

FLOOR CLEANING DEVICE

This application claims priority to Chinese Patent Application No. 202010982593.1 filed with the China National Intellectual Property Administration on September 17, 2020; and to Chinese Patent Application No. 202010980795.2 filed with the China National Intellectual Property Administration on September 17, 2020, which are incorporated herein by reference in their entireties.

TECHNICAL FIELD

This application relates to the field of construction technologies, and for example, to a floor cleaning device.

BACKGROUND

A cleaning robot usually sends trash in a passing area to a rear trash bin by using a rolling brush. However, the rolling brush may raise dust during cleaning, and the dust may also enter the trash bin through a rolling brush channel. Because of relatively small particles, the dust easily floats in the trash bin, and overflows from a gap between the trash bin and the cleaning device, thereby resulting in secondary pollution. A cleaning device previously developed by the applicant is equipped with a filter cartridge component communicating with the trash bin, and floating dust is absorbed by using the filter cartridge component, to reduce secondary pollution. However, based on a consideration of an overall lower center of gravity of the device, the filter cartridge component of the previous cleaning device is horizontally placed on a machine body. The cleaning device is relatively applicable to an outdoor environment with relatively small dust and relatively large moving space, but is not very suitable for cleaning an indoor floor of a building in which just main construction is completed, and the building has extremely small indoor moving space and too much dust.

SUMMARY

This application provides a floor cleaning device, to reduce a horizontal occupation area of the device.

An embodiment provides a floor cleaning device, including:
a frame;

an edge brush apparatus, mounted at the bottom of the front part of the frame;

a roller brush apparatus, mounted at the bottom of the center part of the frame;

a trash bin, mounted at the bottom of the rear part of the frame and in communication with the roller brush apparatus; and

5 a filter cartridge apparatus, mounted at the top of the rear part of the frame, where the filter cartridge apparatus includes a filter cartridge mechanism and a blower mechanism, and the filter cartridge mechanism includes a housing and at least two filter cartridges. The at least two filter cartridges are arranged in parallel vertically perpendicular to the heading direction of the frame, and the at least two filter cartridges are disposed in the housing, where an upper end of the housing
10 is sealedly connected to the outer periphery wall of the blower mechanism. An air discharge duct, which communicates the blower mechanism, is formed inside each filter cartridge, an air intake duct is formed between an outer periphery wall of each filter cartridge and the housing. The lower ends of the filter cartridges are sealed, and the lower end of the housing is provided with an opening. An air inlet is formed between the edge of the opening and each filter cartridge, and the
15 air inlet communicates with the roller brush apparatus and the edge brush apparatus.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a schematic diagram of a structure of a front view of a floor cleaning device according to Embodiment 1;

FIG. 2 is a schematic diagram of a structure of a rear view of a floor cleaning device
20 according to Embodiment 1;

FIG. 3 is a schematic diagram of a structure of a filter cartridge apparatus according to Embodiment 1;

FIG. 4 is a full-sectional view of a filter cartridge apparatus according to Embodiment 1;

FIG. 5 is a sectional view of a floor cleaning device according to Embodiment 1;

25 FIG. 6 is a diagram of an enlarged part of a position A shown in FIG. 4;

FIG. 7 is a schematic diagram of a structure of a filter cartridge apparatus according to Embodiment 2;

FIG. 8 is a schematic exploded diagram of a filter cartridge apparatus according to Embodiment 2;

FIG. 9 is a side view of a filter cartridge apparatus according to Embodiment 2;

FIG. 10 is a sectional view of a B–B direction shown in FIG. 9;

FIG. 11 is a diagram of an enlarged part of a position B shown in FIG. 10; and

FIG. 12 is a schematic diagram of a structure of a floor cleaning device according to

5 Embodiment 2.

In FIG. 1 to FIG. 12:

100. Blower mechanism;

10. Fan bracket;

20. Centrifugal fan; 21. Large end; 22. Small end; 23. Stepped surface; 24. Fan mounting

10 plate;

30. Air intake cover; 31. First air intake hole;

40. Air duct; 41. Air ventilation hole; 411. Large hole end; 412. Small hole end; 413. First
chamfer. 42. Flange part; 43. Air guide part;

50. Axial clearance;

15 60. Radial clearance;

2. Filter cartridge apparatus; 200. Filter cartridge mechanism; 201. Housing; 2011. Opening;
2012. Air inlet; 202. Substrate; 203. Filter cartridge; 204. Air intake cavity; 205. Air intake duct;
206. Mounting cylinder; 207. Second air intake hole; 208. Air discharge duct;

300. Dust vibration mechanism; 301. Motor; 302. Dust vibration blade component;

20 400. Frame; 500. Edge brush apparatus; 600. Roller brush apparatus; 601. Rolling brush
cavity; 602. Central rolling brush; 603. Baffle plate; 700. Trash bin; and

800. Dumping apparatus; 801. Dumping drive mechanism; 802. Dumping connecting rod.

DESCRIPTION OF EMBODIMENTS

In descriptions of this application, unless otherwise clearly specified and limited, terms
25 "connect", "connection", and "fix" shall be understood in a broad sense, for example, may be a
fixed connection, may be a removable connection, or may be an integration; may be a mechanical
connection, or may be an electrical connection; or may be a direct connection, may be an indirect
connection by using an intermediate medium, or may be an internal communication between two
components or an interaction relationship between two components. A person of ordinary skill in

the art may understand specific meanings of the terms in this application based on specific circumstances.

In this application, unless otherwise specified and limited, that a first feature is "above" or "below" a second feature may include direct contact between the first feature and the second feature, or may include contact by using another feature between the first feature and the second feature, but not direct contact between the first feature and the second feature. In addition, that the first feature is "over", "above" and "on" the second feature includes: the first feature is over or above the second feature, or only indicates that the first feature has a higher level than the second feature. In addition, that the first feature is "under", "below" and "beneath" the second feature includes: the first feature is below or underneath the second feature, or only indicates that the first feature has a lower level than the second feature.

Embodiment 1

This embodiment provides a floor cleaning device, as shown in FIG. 1 to FIG. 6, including a frame 400, an edge brush apparatus 500, a roller brush apparatus 600, a trash bin 700, and a filter cartridge apparatus 2. The edge brush apparatus 500 is mounted at the bottom of the front part of the frame 400, and the roller brush apparatus 600 is mounted at the bottom of the center part of the frame 400. The trash bin 700 is mounted at the bottom of the rear part of the frame 400, and the trash bin 700 communicates with the roller brush apparatus 600. The filter cartridge apparatus 2 is mounted above a rear part of the frame 400, and the filter cartridge apparatus 2 includes a filter cartridge mechanism 200 and a blower mechanism 100, where the filter cartridge mechanism 200 includes a housing 201 and at least two filter cartridges 203. The at least two filter cartridges 203 are arranged in parallel vertically perpendicular to the heading direction of the frame 400, and the filter cartridges 203 are disposed in the housing 201, where an upper end of the housing 201 is sealedly connected to the outer periphery wall of the blower mechanism 100. An air discharge duct 208, which communicates with the blower mechanism 100, is formed inside each filter cartridge 203, an air intake duct 205 is formed between the filter cartridge 203 and the housing 201 (a clearance in a diameter direction between the filter cartridge 203 and the housing 201 forms an air intake duct 205), and the lower end of the filter cartridge 203 is sealed. The lower end of the housing 201 is provided with an opening 2011, and an air inlet 2012 is formed between the edge of

the opening 2011 and the filter cartridge 203 and is in communication the roller brush apparatus 600 and the edge brush apparatus 500.

Filter cartridge apparatus 2 can drive trash and dust on a floor into the trash bin 700 in combination with the edge brush apparatus 500 and the roller brush apparatus 600, to automatically
 5 clean the floor. In addition, the filter cartridge mechanism 200 includes at least two filter cartridges 203 vertically disposed side by side, so that a horizontal occupation area of the filter cartridge mechanism 200 can be reduced to arrange more filter cartridges 203, which helps to reduce a horizontal occupation area of the entire device and improve passing performance of the device; and a dust absorption capability per unit horizontal area can be improved. Furthermore, a plurality of
 10 filter cartridges 203 are arranged in an extension way along a forward direction perpendicular to the frame 400, which helps to reduce a distance between a front and rear of the frame 400, thereby helping to reduce a turning radius of the frame 400 and improve a capability of the device to operate in small space. Finally, the filter cartridge 203 is disposed as a cylindrical structure, and is designed to allow air intake from the opening 2011 at the lower end of the housing 201. After
 15 entering the air intake duct 205 between an outer periphery wall of the filter cartridge 203 and the housing 201, dusty air passes through the outer periphery wall of the filter cartridge 203, then reaches the air discharge duct 208 formed at the interior of the filter cartridge 203, and finally is exhausted from the blower mechanism 100 at an upper end of the filter cartridge 203. Compared with a manner of air intake (one-side air intake) from the filter cartridge 203 along a radial side, a
 20 360-degree outer periphery wall of the filter cartridge 203 can be a filtering surface in the foregoing manner, to effectively improve dust absorption efficiency and avoid damage of the dust to the centrifugal fan.

Optionally, rear wheels are disposed on two sides at the bottom of the rear part of the frame 400, where the two rear wheels are located on two sides of the trash bin 700. A front wheel is
 25 disposed at the bottom of the front part of the frame 400, the edge brush apparatus 500 includes two rotary brushes, and the front wheel is located between the two rotary brushes. The front wheel and the rear wheels form a triangular layout structure, to reliably support the frame 400. In addition, the rear wheels are located on both left and right sides of the trash bin 700, to effectively avoid left or right overturning of the device.

In this embodiment, the floor cleaning device further includes a dumping apparatus 800. The dumping apparatus 800 is mounted above the middle part of the frame 400, and the dumping apparatus 800 can drive flipping of the trash bin 700. The dumping apparatus 800 is disposed, so that the trash bin 700 can dump trash automatically.

5 For example, the dumping apparatus 800 includes a dumping drive mechanism 801 and two groups of dumping connecting rods 802. The dumping drive mechanism 801 is connected to the trash bin 700 in a transmission way by using the dumping connecting rods 802, and the dumping drive mechanism 801 is mounted above a middle part of the frame 400. The two groups of dumping connecting rods 802 respectively cross the outer periphery wall of the filter cartridge
10 apparatus 2 from two sides of the forward direction perpendicular to the frame 400. The dumping connecting rods 802 cross an outer side wall of the filter cartridge apparatus 2, so that surplus space on two sides of the filter cartridge apparatus 2 can be fully utilized, and overall layout of the device can be more compact and miniaturized, thereby improving passing performance of the device.

In this embodiment, as shown in FIG. 4, the filter cartridge mechanism 200 further includes a
15 dust vibration mechanism 300. The dust vibration mechanism 300 is mounted inside the filter cartridge 203, and can drive vibration of the filter cartridge 203. Optionally, one dust vibration mechanism 300 is disposed inside each filter cartridge 203. In a non-clean state, the dust vibration mechanism 300 drives vibration of the filter cartridge 203, so that dust on an outer surface of the filter cartridge 203 can fall off, and cleaning of the filter cartridge 203 is implemented to ensure
20 ventilation efficiency of the filter cartridge 203. In addition, the vertically disposed filter cartridge 203 can reduce the probability that dust adheres to the outer surface of the filter cartridge 203 again after falling off, which helps to improve a vibration dust removal effect of the filter cartridge 203.

In this embodiment, the dust vibration mechanism 300 includes a dust vibration blade component 302 and a motor 301. The dust vibration blade component 302 presses against an inner
25 wall of the outer periphery wall of the filter cartridge 203, and the motor 301 can drive rotation of the dust vibration blade component 302. The dust vibration blade component 302 squeezes the filter cartridge 203, so that vibration of the filter cartridge 203 can be effectively implemented, and dust on the outer surface of the filter cartridge 203 can fall off. Optionally, an output shaft of the motor 301 is vertically disposed and is coaxial with an axis of the filter cartridge 203. Based on this

design, the dust vibration blade component 302 can always keep in contact with the inner wall of the filter cartridge 203 during rotation, and has a same pressing force, to avoid local damage caused by the dust vibration blade component 302 to the filter cartridge 203.

In this embodiment, the roller brush apparatus 600 includes a rolling brush cavity 601, a central rolling brush 602, and a baffle plate 603. An upper end of the rolling brush cavity 601 communicates with the filter cartridge apparatus 2, a rolling brush opening facing the floor is disposed at a lower end of the rolling brush cavity 601, and the central rolling brush 602 is mounted in the rolling brush opening. The outer periphery wall of the central rolling brush 602 is in contact with the floor, so that dust on the floor can be raised. The baffle plate 603 is mounted on the rolling brush opening, and horizontally surrounds the central rolling brush 602. The baffle plate 603 is disposed, so that negative pressure at a location of the central rolling brush 602 can be increased, and dust raised by the central rolling brush 602 can be enclosed in the outer periphery wall of the central rolling brush 602, and therefore the filter cartridge apparatus 2 can more efficiently absorb the dust. Optionally, the central rolling brush 602 has a horizontal axis. The baffle plate 603 is a rubber barrier strip, and the baffle plate 603 is in contact with the floor.

Optionally, a sealing strip is disposed at the lower end of the housing 201, and the housing 201 is sealedly connected to the frame 400 by using the sealing strip. The sealing strip is disposed, so that reliable sealing between the housing 201 and the frame 400 can be implemented, thereby ensuring reliable negative pressure formed between the housing 201 and the frame 400.

Optionally, as shown in FIG. 3 and FIG. 4, there is one housing 201, and two filter cartridges 203 are mounted in the housing 201. The blower mechanism 100 includes two centrifugal fans 20 and one fan mounting plate 24. The fan mounting plate 24 is sealedly connected to the upper end of the housing 201, an upper end of the filter cartridge 203 is sealedly connected to the fan mounting plate 24, and an air exhaust vent is disposed at a location that corresponds to the filter cartridge 203 and that is on the fan mounting plate 24. The centrifugal fans 20 are mounted on the fan mounting plate 24 and cover the air exhaust vent. The two filter cartridges 203 are mounted in a same housing 201, so that a structure and mounting process of the device can be simplified. One centrifugal fan 20 is disposed on the upper end of each filter cartridge 203, so that negative pressure can be more effectively formed at the interior of the filter cartridge 203, thereby helping to

improve cleaning efficiency.

In this embodiment, a box opening is disposed at an upper end of the trash bin 700, where the box opening is located below the filter cartridge mechanism 200 and faces the filter cartridge mechanism 200. A size of the box opening is greater than a size of the opening of the housing 201, and a projection of the opening on a horizontal plane is located in a projection of the box opening on the horizontal plane. Based on the foregoing design, the trash bin 700 can more reliably load dust falling from the filter cartridge apparatus 2, to prevent dust from falling to the floor again by using the roller brush apparatus 600.

Optionally, the blower mechanism 100 further includes a fan bracket 10 and an air intake cover component. The centrifugal fan 20 is located in the fan bracket 10, and an axial upper part of the centrifugal fan 20 is mounted on the fan bracket 10. The air intake cover component includes an air intake cover 30 and an air duct 40. The fan bracket 10 is mounted above the air intake cover 30, where the air intake cover 30 is mounted on the fan mounting plate 24. An air intake cavity 204 is formed between the air intake cover 30 and the fan mounting plate 24, and an interior of the air filter cartridge 203 communicates with the air intake cavity 204. A first air intake hole is disposed on the air intake cover 30, and the air duct 40 extends into the air intake cavity 204 and communicates with the first air intake hole. An axial lower part of the centrifugal fan 20 extends into the air duct 40, and an axial clearance 50 communicating with the outside is formed between the air duct 40 and an outer periphery wall of the centrifugal fan 20. In this way, the centrifugal fan 20 communicates with the interior of the air filter cartridge 203 by using the air intake cavity 204, and also communicates with the outside by using the axial clearance 50. The blower mechanism 100 is mounted on a side of the filter cartridge mechanism 200. The air duct 40 is disposed on an air intake side of the centrifugal fan 20, and the axial clearance 50 is disposed between the centrifugal fan 20 and the air duct 40, so that an emergency air channel can be formed between the centrifugal fan 20 and the air duct 40. When the filter cartridge 203 is blocked, that is, when an inner cavity of the filter cartridge 203 cannot absorb air from the outer periphery wall of the filter cartridge 203, the air intake cavity 204 cannot correspondingly absorb air from the inner cavity of the filter cartridge 203. In this case, the centrifugal fan 20 absorbs air from the outside by using the axial clearance 50, to prevent the centrifugal fan 20 from being burned out due to excessively large

negative pressure of the air intake cavity 204 that is caused by continuously absorbing air from the air intake cavity 204. Therefore, an overload protection effect of the centrifugal fan 20 can be achieved, and a service life of the centrifugal fan 20 can be effectively prolonged.

Optionally, the outer periphery wall of the centrifugal fan 20 is in a step shape axially, and the centrifugal fan 20 includes an upper large end 21 and a lower small end 22. There is a stepped surface 23 between the large end 21 and the small end 22, and a radial clearance 60 is formed between the stepped surface 23 and an upper surface of the air duct 40 or an upper surface of the air intake cover 30, where the radial clearance 60 communicates with the axial clearance 50. A bent emergency air channel is formed between the radial clearance 60 and the axial clearance 50, so that the emergency air channel has specific flow resistance based on a premise that an overload protection effect of the centrifugal fan 20 is ensured, thereby more reliably ensuring that the blower mechanism 100 can form negative pressure in an inner cavity of the filter cartridge mechanism 200 to achieve a dust absorption effect of the filter cartridge mechanism 200.

For example, the air duct 40 is in a step shape, and includes a flange part 42 and an air guide part 43. The flange part 42 of the air duct 40 presses against an upper surface or a lower surface of the air intake cover 30, and the air duct 40 is fixedly connected to the air intake cover 30 by using the flange part 42. The air guide part 43 extends into the air intake cavity 204 below the air intake cover 30. If the flange part 42 of the air duct 40 presses against an upper surface of the air intake cover 30, an upper surface of the flange part 42 is the upper surface of the air duct 40, and a radial clearance 60 is formed between the stepped surface 23 of the centrifugal fan 20 and the upper surface of the air duct 40; or if the flange part 42 of the air duct 40 presses against a lower surface of the air intake cover 30, a radial clearance 60 is formed between the stepped surface 23 of the centrifugal fan 20 and the upper surface of the air intake cover 30. The separately formed air duct 40 and air intake cover 30 can simplify a part structure, which helps to simplify a forming mold of a part and reduce a manufacturing difficulty. In another embodiment, there may alternatively be the following structure: The air duct 40 and the air intake cover 30 are integrally formed. In this case, a radial clearance 60 is formed between the stepped surface 23 of the centrifugal fan 20 and an upper surface of the integrally formed air intake cover. The integrally formed air duct 40 and air intake cover 30 can simplify an assembly process and improve assembly efficiency.

Embodiment 2

According to a first aspect, as shown in FIG. 7 to FIG. 11, an embodiment provides a blower mechanism 100, including a fan bracket 10, a centrifugal fan 20, and an air intake cover component. The centrifugal fan 20 is located in the fan bracket 10, and an axial upper part of the centrifugal fan 20 is mounted on the fan bracket 10. The air intake cover component includes an air intake cover 30 and an air duct 40. The fan bracket 10 is mounted above the air intake cover 30, a first air intake hole 31 is disposed on the air intake cover 30, and the air duct 40 communicates with the first air intake hole 31 and extends below the air intake cover 30. An axial lower part of the centrifugal fan 20 extends into the air duct 40, and an axial clearance 50 communicating with the outside is formed between the air duct 40 and an outer periphery wall of the centrifugal fan 20. For example, the blower mechanism 100 is mounted on a side of the filter cartridge mechanism 200. The air duct 40 is disposed on an air intake side of the centrifugal fan 20, and the axial clearance 50 is disposed between the centrifugal fan 20 and the air duct 40, so that an emergency air channel can be formed between the centrifugal fan 20 and the air duct 40. When the filter cartridge mechanism 200 is blocked, the first air intake hole 31 can communicate with outer air by using the emergency air channel, to prevent the centrifugal fan 20 from being burned out due to excessively large negative pressure of the first air intake hole 31. Therefore, an overload protection effect can be achieved, and a service life of the centrifugal fan 20 can be effectively prolonged.

Optionally, as shown in FIG. 8 and FIG. 11, an outer periphery wall of the centrifugal fan 20 is in a step shape axially, and the centrifugal fan 20 includes an upper large end 21 and a lower small end 22. A stepped surface 23 is provided between the large end 21 and the small end 22, and a radial clearance 60 communicating with the outside is formed between the stepped surface 23 and an upper surface of the air intake cover 30 or an upper surface of the air duct 40, where the radial clearance 60 communicates with the axial clearance 50. For example, a bent emergency air channel is formed between the radial clearance 60 and the axial clearance 50, so that the emergency air channel has specific flow resistance based on a premise that an overload protection effect of the centrifugal fan 20 is ensured, thereby more reliably ensuring that the blower mechanism 100 can form negative pressure in an inner cavity of the filter cartridge mechanism 200 to achieve a dust absorption effect of the filter cartridge mechanism 200.

Optionally, as shown in FIG. 11, an air ventilation hole 41 is disposed in a center of the air duct 40, where the air ventilation hole 41 is a stepped hole. A large hole end 411 of the air ventilation hole 41 is sleeved on the outer periphery wall of the small end 22 of the centrifugal fan 20, and a depth of the large hole end 411 is less than a height of the small end 22. A diameter of the large hole end 411 is greater than an outer diameter of the small end 22, and a diameter of the small hole end 412 of the air ventilation hole 41 is less than the outer diameter of the small end 22. For example, step-shaped air ventilation hole 41 forms a structure similar to a bell mouth, so that it is easier for air to enter the air ventilation hole 41 from the outside than to be exhausted to the outside from the air ventilation hole 41, which helps to reliably implement overload protection of the centrifugal fan. Optionally, a first chamfer 413 is disposed on a side of the large hole end 411 away from the small hole end 412, or a second chamfer is disposed on a side of the small hole end 412 near the large hole end 411; alternatively, a first chamfer 413 is disposed on a side of the large hole end 411 away from the small hole end 412, and a second chamfer is disposed on a side of the small hole end 412 near the large hole end 411. At least one of the first chamfer 413 and the second chamfer is disposed, which helps to reduce noise in an air flow process.

In this embodiment, as shown in FIG. 11, the air duct 40 is in a step shape, and includes a flange part 42 and an air guide part 43. The flange part 42 of the air duct 40 presses against an upper surface or a lower surface of the air intake cover 30, and the air duct 40 is fixedly connected to the air intake cover 30 by using the flange part 42. The air guide part 43 extends below the air intake cover 30. If the flange part 42 of the air duct 40 presses against an upper surface of the air intake cover 30, an upper surface of the flange part 42 is the upper surface of the air duct 40, and a radial clearance 60 is formed between the stepped surface 23 of the centrifugal fan 20 and the upper surface of the air duct 40; or if the flange part 42 of the air duct 40 presses against a lower surface of the air intake cover 30, a radial clearance 60 is formed between the stepped surface 23 of the centrifugal fan 20 and the upper surface of the air intake cover 30. The separately formed air duct 40 and air intake cover 30 can simplify a part structure, which helps to simplify a forming mold of a part and reduce a manufacturing difficulty. In another embodiment, there may alternatively be the following structure: The air duct 40 and the air intake cover 30 are integrally formed. In this case, a radial clearance 60 is formed between the stepped surface 23 of the

centrifugal fan 20 and the upper surface of the air intake cover 30, and the integrally formed air duct 40 and air intake cover 30 can simplify an assembly process and improve assembly efficiency.

According to a second aspect, as shown in FIG. 7 to FIG. 11, a filter cartridge apparatus is provided, including a filter cartridge mechanism 200 and the blower mechanism 100. The blower mechanism 100 is mounted above an axial direction of the filter cartridge mechanism 200, and communicates with the filter cartridge mechanism 200. The filter cartridge mechanism 200 is disposed on an air intake side of the blower mechanism 100, so that air can be effectively filtered, and impurities such as dust can be prevented from reaching the blower mechanism 100, thereby effectively prolonging a service life of the blower mechanism 100.

Optionally, as shown in FIG. 8, FIG. 10, and FIG. 11, the filter cartridge mechanism 200 includes a housing 201, a substrate 202, and a filter cartridge 203. The housing 201 is in a cylindrical shape with openings at both the upper end and the lower end, and the substrate 202 is sealedly connected to the upper end of the housing 201. The air intake cover 30 is located above the substrate 202, the air intake cover 30 is sealedly connected to the substrate 202, and an air intake cavity 204 is formed between the air intake cover 30 and the substrate 202. The filter cartridge 203 is located in the housing 201, and the filter cartridge 203 is in a cylindrical shape. An upper end of the filter cartridge 203 is sealedly connected to the substrate 202, and the lower end of the filter cartridge 203 is sealed, and an interior of the filter cartridge 203 communicates with the air intake cavity 204. A hermetical air intake duct 205 is formed between the filter cartridge 203 and the housing 201, and an air inlet is formed between an opening edge at the lower end of the housing 201 and the filter cartridge 203. For example, the filter cartridge 203 is disposed as a cylindrical structure, and is designed to allow air intake from the opening at the lower end of the housing 201. After entering the air intake duct 205 between an outer periphery wall of the filter cartridge 203 and the housing 201, dusty air passes through the outer periphery wall of the filter cartridge 203, then reaches an inner cavity of the filter cartridge 203, and finally is exhausted from the blower mechanism 100 after passing through the air intake cavity 204 at the upper end of the filter cartridge 203. Compared with a manner of air intake (one-side air intake) from the filter cartridge 203 on a radial side, a 360-degree outer periphery wall of the filter cartridge 203 can be a filtering surface in the foregoing manner, to effectively improve dust absorption efficiency and

avoid damage of the dust to the centrifugal fan 20.

For example, a mounting cylinder 206 protruding from the interior of the filter cartridge 203 is disposed on the substrate 202, and a second air intake hole 207 communicating with the air intake cavity 204 and the interior of the filter cartridge 203 is disposed on a side of the mounting cylinder 206. The filter cartridge apparatus further includes a dust vibration mechanism 300, where the dust vibration mechanism 300 includes a motor 301 and a dust vibration blade component 302. The motor 301 is located in the mounting cylinder 206, a first end of the dust vibration blade component 302 is connected to the motor 301, and a second end protrudes from the mounting cylinder 206 and is in contact with an inner wall of the filter cartridge 203. For example, in a non-clean state, the dust vibration mechanism 300 drives vibration of the filter cartridge 203, so that dust on an outer surface of the filter cartridge 203 can fall off, thereby implementing cleaning of the filter cartridge 203 to ensure ventilation efficiency of the filter cartridge 203. In addition, the vertically disposed filter cartridge 203 can reduce the probability that dust adheres to the outer surface of the filter cartridge 203 again after falling off, which helps to improve a vibration dust removal effect of the filter cartridge 203.

Optionally, the filter cartridge 203 is in a truncated conical shape, and a tilt angle of a side wall of the filter cartridge 203 is 2.2° to 4.3° . In this embodiment, the tilt angle may be 3.2° . The filter cartridge 203 disposed at a specific angle can reduce the probability that the dust adheres to the outer surface of the filter cartridge 203 again after falling off, which helps to improve a vibration dust removal effect of the filter cartridge 203.

According to a third aspect, as shown in FIG. 12, a floor cleaning device is provided, including a frame 400, an edge brush apparatus 500, a roller brush apparatus 600, a trash bin 700, and the filter cartridge apparatus. The edge brush apparatus 500 is mounted at the bottom of the front part of the frame 400, and the roller brush apparatus 600 is mounted at the bottom of the center part of the frame 400. The trash bin 700 is mounted at the bottom of the rear part of the frame 400 and is in communication with the roller brush apparatus 600 and the edge brush apparatus 500. The filter cartridge apparatus is mounted above a rear part of the frame 400, communicates with the trash bin 700, and is configured to absorb dust raised by the roller brush apparatus 600 and the edge brush apparatus 500. The foregoing design can implement automatic

dust absorption, and can prolong a service life of the filter cartridge apparatus, thereby improving overall reliability of the device and prolonging a service life of the device.

Optionally, the filter cartridge mechanism 200 includes a housing 201 and at least two filter cartridges 203. The at least two filter cartridges 203 are arranged in parallel vertically perpendicular to the heading direction of the frame 400, and the at least two filter cartridges 203 are disposed in the housing 201, where an upper end of the housing 201 is sealedly connected to the outer periphery wall of the blower mechanism 100. An air intake cavity 204 communicating with an interior of the filter cartridge 203 is formed between the air intake cover 30 and the filter cartridge 203, an air intake duct 205 is formed between the outer periphery wall of the filter cartridge 203 and the housing 201, and the lower end of the filter cartridge 203 is sealed. The lower end of the housing 201 is provided with an opening 2011, and an air inlet 2012 is formed between the edge of the opening 2011 and the filter cartridge 203 and is in communication with the roller brush apparatus 600 and the edge brush apparatus 500. For example, the filter cartridge mechanism 200 includes at least two filter cartridges 203 vertically disposed side by side, so that a horizontal occupation area of the filter cartridge mechanism 200 can be reduced to arrange more filter cartridges 203, which helps to reduce a horizontal occupation area of the entire device and improve passing performance of the device; and a dust absorption capability per unit horizontal area can be improved. Furthermore, a plurality of filter cartridges 203 are arranged in an extension way along a forward direction perpendicular to the frame 400, which helps to reduce a distance between a front and rear of the frame 400, thereby helping to reduce a turning radius of the frame 400 and improve a capability of the device to operate in small space.

Optionally, a sealing strip is disposed at the lower end of the housing 201, and the housing 201 is sealedly connected to the frame 400 by using the sealing strip. The sealing strip is disposed, so that reliable sealing between the housing 201 and the frame 400 can be implemented, thereby ensuring reliable negative pressure formed between the housing 201 and the frame 400.

In the descriptions of this specification, it should be understood that the terms "above", "below", "left", "right", and another location or positional relationship are based on a location or positional relationship shown in the accompanying drawings, and are merely for convenient description and a simplified operation, but are not intended to indicate or imply that the described

apparatuses or elements must have specific locations, be constructed and operated at the specific locations, and therefore cannot be understood as a limitation to the present invention. In addition, the terms "first" and "second" are merely intended to distinguish between descriptions without specific meanings.

5 In the descriptions of this specification, descriptions of reference terms such as "an embodiment", an "example" mean that a specific feature, structure, material, or feature described with reference to the embodiment or the example is included in at least one embodiment or example of the present invention. In this specification, schematic descriptions of the foregoing terms do not necessarily indicate a same embodiment or example.

CLAIMS

1. A floor cleaning device, comprising:

a frame (400);

an edge brush apparatus (500), mounted at the bottom of the front part of the frame (400);

5 a roller brush apparatus (600), mounted at the bottom of the center part of the frame (400);

a trash bin (700), mounted at the bottom of the rear part of the frame (400) and in communication with the roller brush apparatus (600); and

a filter cartridge apparatus (2), mounted at the top of the rear part of the frame (400), wherein the filter cartridge apparatus (2) comprises a filter cartridge mechanism (200) and a blower
10 mechanism (100), the filter cartridge mechanism (200) comprises a housing (201) and at least two filter cartridges (203), wherein the at least two filter cartridges (203) are arranged in parallel vertically perpendicular to the heading direction of the frame (400), the at least two filter cartridges (203) are disposed in the housing (201), an upper end of the housing (201) is sealedly connected to the outer periphery wall of the blower mechanism (100); an air discharge duct (208), which
15 communicates with the blower mechanism (100), is formed inside each filter cartridge (203), an air intake duct (205) is formed between an outer periphery wall of each filter cartridge (203) and the housing (201), and the lower ends of the filter cartridges (203) are sealed; and the lower end of the housing (201) is provided with an opening (2011), an air inlet (2012) is formed between the edge of the opening (2011) and the filter cartridge (203) and is in communication with the roller brush
20 apparatus (600) and the edge brush apparatus (500).

2. The floor cleaning device according to claim 1, further comprising a dumping apparatus (800), wherein the dumping apparatus (800) is mounted above the middle part of the frame (400), and the dumping apparatus (800) can drive flipping of the trash bin (700).

3. The floor cleaning device according to claim 2, wherein the dumping apparatus (800)
25 comprises a dumping drive mechanism (801) and two groups of dumping connecting rods (802), the dumping drive mechanism (801) is connected to the trash bin (700) in a transmission way by using the two groups of dumping connecting rods (802), the dumping drive mechanism (801) is mounted above the middle part of the frame (400), and the two groups of dumping connecting rods

(802) respectively cross the outer periphery wall of the filter cartridge apparatus (2) from two sides of the forward direction perpendicular to the frame 400.

4. The floor cleaning device according to claim 1, wherein the filter cartridge mechanism (200) further comprises:

5 a dust vibration mechanism (300), mounted inside each filter cartridge (203), and configured to drive vibration of the filter cartridge (203).

5. The floor cleaning device according to claim 4, wherein the dust vibration mechanism (300) comprises:

10 a dust vibration blade component (302), wherein the dust vibration blade component (302) presses against an inner wall of the filter cartridge (203); and

a motor (301), wherein the motor can drive rotation of the dust vibration blade component (302).

6. The floor cleaning device according to claim 1, wherein the roller brush apparatus (600) comprises:

15 a rolling brush cavity (601), wherein an upper end communicates with the filter cartridge apparatus (2), and a rolling brush opening facing a floor is disposed at a lower end;

a central rolling brush (602), mounted in the rolling brush opening, wherein the outer periphery wall of the central rolling brush (602) is in contact with the floor, and dust of the floor can be raised; and

20 a baffle plate (603), mounted on the rolling brush opening, and horizontally surrounding the central rolling brush (602).

7. The floor cleaning device according to claim 1, wherein a sealing strip is disposed at the lower end of the housing (201), and the housing (201) is sealedly connected to the frame (400) by using the sealing strip.

25 8. The floor cleaning device according to claim 1, wherein there is one housing (201), and two filter cartridges (203) are mounted in the housing (201).

9. The floor cleaning device according to claim 8, wherein the blower mechanism (100) comprises two centrifugal fans (20) and one fan mounting plate (24), the fan mounting plate (24) is sealedly connected to the upper end of the housing (201), an upper end of each filter cartridge (203)

is sealedly connected to the fan mounting plate (24), and an air exhaust vent is disposed in a position on the fan mounting plate (24) that is corresponding to each filter cartridge (203), and the two centrifugal fans (20) are separately mounted on the fan mounting plate (24) and cover the air exhaust vent.

5 10. The floor cleaning device according to any one of claims 1 to 9, wherein a box opening is disposed at an upper end of the trash bin (700), and the box opening is located below the filter cartridge mechanism (200) and faces the filter cartridge mechanism (200).

11. The floor cleaning device according to claim 1, wherein the blower mechanism (100) comprises:

10 a fan bracket (10);

a centrifugal fan (20), wherein the centrifugal fan (20) is located in the fan bracket (10), and an axial upper part of the centrifugal fan (20) is mounted on the fan bracket (10); and

an air intake cover component, comprising an air intake cover (30) and an air duct (40), wherein the fan bracket (10) is mounted above the air intake cover (30), a first air intake hole (31) is disposed on the air intake cover (30), the air duct (40) communicates with the first air intake hole (31) and extends below the air intake cover (30), an axial lower part of the centrifugal fan (20) extends into the air duct (40), and an axial clearance (50) communicating with the outside is formed between the air duct (40) and an outer periphery wall of the centrifugal fan (20).

12. The floor cleaning device according to claim 11, wherein the outer periphery wall of the centrifugal fan (20) is in a step shape axially, the centrifugal fan (20) comprises an upper large end (21) and a lower small end (22), there is a stepped surface (23) between the large end (21) and the small end (22), wherein the stepped surface (23) is configured to form a radial clearance (60) communicating with the outside between an upper surface of the air intake cover (30) or an upper surface of the air duct (40) and the stepped surface (23), and the radial clearance (60) communicates with the axial clearance (50).

13. The floor cleaning device according to claim 11, wherein the air duct (40) and the air intake cover (30) are integrally formed.

14. The floor cleaning device according to claim 11, wherein the air duct (40) is in a step shape, the air duct (40) comprises a flange part (42) and an air guide part (43); the flange part (42)

of the air duct (40) presses against an upper surface or a lower surface of the air intake cover (30), the air duct (40) is fixedly connected to the air intake cover (30) by using the flange part (42), and the air guide part (43) extends below the air intake cover (30).

15 15. The floor cleaning device according to any one of claims 11 to 14, wherein the blower mechanism (100) is mounted above the filter cartridge mechanism (200) and communicates with the filter cartridge mechanism (200).

16. The floor cleaning device according to claim 15, wherein the housing (201) is in a cylindrical shape with openings at both the upper end and the lower end, the filter cartridge mechanism (200) further comprises a substrate (202), the substrate (202) is sealedly connected to
10 the upper end of the housing (201), the air intake cover (30) is located above the substrate (202), the air intake cover (30) is sealedly connected to the substrate (202), and an air intake cavity (204) is formed between the air intake cover (30) and the substrate (202); and

the filter cartridge (203) is in a cylindrical shape, and an upper end of the filter cartridge (203) is sealedly connected to the substrate (202).

15 17. The floor cleaning device according to claim 16, wherein an mounting cylinder (206) protruding from the interior of the filter cartridge (203) is disposed on the substrate (202), a second air intake hole (207) communicating with the air intake cavity (204) and the interior of the filter cartridge (203) is disposed on a side of the mounting cylinder (206), the filter cartridge apparatus (2) further comprises a dust vibration mechanism (300), the dust vibration mechanism (300) comprises
20 a motor (301) and a dust vibration blade component (302), the motor (301) is located in the mounting cylinder (206), a first end of the dust vibration blade component (302) is connected to the motor (301), and a second end of the dust vibration blade component (302) protrudes from the mounting cylinder (206) and is in contact with an inner wall of the filter cartridge (203).

18. The floor cleaning device according to claim 16, wherein the filter cartridge (203) is in a
25 truncated conical shape, and a tilt angle of a side wall of the filter cartridge (203) is 2.2° to 4.3°.