatively small, and the dust suppression effect declines. Therefore, the foregoing arrangement can increase the effective dust suction area of the second air duct 250, have the flow deflection dust suppression effect on the air flow that is of the first air duct 240 and that is close to the first outlet 242, and have a best effect.

In this embodiment, a part that is of the first air duct 240 and that is close to the first outlet 242 and a part that is of the second air duct 250 and that is close to the second outlet 252 are combined to form a convergence channel 260, and an outlet of the convergence channel 260 faces the opening of the dustbin 900. Certainly, in another embodiment, outlets of the first air duct 240 and the second air duct 250 may directly face the dustbin 900 without being combined.

In this embodiment of this application, the cleaning apparatus 10 further includes a negative

pressure source arranged on the rack 100. The negative pressure source is arranged at an upstream position of the rough-precision multi-layer filter 511, that is, a position close to the outlets of two air ducts. In this way, the negative pressure source can simultaneously suck both the first air duct 240 and the second air duct 250, so that negative pressure is simultaneously formed in the first air duct 240 and the second air duct 250, thereby facilitating suction of dust and garbage in the first air duct 240 and the second air duct 250. In this way, one negative pressure source operates on two cavity channels, so that usage efficiency of the negative pressure source is improved. Compared with a conventional manner in which one negative pressure source is respectively arranged in the two cavity channels, an arrangement manner of the negative pressure source in this application reduces manufacturing costs of the cleaning apparatus 10.

With reference to FIG. 2, the following describes an assembly relationship of main components of the cleaning apparatus 10 in this application. Components are assembled in an assembly sequence from right to left in a horizontal direction in FIG. 2, and respectively are the second auxiliary shell 420, the rough-precision multi-layer filter 511, and the high-precision filter element filter 512. The first air duct 240 and the second air duct 250 are integrally welded to the chassis when manufactured, that is, the side plate is further welded to the chassis, no assembly relationship exists, and the second auxiliary shell 420 is mounted on the chassis. The cleaning apparatus 10 travels forward, and in a cleaning process, flying dust is absorbed on the second auxiliary shell 420 by using the traveling wind speed, and then enters the second air duct 250. In addition, the first air duct 240 collects garbage and dust at a bottom of the cleaning apparatus 10. Mixed air and dust of the garbage and the dust are collected at the outlets of the first air duct 240 and the second air duct 250, guided by the negative pressure, first go through the rough-precision multi-layer filter 511 so that a large quantity of dust is blocked and absorbed, then go through the high-precision filter element filter 512, and finally, filtered air is discharged by the fan, so that the dust suppression effect is basically achieved.

It should be noted that the dustbin 900 is arranged at a lower part of the rear of the rack 100, and the dustbin 900 is arranged below the filtering assembly. Specifically, the dustbin 900 is arranged on a left side of the second brush shell 220 in FIG. 2, and the second brush shell 220 is welded to the support frame of the rack 100. A top opening of the dustbin 900 is arranged in

correspondence to the second outlet 252 and the first outlet 242, so that garbage output by the first air duct 240 and the second air duct 250 can be thrown into the dustbin 900. Dust output by the first air duct 240 and the second air duct 250 first enters the rough-precision multi-layer filter 511 for primary filtration, and then enters the high-precision filter element filter 512 for secondary filtration. Dust adsorbed by the high-precision filter element filter 512 falls into the dustbin 900 after being beat, so that dust discharged by the cleaning apparatus 10 can meet an emission standard.

Apparently, the foregoing described embodiments are only some embodiments of this application, but not all embodiments. All other embodiments obtained by a person of ordinary skill in the art based on embodiments of this application without creative efforts shall fall within the protection scope of this application.

It should be noted that the terms used herein are merely intended to describe a specific embodiment, but are not intended to limit an embodiment as an example of this application. As used herein, unless otherwise expressly indicated in context, a singular form is intended to include a plural form. In addition, it should be understood that when the terms "contain" and/or "include" are used in this specification, they indicate existence of a feature, a step, operation, a component, an assembly, and/or combinations thereof.

It should be noted that the terms "first" and "second" in the specification, claims, and the foregoing accompanying drawings of this application are used to distinguish between similar objects, and do not need to be used to describe a specific sequence or order. It should be understood that terms used in this way may be interchangeable in an appropriate situation, so that embodiments of this application described herein can be implemented in a sequence other than that shown or described herein.

The foregoing describes merely preferred embodiments of this application, and is not intended to limit this application. For a person skilled in the art, various modifications and changes may be made in this application. Any modification, equivalent replacement, improvement, and the like made within the spirit and principles of this application shall be included in the protection scope of this application.

CLAIMS

1. A cleaning apparatus, comprising:

a rack, provided with a traveling assembly, wherein a direction that is the same as a traveling direction of the rack is a front direction, and a direction that is opposite to the traveling direction of the rack is a back direction;

a roller brush assembly, mounted on the rack, wherein the roller brush assembly comprises a first brush shell, a second brush shell, and a roller brush arranged between the first brush shell and the second brush shell, the first brush shell is arranged in front of the second brush shell, the first brush shell and the second brush shell form a first air duct, the first air duct has a first inlet and a first outlet, the roller brush is arranged at the first inlet, and the first outlet is located behind the first inlet;

a side brush, mounted below the rack, and is arranged in front of the first brush shell;

an auxiliary air duct shell, mounted on the rack, and is arranged in front of the first brush shell and behind the side brush, wherein the auxiliary air duct shell and the first brush shell form a second air duct, the second air duct has a second inlet and a second outlet, the second inlet is arranged near the side brush, flying dust of the side brush can enter the second air duct by means of the second inlet, and the second outlet is located behind the second inlet; and

a filtering assembly, arranged near the first outlet and the second outlet.

2. The cleaning apparatus according to claim 1, wherein the auxiliary air duct shell comprises a first auxiliary shell and a second auxiliary shell, the first auxiliary shell is arranged at an end that is of the second auxiliary shell and that is away from the second inlet, the second air duct comprises a first channel and a second channel, the first channel is formed between the first auxiliary shell and the first brush shell, the second channel is formed between the second auxiliary shell and the first brush shell, and an inner diameter of the first channel is less than an inner diameter of the second channel.

3. The cleaning apparatus according to claim 2, further comprising a power supply support mounted on the rack, wherein the power supply support is arranged on an upper part of the second channel and in front of the first channel, a mounting boss is formed at a joint between the first auxiliary shell and the second auxiliary shell, and an end of the power supply support is fastened to

the mounting boss.

4. The cleaning apparatus according to claim 3, wherein the auxiliary air duct shell is of an integrally molded structure, the second auxiliary shell is formed by extending downward the first auxiliary shell, and a part that is of the auxiliary air duct shell and that is close to the power supply support is bent to form the mounting boss, or the first auxiliary shell and the second auxiliary shell are of separated structures, and the first auxiliary shell, the second auxiliary shell, and the power supply support are connected at a same place.

5. The cleaning apparatus according to claim 3, wherein the second auxiliary shell comprises a first plate segment and a second plate segment, the first plate segment and the second plate segment are connected and arranged to present an included angle, the first plate segment and the first brush shell form the second channel, and the second plate segment is connected to the power supply support.

6. The cleaning apparatus according to claim 5, wherein an included angle m exists between the first plate segment and the first brush shell, and the included angle m is 5° – 10° .

7. The cleaning apparatus according to claim 5, wherein the second auxiliary shell further comprises a third plate segment connected to the first plate segment, the third plate segment is arranged to present an included angle with the first plate segment and is arranged on a side that is of the first plate segment and that is away from the second plate segment, and the third plate segment extends forward.

8. The cleaning apparatus according to claim 7, wherein a ground clearance h_2 of the third plate segment is 230 mm–388 mm, the traveling assembly comprises a wheel arranged below the rack, and a distance h_1 between a front edge of the third plate segment and a rear edge of the wheel is 15 mm–30 mm.

9. The cleaning apparatus according to claim 3, further comprising a power supply, wherein the power supply is arranged on the power supply support, and the power supply is configured to supply power to the traveling assembly, the roller brush assembly, and the side brush.

10. The cleaning apparatus according to claim 3, further comprising a reinforcing bar, wherein the reinforcing bar is fastened below the power supply support, and a connecting end of the first auxiliary shell and a connecting end of the second auxiliary shell are fastened to the reinforcing bar.

11. The cleaning apparatus according to claim 1, wherein the filtering assembly comprises a filter and a fan, the fan is configured to suck air that is in the first air duct and the second air duct into the filter through the first outlet and the second outlet, and the filter is configured to filter sucked air.

5 12. The cleaning apparatus according to claim 1, wherein a flow deflector is formed on a part that is of the first brush shell and that is close to the first outlet, and an edge of the flow deflector extends in a direction away from the auxiliary air duct shell.

10 13. The cleaning apparatus according to claim 12, wherein an included angle c between the flow deflector and a horizontal plane is 20° to 30° , a lateral distance D between the flow deflector and the roller brush is 140 mm–150 mm, and with the flow deflector, a ratio of an air volume of the first air duct to that of the second air duct is 0.74:1–2.08:1.

14. The cleaning apparatus according to claim 12, wherein the flow deflector is an arc plate, and on a vertical section, a center of the arc plate is in the first air duct.

15 15. The cleaning apparatus according to claim 14, wherein there are two roller brushes, a mounting angle β between a connecting line of axial centers of the two roller brushes and a horizontal plane is 70° – 80° , a distance h_3 between the axial centers of the two rollers is 270 mm–300 mm, and an arc length d of the flow deflector is 40 mm–60 mm.

20 16. The cleaning apparatus according to any one of claims 1 to 15, further comprising a dustbin, wherein the dustbin is mounted on the rack, and both the first outlet and the second outlet face an opening of the dustbin.

17. The cleaning apparatus according to claim 16, wherein a part that is of the first air duct and that is close to the first outlet and a part that is of the second air duct and that is close to the second outlet are combined to form a convergence channel, and an outlet of the convergence channel faces the opening of the dustbin.